

1923.

QUEENSLAND.

TWENTY-THIRD ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

Presented to Parliament by Command.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

SIR,—I have the honour to submit the Twenty-third Annual Report of the Bureau of Sugar Experiment Stations up to the 31st October, 1923.

Brisbane, 15th December, 1923.

H. T. EASTERBY,
Director.

DIRECTOR'S REPORT.

The Annual Report of the Bureau for 1923 comprises:—

1. Introduction.
2. Approximate Estimate of the 1923 Cane Crop, and Comparative Figures of the Industry during the past Twenty-four Years.
3. General Work of the Bureau, with Brief Survey of the various Sugar Districts.
4. Work of the Northern Sugar Experiment Station at South Johnstone.
5. Work of the Central Sugar Experiment Station at Mackay.
6. Work of the Southern Sugar Experiment Station at Bundaberg.
7. Work of the Laboratories.
8. Work of the Division of Entomology.
9. Irrigation Experiments with Sugar Cane at Inkerman State Farm.
10. Seedling Propagation at South Johnstone; Bud Variation Experiments; Varieties of Cane, &c.
11. Lime, Green Manure, and Fertilisers
12. Economics of the Industry.
13. Balance-sheet.
14. General.

1.—INTRODUCTION

Grave anxiety was expressed before the termination of the Agreement between the Federal and State Governments in June of the present year, when the price of £30 6s. 8d. per ton of raw sugar which had been current during the three previous years expired. Every effort was made by the Queensland industry, assisted by the New South Wales sugar-growers and with the support of the Beetgrowers' League of Victoria, to endeavour to have the Agreement renewed. Proposals were made by the Queensland Government in order to stabilise the

industry, and representatives of the Queensland sugar industry, led by the Minister for Agriculture and Stock (Mr. Gillies) met the Prime Minister in Melbourne and urged the national and economic value of the industry to Australia, and pressed for a renewal of the Agreement under which the industry had considerably benefited. In the course of his address to the Prime Minister, Mr. Gillies said:—

“We say emphatically that in the defence of this continent and the maintenance of White Australia, the preservation

and advancement of the Queensland sugar industry are involved. We believe that the industry can only be maintained and extended so as to provide all the sugar Australia requires by one or other of the methods now advocated.

"According to Press reports, a few days ago, you were speaking on defence and the importance of the navy. Battleships are necessary, but is not a girdle of white settlers round Australia . . . equally valuable?"

"The new sugar-mill, costing half-a-million, about to be erected by the Queensland Government to open up the jungle lands of the Tully River, is as good an investment for defence as a modern battleship, for it will settle men there who will be ready to fight if needed.

"I am aware that there are differences of opinion regarding the policy of Government or State control of industry, but the delegation before you is made up of all shades of political thought, and it is at one on this question as far as the sugar industry is concerned. Several members of your Government have said time and again that the circumstances of the sugar industry are such that this form of Government control is absolutely necessary."

The Commonwealth Government, however, were anxious to decontrol those industries (including sugar) which they had been handling and declined to renew the Agreement. Alternative proposals were submitted for the creation of a pool to handle sugar for five years, the importation of black-grown sugar during that period to be subject to embargo, the pool to place refined sugar on the market so that the price to the consumer should not exceed 4½d. per lb.

The terms ultimately conceded by the Commonwealth were disappointing, inasmuch as they did not secure that stability to the industry which it has so much need of. Briefly the conditions were—

- (a) That the industry should form a pool free from the control of the Commonwealth Government to buy raw sugar for the 1923-1924 season at £27 per ton of 94 net titre, f.o.b. mill, and to enter into negotiations with the Colonial Sugar Refining Company to refine and distribute the sugar. The embargo against black-grown sugar to be continued till 30th June, 1925. After that the industry to be protected by means of a Customs duty in the same way as every other industry is protected (present duty is £9 6s. 8d. per ton).
- (b) The price for the 1924-1925 season to be determined after investigation by a

tribunal, and to be based upon the cost of efficient production in reasonably good districts and under normal conditions, such price not to exceed £27 per ton.

