

1913.

QUEENSLAND.

ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

(AS REQUIRED BY "THE SUGAR EXPERIMENT STATIONS ACT OF 1900.")

Presented to both Houses of Parliament by Command.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

SIR,—I have the honour to submit the thirteenth Annual Report of the General Superintendent of Sugar Experiment Stations.

ERNEST G. E. SCRIVEN,

Director.

Brisbane, 25th October, 1913.

The Report this year comprises :—

1. Introduction.
2. Progress of the Industry and Estimates of 1913 Crop.
3. Work of the General Superintendent and Field Assistants.
4. Introduction of new Papuan or New Guinea Varieties.
5. Work of the Mackay Sugar Experiment Station.
6. Results of the Sugar Experiment Plots in different parts of the State.
7. Division of Entomology.
8. New Station at Bundaberg.
9. Seedling Experiments at Kamerunga, and planting of old varieties on elevated tableland, near Atherton.
10. Economics and Mill Work.

1.—INTRODUCTION.

Since the publication of the last Annual Report the Sugar Industry has passed through a momentous period. During that time more history has been made than perhaps at any other time during its existence in Queensland. In the first place, the Federal Royal Commission on the Sugar Industry completed its labours of fifteen months and handed in its report on the 2nd December, 1912. The findings were not unanimous, four of the members presenting a majority report, while a dissentient memorandum was furnished by Mr. T. W. Crawford, one of the members, and who is also the President of the Australian Sugar Producers' Association. The conclusions of the Commission are now well known and there is no need to repeat them here. The vast amount of evidence taken from 447 persons, which runs into hundreds of foolscap pages and forms a volume of closely printed matter over four inches thick, will probably never be read by one person in a thousand. But the Commission has served a highly useful purpose. It has to a great extent dispelled the clouds of ignorance and prejudice which have too long obscured this important industry. It has shown emphatically that the Queensland Sugar Industry is one

of national importance, the maintenance of which vitally affects every citizen of the Commonwealth. By no other means at present visible can our vast Northern littoral be peopled and defended, and for this reason alone, apart from its enormous economic importance, it deserves the utmost encouragement and support that our Federal and State Legislatures can give it. The Commission have put this view in the strongest terms when they say:—

“The problem of the Sugar Industry to-day is not, save in subordinate respects, a problem of industry, of wealth, or of production; it is primarily and essentially a problem of settlement and defence. No nation can afford to regard lightly the development of its industries, the progress of its wealth, or the economic efficiency of its productive machinery. But, important as these things undoubtedly are, they rank, as regards the Sugar Industry, on an inferior plane. The Commonwealth to-day is brought face to face with one of the gravest problems that has ever taxed the ingenuity of statesmanship—that of the settlement of tropical and semi-tropical areas by a white population living under standard conditions of life. And intimately associated with this problem is the question of national defence . . . it follows that the supreme justification for the protection of the Sugar Industry is the part that industry has contributed . . . to the problems of settlement and defence of the Northern portion of the Australian Continent.”

In the second place, what is known as Excise and Bounty, which have been in one shape or other since 1902, have been abolished. The abolition was proclaimed on the 26th July last, and followed the passing of three measures by the Queensland State Parliament, known as “*The Sugar Growers Act of 1913*,” “*The Sugar Growers’ Employees Act of 1913*,” and “*The Sugar Cultivation Act of 1913*.” The so-called “bounty” was in reality a rebate, and out of £4 per ton of sugar levied as excise the Federal Government returned only £3 to the grower, the other £1 being retained by the Federal Treasury.

The three Acts above referred to were the outcome of an agreement made by the Premier of Queensland with the Federal Government of the day, and provided—

(a) For the payment by the mills direct to the growers of what was really the old rate of bounty or rebate in the four different districts, plus the sum of 2s. 2d. The latter was assumed to be the sum returnable out of the £1 hitherto retained by the Federal Government, and was not fixed upon a sliding scale for the different sugar districts, as was the old bounty. The sums to be paid to the growers by the mills were therefore—

	<i>s. d.</i>
In No. 1 District	9 8
In No. 2 District	9 2
In No. 3 District	8 8
In No. 4 District	8 2

the old rates of bounty being 7s. 6d., 7s., 6s. 6d., and 6s. respectively.

(b) For making temporary provision in respect to rates of wages and conditions of employment in the Sugar Industry until such matters have been dealt with by awards under “*The Industrial Peace Act of 1912*.” This meant that the rates of wages and hours of labour fixed by what are commonly known as the “Tudor Regulations,” issued in August, 1912, were to be maintained until the rates and hours were settled by Industrial Boards. Three of these boards have been appointed—one for sugar areas north of latitude 20 deg., one for sugar areas between latitudes 20 deg. and 23 deg., and one for sugar areas between latitude 23 deg. and the New South Wales border. At the time of writing this report only the latter board had met, and the minimum rate fixed by them was 10½d. per hour for 55 hours per week.

(c) For the prohibition of certain forms of labour in the production of sugar—*i.e.*, the maintenance of the White Australia policy.

The abolition of the Excise and Bounty and the payment of increased wages to sugar workers are the only two of the many recommendations of the Commission that have so far been carried into effect. The former, while increasing the price to the grower, has also relieved him of considerable work in making returns and filling up statutory forms, and has transferred the control of the Sugar Industry from Federal to State authorities.

The equalisation of the Excise and Bounty and the monetary return to growers therefrom, as from the 1st July, 1912, to the date of their abolition, and an increased rate of protection—which were both recommended—are still earnestly hoped for.

2.—PROGRESS OF THE INDUSTRY.

Turning now to the progress of the industry itself during the past twelve months, it is pleasant to have to record that following the dry year of 1912 a generally heavy wet season set in in January, and as the plantings had been considerable prior to August, 1912, a splendid sugar crop was ensured. Unfortunately the heavy precipitation caused an amount of damage by floods in the sugar belt between Cairns and the Herbert River, which will take a considerable time to repair. Even with these losses, which will be referred to later, the amount of cane to be harvested in the North will reach a high tonnage, while the cane crops in the Southern districts this year are particularly heavy, and as the cane is in many districts cutting out above what was expected, the season should be a record one if estimates are realised.

The following are the estimates of the mills of the 1913 crop, which are, of course, approximate only at this time:—

	Tons of Cane.
Mossman District	42,000
Cairns District	152,000
Innisfail District	73,000
Mourilyan District	48,000
Herbert River District	142,000
Lower Burdekin District	188,000
Proserpine District	58,000
Mackay District	470,000
Baffle Creek District	4,000
Bundaberg District	430,000
Isis District	260,000
Maryborough District	30,000
Mount Bauple District	34,110
Nambour District	30,000
Albert, Logan, and Nerang District ...	26,000
Marburg District	7,000
	1,994,110

In the record year of 1910, 1,840,447 tons of cane were harvested.

The plantings for next season (1914) are good, but it must be remembered that, owing to the dry period last year, a fair amount of stand-over cane in the Southern districts came to the mills this season. Further, this year, the long wet season prevented a certain amount of early planting being done. The heavy rains which fell during the first five months of the year were followed by an abnormally dry spell, and at the time of writing rain is badly needed in all the sugar districts, but particularly in the North, where the rainfall is usually heavy and regular, and where the ground does not seem to be able to stand dry spells so well as in the districts where the rainfall is usually more moderate. The young cane is not yet suffering to any great extent, and if rains set in shortly the prospects for next year should be good.

As the result of recent legislation farmers appear more hopeful, and it is trusted that this will have a good effect on cultivation and fertilising, which have been largely at a standstill during the unsettled condition of the industry in the past fifteen months. Some few sales of farms have recently taken place, which is a sign that more reliance is being placed on the future prospects of the industry.

Labour has been good of its kind, and no trouble has been experienced in getting sufficient men to deal with the harvesting of the crop and fill the mills. Fortunately, up to the present, there have been no strikes in the field. Some minor troubles have occurred in one or two of the mills, but were not of a serious nature. A great improvement has taken place in the general sobriety of the men. Little or no drunkenness was seen in the sugar districts this season. This is partly attributable to the improved type of man offering for the work, but it is also due to the more stringent regulations controlling licensed premises under "The Liquor Act of 1912."

During the "marking-time" period that has elapsed since August, 1912, not much progress has been made in the introduction of new farming machinery. One or two motor tractor ploughs are at work in different sugar districts, and are spoken well of by their owners. The introduction of up-to-date field machinery is a matter of great importance now that the cost of hand labour is becoming such a controlling factor, and any method that will cheapen field work must come to the front.

Cane-cutting implements are still in the trial stage, but progress has been made with these, so that the introduction of a machine that will cut and top cane is by no means to be despaired of yet.

By the use of more intense tillage, liming, green manuring, and careful selection of plants, the yield of cane must be increased, and these points are dealt with later on.

3.—WORK OF THE GENERAL SUPERINTENDENT AND FIELD ASSISTANTS.

The policy of moving around amongst the cane farmers and keeping in touch with them has been the keynote of the visits to cane growing districts made by the General Superintendent and his assistants. The Field Assistants are constantly moving from farm to farm, endeavouring to assist cane farmers in every possible way. Farmers requiring advice on soils and their treatment, on mentioning their difficulties to the Field Assistants, at once receive assistance and advice from the Sugar Bureau.

The officers appointed as Field Assistants are Mr. H. G. Burn, for the districts from Proserpine northwards, and Mr. H. T. Harvey, for the districts from Gladstone southwards. In addition to carrying out the instructions of the General Superintendent having reference to the cane experiment plots established in different localities in the State, reporting upon their cultivation by the farmers in charge, and general condition and appearance, they also have received instructions to make the following observations upon each farm visited by them, which are tabulated and sent in to the Sugar Bureau every month:—

NOTES UPON FARMS VISITED.

(a) *Soils*: Classification, type, colour. Are they shallow or deep, forest or scrub, dry or wet? Condition of tilth, nature of subsoil, acidity or alkalinity (test with litmus papers), presence of rocks, gravel, or stones, washaways.

(b) *Crops*: What number of cane crops have been grown, and during how many years? What are the highest and lowest tonnages of cane secured? Does land grow good crops at present time, and, if not, to what does the farmer attribute the reason?

(c) *Lime*: Ascertain if any farmers have used lime, and what the results have been, also note if there are any probable sources of lime in the district.

(d) *Green Manures*: What farmers are using green manures? What crops have been or are being grown, and with what success as to the crop itself, and its after effect on the cane crop?

(e) *Fertilisers*: What (if any) fertilisers are being used? Times of application, in drills with cane or at sides of rows; what quantities are employed? Are machines used for the purpose, if so, what type; or is application by hand? Has application been successful?

(f) *Drainage*: Is any form of drainage used; if so, of what nature?

(g) *Irrigation*: Is irrigation in use? How much applied per acre at each watering? How applied?

(h) *Weather*: Rainfall statistics need not be collected, as these can be obtained in Brisbane. Notes of heavy rains can be made, severe winds causing damage to cane, thunderstorms, frosts, floods, &c.

(i) *Ploughing*: How many ploughings are usually given? Types of ploughs. Are disc or swing ploughs most common? Diameter of disc in general use. Make of disc most favoured. Are any motor ploughs or steam ploughs in use, and, if so, are they successful? Get details as to cost of ploughing per acre where possible. To what depth is it usual to plough? Is ground usually stirred by a subsoiler below the ordinary depth reached by the plough?

(j) *Planting*: Are top plants usually taken? Number of eyes on each plant, width of rows, distance between plants. Do farmers use cane planters? What depth is the furrow in which the cane is planted? Are canes laid on hard bottom, or is some earth left, and, if so, how much? What are the shallowest and the deepest coverings used? How are the plants covered—by hand or implement. How much cane is used per acre? Do farmers change plants to any extent? Average cost of planting?

(k) *Cultivation*: What implements are in general use? Are cultivators generally fitted with digging tynes, or broad sweeps, or hoes? Is the plough used to any extent between the rows? Are disc harrows or other cutting machines in use? Note what damage, if any, is caused to roots of growing cane by these latter implements. What is the common depth to which cultivation is carried? Average cost of cultivation, including that done by hand?

(l) *Harvesting*: What are the current rates paid in each district for harvesting? Is it the general practice to burn cane before cutting? Is much top or cabbage left? Are canes cleaned from trash before going to mill? Are stools cut well below the ground?

(m) *Labour*: State general feeling as to labour in each district.

(n) *Trash*: Is trash usually burned? If not, how is it treated?

(o) *Ratooning*: How is ratooning done? Do any farmers volunteer rations, and if so, what percentage?

(p) *Pests and Diseases*: Note what pests, vermin, or diseases are prevalent in each district, and what is being done to combat same.

(q) *Varieties of Cane*: Note the varieties of cane and behaviour of each in every district.

(r) *Arrowing*: Note time of arrowing of different varieties each year.

This information is necessary in order that a complete survey of the cane farms of Queensland may be made. When completed and indexed it will prove of the highest value, as each cane farm will then be on record with its history. This will facilitate the giving of advice to growers in a marked degree. The acidity or alkalinity of soils has a most important bearing on the question of the application of lime, to which reference is made later on.

In pursuance of these instructions the Field Officers have so far sent in reports upon 206 farms. Upon these, fourteen farmers have used lime, fifty-nine have practised green manuring, and seventy-one have used fertilisers. The percentage of growers using lime, green manure, and fertilisers, is much higher on Northern sugar farms than it is in the South. Eighty-six soils were tested as to their reaction, and of these seventy were found acid, while sixteen were neutral. In the cane soils submitted to the Agricultural Chemist for analysis it is found that acidity is predominant. This section of the work has been delayed during the past three months owing to the services of the Field Officers being required in distributing new varieties from the various experimental plots, and the harvesting and ratooning of the competitive plots with the standard varieties of the different districts. This work is now practically over, and the collection of farm data will be resumed. In addition to the above duties the Field Assistants collect soil samples from farmers desirous of having their fields mechanically and chemically tested and advised upon. These services are rendered free to all cane growers who desire them. Before leaving this part of the subject the writer would like to state that Messrs. Burn and Harvey have carried out instructions in regard to their duties in a satisfactory manner, and with thoroughness and care, and farmers generally speak in appreciative terms of their assistance.

Since the publication of the last Annual Report the General Superintendent has visited every sugar district in Queensland except Gayndah, Gympie, Waterloo, and Miara, to which he has not yet had time to go. The larger districts, such as Cairns, Mackay, and Bundaberg, have been visited more frequently. These visits are made during intervals away from the Bureau Office, to which frequent returns are necessary to deal with accumulation of correspondence and other Bureau matters. As far as time has allowed, farms have been visited, and advice as to the methods of cultivation given on

the spot. District visits also comprise inspection of canefields and probable yields, the noting of cane varieties in use, and the endeavour in many districts to persuade farmers to take up the trial of new ones. When this is successful, as it nearly always is, crates of new kinds of cane varieties are despatched from the Sugar Experiment Station, Mackay. Wherever possible, meetings of cane farmers have been held, and short, plain addresses upon the maintenance of soil fertility by tillage operations, the intelligent use of lime and green manures, methods of planting, cultivation, ratooning, and fertilising have been delivered. These have been followed by conversational discussions, at which a large amount of useful information is elicited. It may be stated that this portion of the work is highly appreciated by the Farmers' Associations, the larger proportion of which take a very keen interest in such matters. It has been found also that good results follow these addresses, and the use of green manures and artificial fertilisers is largely on the increase. In all, thirty-six of these meetings have been held, and they have enabled the writer to come into touch with a large body of practical cane farmers. The linking-up of one sugar district with another by these visits is also undoubtedly beneficial. It is found that a much larger interest is being taken in the sugar experiment work as its methods are brought before the farmer and discussed. There is not the slightest room for doubt that an upward tendency towards improvement has been made in cane cultivation during the past few years, which is directly attributable to the constant advice of the Sugar Bureau in the direction of better methods of cultivation.

In addition to the above the clerical work of the Bureau has largely increased, involving the despatch of upwards of 800 letters during the year. Farmers are being constantly invited to submit their difficulties to the Sugar Bureau, and they are now doing this to a very much greater extent than hitherto, either by writing direct or by putting their questions to the Field Assistants for transmission. No less than 120 applications for advice as to soil treatment, and over 200 letters dealing with these subjects, have been written. Some seventy samples of soil have been analysed during the year for cane farmers by the Agricultural Chemist and the Mackay laboratory. With each of these a letter of advice is also sent. Every possible effort is now being made to assist cane farmers in every way, and it is gratifying to record that the efforts made in this direction are appreciated.

The time of the General Superintendent has also been taken up to some extent with the supervision of the experimental work at Mackay, and the laying-out of new experiments, also the visiting and inspection of the twelve experiment plots with sugar cane in various portions of the State.

A special visit was also made to Babinda in April on behalf of the Bureau of Central Sugar Mills, to inquire into various matters concerning the supply of cane and areas under cultivation, &c.

During the past year the writer has constantly and vigorously recommended the application of lime to canefields. It has been proved over and over again that our cane lands have become acid, due in part to the long-continued growth of cane upon the one soil, and in part to the continued use of acid fertilisers. The chief objection by farmers to the use of lime has been its high cost, but this is now likely to be overcome. One lime company in the North and another in the South have consulted with the General Superintendent, and already the southern company is putting lime on the market at Bundaberg at much more reasonable rates than hitherto. It is hoped that ere long lime may be supplied to growers in cane districts at such a rate as will enable them to make use of it.

It is the intention of the Bureau to issue bulletins from time to time upon matters of interest to cane growers. The first of these was entitled "The Cultivation of Cane upon Old Lands," and was published in May of this year.

SUMMARY OF NOTES ON DISTRICTS VISITED BY THE GENERAL SUPERINTENDENT.

Mossman.—One mill. Cane has cut out below December estimate, which was 55,000 tons, only 42,000 being crushed. A loss of about 5 per cent. was due to a cyclonic storm early in the year, and a good deal of cane was destroyed by rats. Labour up to requirements. Improved methods of cultivation are required, and lime would be of value. Varieties grown are:—

New Guinea 24 (Goru)	}	.. .. .	50 per cent.
New Guinea 24A		.. .. .
New Guinea 24B		.. .. .
New Guinea 15 (Badila)		.. .. .	17 per cent.
D. 1135		.. .. .	20 per cent.
B. 147		.. .. .	10 per cent.
Other varieties		.. .. .	3 per cent.

Cairns.—Two mills. Good-crushing anticipated. Tonnage of cane expected to reach 151,000. Losses by flood took place in January, amounting to some 15,000 tons of cane. Cultivation and farm management generally good. Lime is required on nearly all soils. Labour satisfactory. Varieties grown are approximately:—

New Guinea 15 (Badila)	}	.. .. .	60 per cent.
New Guinea 24 (Goru)		.. .. .
New Guinea 24A		.. .. .	37 per cent.
New Guinea 24B		.. .. .
Other varieties		.. .. .	3 per cent.

Innisfail.—One mill. This district suffered a severe reverse in January last, when a most disastrous flood occurred, sweeping away 40,000 tons of cane. Not only was this large amount of cane lost, but a good deal of what was left had to be cut back, and is at the present time backward in growth. The ratoons for next year will also be adversely affected. In addition to this, many acres of cane land were quite washed away, while numerous horses were drowned, and many buildings and fences destroyed. The crop, notwithstanding these losses, will be a satisfactory one, amounting to some 73,000 tons of cane. Cultivation methods on the whole good. Labour good. Variety grown: New Guinea 15 or Badila.

Mourilyan.—One mill. Cultivation fair. Lime advocated. Tonnage of cane this year satisfactory—viz., some 48,000 tons. A large number of varieties are grown in this district, including D. 1135, B. 208, Malagache, Daniel Dupont, Rappoe, Striped Singapore, Violet, Badila, Goru, etc.

Herbert River.—Two mills. Loss by January flood amounted to 18,000 tons. A good crop is, however, being harvested, amounting to 142,000 tons. The sugar content of the cane is very high, good rich varieties being grown. A special feature of the labour in this district is that it is largely composed of Italians, who are also acquiring cane farms. Varieties grown:—

New Guinea 15 (Badila).
 New Guinea 24 (Goru).
 New Guinea 24A.
 New Guinea 24B.
 B. 208.
 H. Q. 426
 Rappoe.
 Striped Singapore.
 1900 Seedling, and a small percentage of other varieties

Lower Burdekin District.—Two mills. A splendid season is anticipated, the total crop being estimated at 188,000 tons of cane. This district is largely an irrigated one, and the yields of cane are usually higher than in any other part of Queensland. Cultivation good. The varieties grown are:—

New Guinea 15 (Badila)	}	86 per cent.
New Guinea 24				
New Guinea 24A				
New Guinea 24B				
Imperial Rappoe and a few other other varieties		..	14 per cent.	

Proserpine.—One mill. This district is a very scattered one, and the majority of farms are small and often lie at a considerable distance from the mill. The land is mainly low-lying and somewhat wet. In consequence surface drainage is largely resorted to. Cultivation is fair in most cases, but is capable of improvement. The mill expects to crush this year 58,000 tons of cane, so that the season is a good one. Varieties grown are:—

New Guinea 15 (Badila)	..	..	..	..	10 per cent.
New Guinea 24 (Goru)	}	..	..	..	30 per cent.
New Guinea 24A					
New Guinea 24B					
Malagache					
Rappoe	..	..	..	..	10 per cent.
Cheribon and Otamite	..	..	..	..	5 per cent.
Green Cane	..	..	..	..	10 per cent.
Striped Singapore	..	..	..	..	8 per cent.
Other varieties	..	..	..	..	17 per cent.

Mackay.—Ten mills. This is the largest sugar district in Queensland, though it is closely approached by Bundaberg. The season has been a good one, and about 470,000 tons of cane are expected to be crushed. Unfortunately, the varieties grown at Mackay do not compare with those grown in other Northern sugar districts. Too large a proportion of what are known as "red canes"—*i.e.*, Otamite and Cheribon—are grown, consequently more tons of cane are required to make a ton of sugar than should be the case. This is chiefly due to the want of co-operation amongst the mills and competition for cane. Labour is plentiful, and the crop is being harvested with little trouble. Cultivation is fair, and artificial fertilisers are largely used. Lime is greatly needed, but its high price at present is prohibitive. Varieties grown:—

Otamite and Cheribon	..	..	..	..	60 per cent.
Other varieties, including Badila, Goru, 24A, 24B, N.G. 40, 1900 Seedling, Rappoe, &c.	..	..	..	..	40 per cent.

Baffle Creek.—One mill. This is a small sugar district near Rosedale, on the North Coast line, between Bundaberg and Gladstone. The settlers are principally of German extraction. This district was visited by a severe flood in January last, which carried away some 4,000 tons of cane—a heavy loss to the settlers. This left another 4,000 tons of cane to be dealt with by the mill. Varieties grown: Rappoe, Striped Singapore, D. 1135, Cheribon, and Otamite. New varieties have also been introduced from the Sugar Experiment Station, Mackay.

Bundaberg (including Waterloo, Miara, and Gin Gin).—Nine mills. This district includes some fine up-to-date mills, notably Bingera, Fairymead, Millaquin, and Qumaba. A large proportion of cane is grown by the owners of Bingera and Fairymead, and up-to-date methods of deep tillage, liming, green manuring, and fertilising are in use. At these plantations can be seen the methods of cultivation that are recommended by the Sugar Bureau, being carried out with success on a large scale. The Millaquin Company is also doing good work upon its properties. On the smaller farms the use of lime and green manures is not followed to the extent it should be. The varieties grown are:—

D. 1135	..	..	..	..	90 per cent.
Badila, Rappoe, Striped Singapore, and other kinds	..	..	..	..	10 per cent.

Isis District.—Three mills. This is a particularly fine sugar district, probably the most picturesque in Queensland. The season has been an exceptionally fine one, and it is estimated the crops will amount to 260,000 tons of cane. Cultivation is, on the whole, good. Green manuring is used to some extent, particularly on the Hapsburg and Lynwood estates of Messrs. Young Brothers. Lime would benefit most soils, and on some farms lime screenings are being used with good results. Varieties grown:—

Malagache,
 1900 Seedling,
 D. 1135,
 Badila, and a small proportion of other canes.

Maryborough.—One mill. Not much cane is grown in the Maryborough District, and what there is is mostly grown by farmers who go in for other crops or dairying. The mill draws most of its cane

from a distance, farmers from Pialba, Gympie, Gayndah, Degilbo, and other stations along the railway supplying the bulk of the cane. It is expected that the mill will deal with 30,000 tons of cane this year. Varieties grown :—

D. 1135, Rappoe, Striped Singapore, Mavoe (erroneously called Batoe).

Mount Bauple.—One mill. This district is situated away from the North Coast line, and is connected by a 3-ft. 6-in. tramway with Gundiah. The season has been a good one, and 34,000 tons of cane are expected at the rollers. Green manure crops are grown to a limited extent, and some artificial fertilising is done. Varieties grown :—

D. 1135,
Rappoe,
Striped Singapore,
1900 Seedling.

Nambour.—One mill. This is a cane district on the North Coast Line, and, like Proserpine, is very scattered, embracing a large number of suppliers. The lands on the Maroochy River are good in type and capable of growing fine crops. The mill anticipates dealing with some 28,000 tons of cane this year. Very little liming or green manuring is practised. Some farmers are using blood and bone manures with good results. Varieties grown :—

D. 1135,
N.G. 22 or Mahona,
1900 Seedling,
Black Innis, Striped Singapore, Rappoe, M. 33, and a few others

Albert, Logan, and Nerang.—Eight mills. These districts do not grow cane to any large extent and, with the exception of Nerang, the mills are small in size, working from 1,000 to 6,000 tons of cane. The crop is anticipated to reach 26,000 tons of cane. Varieties grown :—

Rappoe,
Striped Singapore,
Badila,
N.G. 24, 24A, 24B.
D. 1135.

Marburg.—Two mills. This is a small sugar district, south-west of Brisbane, in which cane farming is carried on as an adjunct to other crops and dairying. About 7,000 tons of cane are expected this season. Varieties grown :—

D. 1135,
Mavoe (erroneously called Batoe),
Mahona,
Rappoe,
Striped Singapore.

New varieties have been introduced from the Mackay Sugar Station.

4.—INTRODUCTION OF NEW PAPUAN OR NEW GUINEA VARIETIES.

In the last Annual Report it was stated :—

“A long-standing promise to introduce fresh varieties from New Guinea is now being redeemed. Some little time ago Mr. T. H. Wells, of Childers, was commissioned to proceed to New Guinea and despatch to the Mackay Station as many new varieties of the cane indigenous to that island as he was able to procure in the somewhat limited time at his disposal. A portion of the varieties have now arrived at Mackay, numbering in all twenty-five, and a further shipment is expected and will, in all probability, have arrived before the publication of this report. One or two of the new canes resemble varieties in Tryon's collection, but this will not be definitely known until they mature. Following on with the numbers of the canes introduced by Mr. Tryon in 1895, the new canes will start as New Guinea 67, and so on.”

In all 158 varieties were despatched by Mr. Wells from New Guinea, and arrived at Mackay between 15th October and 27th November, 1912. Owing, however, to the time occupied in transit, only 59 varieties germinated. The greatest care was taken with each variety, and the land was specially prepared for their reception, and each cane carefully planted by hand. Fortunately, Mr. Wells had the foresight to leave a duplicate set of plants at the Hombron Bluff Experiment Station in Papua, and in July of this year he was enabled to send over a further 64 varieties to replace many of those which had failed to germinate out of the original shipments.

These new varieties of Papuan canes were secured by Mr. Wells in the face of considerable difficulties from the mountainous regions of New Guinea, and the cordial appreciation and thanks, not only of the Department of Agriculture and the Sugar Bureau, but of Queensland sugar growers generally are due to him for the labour and trouble he had to undergo in securing so many varieties.

The report of Mr. Wells on his mission to New Guinea, which now follows, will, we are sure, be read with the greatest interest :—

“s.s. ‘Matunga,’

“16th November, 1912.

“Sir,—On the 20th August last I received from the Minister a commission to proceed to British New Guinea (Papua) to obtain new varieties of sugar cane, the details being left entirely in my hands. A sum of money was placed to my credit for expenses, with provision for further credit if required; and an introduction from the Minister to His Excellency the Lieutenant-Governor of Papua was handed to me, to which was added, by the kindness of the Premier, an introduction from His Excellency Sir William McGregor.

"The greater part of the coast country of Papua having been searched for sugar cane by previous expeditions, it was decided that I should try some part of the mountainous country of the interior, where it was hoped that I might not only find different, but better, canes than existed on the coast.

"I therefore took the first ship for Port Moresby, leaving Brisbane on the 2nd September, and arriving at Port Moresby on the 9th September. The Lieutenant-Governor was then absent, and I was unable to see him until the evening of the 13th September, when he was good enough to at once take the matter in hand, and gave instructions that the Patrol Officer for the Central District (Mr. G. F. Jackson) and a squad of police were to be told off to be at my service. Sogeri, about 37 miles inland from Port Moresby, and itself in the mountain region, was fixed as my point of departure.

"Mr. Jackson was at this time absent on duty in the interior, and though a messenger was at once sent to find him, some fourteen days elapsed before he arrived at Sogeri. This time I occupied in journeying to Sogeri to make, as far as I could, preliminary arrangements, returning to Port Moresby to get supplies and again going back to Sogeri and searching that district for canes. This resulted in obtaining some 25 varieties, which were forwarded to you per s.s. 'Matunga' from Port Moresby about the 1st October.

"Mr. Jackson having arrived at Sogeri, carriers were collected, the expedition was organised, and we finally started on the morning of the 3rd October, the party consisting of forty-nine all told, the route laid out being from Sogeri approximately N. by E., through the villages of Uberi, Ionbaiwa, Iduri, Wamai, Efogi, and Kagi in the Main Range, and the furthest village inland on the south side of the range at this point; thence west to Seregina and Hagari, thence back from Hagari *via* Kagi and Efogi; thence west to Koriri, Bola, and Barula, thence south-east to Maguri, Aisoa, and Uberi, to Sogeri. I did not visit the villages of Seregina and Hagari as the natives in these places had eaten all their cane. This was also the case at Uberi, Ionbaiwa, Iduri, Koriri, and Maguri, whilst at Kagi only one small garden of forward ratoons was left; while in the remaining villages also much of the cane was eaten.

"I may here explain the natives celebrate what may be called their harvest season by huge dances lasting a week or more, at this time of the year, and at these dances the cane is eaten in large quantities as a luxury. Roughly, the dances commence about the end of August and last in their district an indefinite time, something after the manner in which we hold agricultural shows in our own country. The consequence was that I had anything but a full assortment to choose from. Owing to the wonderful variety, limited as was the number of gardens, I was able to obtain a very considerable number of canes, particulars of which I have already forwarded to you, and amongst them are some of the very finest canes I have ever seen.

"The mountain country is the very home of sugar cane, and in the bush one can see growing many varieties of wild cane in almost all stages of evolution. Soil, climate, and conditions are ideal, the one thing wanting being proper cultivation, though in the Efogi, Bola, and Barula districts the natives may be said to take very fair care of their cane. In this district I found fewer borers by far than anywhere else, though the borers of at least three species were of a particularly destructive kind and quite new to me.

"Making, by the courtesy of the Manager (Mr. C. P. Kirchner), Sogeri a chief depôt, and using Efogi as an out depôt, I was able to forward you a second and a larger consignment of canes from Sogeri, which left Port Moresby by the s.s. 'Van Waerwyck' on the 25th October.

"On despatching this consignment, considering that at so many villages no cane had been obtained, being still in the mountains, and having my camp in going order, I thought it was my duty to try the only other locality then practicable—viz., to Iigo, *via* the heads of the Hunter and the Minsgrave Rivers. On this journey I collected over twenty more varieties, several of them very good indeed, and these will reach you by this ship. In this district also much of the cane was eaten, and for 30 miles back from the coast the country was drought-stricken, food was not abundant, and all the cane had been eaten. This part of the country is not so much the home of cane as Efogi, Kagi, and Sogeri country, neither is the cane so well looked after by the natives; in addition, the cane was riddled by borers, and much eaten by rats.

"The principal difficulty of such an expedition as this, apart from the very rough nature of the country, is that one is limited as to time by the quantity of supplies one can carry. To use horses or mules is quite impossible, and everything must be carried by the natives on foot. Only a limited number of carriers are available and, therefore, except on a very short journey, it is only possible to carry a small quantity of cane. Also, want of time prevents a very critical examination of the canes on the spot, and it often happens that on close inspection a good deal of a particular cane has to be thrown away; hence some varieties are rather poorly represented in the samples sent. The villages in the mountains are rarely less than a day's journey apart, and their gardens are generally some distance—often several hours' journey—away, and very frequently at a difference in elevation of 500 or 1,000 feet.

"I found it absolutely necessary to visit all the gardens in which cane was growing, not only to note the habit of growth and condition of the canes, but also to obtain all the good varieties. It was hopeless to expect the natives to bring all of these into the village.

"Only the best varieties were taken, and of the 148 lots sent there may be some duplicates, but I think not more than half a dozen, and I strongly recommend that each lot be treated as a separate variety.

"The number of varieties is phenomenal. Any scientific cause it is not now necessary to seek, but it is useful to know the facts surrounding their origin, as going to show that they really are varieties, and very distinct varieties.

"The natives of New Guinea are savages of the stone age, and cannibals at that, each little tribe or village being in deadly fear of its neighbour. Each village is a little community shut up within itself, having at the most two or three neighbouring villages speaking the same language and comparatively friendly. This state of things existed everywhere until the British occupation, and in the Kagi and Efogi

country until about six or seven years ago. This being so, it necessarily follows that little or no intercourse of the nature of exchanging such things as plants could have taken place, and it is most unlikely that such things were taken from one village to another in war or as the result of theft. It is probable that each village has in the course of ages raised its own cane from the wild canes. I saw many patches of wild cane in the bush (some samples of which I have sent to you) and almost every patch was of a different variety. If, therefore, the original wild canes were so different, very many different varieties must have been produced during the ages of cultivation and selection in each little separate locality. Some exchanges may have and probably did take place among the coast villages, but it is extremely unlikely that any exchanges were ever made amongst the mountain villages, and more than improbable that any exchanges took place between the mountains and the coast.

"So far as I have been able to judge, the mountain canes are very superior to those on the coast. These canes are grown in an ideal climate and soil, and are softer, better grown, and better looked after. Of disease and insect pests, other than borers, I found none, except a harmless mealy bug in some of the Musgrave and Hunter canes. So far as I can gather, the country from Sogeri to Kagi and west to Hagari and Barula, is one of the best, if not the best, mountain districts I could have chosen for canes. I do not think I have obtained more than one third of the varieties that could be obtained in, say, from May to August, and I suggest that this district is well worth going over again in those months. Should this be undertaken, a little more preparation would be wanted in the shape of some properly designed inexpensive cases, in which to carry the cane and subsequently pack it for shipment, a quantity of small metal labels and some waterproof coverings for the cases, a properly laid out plan providing for a dépôt, so that there should be the minimum labour of carrying the maximum quantity of cane. Though it is by no means imperative, one should have an assistant; this would save much time in getting through the journey, as I presently found I had to sacrifice travelling time, and this means keeping an expensive camp idle when certain stages have to be made.

"New Guinea as a future field for new varieties of cane is practically unlimited. In British New Guinea perhaps three-fourths of the coast line has been practically exploited; the interior, except for this expedition, and the whole of Dutch and German New Guinea, are as yet untouched. Almost every village has sugar in many gardens. Judging by my own experience and the circumstances under which the cane has been evolved the number of varieties yet to be found must be almost infinite.

"Thinking it highly probable that some one or more of the canes, necessarily in small quantities, to be sent to you might not survive all the hardships they would have to go through I asked, before leaving Port Moresby for the Mountains, to be allowed to plant some of each at the Government Experimental Station at Hombron Bluff, and this privilege was most readily granted. Hombron Bluff station is a very suitable place, about 20 miles from Port Moresby and on the road to Sogeri. As each consignment was forwarded to you, one or more plants of each variety, except some six varieties of which I have already advised you, were forwarded to Hombron Bluff. The Manager of the Station (C. S. Speedie) was kind enough to take a very keen interest in the matter; and before finally leaving Port Moresby I visited the station and found that all I wished had been exceedingly well carried out. Most of the first and many of the second consignments were up, and I anticipate few, if any, misses. By this means you will be able to supply any varieties which have been sent to you and may fail.

"In conclusion I should like to say that I am deeply indebted to His Excellency the Lieutenant Governor, and the Chief Secretary (the Hon. A. W. Campbell) and his officers, from whom I received every courtesy and assistance—an assistance so material, that the difficulties and cost of the expedition were reduced to a minimum; without it, both difficulties and cost would have been considerable. I also found it a great advantage to have been in New Guinea before and known to many people there.

"I have, &c.,

"To the Under Secretary,

"(Signed) T. H. WELLS."

"Department of Agriculture and Stock,
"Brisbane.

Before leaving Papua, in November, 1912, Mr. Wells reported:—

"I have visited the Hombron Bluff Experiment Station, and find that the Manager, Mr. C. S. Speedie, has been kind enough to take the utmost care of the plants. They are planted in an excellent place, in good soil and near enough to water to be watered. This Mr. Speedie had done, and though no rain had fallen, at the time of my visit, since he had received the first plants, some seven weeks, the earlier plants were growing well and I anticipate there will be few, if any, misses. In due course Mr. Speedie will properly mark the different varieties in the ground. They are already recorded."

On the 5th May, 1913, Mr. Wells stated that there were:—

At Mackay and also at Hombron Bluff	...	...	51 varieties.
At Mackay but not at Hombron Bluff	...	...	8 "
		Total at Mackay	59
At Hombron Bluff, but not at Mackay	...	...	66 "
			125
Of the varieties originally secured there failed to germinate at either place	...	...	33 "
Corresponding to the number originally collected by Mr. Wells, viz.—	...	...	158 "

Of the 66 canes at Hombron Bluff, three subsequently died out.

Mr. Wells's remarks as to the varieties that failed to germinate:—

“Of the varieties lost—I have gone very carefully through these, and so far as my notes and my memory serve, nine are classed as superior, while none are classed as among the best. The net result may therefore be considered, I think, as fairly satisfactory, always provided that proper care is exercised in getting the plants from Hombron Bluff, from which place the difficulties of transport are not to be despised.”

It was in June of the present year decided to bring over the varieties that were growing at Hombron Bluff, but which were not at Mackay, and with this object in view the Director of Agriculture, Port Moresby, was written to asking him to permit of the cutting and packing of the canes in question. Fortunately, Mr. Wells was visiting Papua at the time, and he most kindly placed his services at the disposal of the Bureau. The Director of Agriculture was good enough to afford all facilities possible for the packing and transport of the canes, and the Department of Agriculture, Queensland, desires to express its indebtedness both to that gentleman and also to the Manager of the Hombron Bluff Experiment Station, Mr. Speedie, who gave considerable care and attention to the plants during their growth. Mr. Wells accordingly despatched the 63 varieties which were at Hombron Bluff but had failed at Mackay, and these reached the latter place early in August in good condition, and were at once carefully planted out.

While on a recent visit to the Mackay Station, all the new Papuan canes were inspected and were all looking healthy and vigorous. Such of these canes as are sufficiently forward will enter the experimental trials at the Station next year. It is confidently anticipated that out of the total number now at Mackay (120), a number of canes of high promise as croppers and sugar producers will be secured. A preliminary analysis of 23 canes from plantings made from the first shipment appears in the report of the Mackay Station.

5. WORK OF THE CENTRAL SUGAR EXPERIMENT STATION, MACKAY.

The work of the Mackay Sugar Experiment Station has been carried along upon the same practical lines as in former years. New field experiments have been initiated and a large number of tests of new varieties are being conducted. This work is becoming more and more prominent and is yearly demanding more of the available land at the station.

In the work done at the Mackay Station the General Superintendent is assisted by Mr. L. C. McCready, the Chemist in Charge, who carries out the responsible duties entrusted to him with loyalty, enthusiasm, and care. The appearance of the station generally upon the writer's last visit, the condition of the soil, and the execution of the experiments determined upon, were deserving of the highest praise.

The Assistant Chemist, Mr. M. Davis, has also done good work during the year.

The analytical work in connection with the Mackay portion of this report has this year been particularly heavy, and has been carried out with accuracy and care by Messrs. M. Davis and J. Pringle, Assistant Chemists. Mr. McCready also mentions the staff of the station as having by their promptness and cheerfulness given him great help during the year.

The report of the station, which now follows, has been compiled from data supplied by the Chemist in Charge, to which comments have been added by the General Superintendent:—

The past year has from a climatic standpoint, from October to May, been everything that could be desired. Following on a very dry period which interfered to some extent with the germination of some of the varieties, a heavy thunderstorm occurred towards the end of October, 1912, and a fall of 6½ in. of rain resulted. This sent all the cane along with a bound, and the downpour furnished enough moisture to carry the crops on to the usual wet season, and had no more rain fallen a fair crop was assured. From October on to the end of the wet season, however, the conditions have been mostly hot muggy days with well regulated rainfalls, conditions which may be considered ideal for the growth of cane.

MANURIAL EXPERIMENTS, SECOND RATOON CROP, 1912-1913.

As mentioned in last year's report, this experiment has been allowed to continue to a second ratoon crop, in order that the results obtained may be more conclusive.

The method of ratooning was as follows:—

The middles were first broken up with a swing plough to a depth of 12 in., followed by the subsoiler to a further depth of 6 in. The cane was then cut away from on each side and also subsoiled. This ensured the complete loosening of all soil between drills to a depth of 18 in. The row of hard ground containing the stools was then loosened with fork hoes and the ridge left in centre of drill worked down by means of the Planet Junior, with which implement all subsequent cultivation has been carried out.

Prior to working down the centres the plats were treated with the first application of manure on those that were to receive two dressings and with the total quantity of manure on those which were to receive only one dressing.

As mentioned in previous reports, the experiment consists of two areas, divided into five plats each, and planted with the varieties of cane known as New Guinea 24a and New Guinea 40, respectively. These plats received identical treatment, and were manured as follows:—

- Plat 1 in each series received 4 cwt. per acre of nitrate of soda, applied in two dressings.
- Plat 2 in each series received 4 cwt. per acre sulphate of ammonia, applied in two dressings.
- Plat 3 in each series received 4 cwt. per acre of sulphate of potash, applied in one dressing.
- Plat 4 in each series received 4 cwt. per acre mixed fertiliser, containing sulphate of ammonia, sulphate of potash, and superphosphate.
- Plat 5 in each series received no manure.

As already mentioned, the application of manure was made when ratooning. The second application to those plats receiving two dressings was made at the foot of the stools by hand and then lightly covered with the Planet Junior.

The usual preliminary analyses were carried out in June, July, and August, the samples consisting of one representative stool from each plat.

The final and fibre analyses were carried out in September, the sample consisting of all canes growing on 40 running feet.

The following tables give the details of analyses:—

FIRST PRELIMINARY ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, SECOND RATOON CROP, JUNE 1913.

No. of Plat.	Variety of Cane.	Manure Applied.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>									
1	New Guinea 24 A ..	Nitrate of soda	4 cwt.	13-6-13	9 mo's.	15.9	12.43	2.05	78.17
2	Do.	Sulphate of ammonia	do.	13-6-13	do.	16.9	13.77	1.74	81.47
3	Do.	Sulphate of potash	do.	13-6-13	do.	16.1	13.23	1.71	82.17
4	Do.	Mixed fertilizer	do.	13-6-13	do.	16.3	13.07	1.98	80.18
5	Do.	No manure	do.	13-6-13	do.	16.7	14.25	1.23	85.32
<i>Second Series.</i>									
1	New Guinea 40 ..	Nitrate of soda	4 cwt.	14-6-13	9 mo's.	14.0	10.39	2.12	74.21
2	Do.	Sulphate of ammonia	do.	14-6-13	do.	13.8	10.20	2.30	73.91
3	Do.	Sulphate of potash	do.	14-6-13	do.	14.1	11.14	1.69	79.00
4	Do.	Mixed fertilizer	do.	14-6-13	do.	14.0	10.74	2.05	76.71
5	Do.	No manure	do.	14-6-13	do.	14.9	11.40	2.09	76.51

SECOND PROGRESSIVE ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, SECOND RATOON CROP, JULY, 1913.

No. of Plat.	Variety of Cane.	Manure Applied.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>									
1	New Guinea 24A ..	Nitrate of soda	4 cwt.	4-7-13	10 mo's	16.7	14.01	1.40	83.89
2	Do.	Sulphate of ammonia	do.	4-7-13	do.	16.6	13.66	1.64	82.28
3	Do.	Sulphate of potash	do.	4-7-13	do.	19.3	17.56	.78	90.98
4	Do.	Mixed fertilizer	do.	4-7-13	do.	16.4	12.37	1.85	79.08
5	Do.	No manure	do.	4-7-13	do.	18.3	16.41	.82	83.67
<i>Second Series.</i>									
1	New Guinea 40 ..	Nitrate of soda	4 cwt.	4-7-13	10 mo's	16.8	14.38	1.43	85.59
2	Do.	Sulphate of ammonia	do.	4-7-13	do.	15.6	12.34	1.91	79.10
3	Do.	Sulphate of potash	do.	4-7-13	do.	16.5	15.00	.85	90.90
4	Do.	Mixed fertilizer	do.	4-7-13	do.	16.2	13.85	.92	85.49
5	Do.	No manure	do.	4-7-13	do.	15.4	12.64	1.43	82.07

THIRD PROGRESSIVE ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, SECOND RATOON CROP, AUGUST, 1913.

No. of Plat.	Variety of Cane.	Manure Applied.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>									
1	New Guinea 24A	Nitrate of soda	4 cwt.	6-8-13	11 mo's	16.9	15.21	.73	90.00
2	Do.	Sulphate of ammonia	do.	6-8-13	do.	18.3	16.68	.65	91.14
3	Do.	Sulphate of potash	do.	6-8-13	do.	19.8	18.66	.36	94.24
4	Do.	Mixed fertilizer	do.	6-8-13	do.	17.9	16.30	.73	91.06
5	Do.	No manure	do.	6-8-13	do.	19.8	18.81	.19	95.00
<i>Second Series.</i>									
1	New Guinea 40	Nitrate of soda	4 cwt.	7-8-13	11 mo's	17.0	16.02	.38	94.22
2	Do.	Sulphate of ammonia	do.	7-8-13	do.	15.7	13.82	.99	88.02
3	Do.	Sulphate of potash	do.	7-8-13	do.	16.3	14.63	.54	89.75
4	Do.	Mixed fertilizer	do.	7-8-13	do.	16.6	14.87	.61	89.57
5	Do.	No manure	do.	7-8-13	do.	16.3	14.96	.52	91.77

FINAL ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, SECOND RATOON CROP, SEPTEMBER, 1913.

Variety of Cane.	Manure Applied.	Date of Analysis.	Age of Cane.	Density of Juice (Brix)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice	% Fibre in Cane.	% Sucrose in Cane.	Date of Arrowing.
<i>First Series.</i>										
New Guinea 24A	Nitrate of soda	15-9-13	12 mo's	20.2	18.87	.48	93.41	9.98	17.00	} No Arrowing.
Do.	Sulphate of ammonia	15-9-13	do.	20.1	18.63	.40	92.68	8.72	17.00	
Do.	Sulphate of potash	15-9-13	do.	21.3	20.30	.21	95.30	10.64	18.14	
Do.	Mixed fertilizer	15-9-13	do.	20.7	19.59	.30	94.63	9.48	17.73	
Do.	No manure	15-9-13	do.	20.9	20.05	.23	95.93	10.56	17.93	
<i>Second Series.</i>										
New Guinea 40	Nitrate of soda	15-9-13	12 mo's	17.4	15.75	.81	90.51	11.13	13.99	} No Arrowing.
Do.	Sulphate of ammonia	15-9-13	do.	17.8	16.17	.64	90.84	11.35	14.33	
Do.	Sulphate of potash	15-9-13	do.	17.7	16.14	.61	91.18	11.25	14.32	
Do.	Mixed fertilizer	15-9-13	do.	18.3	16.65	.69	90.98	10.86	14.84	
Do.	No manure	15-9-13	do.	18.9	17.79	.36	94.12	11.81	15.68	

Immediately following the final analyses in September, the cane was cut and carted to the Meadowlands Mill. From the mill weights the following table of crop results has been compiled:—

CROP RESULTS: MANURIAL EXPERIMENTS—SECOND RATOON CROP, 1913.

Variety of Cane.	Manure Applied.	Age of Cane.	No. of Canes per Acre.	Average Weight of Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
<i>First Series.</i>							
New Guinea 24A	Nitrate of soda	12 months	28,967	2.6	34.7	13,237	5.9
Do. 24A	Sulphate of ammonia	do.	28,314	2.7	34.2	13,055	5.8
Do. 24A	Sulphate of potash	do.	21,562	3.0	28.9	11,757	5.2
Do. 24A	*Mixed fertilizer	do.	28,314	2.7	34.5	13,718	6.1
Do. 24A	No manure	do.	22,869	2.3	24.3	9,760	4.3
<i>Second Series.</i>							
New Guinea 40	Nitrate of soda	12 months	40,946	1.4	26.9	8,460	3.7
Do. 40	Sulphate of ammonia	do.	33,105	2.0	30.5	9,808	4.3
Do. 40	Sulphate of potash	do.	30,274	1.7	24.2	7,772	3.4
Do. 40	*Mixed fertilizer	do.	34,194	1.9	30.1	10,015	4.4
Do. 40	No manure	do.	32,670	1.2	18.1	6,372	2.8

* The 4cwt. mixed fertiliser consisted of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. superphosphate.

From the above table it will be observed that the nitrogenous manures have given superior results to sulphate of potash used alone.

The greatest difference in the first series is shown by the application of 4 cwt. of nitrate of soda per acre, which has given an increase of 10.4 tons of cane per acre over the plot which received no fertiliser. This was followed very closely by the 4 cwt. of mixed fertiliser, which shows an increase of 10.2 tons per acre over the plot not fertilised. In the second series the difference is yet more marked as far as the mixed fertiliser is concerned. This has given an increase of 12 tons of cane per acre over the non-fertilised plot.

In the following table the financial results of the second ratoon crop are set out:—

FINANCIAL RESULTS : MANURIAL EXPERIMENTS—SECOND RATOON CROP, 1913.

No. of Plat.	Manure Applied.	Variety of Cane.	Age of Cane.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre Calculated to Equal Manure Values Applied.
<i>First Series.</i>						
1	Nitrate of soda	New Guinea 24A	12 months	£ s. d. 3 19 6	£ s. d. 9 8 11	£ s. d. 5 9 5
2	Sulphate of ammonia	do. 24A	do.	4 8 0	8 19 10	4 2 11
3	Sulphate of potash	do. 24A	do.	4 3 6	4 3 6	..
4	Mixed fertilizer	do. 24A	do.	3 6 0	9 5 3	7 3 7
5	No manure	do. 24A	do.	..	..	..
<i>Second Series.</i>						
1	Nitrate of soda	New Guinea 40	12 months	£ s. d. 3 19 6	£ s. d. 7 19 10	£ s. d. 4 0 4
2	Sulphate of ammonia	do. 40	do.	4 8 0	11 5 3	6 3 11
3	Sulphate of potash	do. 40	do.	4 3 6	5 10 9	1 5 11
4	Mixed fertilizer	do. 40	do.	3 6 0	10 18 0	9 3 1
5	No manure	do. 40	do.	..	..	..

From the above it will be seen that the use of a mixed fertiliser containing nitrogen, potash, and phosphoric acid has given the highest profit per acre for the use of manures. It will also be noticed that the manures have in the second ratoon crop acted as they did in the first ratoon crop—viz., they have shown a larger aggregate profit applied to New Guinea 40 than where the New Guinea 24A was used, although the difference is not so marked as it was in the first ratoon crop.

The table set out below shows the entire yield of the three crops—viz., plant, first ratoon, and second ratoon. From it, it will be seen that in the experiment with New Guinea 24A the nitrate of soda alone has given the best results as far as yield per acre is concerned, while in the second series, where New Guinea 40 was the cane planted, the mixed fertiliser has given the highest yield.

CROP RESULTS TO DATE : MANURIAL EXPERIMENTS—PLANT, FIRST RATOON AND SECOND RATOON CROPS (1911, 1912, AND 1913).

Variety of Cane.	Manure Applied.	No. of Plat.	PLANT CROP, 1911.		FIRST RATOON CROP, 1912.		SECOND RATOON CROP, 1913.		TOTAL YIELD OF THREE CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
<i>First Series.</i>										
New Guinea 24A	Nitrate of soda ..	1	57.3	9.9	29.1	4.9	34.7	5.9	121.1	20.7
Do. 24A	Sulphate of ammonia ..	2	54.6	9.0	29.6	4.9	34.2	5.8	118.4	19.7
Do. 24A	Sulphate of potash ..	3	52.4	9.6	26.9	4.6	28.9	5.2	108.2	19.
Do. 24A	Mixed fertilizer ..	4	51.1	8.2	30.7	5.2	34.5	6.1	116.3	19.5
Do. 24A	No manure	5	47.0	8.2	23.9	4.2	24.3	4.3	95.2	16.7
<i>Second Series.</i>										
New Guinea 40	Nitrate of soda ..	1	49.1	7.4	26.2	3.4	29.0	3.7	102.2	14.5
Do. 40	Sulphate of ammonia ..	2	48.0	7.1	28.7	3.4	30.5	4.3	107.2	14.8
Do. 40	Sulphate of potash ..	3	47.4	6.8	24.9	3.4	24.2	3.4	99.5	13.6
Do. 40	Mixed fertilizer ..	4	47.4	7.3	30.7	3.9	30.1	4.4	108.2	15.6
Do. 40	No manure	5	42.0	6.5	18.6	2.7	18.1	2.8	78.8	12.0

We now arrive at the financial results for the whole crop, which are tabulated hereunder:—

FINANCIAL RESULTS TO DATE : MANURIAL EXPERIMENTS—PLANT, FIRST RATOON AND SECOND RATOON CROPS
(1911-1912-1913).

No. of Plat.	Variety of Cane.	Manure Applied.	PLANT CROP, 1911.			FIRST RATOON CROP, 1912.			SECOND RATOON CROP, 1913.			TOTAL RESULTS FOR THE THREE CROPS.			
			Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
<i>First Series.</i>															
1	N. Guinea 24A	Nitrate of soda ...	3 5 0	8 2 1	4 17 1	1 19 6	4 3 2	2 3 8	3 19 6	9 8 11	5 9 5	9 4 0	21 14 2	12 10 2	1
2	Do. 24A	Sulphate of ammonia	3 10 0	5 19 9	2 6 2	2 4 0	4 11 2	2 2 3	4 8 0	8 19 10	4 2 11	10 2 0	19 10 9	8 11 4	3
3	Do. 24A	Sulphate of potash ...	3 5 0	4 5 5	1 0 5	1 19 6	2 8 0	0 8 6	4 3 6	4 3 6	0 0 0	9 8 0	10 16 11	1 8 11	4
4	Do. 24A	Mixed fertilizer ...	2 16 6	3 5 3	0 10 0	1 13 0	5 8 9	4 10 8	3 6 0	9 5 3	7 3 7	7 15 6	17 19 3	12 4 3	2
5	Do. 24A	No manure													
<i>Second Series.</i>															
1	N. Guinea 40	Nitrate of soda ...	3 5 0	5 12 3	2 7 3	1 19 6	6 1 7	4 2 1	3 19 6	7 19 10	4 0 4	9 4 0	19 13 8	10 9 8	3
2	Do. 40	Sulphate of ammonia	3 10 0	4 14 6	1 2 9	2 4 0	8 1 7	5 5 6	4 8 0	11 5 3	6 3 11	10 2 0	24 1 4	12 12 2	2
3	Do. 40	Sulphate of potash ...	3 5 0	4 5 5	1 0 5	1 19 6	5 0 9	3 1 3	4 3 6	5 10 9	1 5 11	9 8 0	14 16 11	5 7 7	4
4	Do. 40	Mixed fertilizer ...	2 16 6	4 5 5	1 13 8	1 13 0	9 13 7	9 12 2	3 6 0	10 18 0	9 3 1	7 15 6	24 17 0	20 8 11	1
5	Do. 40	No manure													

In considering these results it is apparent that from a smaller expenditure for the mixed fertiliser used in the first series an almost equivalent profit has been made as when the nitrate of soda alone was used.

In the second series, where a different variety of cane was used, the mixed fertiliser not only gave the highest yield per acre for a less expenditure for manure, but the profit per acre was very considerably greater than for any other form of manure used.

The interpretation of results of experiments such as the above requires the greatest care, and, as pointed out in Bulletin 29 of the Hawaiian Experiment Station, erroneous conclusions may be drawn unless such experiments are carried on for a number of years or are compared with a similar series of plats that are not fertilised, but which are upon uniform land next to the experiment in question.

It is apparent that not only have the two series shown differences, but the results of the plant, first, and second ratoon crops have not been consistent. There are so many factors, some known and some unknown, which play their part in the growth and maturing of crops, that experiments of this nature can only be read broadly. The conclusion which appears definite and apparent is one that the Experiment Station has constantly maintained—viz., that more profitable results from the use of manure are always obtained by the use of a fertiliser containing the three elements—nitrogen, potash, and phosphorus.

As the piece of land upon which these experiments were planted is now urgently required for other work, the cane has been ploughed out.

RATOONING EXPERIMENT.

This experiment was planted out in August, 1912, with a view to arriving at the best system of treating ratoons. The land selected for the experiment was the same on which a ratooning experiment had been attempted previously, the cane on which, owing to the prevailing dry weather of 1911, had failed to ratoon.

The treatment of the land was as follows:—The stools from the preceding crop were ploughed out and carted off. The land was then ploughed and cross ploughed three times. Early in August of last year it was again deeply ploughed with a swing plough to a depth of 14 in., followed by the subsoiler to a further depth of 6 in., thus securing a seedbed of from 18 to 20 in. in depth of loose soil. The land was then divided into 4 plots of 5 drills each and planted with the cane known as New Guinea 40. In order to secure accuracy in detail all plants were carefully cut to three eyes each and 100 plants dropped in each drill. A departure has also been made from the usual system of planting in 5 ft. drills, the rows in this case having been drawn at 6 ft. This is with the object of allowing more room for the implements in the carrying out of the different systems detailed hereafter.

This crop germinated very satisfactorily, and the resulting plant crop has done exceedingly well; the plots all appear uniform in growth.

In order to obtain a basis to calculate results from the subsequent ratoon crops the cane in this experiment has been duly analysed and harvested, and the results are tabulated as follows:—

FIRST PRELIMINARY EXAMINATION OF CANES IN THE RATOON EXPERIMENT—PLANT CROP, JUNE, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
1	New Guinea	N.G. 40	13-6-13	10 months	13.2	9.26	1.85	70.15
2	Do.	do.	13-6-13	do.	13.9	10.14	2.30	72.94
3	Do.	do.	13-6-13	do.	12.1	7.82	2.67	64.62
4	Do.	do.	13-6-13	do.	13.2	9.56	2.50	72.42

SECOND PROGRESSIVE ANALYSIS OF CANES IN THE RATOON EXPERIMENT—PLANT CROP, JULY, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
1	New Guinea	N.G. 40	3-7-13	11 months	15.2	12.56	1.47	82.63
2	Do.	do.	3-7-13	do.	14.7	11.47	1.98	78.02
3	Do.	do.	3-7-13	do.	14.2	10.58	2.25	74.50
4	Do.	do.	3-7-13	do.	14.7	12.01	1.61	81.70

THIRD PROGRESSIVE ANALYSIS OF CANES IN THE RATOON EXPERIMENT—PLANT CROP, AUGUST, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
1	New Guinea	N.G. 40	6-8-13	12 months	14.9	12.99	1.07	87.18
2	Do.	do.	6-8-13	do.	14.9	12.94	1.05	86.84
3	Do.	do.	6-8-13	do.	15.4	13.77	.73	89.41
4	Do.	do.	6-8-13	do.	17.3	16.26	.39	93.91

FINAL ANALYSIS OF THE CANES IN THE RATOON EXPERIMENT—PLANT CROP, SEPTEMBER, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Harvesting.
1	New Guinea ..	N.G. 40 ..	12-9-13	13 months	17.8	15.74	.87	88.42	11.17	13.98	
2	Do. ..	do. ..	12-9-13	do.	17.9	16.09	.84	89.88	11.23	14.28	
3	Do. ..	do. ..	12-9-13	do.	18.4	16.64	.72	90.43	11.13	14.78	
4	Do. ..	do. ..	12-9-13	do.	17.6	15.86	.85	90.11	9.95	14.28	

CROP RESULTS OF RATOON EXPERIMENT—PLANT CROP, 1913.

Number of Plat.	Country.	Variety of Cane.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1	New Guinea ..	N.G. 40	13 months	29,940	3.7	48.2	15,197	4.7
2	Do. ..	do.	do.	27,406	3.7	45.5	14,586	6.5
3	Do. ..	do.	do.	25,773	4.0	46.2	15,314	4.8
4	Do. ..	do.	do.	27,769	3.7	46.3	14,838	6.6

Immediately on harvesting, these plots will be ratooned as follows:—

Plot 1.—Trash to be left on ground and cane allowed to volunteer.

Plot 2.—Trash to be burnt. The middles to be opened with the swing plough, followed by the subsoiler to a depth of from 16 to 18 in. The land next to the rows will then be turned over with the swing plough on to the middles and the subsoiler again follows. This ensures all the rows being deeply ploughed and moved and is the method of cultivating ratoons practised at the Experiment Station, with excellent results.

Plot 3.—Trash to be buried between the rows.

Plot 4.—Trash to be put in every other space between the rows, the cleared spaces being cultivated with the plough. This is generally known as relieving.

EXPERIMENTS WITH MISCELLANEOUS CANES.

FIRST RATOON CROP, 1912-1913.

During the year 1909 the following varieties of cane were introduced:—Hambledon Seedlings 426 and 452, Mauritius 1900 Seedling, Couve, Mauritius 189, and Barbadoes 208, the last mentioned being reintroduced. These canes, with the exception of Hambledon 452 (which died out), were carefully propagated, and by March of 1911 had furnished sufficient seed to enable them to enter into further experiment. Two sport canes—viz., New Guinea 40 and 64—have also been added.

As a check a plot was planted with Demerara 1135. These canes received identical treatment with regard to cultivation and manuring, so that their relative commercial values might be arrived at.

Immediately following the harvesting of the plant crop (details of which appeared in last year's report) the trash was burned and the canes ratooned. Owing to the heavy clayey nature of this ground and the dry, hard condition of the soil at this period it was found an utter impossibility to use the sub-soiler; contrary to usual practice, therefore, the ratoons were not subsoiled. The ratooning consisted simply of breaking up the middles and cutting away from the cane on each side of the stool. Manures were then applied and the centres worked down with the Planet Junior fitted with broad hoes. The second application of manures was made in December, and with good weather conditions this crop has progressed favourably to maturity.

The following is a short description of the canes:—

Hambledon 426.—A thick brown to light red coloured cane, short jointed, and somewhat similar to Goru, habit semi-erect, good stooler and germinator, good drought-resisting qualities.

Demerara 1135.—Brown to red coloured cane of medium stoutness and particularly erect habit, stools and trashes well, joints about 4 in. long, parallel sided, foliage sparse and erect.

1900 Seedling.—A stout, blue to black coloured cane, with medium to long joints, erect habit, fair stooler and germinator; stood dry weather badly but made marvellous growth since rain. Possesses a decided peculiarity in regard to foliage, which is broad and drooping and in most cases variegated, also has the short joint peculiar to seedling canes to a marked extent.

Barbadoes 208.—Green-coloured, stout cane, heavily waxed, shows in places a reddish blush, joints 3 to 5 in. in length, barrel-shaped near top, and having a peculiar hump opposite eyes on lower half of cane, habit erect, stools and trashes well, foliage broad and erect. Subject to disease.

Mauritius 189.—An erect, blue to black coloured cane of fair thickness, stools and trashes well, joints from 4 to 5 in. long, parallel-sided, and occasionally zig-zag. Did not stand dry weather well.

Couve.—Stout, blue-coloured cane, covered with white wax, joints 4 in. to 6 in. long, slightly barrel-shaped, lodging habit, stools fairly, trashes well. Subject to disease.

N.G. 64 Sport.—Green to light yellow coloured cane, with a purple to red blush and longitudinal skin cracks, of fair thickness, joints 4 in. to 5 in. long and barrel-shaped, lodging habits, stooling power fair, trashes easily, stood drought indifferently.

N.G. 40 Sport.—A green-coloured cane of medium thickness, with a red to brown blush, joints from 3 in. to 4 in. long and barrel-shaped, erect habit, good stooler and trasher.

The usual preliminary analyses, the sample for which consists of one average stool, were carried out in the months of June, July, and August. The final and fibre analyses, the samples for which are taken from all cane growing on 40 running feet, were made early in September. The analytical results appear in the following tables:—

FIRST PRELIMINARY ANALYSIS OF MISCELLANEOUS CANES—FIRST RATOON CROP, JUNE, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambledon, Queensland	H.Q. 426	9-6-13	9 months	17.2	13.88	1.12	80.69
Demerara	D. 1135	9-6-13	do.	13.3	10.3	2.44	75.18
Mauritius	1900 Seedling	9-6-13	do.	17.0	15.16	1.27	89.17
Barbadoes	B. 208	9-6-13	do.	14.2	12.15	1.55	85.56
Mauritius	M. 189	9-6-13	do.	16.1	13.36	1.74	82.98
Mauritius	Couve	9-6-13	do.	14.4	10.72	2.55	74.44
Queensland	N.G. 64 Sport	9-6-13	do.	13.6	9.73	2.87	71.54
Queensland	N.G. 40 Sport	9-6-13	do.	13.5	9.65	2.87	71.48

SECOND PROGRESSIVE ANALYSIS OF MISCELLANEOUS CANES—FIRST RATOON CROP, JULY, 1913

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambledon, Queensland	H.Q. 426	1-7-13	10 months	17.0	14.41	1.38	84.70
Demerara	D. 1135	1-7-13	do.	14.2	11.17	1.91	78.66
Mauritius	1900 Seedling	1-7-13	do.	16.9	15.18	.86	89.82
Barbadoes	B. 208	1-7-13	do.	16.0	14.63	.87	91.43
Mauritius	M. 189	1-7-13	do.	16.8	15.08	1.00	89.76
Mauritius	Couvé	1-7-13	do.	16.0	12.82	1.80	80.18
Queensland	N.G. 64 Sport	1-7-13	do.	16.6	14.47	1.17	87.16
Queensland	N.G. 40 Sport	1-7-13	do.	15.0	12.07	1.80	80.46

THIRD PROGRESSIVE ANALYSIS OF MISCELLANEOUS CANES—FIRST RATOON CROP, AUGUST, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambledon, Queensland	H.Q. 426	4-8-13	11 months	21.0	19.90	.14	94.76
Demerara	D. 1135	4-8-13	do.	16.9	14.79	.84	87.51
Mauritius	1900 Seedling	4-8-13	do.	20.0	18.97	.30	94.85
Barbadoes	B. 208	4-8-13	do.	20.6	19.40	.19	94.12
Mauritius	M. 189	4-8-13	do.	21.2	20.48	.17	96.60
Mauritius	Couvé	4-8-13	do.	17.8	15.26	1.34	85.73
Queensland	N.G. 64 Sport	4-8-13	do.	16.3	13.99	1.21	85.82
Queensland	N.G. 40 Sport	4-8-13	do.	16.6	14.87	.84	89.57

FINAL ANALYSIS OF MISCELLANEOUS CANES, FIRST RATOON CROP, SEPTEMBER, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Arrowing.
1	Hambledon Q.	H.Q. 426	8-9-13	12 months	20.6	19.25	.31	93.44	9.16	17.48	..
2	Demerara ..	D. 1135	8-9-13	do.	18.0	16.17	.57	89.83	12.03	14.22	..
3	Mauritius ..	1900 Seedling	8-9-13	do.	19.8	18.36	.40	92.72	9.71	16.57	June 23
4	Barbadoes ..	B. 208	8-9-13	do.	18.9	17.51	.56	92.64	11.90	15.42	..
5	Mauritius ..	M. 189	8-9-13	do.	19.3	17.37	.83	90.00	11.21	15.42	May 14
6	Mauritius ..	Couvé	8-9-13	do.	16.4	13.56	1.60	82.68	10.53	12.13	May 14
7	Queensland ..	N.G. 64 Sport	8-9-13	do.	18.5	16.24	1.13	87.78	10.58	14.52	..
8	Queensland ..	N.G. 40 Sport	8-9-13	do.	17.4	15.24	.90	87.58	10.62	13.62	..

The cane known as Hambledon Queensland 426 was supplied to the Station by the courtesy of the Colonial Sugar Refining Company, and is one of the numerous seedlings raised some years ago at the Company's Hambledon Plantation, Cairns. It is a cane of remarkably high sugar content and is a fine striker and ratooner. This variety is coming into prominence on the Herbert River and other Northern Districts, and in the former place the p.o.c.s. varied from 17.60 to 18.95 from July to October. It was also amongst the varieties planted by the Bureau of Sugar Experiment Stations on Messrs. Ruge's farm at Proserpine. On the 14th July last it was analysed, with the following result:—

Brix	20.55
Sucrose in juice	20.05
Purity	97.5
P.O.C.S.	16.55

The variety known as 1900 Seedling (a Mauritius cane) is also showing a good sugar content and is much favoured in Southern Districts.

In September the crop was cut and sent to the mill, the cane from each plot being weighed separately. From the mill weights and the count of the canes the following results have been prepared:—

CROP RESULTS OF THE MISCELLANEOUS CANES—FIRST RATOON CROP, 1913.

No. of Plat.	Country.	Variety of Cane.	Age of Cane.	Number of Canes per Acre.	Average weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1	Queensland	Hambledon Seedling 426	12 months	37,243	2.2	37.0	14,505	6.4
2	Demerara	Demerara Seedling 1135	do.	38,768	3.0	52.4	16,693	7.4
3	Mauritius	Seedling 1900	do.	21,562	4.5	43.8	16,276	7.2
4	Barbadoes	Seedling 208	do.	36,154	2.5	41.8	14,441	6.4
5	Mauritius	Seedling 189	do.	39,857	2.6	46.3	16,019	7.1
6	Mauritius	Couvé	do.	25,264	3.8	42.9	11,677	5.2
7	New Guinea	Sport from No. 64	do.	35,937	2.9	47.4	15,432	6.8
8	New Guinea	Sport from No. 40	do.	39,421	2.1	38.6	11,776	5.2

In the table below is given the results of the plant and 1st ratoon crops to date. The check plot of D. 1135 and the sport of N.G. 64 have given the heaviest results so far. This crop will be continued into the second ratoon stage.

TOTAL CROP RESULTS TO DATE, MISCELLANEOUS CANES, PLANT CROP AND FIRST RATOON CROP, 1912-1913.

No. of Plat.	Country.	Variety of Cane.	PLANT CROP, 1912.		FIRST RATOON CROP, 1913.		TOTAL YIELD: TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
1	Queensland	Hambledon Seedling 426	23.1	4.1	37.0	6.4	60.1	10.5
2	Demerara	Demerara Seedling 1135	33.3	4.3	52.4	7.4	85.7	11.7
3	Mauritius	Mauritius Seedling 1900	27.4	4.3	43.8	7.2	71.2	11.5
4	Barbadoes	Seedling 208	29.9	4.7	41.8	6.4	71.7	11.1
5	Mauritius	Seedling 189	27.9	4.4	46.3	7.1	74.2	11.5
6	Mauritius	Couvé	35.9	3.9	42.9	5.2	78.8	9.1
7	Queensland	N. Guinea Sport from No. 64	40.8	5.1	47.4	6.8	88.2	11.9
8	Queensland	N. Guinea Sport from No. 40	36.4	5.1	38.6	5.2	75.0	10.3

EXPERIMENTS WITH MAURITIUS SEEDLING CANES.

FIRST RATOON CROP, 1912-1913.

As mentioned in the report for 1910, the following canes were received from Mauritius:—55, 87, 89, 779, 998, 1002, 1201, 1237, and 1474. Of these Nos. 1201 and 1237 failed to germinate after the long sea voyage. The remainder made good growth, and by August of 1911 were planted out in competition, the details of this plant crop having already appeared in the report for last year.

The following is a short description of the above-mentioned varieties:—

M 55.—A stout blue-coloured cane of good length, and covered with white wax, good stooler and germinator, erect habit, arrows slightly, joints 4 to 5 in. long, parallel-sided, eyes small and round.

M 87.—A stout light red to reddish blue coloured cane of good length, lightly waxed, good stooler and germinator, erect habit, partially arrowed, joints 4 to 6 in. long, slightly barrel-shaped, eyes large and pointed.

M 89.—A stout light red coloured cane with heavy white wax, of good length, good stooler and germinator, erect habit, partly arrows, joints 4 to 6 in., parallel-sided and occasionally zig-zag, eyes medium and from round to slightly acute.

M 779.—Stout green-coloured cane with roseate blush and white wax, of good length, good stooler and germinator, and erect habit, joints 4 to 5 in., slightly barrel-shaped, eyes small and round.

M 998.—A dark red coloured cane of medium stoutness and good length, good stooler and germinator, erect habit, arrows slightly, joints 4 to 5 in., bulging at eyes, eyes medium and slightly acute.

M 1002.—A rosy coloured thin cane covered with white wax, fair stooler and germinator, possesses a peculiar foliage, very sparse, and having an elliptical shaped leaf sheath, joints 3 or 4 in. long, eyes medium and slightly acute, has not arrowed.

M 1474.—A stout green-coloured cane of medium length, possesses a red blush and is heavily waxed, good stooler and germinator, and very erect habit, has not arrowed, joints 3 to 4 in. long, slightly barrel-shaped, eyes small and round.

Immediately following the harvesting of the plant crop the trash of these plots was burned and the cane ratooned in accordance with the usual system practised. The first application of manures was made in October, followed by a top dressing of nitrogenous manures towards the middle of December.

Taken as a first ratoon crop these canes have all been somewhat backward. This is in all probability due to the effect of the drought conditions of 1911-1912, the hard struggle of the young plant cane against adverse conditions tending to lower the vitality of the stools and thereby lessening its power to throw out vigorous shoots as ratoons. As in the plant crop, Nos. 55, 87, and 89 have again arrowed early.

The usual preliminary and progressive analyses have been carried out as in the other experiments and the results appear hereunder:—

FIRST PRELIMINARY EXAMINATION OF MAURITIUS SEEDLINGS—FIRST RATOON CROP, JUNE, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	M 55	12-6-13	9 months	15.7	11.65	2.73	74.20
Do.	M. 87	12-6-13	do.	16.3	13.13	2.16	80.55
Do.	M. 89	12-6-13	do.	13.3	8.78	2.87	66.01
Do.	M. 779	12-6-13	do.	11.9	6.88	3.18	57.81
Do.	M 998	12-6-13	do.	13.1	8.88	2.61	67.78
Do.	M. 1002	12-6-13	do.	15.2	12.37	1.41	81.38
Do.	M. 1474	12-6-13	do.	15.2	11.97	1.91	78.75

SECOND PROGRESSIVE ANALYSIS OF MAURITIUS SEEDLINGS—FIRST RATOON CROP, JULY, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	M. 55	3-7-13	10 months	14.8	10.27	3.19	69.39
Do.	M. 87	3-7-13	do.	17.7	15.10	1.64	85.31
Do.	M. 89	3-7-13	do.	14.8	9.62	3.28	65.00
Do.	M. 779	3-7-13	do.	13.9	8.98	3.28	64.60
Do.	M. 998	3-7-13	do.	16.0	13.42	1.26	83.87
Do.	M. 1002	3-7-13	do.	17.4	15.51	.82	89.13
Do.	M. 1474	3-7-13	do.	15.8	13.07	1.53	82.72

THIRD PROGRESSIVE ANALYSIS OF MAURITIUS SEEDLINGS—FIRST RATOON CROP, AUGUST, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	M. 55	6-8-13	11 months	16.1	12.43	2.54	77.20
Do.	M. 87	6-8-13	do.	17.4	14.99	1.52	86.14
Do.	M. 89	6-8-13	do.	16.0	12.64	1.97	79.00
Do.	M. 779	6-8-13	do.	15.9	12.93	1.45	83.20
Do.	M. 998	6-8-13	do.	17.7	16.14	.74	91.18
Do.	M. 1002	6-8-13	do.	17.5	15.83	.69	90.45
Do.	M. 1474	6-8-13	do.	15.7	13.61	1.22	86.68

The final analyses of all cane growing upon 40 running feet of land were carried out, together with the fibre analyses, in September. The results are appended:—

FINAL ANALYSIS OF MAURITIUS SEEDLINGS—FIRST RATOON CROP, SEPTEMBER, 1913.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Arriving.
1	Mauritius ..	M. 55 ..	12-9-13	12 months	19.2	17.19	.90	89.53	8.35	15.57	23 June
2	Do. ..	M. 87 ..	12-9-13	do.	19.8	18.23	.70	92.07	10.26	16.35	do.
3	Do. ..	M. 89 ..	12-9-13	do.	18.3	15.58	1.36	85.13	10.26	13.98	do.
4	Do. ..	M. 779 ..	12-9-13	do.	18.1	15.53	1.26	85.80	10.77	13.85	..
5	Do. ..	M. 998 ..	12-9-13	do.	19.0	17.43	.48	91.73	12.22	15.30	..
6	Do. ..	M. 1002 ..	12-9-13	do.	21.4	19.68	.40	91.96	11.98	17.32	23 June
7	Do. ..	M. 1474 ..	12-9-13	do.	19.5	18.13	.42	92.96	10.05	16.30	..

These varieties do not appear to mature early and their sugar content commences to rise in August. They would probably be better fitted for a long crop, that is planted in March. However, it is possible that two or three useful varieties will be secured.

Early in September the whole of the plots were harvested and the canes sent to the mill. The crop results follow:—

CROP RESULTS OF MAURITIUS SEEDLINGS—FIRST RATOON CROP.

Number of Plat.	Name or Number of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Canes per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1	Mauritius Seedling 55	11½ months	34,104	3.2	50.1	17,700	7.9
2	Do. 87	do.	28,096	2.9	36.4	13,353	5.9
3	Do. 89	do.	24,175	2.9	31.6	9,895	4.4
4	Do. 779	do.	29,620	2.5	33.0	10,256	4.5
5	Do. 998	do.	33,976	1.9	28.8	9,896	4.4
6	Do. 1002	do.	32,670	1.7	25.6	9,958	4.4
7	Do. 1474	do.	29,403	2.0	27.4	10,011	4.4

The total crop results to date (*i.e.*, plant and 1st ratoon canes) are now given:—

CROP RESULTS TO DATE: MAURITIUS SEEDLINGS—PLANT AND FIRST RATOON CROP, 1912-1913.

Number of Plat.	Country.	Variety of Cane.	PLANT CROP, 1912.		FIRST RATOON CROP, 1913.		TOTAL YIELD. TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
1	Mauritius ..	M. 55 ..	43.9	6.3	50.1	7.9	94.0	14.2
2	Do. ..	M. 87 ..	54.1	7.3	36.4	5.9	90.5	13.2
3	Do. ..	M. 89 ..	39.8	4.8	31.6	4.4	71.4	9.2
4	Do. ..	M. 779 ..	32.2	3.7	33.0	4.5	65.2	8.2
5	Do. ..	M. 998 ..	33.7	4.0	28.8	4.4	62.5	8.4
6	Do. ..	M. 1002 ..	27.2	4.3	25.6	4.4	52.8	8.7
7	Do. ..	M. 1474 ..	28.3	3.9	27.4	4.4	55.7	8.3

EXPERIMENTS WITH SEEDLING CANES FROM THE ACCLIMATISATION SOCIETY,
BRISBANE.

PLANT CROP, 1912-1913.

In last year's report all preliminary details of the canes abovementioned appeared. It was shown therein that of the original 144 varieties received, owing to drought and diseases, only 30 varieties had made sufficient progress to be planted out in competition, the names or numbers being as follows:—

Country.	Name or Number.	Country.	Name or Number.
Queensland	58	Queensland	59
Queensland	135	Queensland	137
Queensland	286	Queensland	303
Queensland	307	Queensland	365
Queensland	437	Queensland	694
Queensland	695	Queensland	795
Queensland	813	Queensland	855
Queensland	970	Queensland	1001
Queensland	1092	Queensland	1098
Queensland	1110	Queensland	1133
Barbadoes	3412	Barbadoes	3922
Barbadoes	3747	Demerara	306
Queensland	1112	Queensland	Badila Seedling
Queensland	Hybrid No. 1	Queensland	903
Queensland	1049	Queensland	1121

Of the above thirty canes the following were planted out in one field:—

Country.	Name or Number.	Country.	Name or Number.
Queensland	58	Queensland	813
Queensland	59	Queensland	855
Queensland	135	Queensland	970
Queensland	137	Queensland	1001
Queensland	286	Queensland	1092
Queensland	303	Queensland	1098
Queensland	307	Queensland	1110
Queensland	365	Demerara	306
Queensland	437	Barbadoes	3412
Queensland	694	Barbadoes	3922
Queensland	695	Barbadoes	3747
Queensland	795	Queensland	1133

The whole of the twenty-four varieties above mentioned received the following treatment:—

The land selected for the experiment was the plot on which the experiments with nitro-bacterine culture had been previously carried out, but care has been taken to plant the cane in the opposite direction to those experiments, so as to secure uniformity. The beans having been ploughed under, the land has since lain in bare fallow, with an occasional light ploughing to prevent fouling with weeds. The extra work given before planting consisted of a deep swing ploughing crossways, in July, 1912, followed early in August by a deep swing ploughing lengthways, followed by the subsoiler to a depth of 18 in. The land was then laid out into plats of two 5 ft. drills each, with 7 ft. interspaces between the plats, and planted with the above varieties. The plants used consisted of three-eye plants, spaced 6 in. apart.

The following is a short description of the canes. All details in connection with dates of arrowing will be found in the table of analytical data:—

Queensland 58.—Brown-coloured cane with small linear skin cracks, good germinator, and good stooler, fairly stout, joints 3 to 4 in. in length, eyes full and round.

Queensland 59.—Dark red coloured cane with heavy wax, good germinator, and good stooler, fair thickness, joints 2 to 4 in., eyes prominent, full, and pointed—slightly affected with stripe leaf disease.

Queensland 135.—Light yellow to green coloured cane, good germinator and stooler, fair stoutness, joints 4 to 5 in. in length, eyes medium, round, and full.

Queensland 137.—Red-coloured cane, heavily waxed, fair striker, good stooler, medium thickness, joints 5 in. in length, eyes long, flat, and pointed.

Queensland 286.—Dark red to blue coloured cane, fair germinator and good stooler, slight wax, joints 4 in. in length, fair stoutness, eyes small, round, and full.

Queensland 303.—Pink-coloured cane, waxed, poor germinator, fair stooler, joints 5 to 6 in. in length and of medium stoutness, eyes large and full, slightly pointed.

Queensland 307.—Blue-black coloured cane, waxed, good germinator and good stooler, joints 5 in. long and of fair stoutness, eyes large, full, and pointed.

Queensland 365.—Purple-coloured cane, heavily waxed, good germinator and stooler, joints 4 in. in length and of fair stoutness, eyes large and pointed.

Queensland 437.—Light red coloured cane, fair germinator, but medium stooler, joints 4 in. long and of medium stoutness, eyes large and pointed, affected with red rot, and of very backward growth.

Queensland 694.—Black-coloured cane, heavily waxed, good germinator and stooler, joints 5 in. in length and cane somewhat thin, eyes medium, full, and pointed.

Queensland 695.—Blue-black cane, waxed, round joints like the Badila, a cane which this variety somewhat resembles, good germinator and stooler, joints 4 in. long and stout, eyes small and round.

Queensland 795.—Light brown coloured cane with a red blush, medium germinator and only fair stooler, joints 4 in. in length and zig-zag in appearance, and of good thickness, eyes slightly acute; badly affected with dry rot. A marked peculiarity about this variety is that many of the joints carry two and three eyes on each node.

Queensland 813.—Dark red to black coloured cane, slightly waxed, good germinator and stooler, joints of fair length and medium thickness, eyes round and full.

Queensland 855.—Reddish brown coloured cane, heavily waxed, fair germinator and good stooler, joints of fair length and of fair thickness, eyes large, full, and pointed.

Queensland 970.—Light brown coloured cane with red blush, good germinator and stooler, joints of fair length and of fair stoutness, eyes small and pointed.

Queensland 1001.—Dirty green coloured cane with red blush, covered with heavy black wax, fair germinator and medium stooler, joints long and stout, growth very erect, eyes small, round, and depressed.

Queensland 1092.—Red to black coloured cane, waxed at nodes, very good striker and stooler, joints of fair length and stout, bulging at nodes, eyes full and slightly pointed.

Queensland 1098.—Reddish brown coloured cane with linear skin cracks, waxed, good germinator and stooler, joints long and stout, eyes small and round.

Queensland 1110.—Blue coloured waxy cane, good germinator and stooler, joints of good length but cane rather thin, eyes medium and pointed.

Demerara 306.—Yellow to green coloured cane with occasional white scaly blotches, fur round joints, good striker and stooler, joints long and stout, eyes medium and pointed. This cane possesses a most peculiar foliage and leads one to the conclusion that it is only a matter of days before disease becomes apparent; it, however, has come through the season without developing any, the plot giving a fine body of cane.

Barbadoes 3412.—Rose to green coloured cane, good striker and stooler, joints long and of medium stoutness, eyes large and pointed. Resembles very much the old Rappoe.

Barbadoes 3922.—Light yellow to green coloured cane with rose blush, good germinator and stooler, joints fair length and stout, eyes medium and slightly pointed, cane of very erect habit. This cane appears to be the most promising on the block.

Barbadoes 3747.—Light yellow to green coloured cane with rose blush, good germinator and stooler, joints long, zig-zag, and stout, eyes small and round. Appears to be very little behind the 3922, but is not of the same erect habit.

Queensland 1133.—Light red to brown coloured cane, good germinator and stooler, joints long and of fair stoutness, eyes medium and pointed.

The canes in most cases came up well, and the plant crop has shown canes of very high promise. The Barbadoes Seedlings have easily proved the most promising, the B. 3922 having attracted attention from an early stage. Others which have been worthy of notice are Q. 135, Q. 307, Q. 365, Q. 695, Q. 1092, Q. 813, Q. 970, Q. 1098, B. 3412, B. 3747, and Q. 1133. Queensland 59 and 286 have both developed the striped leaf disease to a slight extent. Q. 437 is badly affected with red rot, whilst Q. 795, though apparently healthy up till May, developed dry rot to a serious extent, and Queensland 307 and 1001 also showed signs of gum.

The first application of manures was made in October, followed by a second dressing of nitrogenous manures towards the middle of December.

The usual preliminary and progressive analyses were carried out in June, July, and August, the sample consisting of one representative stool. The final and fibre analyses were carried out in September, the sample consisting of all canes growing on 40 running feet. The following tables give the details of analyses:—

FIRST PRELIMINARY ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, JUNE, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	Q. 58	10-6-13	9 months	12.8	7.81	3.19	61.01
Do.	Q. 59	10-6-13	do.	14.9	12.51	1.25	83.95
Do.	Q. 135	10-6-13	do.	13.1	8.06	3.19	61.52
Do.	Q. 137	10-6-13	do.	12.9	9.09	2.44	70.46
Do.	Q. 286	10-6-13	do.	14.0	11.09	1.64	79.21
Do.	Q. 303	10-6-13	do.	10.5	5.18	3.19	49.33
Do.	Q. 307	10-6-13	do.	11.1	6.76	2.55	60.90
Do.	Q. 365	10-6-13	do.	12.2	7.28	3.83	59.67
Do.	Q. 437	10-6-13	do.	11.5	6.09	3.83	52.95
Do.	Q. 694	10-6-13	do.	15.6	12.19	2.17	78.14
Do.	Q. 695	10-6-13	do.	14.0	9.77	2.80	69.78
Do.	Q. 795	10-6-13	do.	16.1	13.34	1.40	82.85
Do.	Q. 813	10-6-13	do.	17.7	16.17	.63	91.35
Do.	Q. 855	11-6-13	do.	17.2	13.93	1.21	80.98
Do.	Q. 970	11-6-13	do.	16.6	13.51	1.76	81.38
Do.	Q. 1001	11-6-13	do.	15.3	12.80	1.25	83.66
Do.	Q. 1092	11-6-13	do.	14.3	9.10	3.48	63.63
Do.	Q. 1098	12-6-13	do.	16.1	13.20	2.09	81.98
Do.	Q. 1110	12-6-13	do.	15.9	12.82	1.76	80.62
Do.	Q. 1133	12-6-13	do.	14.9	11.64	2.01	78.12
Demerara	D. 306	12-6-13	do.	10.8	5.92	3.38	54.81
Barbadoes	B. 3412	12-6-13	do.	13.7	8.08	2.87	63.62
Do.	B. 3747	12-6-13	do.	15.2	12.59	1.50	82.82
Do.	B. 3922	12-6-13	do.	15.4	13.53	.85	87.85

SECOND PROGRESSIVE ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT
CROP, JULY, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	Q. 58	1-7-13	10 months	15.2	11.80	1.98	77.63
Do.	Q. 59	1-7-13	do.	16.9	15.51	.65	91.77
Do.	Q. 135	1-7-13	do.	15.6	11.88	2.30	76.15
Do.	Q. 137	1-7-13	do.	15.5	13.18	1.35	85.03
Do.	Q. 286	1-7-13	do.	10.7	6.89	3.02	64.39
Do.	Q. 303	2-7-13	do.	14.8	11.43	1.76	77.22
Do.	Q. 307	2-7-13	do.	13.8	9.98	2.30	72.31
Do.	Q. 365	2-7-13	do.	13.7	9.05	2.55	72.62
Do.	Q. 437	2-7-13	do.	11.2	6.74	2.87	60.17
Do.	Q. 694	2-7-13	do.	15.7	11.83	2.21	75.35
Do.	Q. 695	2-7-13	do.	15.2	11.72	2.25	77.10
Do.	Q. 795	2-7-13	do.	16.7	14.55	.93	87.12
Do.	Q. 813	2-7-13	do.	18.8	17.70	.38	94.14
Do.	Q. 855	2-7-13	do.	16.4	14.14	1.18	86.21
Do.	Q. 970	2-7-13	do.	19.0	17.27	.73	90.89
Do.	Q. 1001	2-7-13	do.	16.7	15.03	.81	90.00
Do.	Q. 1092	2-7-13	do.	16.1	11.81	2.73	73.35
Do.	Q. 1098	2-7-13	do.	16.3	13.31	2.05	81.65
Do.	Q. 1110	2-7-13	do.	17.3	14.47	1.39	83.64
Do.	Q. 1133	2-7-13	do.	15.7	12.56	1.91	80.00
Demerara	D. 306	2-7-13	do.	14.6	11.39	2.11	78.01
Barbadoes	B. 3412	2-7-13	do.	15.1	11.75	2.16	77.81
Do.	B. 3747	2-7-13	do.	15.7	13.29	1.43	84.64
Do.	B. 3922	2-7-13	do.	17.3	16.16	.42	93.41

THIRD PROGRESSIVE ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT
CROP, AUGUST, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	Q. 58	4-8-13	11 months	15.7	13.34	1.22	84.96
Do.	Q. 59	4-8-13	do.	17.2	14.79	1.00	85.98
Do.	Q. 135	4-8-13	do.	16.7	14.33	1.38	85.80
Do.	Q. 137	5-8-13	do.	17.7	16.74	.41	94.57
Do.	Q. 286	5-8-13	do.	18.2	17.26	.28	94.83
Do.	Q. 303	5-8-13	do.	15.9	14.28	.63	89.81
Do.	Q. 307	5-8-13	do.	13.9	10.87	2.00	78.20
Do.	Q. 365	5-8-13	do.	15.2	12.97	1.45	85.32
Do.	Q. 437	5-8-13	do.	14.6	10.64	2.97	72.87
Do.	Q. 694	5-8-13	do.	16.4	14.31	1.45	87.25
Do.	Q. 695	5-8-13	do.	14.6	11.42	1.88	78.21
Do.	Q. 795	5-8-13	do.	16.0	13.31	1.27	83.18
Do.	Q. 813	5-8-13	do.	19.3	18.12	.41	93.88
Do.	Q. 855	5-8-13	do.	16.8	15.24	.63	90.71
Do.	Q. 970	5-8-13	do.	19.5	18.40	.39	94.35
Do.	Q. 1001	5-8-13	do.	19.0	17.86	.24	94.00
Do.	Q. 1092	5-8-13	do.	17.3	15.51	.89	89.65
Do.	Q. 1098	5-8-13	do.	17.4	15.15	1.18	87.06
Do.	Q. 1110	5-8-13	do.	17.9	16.25	.66	90.78
Do.	Q. 1133	5-8-13	do.	16.2	13.61	1.56	84.04
Demerara	D. 306	5-8-13	do.	14.7	12.09	1.72	82.24
Barbadoes	B. 3412	5-8-13	do.	14.9	11.91	2.00	79.93
Do.	B. 3747	5-8-13	do.	18.3	17.37	.29	94.91
Do.	B. 3922	5-8-13	do.	17.3	16.47	.29	95.20

FINAL ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, SEPTEMBER, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice. (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Harvesting.
Queensland	Q. 58	8-9-13	12½ months	17.4	15.51	.78	89.13	11.57	13.71	..
Do.	Q. 59	8-9-13	do.	18.6	17.58	.28	94.51	11.92	15.47	..
Do.	Q. 135	9-9-13	do.	18.2	16.25	.83	89.28	9.36	14.72	..
Do.	Q. 137	9-9-13	do.	20.0	19.21	.12	96.05	10.97	17.10	14 May
Do.	Q. 286	9-9-13	do.	19.4	18.66	.17	96.18	11.67	16.49	..
Do.	Q. 303	9-9-13	do.	20.3	19.30	.14	95.07	12.26	16.93	14 May
Do.	Q. 307	9-9-13	do.	18.8	17.24	.38	91.70	9.85	15.58	..
Do.	Q. 365	9-9-13	do.	18.8	17.27	.64	91.86	11.88	15.21	..
Do.	Q. 437	9-9-13	do.	17.0	13.69	2.45	80.52	10.01	12.31	..
Do.	Q. 694	9-9-13	do.	20.3	18.65	.80	91.87	12.73	16.27	..
Do.	Q. 695	9-9-13	do.	18.1	15.98	1.22	88.28	8.27	14.65	..
Do.	Q. 795	9-9-13	do.	21.0	20.03	.25	95.38	9.55	18.11	23 June
Do.	Q. 813	9-9-13	do.	21.4	20.41	.19	95.37	11.36	18.09	..
Do.	Q. 855	9-9-13	do.	19.6	18.69	.34	95.35	12.06	16.43	..
Do.	Q. 970	9-9-13	do.	21.1	19.93	.35	94.45	10.29	17.87	..
Do.	Q. 1001	9-9-13	do.	19.4	18.27	.30	94.17	12.14	16.05	..
Do.	Q. 1092	11-9-13	do.	18.5	15.55	1.49	84.05	8.97	14.15	23 June
Do.	Q. 1098	11-9-13	do.	20.1	18.89	.51	93.98	8.12	17.35	..
Do.	Q. 1110	11-9-13	do.	20.3	18.74	.57	92.31	11.25	16.63	23 June
Do.	Q. 1133	11-9-13	do.	17.8	15.61	1.28	87.69	8.18	14.33	30 July
Demerara	D. 306	11-9-13	do.	18.3	16.60	1.06	90.71	7.13	15.41	..
Barbadoes	B. 3412	11-9-13	do.	16.9	14.38	1.36	85.08	9.03	13.08	..
Do.	B. 3747	11-9-13	do.	18.4	16.99	.59	92.33	7.84	15.65	..
Do.	B. 3922	11-9-13	do.	18.1	17.32	.23	95.69	8.24	15.88	..

Immediately following the final analyses, the cane was cut and harvested and sent to the Meadowlands Mill. From the mill weights, the following table of crop results has been compiled:—

CROP RESULTS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, 1913.

Country.	Variety of Cane.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
Queensland	Q. 58	12½ months	27,442	3.1	38.6	11,854	5.2
Do.	Q. 59	do.	24,175	3.3	35.6	12,365	5.4
Do.	Q. 135	do.	37,461	3.1	52.6	17,376	7.8
Do.	Q. 137	do.	22,869	4.0	40.8	15,642	6.9
Do.	Q. 286	do.	23,740	4.5	48.0	17,742	7.9
Do.	Q. 303	do.	16,770	3.4	25.8	9,808	4.3
Do.	Q. 307	do.	29,838	3.9	51.9	18,120	8.0
Do.	Q. 365	do.	24,393	3.9	42.9	14,642	6.5
Do.	Q. 437	do.	23,086	2.3	23.9	6,595	2.9
Do.	Q. 694	do.	29,620	3.6	48.8	17,788	7.9
Do.	Q. 695	do.	23,086	4.4	45.4	14,900	6.6
Do.	Q. 795	do.	20,255	3.5	31.9	12,976	5.7
Do.	Q. 813	do.	26,353	3.7	43.8	17,769	7.9
Do.	Q. 855	do.	23,958	2.9	31.3	11,522	5.1
Do.	Q. 970	do.	29,620	3.5	47.2	18,915	8.4
Do.	Q. 1001	do.	26,571	2.8	33.7	12,129	5.4
Do.	Q. 1092	do.	25,700	4.0	46.4	14,731	6.5
Do.	Q. 1098	do.	30,709	3.9	53.5	20,821	9.2
Do.	Q. 1110	do.	31,363	2.8	39.2	14,632	6.5
Do.	Q. 1133	do.	25,482	4.8	55.4	17,790	7.9
Demerara	D. 306	do.	21,344	4.7	45.3	15,640	6.9
Barbadoes	B. 3412	do.	30,927	3.5	49.5	14,529	6.4
Do.	B. 3747	do.	26,353	4.4	52.7	18,508	8.2
Do.	B. 3922	do.	24,393	4.5	49.8	17,754	7.9

It will be seen from the above results that there are several canes of high promise, both as croppers and sugar producers. The results of the tests of the first and second ratoon crops will be awaited with interest. B. 3922 is a very striking cane and was an object of admiration to all visiting farmers.

CONTINUATION OF EXPERIMENTS WITH CANES FROM THE ACCLIMATISATION SOCIETY.

PLANT CROP 1912-1913.

The remaining six canes mentioned as having made sufficient progress to be planted out in experiment were, owing to lack of ground adjacent to the first experiments, carried over to another portion

of land. The preparation of the soil and subsequent cultivation and treatment have been identical with the twenty-four Acclimatisation Seedlings just dealt with.

The following is a short description of these canes:—

Queensland 1112.—Blue-black coloured cane, heavily waxed, good germinator and stooler, joints from 4 to 6 in. and of medium stoutness, eyes oval, full, and slightly pointed.

Badila Seedling.—This variety to all appearances is identical with the original Badila.

Hybrid No. 1.—Dark red coloured cane, waxed round joints like Badila, good germinator and fair stooler, joints stout and barrel shaped, 3 to 5 in. long, eyes medium, full, and pointed.

Queensland 903.—Green-coloured cane with a red blush, waxed, good striker and stooler, joints fairly stout, 4 to 6 in. long, eyes medium, round, and flat.

Queensland 1049.—Red-coloured cane, fair germinator and good stooler, joints 4 to 6 in. long and inclining to be thin, eyes small and round, very sparse top and foliage.

Queensland 1121.—Green-coloured cane with yellow blush, good germinator and stooler, joints stout and from 3 to 5 in. long, eyes large, full, and pointed.

As in other experiments, the canes have been subjected to the usual analytical tests, the results appearing in the following tables:—

FIRST PRELIMINARY ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, JUNE, 1913.

Country.	Variety of Cane.					Date of Analysis.	Age of Cane.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	..	Q. 903	..	..	..	13-6-13	9 months	14.8	11.70	1.91	79.05
Do.	..	Q. 1049	..	..	..	13-6-13	do.	17.5	15.96	.92	91.20
Do.	..	Q. 1112	..	..	..	13-6-13	do.	15.3	11.37	1.41	74.31
Do.	..	Q. 1121	..	..	..	13-6-13	do.	14.4	11.72	1.59	81.38
Do.	..	Badila Sport	..	..	..	13-6-13	do.	16.1	13.26	1.76	82.36
Do.	..	Hybrid No. 1	..	..	..	13-6-13	do.	15.6	13.31	1.23	85.32

SECOND PROGRESSIVE ANALYSIS OF CANES FROM QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, JULY, 1913.

Queensland	..	Q. 903	..	..	..	3-7-13	10 months	16.7	14.74	1.21	88.26
Do.	..	Q. 1049	..	..	..	3-7-13	do.	15.0	12.48	1.53	83.20
Do.	..	Q. 1112	..	..	..	3-7-13	do.	15.9	12.74	2.55	80.12
Do.	..	Q. 1121	..	..	..	3-7-13	do.	15.5	13.26	1.02	85.54
Do.	..	Badila Sport	..	..	..	3-7-13	do.	18.0	16.22	.92	90.11
Do.	..	Hybrid No. 1	..	..	..	3-7-13	do.	16.4	14.52	1.09	88.53

THIRD PROGRESSIVE ANALYSIS OF CANES FROM QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, AUGUST, 1913.

Queensland	..	Q. 903	..	..	..	6-8-13	11 months	17.8	16.71	.35	93.87
Do.	..	Q. 1049	..	..	..	6-8-13	do.	17.6	16.66	.48	94.65
Do.	..	Q. 1112	..	..	..	6-8-13	do.	16.5	14.63	.87	88.66
Do.	..	Q. 1121	..	..	..	6-8-13	do.	14.5	12.61	.92	86.96
Do.	..	Badila Sport	..	..	..	6-8-13	do.	17.9	16.86	.34	94.18
Do.	..	Hybrid No. 1	..	..	..	6-8-13	do.	18.0	17.24	.29	95.77

In the month of September the final analyses were carried out and the crop harvested and weighed. The data furnished has been used in compiling the following tables of final analyses and crop results:—

FINAL ANALYSIS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, SEPTEMBER, 1913.

Country.	Variety of Cane.					Date of Analysis.	Age of Cane.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Harvesting.
Queensland	..	Q. 903	..	..	..	12-9-13	12½ months	19.8	18.76	.30	94.74	13.12	16.24	..
Do.	..	Q. 1049	..	..	..	12-9-13	do.	22.0	21.16	.23	96.13	7.63	15.54	23 June
Do.	..	Q. 1112	..	..	..	12-9-13	do.	18.6	16.64	.90	89.46	13.10	14.46	..
Do.	..	Q. 1121	..	..	..	12-9-13	do.	20.3	19.30	.29	95.07	10.22	17.32	..
Do.	..	Badila Seedling	..	..	..	12-9-13	do.	21.2	20.19	.30	95.23	9.44	18.28	..
Do.	..	Hybrid No. 1	..	..	..	12-9-13	do.	20.3	19.41	.17	95.61	9.38	17.58	..

CROP RESULTS OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP, 1913.

Country.	Variety of Cane.	Age of Crop.	Number of Canes per acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
Queensland ..	Q. 903	12½ months	16,770	4.7	35.4	12,950	5.7
Do. ..	Q. 1049	do.	16,770	3.1	23.3	10,213	4.5
Do. ..	Q. 1112	do.	25,700	3.7	42.5	13,794	6.1
Do. ..	Q. 1121	do.	26,571	3.3	40.2	15,617	6.9
Do. ..	Badila Seedling	do.	27,660	3.8	47.1	19,309	8.6
Do. ..	Hybrid No. 1	do.	27,442	3.5	43.7	17,230	7.6

EXPERIMENTS WITH CANES FROM LOUISIANA, AND CANE KNOWN AS CASSILIS.

PLANT CROP 1912-1913.

In March of 1910 two plants each of the following varieties were received from Audubon Park, Louisiana, viz., D. 117, D. 604, La Striped, T. 211, and La Purple. Owing to the long voyage and the time occupied, the plants had all perished with the exception of the Louisiana Striped and Trinidad 211, and of these only one and two eyes respectively were available. These two canes were carefully propagated, and in April, 1911, were cut and planted out in order to provide seed for further experiment. The canes, more especially the Trinidad 211, came along well, and by August of 1912 had provided an abundance of seed for planting out in competition.

These two canes, to which has been added the Cassilis, a cane spoken of favourably by Mr. Scougall, of Tiaro, and to whom we are indebted for the original plants, have been planted out and have received the same treatment as the Queensland Seedlings.

The following is a description of these three canes:—

Louisiana Striped.—Light yellow and red striped cane, heavily waxed with white, poor germinator, and medium stooler, joints long and of fair stoutness, eyes medium, full, and pointed, slightly affected with striped leaf disease and showing symptoms of gumming. This cane is identical with the Queensland cane known in different districts as Mauritius Gingham, Striped Singapore, and Imperial.

Trinidad Seedling 211.—Yellow to green coloured cane, medium striker and poor stooler, joints 4 to 5 in. long and stout, eyes medium and pointed.

Cassilis.—Blue-coloured cane heavily waxed, poor striker, but good stooler, long jointed and fairly stout. Eyes medium, full, and pointed. This cane very much resembles the Meerah, but is much stouter. Slightly affected with striped leaf disease.

The usual preliminary and progressive analyses have been carried out as in other experiments, the results being given in the following tables:—

FIRST PRELIMINARY ANALYSIS OF CANES FROM LOUISIANA AND CANE KNOWN AS CASSILIS—PLANT CROP, JUNE, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Louisiana	T. 211	10-6-13	9 months	13.2	7.14	4.25	54.09
Do.	La Striped	10-6-13	do.	14.6	11.86	1.61	81.23
Unknown	Cassilis	10-6-13	do.	11.2	7.09	2.73	63.30

SECOND PROGRESSIVE ANALYSIS OF CANES FROM LOUISIANA AND CANE KNOWN AS CASSILIS—PLANT CROP, JULY, 1913.

Louisiana	T. 211	1-7-13	10 months	15.2	12.72	1.40	83.68
Do.	La Striped	1-7-13	do.	12.1	5.43	4.60	44.87
Unknown	Cassilis	1-7-13	do.	17.0	15.70	.61	92.35

THIRD PROGRESSIVE ANALYSIS OF CANES FROM LOUISIANA AND CANE KNOWN AS CASSILIS—PLANT CROP, AUGUST, 1913.

Louisiana	T. 211	4-8-13	11 months	14.0	9.47	2.91	67.64
Do.	La Striped	4-8-13	do.	19.2	18.55	.22	96.61
Unknown	Cassilis	4-8-13	do.	18.0	16.33	.30	93.50

The final analyses were carried out in the usual manner, the cane growing upon 40 running feet of ground being all taken for the sample, so as to ensure its correctness. The results appear hereunder:—

FINAL ANALYSIS OF CANES FROM LOUISIANA AND CANE KNOWN AS CASSILIS—PLANT CROP, SEPTEMBER, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Harvesting.
Louisiana ..	T. 211	8-9-13	12½ months	18.4	15.15	1.85	82.33	10.70	13.52	14 May
Do. ..	La Striped ..	8-9-13	do.	20.4	19.49	.20	95.53	10.24	17.49	23 June
Unknown ..	Cassilis	8-9-13	do.	20.5	19.52	.14	95.21	12.13	17.15	14 May

The whole of the plats were then harvested and carted to the Meadowlands Mill. The mill weights have provided the data for the following table of crop results:—

CROP RESULTS OF CANES FROM LOUISIANA AND A CANE KNOWN AS CASSILIS—PLANT CROP, 1913.

Country.	Variety of Cane.	Age of Cane.	Number of Canes per Acre.	Average Weight of Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
Louisiana ..	T. 211	12½ months	20,691	4.3	39.7	12,043	5.3
Do. ..	La Striped ..	do.	16,335	2.5	18.6	7,313	3.2
Unknown ..	Cassilis	do.	19,166	4.7	40.4	15,538	6.9

NEW EXPERIMENTS PLANTED DURING 1913.

FURTHER EXPERIMENTS WITH SEEDLING CANES FROM THE ACCLIMATISATION SOCIETY.

On referring to the last report from this Station, it will be seen that a second selection of the canes received from the Acclimatisation Society was made. The varieties in this secondary selection in many cases appeared promising, but, owing to various causes, chief of which were drought and stunted and debilitated plants, they failed to furnish sufficient seed for planting out in experiment, and in consequence had to be replanted in order that sufficient cane might be obtained for experimental work. They were therefore planted out in September, 1912, on a new piece of land, which had for some years been growing cassava. The season being favourable these canes have made good growth, and by the latter end of July of the present year a further selection of the most promising were made and the canes planted out in competition.

The piece of land selected for the trial had previously been under a cane crop for three years, and received the following treatment:—Immediately following the harvest the trash was burnt and the stools ploughed out and carted off the land. The ground was then ploughed as deeply as possible and laid in bare fallow for some months. In November, 1912, the land received a dressing of lime at the rate of 1 ton per acre. This was applied broadcast and then ploughed in. Early in December, suitable rains having fallen, a crop of cowpea was sown at the rate of 1 bushel per acre. Owing to the heavy and continuous rains in the early part of the year this crop could not be ploughed under until April. Early in June a deep swing ploughing was given, followed early in July by a further ploughing and sub-soiling. The land was then divided off into plats consisting of two rows 5 ft. apart, the interspaces allowed between each variety being 6 ft., and planted with the following canes:—

Queensland Seedlings No. 112, Q. 115, Q. 554, Q. 558, Q. 634, Q. 698, Q. 719, Q. 721, Q. 745, Q. 748, Q. 750, Q. 763, Q. 767, Q. 768, Q. 779, Q. 812, Q. 812a, Q. 822, Q. 840, Q. 887, Q. 900, Q. 999, Demerara 115, Demerara 1483, Barbadoes 224, New Guinea 41 Sport, Q. 1004, Q. 1009, Q. 1013, and Q. 1025.

In order to have some guide as to the sucrose values of the above canes a preliminary analysis was carried out during the month of August, details of which are given in the following table:—

PRELIMINARY EXAMINATION OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY (SECONDARY SELECTION)—PLANT CANE, AUGUST, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice. (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	Q. 112	8-8-13	12 months	15.1	10.67	2.03	70.66
Do.	Q. 115	7-8-13	do.	15.8	12.93	1.37	81.83
Do.	Q. 554	8-8-13	do.	16.1	13.09	1.79	81.30
Do.	Q. 558	8-8-13	do.	15.7	12.50	1.82	79.61
Do.	Q. 684	8-8-13	do.	11.5	2.95	4.89	25.65
Do.	Q. 698	8-8-13	do.	15.7	10.49	3.05	66.81
Do.	Q. 719	8-8-13	do.	17.6	15.34	1.19	87.15
Do.	Q. 721	7-8-13	do.	18.3	16.25	1.16	88.79
Do.	Q. 745	7-8-13	do.	18.9	18.02	.34	95.34
Do.	Q. 747	8-8-13	do.	12.2	6.90	3.21	56.55
Do.	Q. 748	7-8-13	do.	10.2	5.12	3.70	50.19
Do.	Q. 750	8-7-13	do.	15.0	11.10	2.10	74.00
Do.	Q. 763	7-8-13	do.	15.5	13.91	.66	89.74
Do.	Q. 767	8-8-13	do.	16.9	14.57	1.02	86.21
Do.	Q. 768	7-8-13	do.	15.5	13.45	1.02	86.77
Do.	Q. 779	8-8-13	do.	17.4	15.42	.57	88.62
Do.	Q. 792	7-8-13	do.	18.4	17.14	.38	93.15
Do.	Q. 795	8-8-13	do.	16.3	14.09	.57	86.44
Do.	Q. 812	7-8-13	do.	15.3	12.75	1.47	83.33
Do.	Q. 812A	7-8-13	do.	18.8	17.56	.33	93.40
Do.	Q. 822	8-8-13	do.	17.3	15.83	.67	91.50
Do.	Q. 840	7-8-13	do.	12.7	9.85	2.35	77.55
Do.	Q. 849	8-8-13	do.	14.0	10.47	2.22	74.78
Do.	Q. 881	8-8-13	do.	13.2	11.07	.90	83.86
Do.	Q. 887	8-8-13	do.	15.7	12.94	1.27	82.42
Do.	Q. 889	7-8-13	do.	16.5	13.24	1.94	80.24
Do.	Q. 899	7-8-13	do.	17.6	16.09	.68	91.42
Do.	Q. 900	8-8-13	do.	19.1	18.39	.21	96.28
Do.	Q. 918	8-8-13	do.	12.1	7.85	2.77	64.87
Do.	Q. 928	7-8-13	do.	17.5	14.79	1.43	84.51
Do.	Q. 999	7-8-13	do.	12.7	9.17	1.82	72.20
Do.	Q. 1004	7-8-13	do.	19.0	17.51	.73	92.15
Do.	Q. 1009	8-8-13	do.	10.5	6.61	2.22	62.95
Do.	Q. 1013	7-8-13	do.	16.7	14.74	1.07	88.26
Do.	Q. 1025	7-8-13	do.	17.0	14.30	1.52	84.11
Do.	Q. 1048	8-8-13	do.	14.4	11.28	1.77	78.33
Do.	Q. 1095	7-8-13	do.	16.3	13.55	1.38	83.12
Do.	Q. 1115	7-8-13	do.	18.2	17.29	.34	95.00
Barbadoes	B. 147	8-8-13	do.	17.2	15.43	.70	89.70
Do.	B. 224	7-8-13	do.	14.6	10.66	2.18	73.01
Queensland	N.G. 41 Sport	8-8-13	do.	16.5	14.47	.78	87.69
Demerara	D. 115	8-8-13	do.	14.4	11.61	1.65	73.68
Do	D. 1483	8-8-13	do.	15.9	12.27	1.63	77.16

These varieties have been worthy of note owing to the almost entire absence of any disease amongst them, and also the marked improvement in many of the canes since they were last planted. Taking this last factor into consideration, it has been decided to ratoon the plot from which the plants were cut. This would allow any backward canes a further year to improve before being finally accepted or discarded, and at the same time furnish further evidence as to the ratooning powers of the varieties planted out.

EXPERIMENTS WITH DIFFERENT FORMS OF NITROGENOUS MANURES, EMBRACING NEW COMPOUNDS.

Experiments for testing the action of different forms of nitrogenous manures, including the new nitrogenous compound known as "Nitrolim," have been laid down and are now being carried out. In order that more reliable data may be obtained a series of four check plots which have not been fertilised have been included. Any differences shown between the check plots will have to be considered in the fertiliser plots on dealing with the final figures.

The land selected for this experiment was the plot on which Hambleton seedlings were tested, and received the following treatment:—Immediately following the final crop of these experiments, the trash was burnt, and the stools ploughed out and carted off. The land was then treated with 1 ton per acre of lime and deeply ploughed. On the first rains a crop of small red Mauritius bean was sown, which crop on reaching maturity was ploughed under and allowed to rot. Early in February, 1913, the whole of the plot was deeply ploughed with a swing plough and harrowed down. It then received two deep cross ploughings, and early in April was ploughed and subsoiled to a depth of 20 in. The ground was then laid off into 9 plots of 4 drills each and planted with the variety known as New Guinea 24a.

These plots will now receive the following treatment and five of them will be manured at the rate of 100 lb. of nitrogen per acre, with the following nitrogenous manures:—

Plat No. 1 will receive 100 lb. per acre nitrogen as nitrate of soda.

Plat No. 2 will receive 100 lb. per acre nitrogen as sulphate of ammonia.

Plat No. 3 will receive 100 lb. per acre nitrogen as "Nitrolim."

Plat No. 4 will receive 100 lb. per acre nitrogen as dried blood.

Plat No. 5 will receive 100 lb. per acre nitrogen as nitrate of ammonia.

Plats Nos. 6, 7, 8, and 9.—No manure.

EXPERIMENTS HAVING FOR THEIR OBJECT DIFFERENT METHODS OF CULTIVATION
BETWEEN THE CANE ROWS.

As a good deal of difference of opinion exists in Queensland as to the proper methods of subsequent cultivation of cane—*i.e.*, cultivation after the cane is planted and up—a series of experiments have been initiated for the purpose of testing different implements between the rows. The method recommended by cane experts in other countries is what is known as “shallow surface cultivation” with an implement fitted with broad cutting hoes, which leaves a 3 in. mulch upon the surface and so breaks the capillary tubes which are leading water to the air, and conserves moisture. To carry out this method, good tillage before planting is absolutely essential.

Many farmers in Queensland, however, believe in ploughing away from and back to the cane, although this method is often condemned, as it is stated to bury plant foods and ferments, and damages the roots of the young cane by cutting them. It is often adopted, however, as a labour saving device, so as to avoid excessive hand labour.

The following methods will be used on these plots:—

Plat No. 1.—All subsequent cultivation will be performed with the ordinary Planet Junior fitted with the digging tynes.

Plat No. 2.—All subsequent cultivation will be performed with the same implement fitted with the broad duck feet hoes.

Plat No. 3.—All subsequent cultivation will be performed with the spring tooth cultivator.

Plat No. 4.—All subsequent cultivation will be performed with a light drill harrow.

Plat No. 5.—All subsequent cultivation will be performed with the pony plough and Planet Junior cultivator fitted with the digging tynes.

The land selected for this experiment was last year under a first ratoon crop of varieties for distribution, and the preparation of the land was as follow:—

Immediately following the harvesting of the abovementioned crop, the trash was burnt and the stools split out and carted off. Lime was then sown broadcast at the rate of 1 ton per acre and ploughed under with the disc plough. Early in December of last year small red Mauritius bean was planted at the rate of 1 bushel per acre. This crop was allowed to grow until June before ploughing in. By this time a magnificent crop was showing, and, owing probably to the effect of the lime and the fact that the crop was sufficiently heavy to keep the ground from being beaten down hard by the heavy rains early in the year, the soil was in a very loose condition. This fact, added to the heavy nature of the crop, rendered the ploughing in a somewhat difficult matter. As a consequence of the unsatisfactory covering in, the green crop took a matter of fully eight weeks before finally decomposing. Just previous to planting the plot was again cross ploughed with the disc and then deeply ploughed with the swing plough, followed by the subsoiler to a total depth of 20 in., and by the time of planting was in a condition of almost perfect tilth.

Portion of the block was now laid off into plats as follow:—Five plots were laid out containing five rows 5 ft. apart, the plants being placed 6 in. apart in the drills, an 8 ft. interspace being allowed between each plot. The variety of cane used was that known as New Guinea 24b.

EXPERIMENTS TO DETERMINE IF CANE SETS CUT FROM ARROWED CANES HAVE A
PREJUDICIAL EFFECT ON THE GERMINATION AND SUBSEQUENT YIELD.

In order to gain reliable data in regard to the above question a portion of land has been set aside for this purpose. Two plats have been planted as under, the variety used being Queensland 116:—

Plot 1.—Two drills 5 ft. apart, each drill containing 88 plants of three eyes each, cut from cane which had arrowed.

Plot 2.—Two drills 5 ft. apart, each drill containing 88 plants of three eyes each, cut from cane of the same age, but which had not arrowed.

Great care was taken in the selection of these plants, each one being carefully inspected before placing in the drill, so that every precaution might be taken that none of the eyes were in any way damaged. The germination will be most carefully noted every week during the germinating period, every shoot in both plots being counted.

ANALYTICAL TESTS OF MALABAR, OTAMITE, AND CHERIBON IN COMPETITION WITH NEW
GUINEA 15 (BADILA), 24 (GORU), AND H. Q. 426.

A great amount of controversy exists in some sugar districts (more particularly Mackay) as to the commercial value of Malabar or Green Tanna, Otamite, and Cheribon. These three canes were introduced into Queensland many years before the establishment of the Sugar Experiment Station, and no exact data is on record concerning them. Analyses of these particular varieties are of course available at the mills, but these have shown such extremes that it is claimed by many farmers that these canes are capable of giving good results at a certain age. Samples have been taken from a field and tested, but no further analysis has been made at a later date, so that early and late tests of the same field of cane are often not procurable.

In order that this matter may be definitely settled, Malabar, Otamite, and Cheribon, in competition with Badila, Goru, and H. Q. 426, were planted up in April last, while the same varieties were again planted in August, so that what is known as a “long” and a “short” crop might be secured. Analyses of all the varieties will be made, starting in June next, which will be carried on for several months with a view to determining whether the three first named canes are to be compared with the well known rich varieties, such as Badila, Goru, and H. Q. 426.

PRELIMINARY ANALYSIS OF TWENTY-THREE NEW PAPUAN CANES.

The introduction of the new Papuan canes (Wells's collection) has already been referred to. Such of the first shipment as had made sufficient progress for replanting had also made enough cane to spare small samples for analyses in August. These were carried out and appear hereunder. The numbers commence as N.G. 67, the last of Mr. Tryon's collection which was brought over in 1895 being New Guinea 66. It will be observed that several of these new canes show promising analytical figures.

PRELIMINARY EXAMINATION OF PAPUAN CANES (WELLS'S COLLECTION)—PLANT CANE, AUGUST, 1913.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
New Guinea	N.G. 67	11-8-13	10 months	15.8	12.93	1.28	81.83
Do.	N.G. 68	11-8-13	do.	17.3	16.02	.41	92.60
Do.	N.G. 69	11-8-13	do.	13.8	10.06	2.26	72.89
Do.	N.G. 70	11-8-13	do.	15.6	12.29	1.79	78.78
Do.	N.G. 72	11-8-13	do.	16.4	13.90	1.30	84.75
Do.	N.G. 73	11-8-13	do.	14.2	11.91	1.13	83.87
Do.	N.G. 74	11-8-13	do.	17.9	16.36	.51	91.39
Do.	N.F. 75	11-8-13	do.	18.1	16.91	.44	93.42
Do.	N.G. 77	11-8-13	do.	20.0	18.97	.34	94.85
Do.	N.G. 78	11-8-13	do.	15.0	12.94	.57	86.26
Do.	N.G. 79	11-8-13	do.	16.7	14.31	1.26	85.68
Do.	N.G. 80	10-8-13	do.	16.5	13.51	1.50	81.87
Do.	N.G. 81	10-8-13	do.	16.4	13.61	1.38	82.98
Do.	N.G. 82	11-8-13	do.	15.1	12.13	1.54	80.33
Do.	N.G. 83	11-8-13	do.	15.8	13.07	1.49	82.72
Do.	N.G. 84	11-8-13	do.	16.6	14.20	1.11	85.54
Do.	N.G. 85	11-8-13	do.	15.2	12.05	2.03	79.27
Do.	N.G. 86	11-8-13	do.	17.2	15.56	.63	90.46
Do.	N.G. 87	11-8-13	do.	16.3	13.34	1.88	81.84
Do.	N.G. 88	11-8-13	do.	15.4	13.10	1.01	85.06
Do.	N.G. 89	11-8-13	do.	17.6	15.86	.70	90.11
Do.	N.G. 90	11-8-13	do.	16.3	13.34	1.63	81.84
Do.	N.G. 91	11-8-13	do.	15.4	11.67	2.44	75.77

TOTAL SUGAR AND OBTAINABLE SUGAR.

In all the results of the Mackay experiment work the total sugar per acre is calculated out. What is known as "available" or "obtainable" sugar depends entirely (as has often been previously explained) on the skill of the manufacturer and the condition of his plant. No satisfactory formula for reducing total to obtainable sugar has been evolved for Queensland conditions, as the work of the mills differs so greatly.

INTRODUCTION OF NEW VARIETIES OTHER THAN NEW GUINEA CANES.

The Bureau of Sugar Experiment Stations has been constantly on the alert to introduce to the Mackay Station canes of apparent promise with a view of their being tested and if of value ultimately distributed to farmers. The following canes have been procured and planted during the past twelve months:—

1. Gingila (a cane having its origin on the Herbert River and stated to be a cross between Mauritius Gingham and Badila procured by grafting).
2. H.Q. 458.
3. N.G. 16. A cane stated to be giving fine results on the Northern Rivers of New South Wales.
4. Petit Senneville, grown in the Childers district.
5. A large unknown variety which attracted considerable attention at the last Mackay Show.

We are indebted to the Colonial Sugar Refining Company at Macnade for H.Q. 458, and to Messrs. G. P. Wright, T. W. Powell, and Mr. Franklin, of Mackay, for Gingila, N.G. 16, and the unknown variety. Mr. Swindell, of Childers, kindly sent the Petit Senneville.

DISTRIBUTION OF VARIETIES OF CANE FROM MACKAY.

The demand for new canes in the different districts still continues, and the work of distribution is one of the most important duties of the Mackay Station. All cane has to be most carefully selected, examined, and packed, so that the varieties may reach their destination in the very best of order. Notwithstanding that many farmers last year obtained varieties from the different experiment plots established in their districts, there has been no falling off in the number of applications dealt with by the station. Up to this year crates of cane sent to Southern sugar districts were sent *via* Brisbane, which often meant the transfer of crates to other steamers and considerable delay. This year, however, a firm of shipping agents at Gladstone were appointed to deal with crates of varieties, and these are now railed direct from Gladstone to Southern centres on arrival—a method which often saves a fortnight's delay.

During the distributing season of this year, March and August, twenty-five crates of sugar-cane have been despatched to Farmers' Associations and millowners in the South and nine crates to Northern

sugar centres. These crates are carefully and strongly built and carry the cane quite safely and in good condition to its destination. Smaller parcels of cane, packed in hessian, have been sent to fifty persons.

In addition to this, local distributions to Mackay farmers have been made, an unusually large number applying for and receiving cane.

Crates or boxes of varieties have also been forwarded to the Department of Agriculture, Cawnpore, India; The Administrator, Northern Territory; and also to the Philippine Islands. Exhibition canes were also sent to the Mackay Show and to the Brisbane Exhibition.

SUBSIDIARY CROPS.

SORGHUMS.

Sufficient sorghum varieties have been grown during the year to provide feed for station horses and seed for distribution purposes. The kinds grown chiefly are:—Early Orange, Mixed American, and Giant Honduras. Of these, the two former give the best results, furnishing generally two or more crops while the Giant Honduras is making one. Seed is now collected when applied for, owing to the difficulty experienced in keeping this seed in stock.

FRUIT TREES.

A small demand still exists for mango, pawpaw, and tamarind seeds and plants. These are from time to time available for distribution.

GRAPE VINES AND PINEAPPLES.

Distributions of vine cuttings and pineapple suckers have been made at the usual time to cane farmers. Owing to the ground in which these crops have been planted having to a certain extent run out, the best of the pineapple suckers and cuttings of all vines have been replanted in order to replace all old stock.

GREEN MANURE CROPS.

Green manuring crops of different kinds have been grown during the year, and, where possible, seed has been collected. A good deal of this has been distributed, and further areas of the small red Mauritius bean are now ripening and will shortly be ready for picking.

MISCELLANEOUS.

During the past year the laboratory has been kept fully employed. A new gas plant for heating purposes has been installed, the old "Alpha" gasolene machine, originally erected in 1898, having become unfit for use.

The following analyses of soils from different districts have been made:—

ANALYSIS OF SOILS CARRIED OUT AT THE MACKAY LABORATORY.

Analysis Number.	Locality.	TOTAL ELEMENTS IN SOIL.				AVAILABLE ELEMENTS IN SOIL.			TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
		Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
49	Mackay Soils ...	0.19	0.375	0.153	0.112	0.0181	0.0086	0.0068	4.750	9.375	3.825	2.800	452.5	219	170.0
50	" " ...	0.170	0.251	0.144	0.206	0.0146	0.0106	0.0051	4.250	6.250	3.650	5.170	365	267	127.5
51	" " ...	0.160	0.400	0.198	0.124	0.0394	0.0090	0.0073	4.000	10.000	4.950	3.100	985	184.5	128.5
55	Mackay (Station Soil) ...	0.840	0.170	0.211	0.164	0.1406	0.0088	0.0068	21.000	4.250	5.275	3.850	3.516	85	17.0
1374	" " ...	0.500	0.196	0.121	0.160	0.0721	0.0040	0.0040	12.500	4.900	3.025	4.000	1.800	225	100.0
1379	" " ...	0.470	0.181	0.076	0.184	0.0524	0.0044	0.0007	11.750	4.900	4.550	3.350	1.310	110	17.5
1389	" " ...	0.780	0.157	0.185	0.180	0.0746	0.0078	0.006	19.500	3.950	4.625	1.500	1.865	195	15.0
13-1	Palms, Mackay ...	0.720	0.194	0.185	0.088	0.0893	0.100	0.0034	18.000	4.800	4.625	2.200	2.232.5	250	8.5
13-6	North Side, Mackay ...	0.720	0.200	0.127	0.102	0.0758	0.0032	0.002	18.000	6.875	3.175	3.390	1.905	80	5.0
1386	Racecourse, Mackay ...	1.000	0.203	0.121	0.131	0.0621	0.042	0.0007	25.000	5.075	3.025	3.275	2.232.5	105	17.5
1387	Maran, Mackay ...	1.370	0.90	0.338	0.141	0.1511	0.052	...	31.250	9.750	8.470	3.725	3.785	130	...
1393	Hutton, Mackay ...	0.830	0.372	0.302	0.122	0.1111	0.051	0.0015	20.750	8.800	8.300	3.050	2.852	127.5	37.5
1394	" " ...	1.030	0.419	0.338	0.202	0.1308	0.039	0.0012	25.750	8.725	8.430	5.450	3.270	117.5	30.0
1395	" " ...	0.800	0.154	0.379	0.352	0.095	0.043	0.0005	29.000	3.850	11.975	8.800	2.512.5	107.5	12.5
1391	Pinnacle, Mackay ...	1.200	0.556	0.19	0.191	0.083	0.033	0.0005	30.000	11.400	7.075	4.775	3.657.5	232.5	87.5
1397	" " ...	1.110	0.493	0.294	0.224	0.093	0.046	0.0018	27.750	12.372	7.335	5.000	4.800	365	45
1398	" " ...	0.500	0.07	0.185	0.205	0.086	0.076	0.0058	12.500	2.425	4.925	5.125	4.000	199	145
1399	Farleigh, Mackay ...	1.234	0.87	0.131	0.116	0.096	0.026	0.0004	30.850	2.175	3.350	2.000	2.700	45	10.0
1369	Mossman ...	0.189	0.215	0.179	0.165	0.0210	0.002	0.0006	4.500	5.375	4.475	4.125	525	200	15.0
1370	" " ...	0.100	0.50	0.115	0.199	0.0202	0.014	0.0011	2.500	14.975	2.875	4.975	605	360	27.5
1371	" (Subsoil of 1370) ...	0.100	0.631	0.191	...	...	...	...	...	...	...	...	...	...	...
1372	Johnstone River ...	0.140	0.269	0.230	0.230	0.019	0.0066	0.0015	3.500	5.225	5.750	5.750	272.5	165	37.5
1383	Mossman ...	0.300	0.293	0.179	0.176	0.098	0.034	0.0005	7.500	7.325	4.475	4.400	215	85	12.5
1384	" (Subsoil of 1383) ...	0.230	0.31	0.166	...	...	...	...	...	...	...	...	...	...	...
1389	Innisfail ...	0.20	0.242	0.230	0.173	0.0251	0.0114	0.0010	5.500	6.050	5.750	4.325	702.5	295	25.0
1390	" (Subsoil of 1389) ...	0.350	0.108	0.185	...	...	...	...	...	...	...	...	...	...	...
1391	Mossman ...	0.180	0.307	0.140	0.095	0.0114	0.0057	0.0085	4.500	0.925	3.500	2.375	280	142.5	21.5
1392	" (Subsoil of 1391) ...	0.250	0.15	0.350	...	...	...	...	...	...	...	...	...	...	...
1400	Daradgee ...	0.520	0.199	0.201	0.272	0.0300	0.0073	0.0036	8.000	4.975	9.100	6.800	150	182.5	9.0
14-1	" (Subsoil of 1400) ...	0.310	0.165	0.139	...	...	...	...	...	...	...	...	...	...	...
1417	Innisfail ...	0.200	0.133	0.379	0.321	0.0513	0.0069	0.0012	6.500	9.375	12.975	8.025	792.5	172.5	30.0
1418	" " ...	0.210	0.181	0.353	0.306	0.0256	0.004	0.0009	5.250	2.025	11.325	7.450	610	160	22.5
1413	Farleigh, Mackay ...	0.520	0.12	0.160	0.610	0.0562	0.0051	0.0011	13.000	3.550	1.300	2.800	1.400	135	27.5
1382	Proserpine ...	0.550	0.03	0.140	0.171	0.087	0.0033	0.0003	13.750	2.325	3.500	4.275	2.002.5	82.5	7.5

For obvious reasons the names of individual senders have been replaced by a number, but each farmer sending in soil samples receives the results put in such a form that he can readily understand them, and each result is accompanied by a letter from the General Superintendent, containing advice as to the best method of treating the soil in question.

In the Mackay district, in which the sensitive plant is very common, it has frequently been remarked that where a heavy crop of this plant has been ploughed under a good crop of cane usually

The temperature readings are also of importance from the manner in which they are shown. Hilgard ("Soils," page 289) points out that it is the extremes of temperature that are most important, and that the annual mean temperature is not a good criterion, since one and the same figures may result equally from the averaging of two widely divergent data and from such as are close together. Thus an average of 60 deg. Fahr. might result equally from the averaging of 65 and 55 deg., or from taking the mean of 15 and 105 deg., yet the respective cultural adaptations would be widely different.

The following table shows the total number of analyses carried out at the Mackay Station Laboratory from 1st July, 1912, to the 30th June, 1913.

DETAILED REPORT OF ANALYTICAL WORK PERFORMED IN THE LABORATORY OF THE SUGAR EXPERIMENT STATION,
MACKAY, FROM 1ST JULY, 1912, TO 30TH JUNE, 1913.

Materials.	Number of Samples Analysed.	Number of Analyses.
Soils—		
Agricultural Method	18	36
Nitrogen Determinations	18	36
Humus	14	28
Mechanical Analyses	18	18
Aspartic Acid Soluble	14	14
Fertiliser	2	4
Lime, complete analysis	1	2
Limestone	2	4
Sugar-canes and Juices	142	284
Fibre Determinations	25	50
Water	1	2
Total	255	478

L. C. McCREADY,
Chemist in Charge.

In addition to the above analyses, the Agricultural Chemist—Mr. J. C. Brünnich—has carried out a number of soil and other analyses on behalf of the Sugar Bureau, as under:—

Materials.	Number of Samples Analysed.	Number of Analyses.
Soils, Agricultural Method	52	104
Soils, Available Constituents	46	46
Sugar Canes (Ash)	43	86
Water	1	2
Totals	142	238

The thanks of the Sugar Bureau are due to Mr. Brünnich for the promptness with which results are forwarded.

ESTABLISHMENT OF EXPERIMENT PLOTS IN THE NORTHERN AND SOUTHERN SUGAR
DISTRICTS OF QUEENSLAND.

In the report of 1911, my predecessor, Dr. Gibson, mentioned that a number of farmers' experiment plots were to be established in leading centres, north and south of Mackay.

A series of such plots were therefore planted:—

- (a) To test green manuring, subsoiling, use of lime and fertilisers upon varying soils.
- (b) To test approved varieties of sugar cane in different localities.
- (c) To provide for the distribution of the approved varieties in such districts.

Unfortunately in laying out these experimental plots the Bureau struck a bad year. Not only was the weather of the driest and most unfavourable nature to cane crops that had been experienced for many years past, but the labour difficulties became acute, and this feature caused the abandonment of some of the plots originally provided for.

Another drawback is the fact that many farmers are not equipped with sufficient horses and implements to carry out the subsoiling as deeply as is desired, and the hard soil last year has prevented the depth accomplished being as great as it should have been.

The existing plots were chosen by the chemist in charge of the Mackay Station, Mr. McCready, who has supplied the following particulars and remarks:—

“The fact that sugar is grown practically all along the Queensland seaboard, between the 16th and 28th parallels of latitude, renders the conditions of soil and climate in this State unique and not approached by those of any other sugar-growing country in the world. When the fact is taken into consideration that sugar-cane is grown in, say, the Bundaberg district, with a red volcanic soil and an average rainfall of 40 in., and is also grown in the Mossman district, on an alluvial soil with an average rainfall of 170 in., it becomes obvious that no hard and fast principles of working can be laid down. For these reasons the findings of the different plots should prove of some value. It is intended to experiment with different mixtures of fertiliser in order to try and arrive at the best mixture for each locality. This mixture may then be used as a basis, subject, of course, to modifications to suit the seasons.

“In addition to the above the plots will be made use of as a means of introduction and distribution of new varieties. Cane varieties will first be grown and tested at the Head Station at Mackay, and all canes proved of commercial value and free from disease will then be sent to the different plots, and from there distributed to the surrounding farmers.

“The plots have, except where otherwise mentioned, been laid out into eight divisions.

“Plots 1 and 2 have been reserved for the introduction of new varieties, one plot being planted and the other held in reserve to supply cane when the first has run out. By this means there will always be one plot under cane and one in reserve.”

Referring to the working of these plots, Mr. H. G. Burn, the Northern Field Assistant, who is in charge of the work on the Northern plots under instructions from the General Superintendent, remarks:—

“In reference to the working of the plots it may be necessary to state, and the same remark has been expressed to me by the farmers who have undertaken the work, that the preparation of land for experiments could be done in less time on a much larger area—*i.e.*, the constant turning of horses on limited areas, the method of work being somewhat new, and (being short of horses) the changing of same team from the disc plough to the subsoiling plough, causes considerable delay, and adds largely to the cost.”

In the statements which follow, the Field Assistants—Mr. H. G. Burn (Northern) and Mr. H. T. Harvey (Southern)—have supplied the particulars and dates of the work done on the various plots in the shape of a report to the General Superintendent. These have been freely used as a preface in each case to giving the actual results:—

Mr. Geo. Muntz's Plot, Mossman.

September 18, 1911.—Land was broken up, old cane stools being ploughed out and trash burnt, then harrowed and rolled.

December 7.—Plots 1, 2, 3, 4, 5, and 6, lime applied broadcast at the rate of 1 ton per acre.

December 12.—Plots 1 to 6 were cross ploughed. Plots 7 and 8 also received a ploughing. Plots 1 to 4 red Mauritius beans sown broadcast. Conditions were dry. Plots 1 to 8 were rolled and harrowed. Beans did not strike sufficiently, and black Mauritius were sown in drills with better success.

June 1, 1912.—Plots 2 to 4, green manure ploughed under. Plots 5, 6, 7, and 8 received a ploughing and harrowing.

July 28.—Plots 2 to 7 were cross ploughed to the depth of 8 in., and subsoiled from 3 to 5 in. Plot 8 received a ploughing but no subsoiling.

July 31.—Plot 2 was planted with cane varieties as under:—

Rows 1, 2, and 3	.. .. .	Mauritius Malagache.
Rows 4, 5, and 6	.. .. .	Mauritius 189.
Rows 7 and 8	.. .. .	H.Q. 426.
Rows 9, 10, and 11	.. .. .	N.G. 26
Rows 12, 13, 14, and 15	.. .. .	N.G. 24B
Rows 16, 17, 18, and 19	.. .. .	N.G. 24A
Rows 20, 21, 22, and 23	.. .. .	N.G. 40
Rows 24 and 25	.. .. .	D. 1135
Rows 26 and 27	.. .. .	B. 147
Rows 28, 29, and 30	.. .. .	H.Q. 5
Rows 31, 32, and 33	.. .. .	H.Q. 114.

August 6.—Plots 3 to 8 were planted with N.G. 24.

In the case of the variety plot, drills were made 6 ft. apart, and plots 3 to 8, 5 ft. apart. All drills were 6 in. deep. Plants with three eyes were placed 6 in. apart, and covered with 2½ to 3½ in. of soil with scarifier.

October 5.—Plots 2 to 8 were scarified.

October 15.—Plots 2 to 8 were weeded.

November 4.—Plots 2 to 8 again received a scarifying.

November 29.—Plots 2 to 8 were weeded.

December 7.—Plots 4 and 6. Manure at the rate of 4 cwt. per acre was applied to these two plots. This was a mixed fertiliser consisting of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. superphosphate, the cost of the manure per acre being £2 4s. Plots 2 to 8 were scarified.

December 20.—Plots 2 to 8 were scarified.

January, 14, 1913.—Plots 4 and 6—1 cwt. sulphate of ammonia applied on the surface to cane stools. Cost of manure per acre, 16s.

Before planting, best conditions and depth of tilth were not obtained, due to dry weather. A little rain in August and September, and more fell in October and November, 1912, and the cane improved a little in growth. With good rain from January to April, 1913, inclusive, growth of cane was splendid.

A check in growth may have been due to cold and dry conditions from June this year. Some of the cane varieties and a small portion of cane in competitive plots had arrowed.

July 1.—Cane varieties were distributed to farmers.

July 7.—Plot 2. Ratooning of cane varieties.

August 11.—Cane from competitive plots harvested with the following results:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MR. GEO. MUNTZ'S FARM AT MOSSMAN.
PLANT CANE. VARIETY, N.G. 24 (Goru). AREA OF PLOT, 3 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (P.O.C.S.)
3	Lime, green manuring, and subsoiling	30.28	5.56	4.98
4	Lime, green manure, mixed manure and subsoiling	31.75	5.51	4.85
5	Lime and subsoiling	30.96	5.90	5.33
6	Lime, mixed manure, and subsoiling	36.99	6.39	5.67
7	Subsoiling only	24.76	4.50	4.04
8	Ordinary cultivation only	27.51	5.23	4.74

Plots 1 and 2.—Varieties. Cane planted 8th August, 1912. Cane harvested 11th August, 1913.

The analytical results are shown below:—

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS UPON GEO. MUNTZ'S FARM, MOSSMAN.
VARIETY, NEW GUINEA 24 (Goru).

Division.	Treatment.	Density of Juice (Brix).	Sucrose in Juice.	Quotient of Purity.	% Sucrose in Cane.	P.O.C.S.
3	Lime, green manuring, and subsoiling	22.9	20.88	91.1	18.37	16.45
4	Lime, green manuring, mixed manure, and subsoiling	22.2	19.74	88.9	17.37	15.30
5	Lime and subsoiling	23.3	21.68	93.0	19.07	17.24
6	Lime, mixed manure, and subsoiling	21.9	19.66	89.7	17.30	15.33
7	Subsoiling only	22.5	20.66	91.8	18.18	16.33
8	Ordinary cultivation only	23.3	21.64	92.8	19.04	17.24

Supplied by courtesy of the Mossman Central Mill Company.

No great reliance can be placed on conclusions drawn from experiments that are not carried out in duplicate, or compared with a companion series of untreated plots. Further it was known that the rats had damaged the plots to some extent. The mixed manure appears to have given a slight increase on plot 4 and a larger one on plot 6. Lime appears to have benefited all the plots upon which it was used.

The yield of sugar per acre is entirely satisfactory. It will be noted that the tonnage of so-called "pure obtainable cane sugar" has been given in addition to the "total sugar per acre" in the case of these experiment plots. The former is based on an arbitrary formula used by the Colonial Sugar Refining Company, as the outcome of their long experience in manufacture. It is, however, not applicable to other manufacturing conditions in Queensland, except in a limited sense, but the p.o.c.s., as it is termed, has all the same come into very general use, and it certainly promises some means of reducing the total sugar to what might be obtained by skilled manufacturers, chemical control, and up-to-date plants. Until the succeeding ratoon crops are harvested no other definite inferences can be drawn.

Mr. James Souter's Plot, Saltwater, Mossman.

This plot, the area of which is 2 acres, is situated on a low-lying portion of the district, known as Saltwater Creek.

A large area of land having gone out of cultivation on account of the soil having become impoverished by continuous cropping, the present plot has been laid out to endeavour to ascertain whether cane can still be raised successfully and at the same time find a general fertiliser to suit the locality. No varieties were grown on this plot.

March 15, 1912.—Cane stools were ploughed out, harrowed, grass worked out, and stools carted off.

March 20.—Plots 1 to 6 cross ploughed.

March 22.—Plots 1 to 6, lime applied broadcast at the rate of 30 cwt. per acre.

March 23 to 25.—Cross ploughing.

April 1.—Plots 1 to 6, cowpea was sown broadcast and harrowed, but crop poor.

June 9.—Ploughing under green manure with disc.

July 27.—Cross ploughing 7 in. in depth with swing plough and subsoiled 9 in. below the ploughing, then harrowed.

August 8 to 10.—Plots 1 to 6 planted with variety cane E. 147, in good condition; drills were opened up 5 ft. apart, depth of drills 6 in., plants of three eyes placed 6 in. apart, covered with 2 to 3 in. of soil with scarifier.

August 9 and 10.—Plot 1 received at the rate of 1 cwt. sulphate of potash, and 2 cwt. of meatworks per acre, applied in drill when planting. Cost of manure per acre, £1 9s. 6d.

Plot 2 received at the rate of 2 cwt. dried blood, 1 cwt. sulphate of potash, and 1 cwt. of meatworks per acre, applied in drill when planting. Cost of manure per acre, £2 4s.

Plot 3 received at the rate of 1 cwt. dried blood, 1 cwt. sulphate of potash, and 1 cwt. superphosphate per acre, applied in drill when planting. Cost of manure per acre, £1 12s. 6d.

September 25.—Plots 1 to 6 scarified with Planet Junior.

October 17.—Plots 4, 5, and 6, supplying cane misses.

October 18.—Plots 1 to 6 were weeded.

December 2.—Plots 1 to 6, scarifying and weeding.

December 9.—Plots 1 and 3 received a surface dressing of sulphate of ammonia, at the rate of 1 cwt. per acre. Cost of manure per acre, 16s.

December 9.—Plots 1 and 3 scarified.

December 10.—Plot 4 received at the rate of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate per acre. Cost of manure per acre, £2 4s.

December 10.—Plot 5 received a dressing at the rate of 256 lb. sulphate of ammonia, 77 lb. sulphate of potash, and 115 lb. superphosphate. Cost of manure per acre, £2 14s.

December 20 and 21.—Plots 1 to 6 received a chipping.

February 7, 1913.—Plots 1 to 6 were scarified.

Before planting, tilth was fairly good and moisture fair, the growth of cane in plots 1 to 3 was better than in plots 4, 5, and 6, the difference being probably due to the earlier application of the manures. As in other cases, the cane did not make very much growth during the year 1912, conditions being dry. Best growth of cane was during the period from January to May inclusive; from then to the time of harvesting the cane, dry weather spells set in, with cold snaps, the cane matured quickly and arrowed. Rats also destroyed much of the cane.

September 3 to 9.—Harvesting of crop carried out.

The crop results are set forth in the following table:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENTAL PLOTS UPON MR. J. SOUTER'S FARM AT SALTWATER,] MOSSMAN. PLANT CANE. VARIETY, B. 147. AREA OF PLOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of total Sugar per Acre.	Tons of Pure obtainable Cane Sugar per Acre (P.O.C.S.)
1	Lime, green manure, subsoiling, mixed manure as meatworks, sulphate of ammonia, and sulphate of potash, 4 cwt. per acre.	26.19	4.87	4.23
2	Lime, green manure, subsoiling, mixed manure as dried blood, sulphate of potash, and meatworks, 4 cwt. per acre.	25.18	4.75	4.30
3	Lime, green manure, subsoiling, mixed manure as dried blood, sulphate of potash, sulphate of ammonia, and superphosphate	24.66	4.69	4.25
4	Lime, green manure, subsoiling, mixed manure as 172 lb. sulphate ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate, 4 cwt. per acre	20.31	3.94	3.62
5	Lime, green manure, subsoiling, mixed manure as 256 lb. sulphate ammonia, 77 lb. sulphate of potash, and 115 lb. superphosphate, 4 cwt. per acre	19.65	3.84	3.53
6	Lime, green manure, and subsoiling only	13.28	2.43	2.19

Cane planted 10th August, 1912.

Cane harvested 4th September, 1913.

Analyses of the canes from these plots were made by the Mossman Mill Company at time of harvest, the results of which are set out in the table hereunder:—

ANALYTICAL RESULTS FROM EXPERIMENTAL PLOTS UPON J. SOUTER'S FARM AT SALTWATER, MOSSMAN. VARIETY, B. 147.

Division.	Treatment.	Density of Juice (Brix)	Sucrose in Juice.	Quotient of Purity.	% Sucrose in Cane.	P.O.C.S.
1	Lime, green manure, subsoiling, and mixed manure	23.5	21.69	92.0	18.60	16.17
2	Lime, green manure, subsoiling, and mixed manure	23.2	21.69	93.4	18.87	17.10
3	Lime, green manure, subsoiling, and mixed manure	23.4	21.39	91.5	19.03	17.25
4	Lime, green manure, subsoiling, and mixed manures	22.4	22.35	95.5	19.44	17.83
5	Lime, green manure, subsoiling, and mixed manures	25.4	22.48	96.0	19.55	18.01
6	Lime, green manure, and subsoiling only	22.7	21.04	92.6	18.30	16.50

Supplied by courtesy of Mossman Central Mill Company.

The only conclusion that can be drawn at the present time is that the manures have given a good account of themselves, No. 1 mixture having given the best results. It is to be regretted that the severe depredations of rats in the Mossman District have also extended to this plot. The point most in evidence appears to be that these poor soils could be made to grow cane with the use of lime, green manure, and mixed manure.

Mr. W. F. Andrew's Plot, Innisfail.

This plot, the area of which is 3 acres, is situated on a high piece of red volcanic soil.

November 1, 1911.—Land for plots 1, 2, 3, 4, 5, 6, 7, and 8 was ploughed with disc plough, then harrowed and grass burnt.

November 7.—Lime was applied broadcast to plots 1 to 6 at the rate of 1 ton per acre.

December 10.—Plots 1 to 8 were cross ploughed, then harrowed.

January, 8, 1912.—Black Mauritius bean and cowpea sown in drills 3 ft. apart on plots 1, 2, 3, and 4.

Portion of plots 5 and 6 was ploughed. This was due to cowpea being sown in mistake and instructions being mislaid.

Plots 7 and 8 received a ploughing contrary to instructions.

March 25.—Ploughing under green manure in plots 1 to 4, at same time plots 5 to 8 received a ploughing. Green manure was rolled before being ploughed under and plots 5 to 8 were harrowed once.

April 25.—Ploughing plots 1 to 8 with disc to depth of 10 in., and then with a skeleton plough not less than 5 in. below the ploughing, then harrowed twice. Plot 7 not subsoiled.

May 3.—Variety plot 1 was planted with Mackay cane varieties as under:—

Rows 1 and 2	.. .. .	M. 189.
Rows 3 and 4	.. .. .	N.G. 26
Rows 5 and 6	.. .. .	H.Q. 5
Rows 7, 8, and 9	.. .. .	N.G. 40
Rows 10, 11, and 12	.. .. .	Malagache
Rows 13, 14, and 15	.. .. .	B. 147
Rows 16 and 17	.. .. .	H.Q. 114
Rows 18, 19, and 20	.. .. .	H.Q. 426
Rows 21, 22, and 23	.. .. .	N.G. 24A
Rows 24, 25, and 26	.. .. .	N.G. 24B

The drills were made 5 ft. apart, depth of drills being 7 in., plants of three eyes being placed 6 in. apart. Two hundredweight per acre of mixed fertiliser, containing 86 lb. sulphate of ammonia, 34½ lb. sulphate of potash, and 103½ lb. superphosphate, was then applied. Cost of fertiliser, 22s. per acre.

May 7.—The competitive plots 3 to 8 were then planted with N.G. 15 (Badila), drills 5 ft. apart, and depth of drills, etc., same as in variety plot. Mixed manure at the rate of 86 lb. of sulphate of ammonia, 34½ lb. sulphate of potash, and 103½ lb. of superphosphate, per acre was applied in the drills to plots 4 and 6, the cost of the fertiliser being 22s. per acre.

June 1.—Cultivation plots 2, 3, 4, 5, 6, 7, and 8 were scarified and weeded.

July 6.—A few misses of plants were supplied to competitive plots.

July 15.—Competitive plots 3 to 8 were weeded.

August 30.—Competitive plots 3 to 8 were scarified and weeded.

November 15.—Competitive plots 3 to 8 were weeded.

December 5.—A second dressing of mixed manure was applied to plots 4 and 6 at the same rate per acre as mentioned above, the cost per acre being the same. This was applied in shallow drills on each side of the cane, drawn 9 in. from the plants.

The condition of the soil, when planting, was good, and during the germination period during the months of May and June, 1912, heavy rain was experienced, but very little fell from July to December of the same year, when the condition of the soil and growth of cane was not so good. From January to April, 1913, good rains improved the cane growth splendidly, but from May to the time of cutting, dry and cold weather brought about a quicker maturity and arrowing of the cane. The New Guinea borer had also got into the Badila and may have affected the growth a little.

The distribution of cane varieties was carried out from the 24th to the 29th July inclusive, and the ratooning on the 31st July.

The competitive plots were harvested on August 15th, the results appearing below:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MR. ANDREW'S FARM AT INNISFAIL.
PLANT CANE. VARIETY, BADILA. AREA OF PLOT, 3 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre.
3	Lime, green manuring, and subsoiling	35.24	5.61	5.35
4	Lime, green manure, mixed manure, and subsoiling	31.84	5.44	5.22
5	Lime and subsoiling	30.42	5.47	5.24
6	Lime, mixed manure, and subsoiling	31.51	5.32	5.08
7	Ordinary cultivation only	17.27	3.21	3.08
8	Subsoiling only	15.57	2.78	2.67

Divisions 1 and 2, varieties Cane planted 8th May, 1912. Cane harvested 15th August, 1913.

The cane was kindly analysed by the Colonial Sugar Refining Company at Goondi, to whom we are indebted for the following figures:—

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS UPON MR. W. F. ANDREWE'S FARM, INNISFAIL, VARIETY, BADILA.

Division.	Treatment.	Density of Juice (Brix.)	Sucrose in Juice.	Quotient of Purity.	% Sucrose in Cane.	P.O.C.S.
3	Lime, green manuring, and subsoiling	20.7	19.4	92	16.9	16.10
4	Lime, green manure, mixed manure, and subsoiling ..	20.9	19.7	92	17.1	16.40
5	Lime and subsoiling	21.9	20.7	92	18.0	17.25
6	Lime, mixed manure, and subsoiling	20.6	19.4	92	16.9	16.15
7	Ordinary cultivation only	22.6	21.4	93	18.6	17.85
8	Subsoiling only	21.7	20.6	93	17.9	17.20

The manure showed to little or no advantage in the plant crop, and this frequently happens. The plot not subsoiled also gave a higher return than the plot that was so treated. It must be remembered, however, that the subsoiling is not done in the same way as at Mackay—viz., very deeply with a special implement, which loosens but does not invert any soil. The most patent fact appears here also that lime and green manure have given the highest results, the increase being nearly double over the plots without lime and green manures. The yield of sugar per acre is highly satisfactory, and the analytical results are good, showing a pure juice of high sugar content, the usual accompaniment of Badila. In the ratoon experiments now to be conducted some alteration in the treatment of the plots is to be carried out. Plots 5 and 7 will not be subsoiled. The mixed fertilisers will consist of meatworks, sulphate of potash, and sulphate of ammonia.

Messrs. H. Ruge and Sons' Plot, Proserpine (formerly W. Webster).

This plot, the area of which is 2 acres, is situated within half a mile of the town of Proserpine, and is representative of the ordinary forest lands in that locality.

October 20, 1911.—Ploughing out old stools, then harrowed.

December 28.—Lime applied at the rate of 1 ton per acre to plots 1 to 6.

January 29, 1912.—Plots 1 to 8 were cross ploughed.

January 31.—Plots 1 to 4, cowpea was sown broadcast, then harrowed; the resulting green crop turned out poorly.

April 15.—Plots 1 to 4, ploughing under green manure. Plots 5 to 8 were at the same time ploughed; all plots were harrowed.

August 23.—Plots 2 to 7 cross ploughed and subsoiled to the depth of 17 in. Plot 8 was ploughed also, but not subsoiled. Then all plots were harrowed.

August 27.—Plot 2 was planted with cane varieties from Mackay, as under:—

Row 1	H.Q. 426	Row 11	H.Q. 114
Rows 2 and 3	N.G. 40	Row 12	B. 147
Rows 4 and 5	N.G. 24B	Row 13	Q. 116
Rows 6, 7, and 8	N.G. 24A	Row 14	M. 189
Rows 9 and 10	Malagache	Rows 15, 16, and 17	H. Q. 5

Plots 3 to 8 were planted with Malagache. In both cases drills were opened up 5 ft. apart, 8 to 9 in. in depth, plants with three eyes placed 6 in. apart, then covered with 2 in. of soil with hoe; scarifier not in working order.

September 16.—Plots 2, 3, 4, 5, 6, 7, and 8 harrowing bays, condition of tilth lumpy.

September 3.—Plots 2 to 8, scarifying and ploughing.

September 10.—Plots 2 to 8, scarifying and ploughing.

September 11.—Plots 2 to 8, scarifying and ploughing.

The work of ploughing was contrary to instructions and may have been done to save weeding.

November 2.—Plots 2 to 8 harrowed; this work was not instructed to be done.

November 4 and 12.—Plots 2 to 8 were scarified.

November 20.—Plots 2 to 8, chipping.

November 30.—Plots 4 and 6 received 4 cwt. of mixed fertiliser per acre, consisting of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate, the cost per acre being £2 4s. The manures were applied on each side of the cane rows in shallow furrows 9 in. from cane stools.

December 13.—Plots 2 to 8, chipping.

December 30.—Plots 4 and 6, sulphate of ammonia applied as a surface dressing on each side of cane stools at the rate of 1 cwt. per acre on each plot. Cost per acre, 16s.

December 31.—Plots 2 to 8, scarifying.

The condition of the soil before planting was moist, but later in year 1912 the growth of cane was backward owing to dry weather. Good rains from January to May inclusive, 1913, brought about better condition in soil and a better return in crop, but canes mostly matured early and arrowed freely. August 21 to 23 inclusive.—Cane varieties were distributed to farmers.
August 25.—Ratooning variety plot.

On September 29th the cane was harvested, the results appearing in the table given below:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MESSRS. H. RUGE AND SONS' FARM AT PROSERPINE. PLANT CANE. VARIETY, MALAGACHE. AREA OF PLOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (P.O.C.S.)
3	Lime, green manuring, and subsoiling	31.30	4.95	4.41
4	Lime, green manure, mixed manure, and subsoiling	55.93	5.63	5.00
5	Lime and subsoiling	32.39	5.25	4.68
6	Lime, mixed manure, and subsoiling	40.19	5.89	5.14
7	Subsoiling only	33.84	5.41	4.78
8	Ordinary cultivation only	35.93	5.55	4.92

Plots 1 and 2, varieties. Cane planted 27th August, 1912. Cane harvested 29th September, 1913.

The analytical figures are as follows:—

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS UPON MESSRS. H. RUGE AND SONS' FARM AT PROSERPINE. VARIETY, MALAGACHE.

Division.	Treatment.	Density of Juice (Brix).	Sucrose in Juice.	Quotient of Purity.	% Sucrose in Cane.	P.O.C.S.
3	Lime, green manuring, and subsoiling	19.63	17.80	90.67	15.84	14.10
4	Lime, green manure, mixed manure, and subsoiling	19.50	17.62	90.36	15.68	13.93
5	Lime and subsoiling	20.08	18.22	90.83	16.21	14.45
6	Lime, mixed manure, and subsoiling	18.80	16.50	87.23	14.68	12.81
7	Subsoiling only	20.06	17.97	89.58	15.99	14.14
8	Ordinary cultivation only	19.29	17.37	90.05	15.46	13.72

Supplied by courtesy of the Proserpine Central Mill.

In this series the manures have shown some result on plot 6, while the "ordinary cultivation only" has here also given better results than the subsoiled plot. The whole of this plot has turned out well, but there are no definite results to make use of at the present time. The yield of sugar is very good.

Mr. W. Ogston's Plot, Ingham.

This plot, the area of which is 3 acres, is situated close to the town of Ingham and is representative of the river bank soils in that locality:—

November 11, 1911.—Breaking up land and harrowing for plots 1 to 8.

January 22, 1912.—Plots 1 to 6, applying lime broadcast at the rate of 1 ton per acre.

January 23.—Plots 1 to 6, ploughing under lime. At the same time plots 7 and 8 were ploughed.

January 26.—Sowing cowpea broadcast, plots 1 to 4 then harrowed.

April 1.—Plots 1 to 8 were cross ploughed; at the same time, the green manure on plots 1 to 4, which proved an indifferent crop, was ploughed under, then rolled.

April 8.—Plots 1, 2, 3, 4, 5, 6, and 8 were cross ploughed and subsoiled, plot 7 at the same time being ploughed but not subsoiled. Then all plots were harrowed.

April 9.—Planting cane varieties from Mackay as under:—

Variety of Cane.	No. of Drills.
New Guinea 24A	2
New Guinea 24B	2
New Guinea 26	2
New Guinea 40	3
Mauritius Malagache	2
Queensland 116	2
Hambleton 5	2
Hambleton 114	2
Hambleton 426	2
Barbadoes 147	3

May 11.—Competitive plots planted with variety known as New Guinea 24A.

Plots 4 and 6 received mixed manure at the rate of 86 lb. sulphate of ammonia, 34½ lb. sulphate of potash, and 103½ lb. superphosphate in the drills when planting. Cost per acre, £1 2s.

June 24.—Skeleton ploughing after heavy rains of 13 in.

June 25.—Harrowing bays, Plots 1, 3, 4, 5, 6, 7, and 8.

July 16.—Scarifying, Plots 1, 3, 4, 5, 6, 7, and 8.

Weeding, Plots 1, 3, 4, 5, 6, 7, and 8.

August 19.—Scarifying, Plots 1, 3, 4, 5, 6, 7, and 8.

September 15.—Scarifying, weeding, Plots 1, 3, 4, 5, 6, 7, and 8.

November 1.—Scarifying, weeding, Plots 1, 3, 4, 5, 6, 7, and 8.

December 30.—Plots 4 and 6 received a dressing of mixed manure as above, followed later on by another 1 cwt. sulphate of ammonia per acre. Cost per acre, £1 18s.

December 31.—Plots 1, 3, 4, 5, 6, 7, and 8 were scarified.

Before planting, tilth was satisfactory and moisture good, but immediately after planting cane, very heavy rain fell in June (13 in.), causing condition of soil to set extremely hard, and this also washed portion of top soil from off the plants, especially off the variety plot, where the plant strike was wretched, though the competitive plots were better. Very dry weather was experienced during the months of July to December of the year 1912, the growth of cane being retarded; owing to the hard setting down of the ground, tilth was never restored, and the cane was exceedingly backward right through the season.

The condition of soil when harvesting was very hard and dry. Canes had arrowed freely. September 15 to 18.—Distribution of cane varieties to farmers. September 16.—Harvesting cane from competitive plots.

The following are the results of the plots on Mr. Ogston's farm:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOT ON MR. W. OGSTON'S FARM AT INGHAM. VARIETY, N.G. 24A. AREA OF PLOT, 3 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (p.o.c.s.)
3	Lime, green manure, and subsoiling	13.53	2.48	2.40
4	Lime, green manure, mixed manure, and subsoiling	18.70	3.30	3.19
5	Lime and subsoiling	15.03	2.69	2.60
6	Lime, subsoiling, and mixed manure	28.69	5.16	4.94
7	Ordinary cultivation only	21.04	3.72	3.59
8	Subsoiling only	26.87	4.80	4.62

Divisions 1 and 2, varieties. Cane planted 11th May, 1912.—Cane harvested 16th September, 1913.

The analytical results are given below:—

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS UPON MR. W. OGSTON'S FARM AT INGHAM. VARIETY, N.G. 24 A.

Division.	Treatment.	Sucrose in Juice.	Quotient of Purity.	Sucrose in Cane.	P.O.C.S.
3	Lime, green manure, and subsoiling	22.2	93	18.4	17.78
4	Lime, green manure, mixed manure, and subsoiling	21.3	94	17.7	17.08
5	Lime and subsoiling	21.6	94	17.9	17.33
6	Lime, mixed manure, and subsoiling	21.7	92	18.0	17.24
7	Ordinary cultivation	21.3	94	17.7	17.08
8	Subsoiling only	21.5	93	17.9	17.20

Supplied by courtesy of the Colonial Sugar Refining Company.

The results in this plot are disappointing, but it was apparently largely due to the hard time the cane experienced in June, 1912. The mixed manures have told on division 6, but not to the same extent on plot 4, which is not as good as the plot with no lime, green manure, or subsoiling. The subsoiled plot has given a higher yield than the one not so treated. Due to Mr. Ogston's illness, this experiment will not be continued, but a fresh plot will be rented in the district.

Experiment Plot upon Mr. James McKersie's Farm, Lower Burdekin District.

This plot, the area of which is 2 acres, is situated on a typical piece of the Lower Burdekin forest lands and is representative of the soils of that locality.

An error in sowing the green crop was made in this series and the manurial treatment is different to most of the other experiment plots.

January 16, 1912.—Breaking up and ploughing out grass. Then harrowed land for Plots 1, 2, 3, 4, 5, 6, 7, and 8.

February 22.—Plots 1 to 6, spreading lime broadcast at the rate of 1 ton per acre.

February 28.—Plots 1 to 6, ploughing and harrowing in lime, giving plots 7 and 8 a ploughing also.

March 1.—All plots were rolled.

March 2.—Plots 1 to 7, clay coloured cowpea sown in drills, ground being very dry.

April 3.—Making water furrows to irrigate green manure.

April 24.—Irrigating green manure (a fair crop grew).

May 11.—Plots 1 to 7, ploughing under green manure; at the same time plot 8 was ploughed.

May 14.—Rolling plots 1 to 8.

June 15.—Plots 1 to 8, cross ploughing.

July 9.—Disc harrowing twice.

July 23.—Plots 1 to 7 cross ploughed 11 in, and subsoiled 8 in. Plot 8 received a ploughing only, depth 11 in.

August 10.—Plot 1 was planted with cane varieties from Mackay, as under:—

Rows 1, 2, and 3	N.G. 24A	Rows 14 and 15	H.Q. 114
Rows 4, 5 and 6	N.G. 24B	Row 16	H.Q. 426
Rows 7 and 8	N.G. 26	Rows 17 and 18	B. 147
Rows 9, 10, and 11	N.G. 40	Rows 19 and 20	M. Malagache
Rows 12 and 13	H.Q. 5	Rows 21 and 22	M. 189

August 15.—Plots 3 to 8 were planted with New Guinea 24A obtained in the district. Drills were opened up 5 ft. apart, plants of three eyes placed in drills 6 in. apart from end to end, covered with from 3 to 3½ in. of soil with scarifier.

Plot 3 received meatworks at the rate of 4 cwt. per acre applied in the drill. Cost per acre, 29s.

September 28.—Weeding.

October 13.—Plots 1, 3 to 8, scarifying with Planet Junior with duck feet.

November 20.—Plots 1, 3 to 8, double spring-tooth cultivator was used.

December 2.—Plots 1, 3 to 8, making water furrows.

December 6.—Plots 1, 3 to 8, irrigating.

December 13.—Plot 4 received a mixed manure consisting of sulphate of ammonia 172 lb., sulphate of potash 69 lb., and superphosphate 207 lb., equivalent to 4 cwt. per acre. Cost per acre of manure, £2 4s.

Plot 5 received a mixed manure consisting of sulphate of ammonia 256 lb., sulphate of potash 77 lb., and superphosphate 115 lb., equivalent to 4 cwt. per acre. Cost per acre of manure, £2 16s.

January 14, 1913.—Plot 4, scarifying with Planet Junior.

January 24.—Plots 1, 3 to 8, were scarified.

February 2.—Plots 1, 3 to 8, making water furrows (irrigation was not done).

March 31.—Plots 1, 3 to 8, were weeded.

July 24.—Plots 1, 3, 4, 5, 6, 7, and 8 were irrigated.

August 29.—Plots 3, 4, 5, 6, 7, and 8 were irrigated.

August 11 to 16 inclusive.—Cane varieties were distributed to farmers.

October 9.—The harvesting of cane from competitive plots took place.

The results of the experiments and analyses of the canes appear hereunder.

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOT ON MR. JAMES MCKERSIE'S FARM AT AYR.
VARIETY, 24A. AREA OF PLOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (P.O.C.S.)
3	Lime, green manure, meatworks fertiliser and subsoiling	33.92	5.41	4.71
4	Lime, green manure, mixed fertiliser and subsoiling	40.20	5.75	4.91
5	Lime, green manure, mixed fertiliser and subsoiling	41.10	6.69	5.95
6	Lime, green manure, and subsoiling only	41.60	6.26	5.51
7	Green manure and subsoiling only	39.92	6.95	6.23
8	Ordinary cultivation only	44.81	7.29	6.49

Divisions 1 and 2, varieties. Cane planted 15th August, 1912. Cane harvested 9th October, 1913.

ANALYTICAL RESULTS FROM EXPERIMENT PLOT UPON MR. JAMES MCKERSIE'S FARM AT AYR. VARIETY N.G. 24A.

Division.	Treatment.	Density of Juice. (Brix).	Sucrose in Juice.	Quotient of Purity.	% Sucrose in Cane.	P.O.C.S.
3	Lime, green manure, meatworks fertiliser, and subsoiling	20.49	17.93	87.51	15.95	13.90
4	Lime, green manure, mixed fertiliser, and subsoiling	18.99	16.10	84.78	14.32	12.22
5	Lime, green manure, mixed fertiliser, and subsoiling	20.22	18.31	90.55	16.29	14.49
6	Lime, green manure, and subsoiling only	19.05	16.93	88.87	15.06	13.26
7	Has had green manure and subsoiling only	21.35	19.58	91.71	17.42	15.63
8	Has had ordinary cultivation only	20.22	18.31	90.55	16.29	14.49

Supplied by the courtesy of Messrs. Drysdale Bros. and Co., Pioneer Mill, Lower Burdekin.

This plot differed from all the rest in that it was irrigated, and this factor has disturbed the results. The Field Assistant reports that the water was not evenly distributed and that plot 8 especially got more water than the rest. This would account for the much higher yield on this plot. Plots 4, 5, 6, and 7 are so nearly uniform that the different treatment appears to have made no difference in the results. The yield is good on all the plots and the sugar per acre is especially satisfactory.

Mr. A. J. Draper's Plot, at Nelson, near Cairns.

This plot was being harvested while the report was being prepared and in consequence the results were not obtainable in time to be included. It will be dealt with next year.

SOUTHERN EXPERIMENTS PLOTS.

Mr. H. T. Harvey remarks on these plots:—

“Unfortunately, weather conditions seriously retarded the progress of some of the plots and prevented to some extent the prearranged method of experimental work being carried out.

“The unsuitable weather hindered the growing of satisfactory crops of green manure for ploughing in, and a second attempt on some of the plots proved scarcely more satisfactory. Six plots have been established. Two others which were commenced were abandoned by the farmers concerned owing to labour troubles at that time.”

Mr. J. Clark's Plot, Kalkie, Bundaberg.

The plot established at Kalkie, near Bundaberg, on Mr. J. Clark's farm, consists of red volcanic soil of a very porous nature. It is typical of the greater part of the red soil of the Woongarra District. The soil is deep, porous, and always has a loose dry surface. Its looseness and porosity are caused by the fact that this soil does not contain much colloidal earth. This land has been growing cane for a very long time, and the owner states that during late years it has become somewhat “patchy” in fertility. This “patchiness” seems to be caused, partly at any rate, by the presence of a destructive fungus in some of the soil, which attacks the roots of the cane. The land was under an old ratoon crop of cane when taken over by the Bureau.

After harvesting old cane, the following operations were carried out:—

October, 1911.—Old stools ploughed out.

November.—Lime at the rate of 1 ton per acre applied and worked into soil with a cultivator on plot 3, 4, 5, and 6. Red Mauritius bean seed drilled into plots 3 and 4. Owing to dry weather a poor, insignificant crop was produced.

February, 1912.—Beans ploughed in. Remaining divisions also ploughed.

March.—Land reploughed. Plots 1 to 7 also treated with skeleton plough; depth reached, 13 to 14 in.

March 25.—Divisions 3 to 8, planted with variety known as D. 1135. A long spell of dry weather followed, but the cane germinated fairly well. Plots 4 and 6 received a dressing of mixed fertiliser containing 86 lb. sulphate of ammonia, 34½ lb. sulphate of potash, and 103½ lb. superphosphate. Cost per acre, £1 2s.

August, 1912.—Plots 4 and 6 received a further 2 cwt. of mixed manure per acre of the same composition and cost as above.

Varieties from Mackay, as under, were planted:—

Rows 1 and 2	.. .. .	N.G. 24B	Rows 10 and 11	.. .. .	Q. 116
Row 3	.. .. .	N.G. 40	Row 12	.. .. .	B. 147, Q. 116, and N.G. 24B
Rows 4 and 5	.. .. .	N.G. 24A	Rows 13, 14, and 15	.. .. .	H.Q. 10
Row 6	.. .. .	N.G. 40	Row 16	.. .. .	H.Q. 10 and N.G. 26
Row 7	.. .. .	H.Q. 114	Rows 17, 18, and 19	.. .. .	N.G. 26
Row 8	.. .. .	E. 147	Row 20	.. .. .	N.G. 26 and Malagache
Row 9	.. .. .	H.Q. 5	Row 21	.. .. .	H.Q. 5 and Malagache

These varieties were a long time in transit and consequently did not arrive in the order they should have done. They were carefully selected and soaked in water before planting. They germinated fairly well, but had to pass through a very dry spring and summer.

January, 1913.—Plots 4 and 6 received a top dressing of 1 cwt. of sulphate of ammonia per acre. Cost of manure per acre, 16s.

Very heavy rain fell during this month, after which all the cane made rapid growth.

The plot was kept fairly clean by being scarified and chipped occasionally, though this work of surface cultivation was not done as thoroughly and often as is recommended by the Bureau.

During growth it has been noticed that a strip of cane along the south side of the plot has not grown so well as the rest of the cane. Several of the stools of cane in this patch were found to be badly attacked by a root fungus.

August, 1913.—The varieties of cane were cut and distributed among the farmers of the district. There were 32 applicants for plants.

Varieties N.G. 40, H.Q. 5, and M. Malagache were most favoured by the farmers. N.G. 24A, N.G. 24B, and N.G. 26 also grew well; H.Q. 10 and B. 147 were both poor.

October, 1913.—Competitive plots harvested. The results appear in the following table:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MR. J. CLARK'S FARM AT WOONGARRA, — BUNDABERG. PLANT CANE. VARIETY, D. 1135. AREA OF PLOT, 3 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre, P.O.C.S.
3	Lime, green manuring, and subsoiling	26.25	4.27	3.81
4	Lime, green manure, mixed manure, and subsoiling	31.28	5.12	4.57
5	Lime and subsoiling	31.36	5.23	4.65
6	Lime, mixed manure, and subsoiling	30.31	4.87	4.34
7	Subsoiling only	25.97	4.02	3.53
8	Ordinary cultivation only	28.14	4.51	3.98

Plots 1 and 2, varieties. Cane planted 25th March, 1912. Cane harvested 8th October, 1913.

The canes growing upon the experiment plots were also analysed, the following being the data supplied:—

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS ON MR. J. CLARK'S FARM AT WOONGARRA, BUNDABERG. VARIETY, D. 1135.

Division.	Treatment.	Density of Juice (Brix.)	Sucrose in Juice.	Quotient of Purity.	Sucrose in Cane.	P.O.C.S.
3	Lime, green manuring, and subsoiling	20.1	18.3	91.04	16.28	14.52
4	Lime, green manure, mixed manure, and subsoiling	20.24	18.41	90.95	16.38	14.61
5	Lime and subsoiling	20.70	18.75	90.58	16.68	14.84
6	Lime, mixed manure, and subsoiling	19.98	18.10	90.59	16.10	14.32
7	Subsoiling only	19.62	17.41	88.73	15.49	13.61
8	Ordinary cultivation only	20.16	18.04	89.48	16.05	14.16

Supplied by courtesy of the Millaquin Sugar Company.

Several rows of cane on this experiment plot were damaged by horse teams, and owing to this and another error made when removing stools of cane from one of the headlands, the plots vary in size.

In this plot the ordinary cultivation has given a higher yield than the subsoiled, but the above and other factors have evidently interfered with all the plots in this experiment. The yield of sugar is very good.

Messrs. W. Hocking and Co.'s Plot, Wallaville, Gin Gin.

The experimental plot established on this farm in the Gin Gin District is situated on the rich soil of the Burnett River alluvial flats in that district. The one great drawback to this land from the sugar growers' point of view is that it is greatly subject to frost.

Very old ratoon cane had been recently ploughed out when this plot of land was taken over by the Bureau.

January, 1912.—All plots ploughed.

February, 1912.—Lime at the rate of 1 ton per acre applied and worked in with cultivator, followed by the sowing of red Mauritius beans on plots 3 and 4. Only a small crop resulted owing to the dryness of the season.

May.—Crop ploughed in.

July.—Plots cross ploughed.

August.—Reploughed and all plots except 7 subsoiled with skeleton plough.

September.—Competitive plots planted, the cane used being D. 1135.

October.—Varieties from Mackay, as under, were planted:—

Rows 1 and 2	H.Q. 114	Rows 12 and 13	N.G. 24B
Rows 3 and 4	H.Q. 5	Rows 14, 15, and 16	N.G. 40
Rows 5 and 6	Malagache	Rows 17, 18, and 19	B. 147
Rows 7, 8, and 9	N.G. 26	Rows 20 and 21	H.Q. 285
Rows 10 and 11	N.G. 24A	Rows 22 and 23	Q. 116

These canes were a long time in transit and arrived in poor condition. Care in selection and planting was exercised. Some of the varieties germinated well, others poorly.

December 4, 1912.—Plots 4 and 6 received an application of mixed manure at the rate of 4 cwt. per acre, containing 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. superphosphate. Cost per acre, £2 4s.

January 14, 1913.—Plots 4 and 6 received a surface dressing of sulphate of ammonia at the rate of 1 cwt. per acre. Cost per acre, 16s.

This was immediately followed by a tremendous downpour of rain—about 35 in. in a few days, which no doubt completely spoilt any possible beneficial effect being obtained from the last application of manure. The land was kept fairly clean throughout the season. The winter proved to be exceptionally mild right through until the second week in August, when severe frosts occurred. The whole of the cane on the river flats at Gin Gin was frosted and it was considered advisable to cut the cane on the experiment plot at once.

August, 1913.—Varieties distributed to farmers.

September 3.—Competitive plots harvested.

The results, together with the analytical data, appear in the following tables:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MESSRS. HOCKING AND CO.'S FARM AT WALLAVILLE. VARIETY USED, D. 1135. AREA OF PLOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. P.O.C.S.
3	Lime, green manuring, and subsoiling	29.40	3.36	2.77
4	Lime, green manure, and mixed fertiliser and subsoiling ..	33.06	3.68	3.04
5	Lime and subsoiling	33.33	3.95	3.36
6	Lime, mixed manure, and subsoiling	35.63	3.65	2.88
7	Ordinary cultivation only	28.86	4.20	3.65
8	Subsoiling only	36.24	3.83	3.28

Cane planted 26th September, 1912. Cane harvested 3rd September, 1913. Cut early on account of frost.

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS ON MESSRS. W. HOCKING AND CO.'S FARM, WALLAVILLE, GIN GIN. VARIETY, D. 1135.

Division.	Treatment.	Density of Juice (Brix)	Sucrose in Juice.	Quotient of Purity.	Sucrose in Cane.	P.O.C.S.
3	Lime, green manure, and subsoiling	15.67	12.70	81.04	11.43	9.44
4	Lime, green manure, mixed fertiliser, and subsoiling ..	15.30	12.40	81.04	11.16	9.23
4	Lime and subsoiling	15.62	13.20	84.50	11.88	10.11
6	Lime, mixed manure, and subsoiling	14.92	11.40	76.40	10.26	8.11
7	Ordinary cultivation only	18.60	16.20	87.09	14.58	12.66
8	Subsoiling only	15.26	11.75	77.00	10.57	8.41

Supplied by courtesy of the Gin Gin Central Mill Company.

The cane in the above experiment grew freely during the late summer and autumn and was full of growth when the frost caught it. It was to be regretted that the plot had to be cut so early, when it was less than 12 months old. The manures, lime and green manure, have given little account of themselves, plot No. 8 with subsoiling only being as good as any. The land on which the experiments were, however, is of first rate quality. Owing to the cane being cut before it was ripe, the sucrose was of course low.

Mr. C. A. F. Stollznow's Plot, Currajong, Gin Gin.

The experiment plot established on Mr. C. Stollznow's farm, Currajong, Gin Gin District, is situated on a high-lying red volcanic soil. It is not very good land, as it contains a lot of gravelly basaltic fragments and is in such a situation that there must necessarily be a considerable amount of leaching of soluble plant foods from the soil. It also dries out very quickly in dry weather. A considerable amount of the high-lying land of the district is somewhat similar to it in these respects.

A crop of 5th ratoon Rappoe cane was cut off this land in 1911, after which it grew up again to the height of about 3 ft. before operations were commenced.

January, 1912.—Cane cut down and ploughed under.

February.—Lime applied to Plots 3, 4, 5, and 6. All Plots ploughed.

March.—Red Mauritius bean sown on plots 3 and 4. Little or no rain fell and they did not grow well.

July.—Whole plot reploughed, at the same time ploughing in the poor green crop on plots 3 and 4.

September.—Ground reploughed and subsoiled to about 14 to 15 in. deep with the exception of plot 7, which was only ploughed.

September 24.—The competitive plots were drilled and planted with the variety known as D. 1135, which struck fairly well.

October.—Varieties, as under, from Mackay Station, were planted:—

Rows 1 and 2	N.G. 24A	Rows 13 and 14	H.Q. 10
Rows 3 and 4	N.G. 24B	Rows 15 and 16	H.Q. 285
Rows 5, 6, and 7	N.G. 26	Rows 17, 18, and 19	H.Q. 114
Rows 8, 9, and 10	N.G. 40	Rows 20 and 21	Malagache
Rows 11 and 12	H.Q. 5	Rows 22 and 23	B. 147

These canes arrived in bad condition, and as the soil was becoming dry they did not grow well.

The long dry spell which followed caused all the cane to come away stunted and irregularly.

December.—A mixed fertiliser containing 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate was applied, equivalent to 4 cwt. per acre. Cost per acre, £2 4s.

January, 1913.—Sulphate of ammonia at the rate of 1 cwt. per acre was applied to plots 4 and 6. Cost per acre, 16s.

September, 1913.—The competitive plots were harvested.

The crop and analytical results will be found below:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MR. C. A. F. STOLLZNOW'S FARM
AT CURRAJONG, GIN GIN. VARIETY USED, D. 1135. AREA OF 1 LOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (P.O.C.S.)
3	Lime, green manure, and subsoiling	12.39	1.84	1.61
4	Lime, green manure, mixed fertilisers, and subsoiling	14.85	1.82	1.47
5	Lime and subsoiling	16.24	2.19	1.88
6	Lime, mixed manure, and subsoiling	19.20	2.80	2.46
7	Ordinary cultivation only	14.56	2.02	1.76

Division 8, subsoiling only, was cut for plants by Mr. Stollznow, in error.

Plots 1 and 2, varieties. Cane planted 24th September, 1912. Cane harvested 9th September, 1913.

Cane would have been allowed to stand over, but severe frost rendered cutting imperative.

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS ON MR. C. A. F. STOLLZNOW'S FARM, CURRAJONG, GIN GIN.
VARIETY, D. 1135.

Division.	Treatment.	Density of Juice (Brix.)	Sucrose in Juice.	Quotient of Purity.	Sucrose in Cane.	P.O.C.S.
3	Lime, green manure, and subsoiling	19.00	16.75	88.15	14.90	13.03
4	Lime, green manure, mixed fertilising, and subsoiling	17.73	13.85	78.11	12.32	9.90
5	Lime and subsoiling	18.10	15.30	84.53	13.61	11.58
6	Lime, mixed manure, and subsoiling	18.41	16.40	89.08	14.59	12.86
7	Ordinary cultivation only	17.85	15.65	87.67	13.92	12.13

Supplied by courtesy of the Gin Gin Central Mill Company.

It will be noticed in reference to these plots that Plot 8, which received subsoiling only, is missing. Mr. Stollznow, the owner of the land, being short of plants, unfortunately cut this division out, so that no results are available.

Heavy rains fell in January—about 35 in. in some three or four days. The land had been well worked up and was in fine order before this heavy rain, but so great a fall seriously counteracted the good work done. Several deep washaways were cut through the plot and the ground afterwards set down hard.

This experiment was backward right through, and had it not been for the frost it would probably have been allowed to stand over till next year.

Mr. J. Broadhurst's Plot, South Isis, Childers District.

The experimental plot at South Isis, on the farm of Mr. J. Broadhurst, is situated on red volcanic soil. This soil is not very fertile—it dries out somewhat fast and according to chemical analyses is of poor quality. The land was lying fallow when it was acquired for experimental purposes.

September, 1911.—Ploughed. Plots 3 to 6 limed at the rate of 1 ton per acre. A long spell of dry weather followed.

January, 1912.—Mauritius beans planted on plots 3 and 4. Owing to the scanty rainfall the beans did not come along well.

April 1.—Beans ploughed in. Plots 6, 7, and 8 ploughed at same time.

June.—Ground ploughed and cross ploughed.

August.—Plots all ploughed, and all except plot 7 were subsoiled also. The variety known as D. 1135 was then planted on divisions 3 to 8.

September.—Varieties of cane as under, from Mackay Station, planted out:—

Rows 1 and 2 N.G. 24A	Rows 12, 13, and 14 Q. 116
Rows 3 and 4 N.G. 24B	Rows 15 and 16 H.Q. 5
Rows 5 and 6 N.G. 40	Rows 17 and 18 H.Q. 114
Rows 7 and 8 B. 147	Rows 19, 20, 21, and 22 H.Q. 10
Rows 9, 10, and 11 Malagache	Rows 23 and 24 H.Q. 285

These arrived in fair order.

December 13.—A mixed fertiliser consisting of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. superphosphate, equal to 4 cwt. per acre, was applied to plots 4 and 6. Cost of manure, £2 4s. per acre.

January, 1913.—Plots 4 and 6 received 1 cwt. of sulphate of ammonia per acre, the cost per acre being 16s.

August.—Varieties distributed to farmers.

Varieties N.G. 40 and H.Q. 5 made the best growth. H.Q. 285 also grew very rapidly, but appears to be too soft. H.Q. 10 and B. 147 were least satisfactory.

October 2.—Competitive plots harvested.

The next two tables contain the crop and analytical results:—

YIELD OF CANE AND SUGAR PER ACRE FROM EXPERIMENT PLOTS ON MR. J. BROADHURST'S FARM AT CHILDERS.
PLANT CANE. VARIETY, D. 1135. AREA OF PLOT, 2 ACRES.

Division.	Treatment.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre. (P.O.C.S.)
3	Lime, green manuring, and subsoiling	21.06	3.16	2.76
4	Lime, green manure, mixed manure, and subsoiling	21.65	3.29	2.84
5	Lime and subsoiling	22.49	3.32	2.84
6	Lime, mixed manure, and subsoiling	21.72	3.32	2.89
7	Ordinary cultivation only	13.94	2.09	1.82
8	Subsoiling only	20.64	2.97	2.52

Divisions 1 and 2, varieties. Cane planted 3rd September, 1912. Cane harvested 15th October, 1913.

ANALYTICAL RESULTS FROM EXPERIMENT PLOTS ON MR. J. BROADHURST'S FARM AT CHILDERS. VARIETY, D. 1135.

Division.	Treatment.	Density of Cane, (Brix).	Sucrose in Juice.	Quotient of Purity.	Sucrose in Cane.	P.O.C.S.
3	Lime, green manure, and subsoiling	19.2	16.9	88.0	15.04	13.14
4	Lime, green manure, mixed manure, and subsoiling	19.8	17.1	86.3	15.21	13.14
5	Lime and subsoiling	19.5	16.6	85.1	14.77	12.63
6	Lime, mixed manure, and subsoiling	19.6	17.2	87.7	15.30	13.35
7	Ordinary cultivation only	19.3	16.9	87.5	15.04	13.10
8	Subsoiling only	19.3	16.2	83.9	14.41	12.21

Supplied by courtesy of the C.S.R. Company's Childers Mill.

Here again the manures have given no increase in the plant crop, all the subsoiled plots have given fair results, the plot with ordinary cultivation being behind. The yield of sugar is good.

Experiments are also being conducted upon the farms of Mr. A. Adie, Cordalba, and Mr. C. A. Popp, Pialba, but the results will not come in till next year.

The Field Assistant for the Southern districts remarks as to the varieties sent from Mackay, that "owing to the length of time in transit and the exceedingly dry weather the plants arrived in a very withered condition and a great many did not germinate, and those that did were remarkably slow in growth for a long time.

The results of the first crop of varieties seem to indicate that some of the canes may not prove suitable for Southern Queensland. It is too early, however, to pass judgement on any of them yet as they may acclimatise themselves to our weather conditions later on and prove to be good canes. So far results indicate that New Guinea 40 and Hambleton 5 are the best growers.

There is every prospect of N.G. 40 becoming a popular cane, as it grows rapidly, makes large stools, quickly covers the ground with its abundant foliage, thus choking down weeds and protecting the soil from the drying effect of the sun's heat. It is an easy cane to cut, is easily trashed, and it ratoons well.

H.Q. 5 also grows very rapidly, makes large stools, and ratoons well, but so far it has shown itself to be difficult to trash.

N.G. 24A and 24B grew well and produced heavy stout canes, but they are not favoured by many growers, partly because they have too many hairy prickles on the leaf sheaths and also because the sticks spread out too much in the stools. It was pointed out repeatedly that these two canes are remarkably good sugar yielders, but this is a matter of secondary interest to the majority of growers.

N.G. 26 makes large stools and appears to be a healthy cane, but it is rather slow growing.

H.Q. 285 is a very rapid grower and has many good points. I am afraid, however, that it is rather too soft, and there are faint indications that it may become subject to root fungus diseases and gum in some localities.

H.Q. 114 is promising fairly well in some places. Its chief fault is that it does not stool out as well as some other canes and would require to be planted closer than is usual to get a heavy crop.

Barbadoes 147 and H.Q. 10 have so far both shown themselves to be very slow growers.

Q. 116 produces thick canes, but arrows too freely.

Q. 121 is so far not satisfactory.

Mauritius Malagache has grown well and ranks about next to N.G. 40 and H.Q. 5 in rapidity of growth."

The costs of these experiments will be published in a future bulletin, meanwhile the cost of the manures has been given. The cost of lime varies from £2 to £4 per acre and the cost of green manure seed is from 10s. to 17s. 6d. per acre. The price which each farmer considers the different operations have cost him varies most considerably and these will have to be reduced to a common standard. Allowance will have to be made in comparing plots of 2 or 3 acres with what could be done on a large scale.

Taking the experiments right through, the yield on the Northern plots is much greater than on those in the South. Generally speaking, most of the results are inconsistent, and it must be borne in mind that "ordinary cultivation," referring to the plots, is a great deal better than most of the ordinary cultivation done by farmers. Taken altogether, the results are satisfactory and show the benefit of good thorough cultivation. The yield of sugar in the Northern plots is especially gratifying and should be an object lesson both to mills and farmers. Seeing that the average yield of sugar has been for many years about $1\frac{1}{2}$ ton per acre, a yield of between 3 and 6 tons cannot but be considered good.

In order to obtain definite results from experiments of this nature they require to be carried out with the most rigid care, and this is impossible except upon an Experiment Station. No matter how willing farmers are to help, there are always times when their own work is imperative and takes the precedence.

The thanks of the Bureau are due to the various farmers who have been good enough to take charge of these different plots. They have one and all given every possible assistance cheerfully and willingly and carried out instructions to the very best of their ability. They have displayed considerable enthusiasm and have met the Bureau in every possible way.

The plots themselves have latterly aroused considerable interest and have been in most instances visited by a large number of farmers, the issue of descriptive cards having had a good effect. Nicely painted pegs have also been prepared by the Mackay Station, and these have now been forwarded to the various plots and will tend to make them more attractive.

The distribution of the different varieties was made absolutely free to the farmers in the district in which the experiment plot was situated, and this was highly appreciated.

In some districts growers arrived at 7 in the morning on the days that cane was being cut and given out, in spring carts, motor cars, wagons, and drays, and each one went away pleased with the Department's efforts.

7.—DIVISION OF ENTOMOLOGY REPORT.

The Entomologist of the Sugar Bureau, Mr. A. A. Girault, whose headquarters are at Nelson, near Cairns, has submitted the following brief report upon the work carried out by him during the last twelve months:—

"I have the honour to submit the following report covering the work of the Entomologist and Assistant for the past year.

"The work undertaken has been a continuation of that of the previous year—viz., a completion of the general rearing operations covering the entire field of scarabaeid grubs, and an attempt to study under controlled conditions the food and other habits of pertinence of the grubs, directed with especial reference to those injuring cane. These studies have so far led to the identification of most of the grubs and their adults and to a knowledge of the various situations inhabited by them. We are now also able to give fairly accurately the general cycle of development of many of the species, their pupating habits (whether or not in reach of cultivation at that time), their native enemies, and the general habits of their young. For this work I have had one man employed continuously in collecting grubs, and when these are brought into the laboratory they are sorted and placed into cages of sifted earth, a record being kept of the number and kind placed in each cage. A number of cages have been sunk into the earth out of doors, and some cages of a special kind which allow a soil depth of three or four feet, so that the grubs may select the depth to which they are accustomed when pupating. The final results from this work will not be obtained until the cages are discontinued, some time in November following.

"Secondly, the following lines of work have been undertaken:—

1. A bacterial infectious disease of grasshoppers has been experimented with, the results so far being negative.
2. Correspondence with entomologists in Porto Rico and America has been commenced, with the view of attempting an introduction of certain insect parasites of scarabaeid grubs and beetles.
3. Observations have been made upon the occurrence of grasshoppers and a few other insects of economic importance, and these have been published (as contributions from this Office) in various entomological journals.
4. A systematic study of two great groups of parasitic insects of the order Hymenoptera (ants, wasps, and so on) has been undertaken as a contribution towards a knowledge of parasitism in insects.
5. A bibliography of the cane grubs has been prepared.

"This work is preliminary to field work which will have to be undertaken and operated under the conditions found on the average farm. For the present, therefore, I would recommend that the customary procedures undertaken against the cane grubs be continued without relaxation."

8.—NEW SUGAR EXPERIMENT STATION AT BUNDABERG.

For many years a Southern Sugar Experiment Station has been strongly desired, not only by the Bureau of Sugar Experiment Stations but also by Southern sugar farmers themselves, who feel that there is little or no chance of their ever visiting Mackay and, further, that results obtained there are probably not on all fours with those that might be obtained in the South. Again, it is known that many varieties which give satisfactory results in North Queensland are apparently not suited to Southern conditions, and *vice versa*.

Although, as stated above, the desire has existed for a considerable period, it was only late this year that it has been given effect to. The General Superintendent received instructions from the Department of Agriculture in September to obtain offers of land considered suitable for use as a Sugar Experiment Station. Steps were accordingly taken which resulted in fifteen farms being submitted for the purpose. All of these were in the Woongarra District of Bundaberg. After making most careful inquiries and inspection of the various places offered, a site was recommended as containing most of the conditions which were needed. This farm was one known as Margam, situated about $3\frac{1}{2}$ miles from Bundaberg.

In the first place this property is well improved, so that little or no outlay for new buildings is required. Secondly, the property is compact and easily laid out into sections for different kinds of work. Thirdly, the soil is uniform in character—one of the most rigidly important matters in experiment work. It is impossible to compare experiments where the soil is varying from plot to plot. Fourthly, the soil is deep red volcanic in nature and typical not only of a great portion of the Bundaberg and Childers districts, but of many other cane-growing localities. This recommendation was accepted by the Department of Agriculture, and as soon as the present owner (Mr. J. Mikklesen) has harvested his cane the Bureau will enter into possession.

The choice of Margam was also endorsed by the representatives of the Queensland Farmers' Union, who consulted with the Minister for Agriculture on the subject.

The red soil on Margam, according to chemical analysis, is no better than the average soils of the district.

The advantages of selecting Margam for an Experiment Station may be summed up as under:—

The Mackay Sugar Station possesses an alluvial soil. By taking a site having red volcanic soils, experiments can now be conducted on the two great types of sugar soils in this State.

Further, no experimental work on any large scale has yet been conducted on any of these red soils, and there are a number of problems in connection with these which are urgently in need of investigation.

Owing to the fact that practically the whole of the 45 acres of the new Experiment Station is under cultivation, it will be possible to carry out experiment work on a much larger scale than at Mackay, where the land that can be made use of for cultivation purposes is limited to some 10 or 12 acres.

Experiments with new varieties of sugar-cane, deep *versus* ordinary cultivation, manuring trials, cultivation, and other lines of work will be commenced as soon as practicable. It is hoped that upwards of 200 new varieties will be introduced next year.

In the meantime, as there are some 28 acres of cane being cut, it has been arranged to commence experiments in different methods of ratooning, such as relieving, volunteering, and grubbing, ploughing and scarifying between the rows, &c. By this time next year the results will be to hand from these, and the new Station should be in full swing.

9.—SEEDLING EXPERIMENTS AT KAMERUNGA.

As after repeated trials it was never found possible to raise seed from canes grown at Mackay, it has been determined to take to Kamerunga, near Cairns, the best of the varieties growing at Mackay, with the view of determining whether seedling canes can be raised from such. Accordingly in April of this year a number of canes were forwarded to the manager of the Kamerunga Nursery (Mr. C. E. Wood). These were planted out and are making good growth. It is expected that they will arrow in the coming year, when the seed will be planted. It is trusted that some new canes of promise may result.

EXPERIMENTS IN SENDING OLD STANDARD VARIETIES TO A HIGH ELEVATION.

Following on the statement contained in last year's report, crates of Rose Bamboo (Rappoe) and Striped Singapore (or Mauritius Gingham) were sent to the manager of the Kairi State Farm, Tolga, near Atherton (Mr. D. Macpherson), in March last. These were accompanied by Mcerah. The first two varieties, which were for so long the standard varieties of the State, have in late years developed disease upon all old lands. It has been thought that, if they were taken to a high elevation and colder climate and allowed to remain for some years, they might ultimately become capable of holding their own again and be practically new varieties. As complaints have been made of Badila also commencing to deteriorate, this variety was also included. These canes were planted out by Mr. Macpherson and were inspected by the General Superintendent in August last. They had not at that time made much growth, but as soon as the warm wet weather arrives they may be expected to grow more vigorously. They will be planted out on a larger scale next year.

10.—ECONOMICS.

The sugar crop 1912 was the lowest on record for many years, being only a little more than half that of 1910. This was due to the adverse weather conditions experienced.

According to the Government Statistician, the average yield of cane per acre during the 1912 season was only 12.72 tons—the lowest yield for a number of years, the yield in 1910, the record year, being 19.45 tons of cane per acre.

The Mackay District apparently suffered more severely than other localities, only $10\frac{1}{2}$ tons of cane per acre being there harvested.

The area under cane in 1912 is given as 141,652 acres, the actual area being larger than in the previous year, though not so great as in 1910. There was, however, a reduction of 337 in the number of planters, which was confined chiefly to districts 3 and 4.

The number of acres actually crushed was lower than in any year since 1903, a larger proportion of cane than usual being allowed to stand over owing to the poorness of the crop.

The total cane crushed last year was 994,212 tons, the resulting sugar being 113,060 tons; the poorest crop since 1903.

The yield of cane per acre varied from 19.71 in the Maroochy District to 10.36 in the Mackay District, and 9.65 in the Marburg District. The average yield of sugar per acre was 1.45 tons, varying from 2.08 at Maroochy, which was closely followed by the Cairns and Douglas Districts, to 0.79 at Marburg, where an inferior variety of cane known locally as Batoo is largely grown. The larger yield of cane and sugar at Maroochy can be accounted for by the newness of much of the land, a fair rainfall, and the fact that the plant crops run from 18 months to 2 years, as against a much shorter period in the North.

The amount of cane required to make one ton of sugar last year averaged 8.79 tons, varying from 7.65 tons in the Ingham and Mourilyan Districts to 12.25 tons at Marburg. The superior quality of the varieties of cane grown in the Ingham and Mourilyan Districts, together with good manufacture, accounts for this difference.

This figure is slightly better than last year, though not so good as in 1909 and 1910.

In his report the Government Statist says:—

“The area of stand-over cane varies somewhat from year to year, but the average for the past ten years is about 30 per cent. Although it would be a material advantage to growers to secure a more rapidly maturing cane, the efforts of experimentalists in that direction do not appear to have been markedly successful judging by the proportion of stand-over for each of the years 1902 to 1912.”

These remarks are based entirely on wrong assumptions. There is nothing like 30 per cent. of stand-over cane in the various sugar districts. Only cane that would be fit for manufacturing purposes in any one year, but which by reason of its poor growth, or of the crushing finishing before it could be cut, is carried over to the following year, can properly be called “stand-over” cane. The proportion of this is relatively small, and this practice is very rarely resorted to in Northern Sugar Districts, it being chiefly in the South where it is carried out. The mere fact of nine-tenths of the cane arrowing during the crushing season in the North would prevent this being accomplished even if it were desired. Cane planted in the early part of the year and carried over to next year is not “stand-over” cane at all. It is purely “plant cane,” and would not be fit to cut for the mill the year it was planted in any case. It was probably the confusion of these two classes of crops which led to the above statement. Further, regarding early maturing canes, experimentalists have not failed in this direction; there are any quantity available, but farmers, quite rightly, do not want them. Any cane that matures early arrows early in the year, and is of little or no value during the crushing period. Northern farmers, therefore, always ask for canes of the type of Badila and Goru, that will give them a long plant crop and mature during the crushing period. There is only a limited demand for early maturing canes, in some small Southern Sugar Districts.

The apparent consumption per head of population of Australia was given at 109.22 lb. for 1912. The number of factories operating in the State during 1912 was 49, a decrease of 2, the hands employed being 4,262, which was some 400 less than the previous year, due to the poor crop. The estimated consumption of sugar in Australia in 1910 was put at 253,494 tons, the average consumption for the ten years from 1901 to 1910 being 211,311 tons per annum. (*Vide* Return to Federal Parliament.)

Eleven years ago there were 60 sugar mills operating in Queensland. To-day there are only 49, and of the latter Baffle Creek and Cattle Creek, though old machinery has been used in their erection, are the only mills in new localities. The tendency, however, for a number of years is to increase the size of the mills, which means that many small plants have had to quit business. A large up-to-date mill in the Lower Burdekin District is now being erected by Drysdale Bros. and Company at Inkermann, which will be capable of dealing with 18,000 tons of sugar. This will be followed by two big mills of modern construction and completeness to be erected by the Queensland Government—one at Babinda, near Cairns, to crush in 1915, the other at South Johnstone, Innisfail District, to be ready for 1916.

There is no doubt that the majority of our mills are not doing the work that they should do. In 1912 the recovery varied at many mills between 72 and 82 at per 100 sugar in cane. Better methods of milling must be introduced and farmers must grow a better and richer class of cane. If this is not done it is certain that many of the smaller mills will be unable to carry on under the new conditions.

Before closing his report, the writer would like to thank the various officers of farmers' associations and the management of the several mills in Queensland for their courtesy in assisting in the work of the Sugar Bureau. Information in connection with the work has been readily supplied and means of transit in the various districts provided. At most of the mills a keen interest in and a desire to further the objects of the Experiment Station are strongly in evidence.

The Sugar Bureau is also indebted to the mills in the different districts where the experiment plots are situated for their willingness to weigh each plot separately and furnish weights and analyses of the canes to the Bureau.

HARRY T. EASTERBY,
General Superintendent.