After considerable discussion by the parties interested these conditions were finally accepted, and the pool has now been formed which is handling the Queensland production.

It is noticeable that in the Southern States the danger of uninhabited Australia is at last being recognised. At a recent public function the Lieutenant Governor of Victoria said:—

"The north of Australia is the Achilles' heel of the country; it is the vulnerable spot. What are we doing in regard to it? We may talk international politics and treaties, but there is one law of higher authority than any human law or power—it says that no nation may be long permitted to enjoy and use a large portion of the earth's surface without putting it to the best use. (Applause.) That law must ultimately govern our destinies. It is absolutely necessary for us to maintain a White Australia. The policy of a White Australia is the keystone of the whole arch of Australian nationhood. It will require the concerted effort of all of the States of Australia to overcome the perilous condition of this country."

While the Melbourne "Argus" said:—

"White Australia has a good sound, too, when we know that in the South African Union there is one coloured immigrant to every two whites, besides six natives. That sweetens even the price of sugar."

The industry this year has been subjected to a most severe drought which has been especially harassing in the districts below Townsville. The Maryborough, Isis, Bundaberg, Mackay, and Lower Burdekin cane areas have harvested poor crops (except where irrigation was used at the Lower Burdekin) and unfortunately at time of writing the drought is persisting. The low yield of cane in Southern Queensland has, however, been compensated for in actual tonnage of cane and sugar by the splendid yields in all the districts above Townsville. Although one of the driest years experienced, the crops there have been especially good and the yield of commercial cane sugar high. This bears out previous observations that dry years in the wetter districts of the North usually give much better crops than do very wet ones. No real droughts have ever occurred in districts like Innisfail and Babinda, where the rainfalls, though only half the average this year, reached 78 inches and 94 inches respectively, from 1st January to end of October.

2.—APPROXIMATE ESTIMATE OF THE 1923 CANE CROP.

Due to the good crops in the districts above Townsville, the yield for 1923 will be much better than anticipated earlier in the year. The estimate in June for 1923 was 240,000 tons of sugar. It now appears that we should approach 260,000 tons of sugar if all the cane crops can be harvested. This will largely depend on the nature of the season at the end of the present and beginning of next year, as South Johnstone, Mourilyan, and Babinda, all expect to go on

crushing well into January. There are now 202,000 acres under cane cultivation, according to the Government Statist—an increase of about 42,000 acres since 1918, due entirely to the recent three-year Agreement now expired.

The following table shows the rough preliminary estimate of the cane crop formed in June last, together with the estimate of crops furnished by the various sugar mills in Queensland during the month of October:—

Mill.	Rough Preliminary Estimate Made in June.	Approximate Estimate Furnished by the Mills in October.	Remarks.
	Tons.	Tons.	
Mossman	70,000	72,000	Increase
Hambledon	115,000	120,000	"
Babinda	120,000	145,000	"
Mulgrave	112,000	120,000	"
Goondi	125,000	135,000	"
South Johnstone	130,000	150,000	"
Mourilyan	83,000	94,000	"
Victoria	120,000	131,000	"
Macknade	107,000	115,000	"
Pioneer	60,000	58,000	Decrease
Kalamia	41,000	41,800	Increase
Inkerman	80,000	74,876	Decrease
Invicta	10,000	10,500	Increase
Proserpine	30,000	35,390	"
Cattle Creek	33,000	34,559	Decrease
Racecourse	30,000	28,848	"
Plane Creek	46,000	45,925	"
Farleigh	80,000	73,000	"
Pleystowe	42,000	40,000	"
Marian	40,000	38,000	"
Palms .. .. .	..	..	Not crushing this year
North Eton	30,000	23,000	Decrease
Qunaba	34,000	27,863	"
Millaquin	53,000	43,000	"
Fairymead	70,000	47,327	"
Bingera	60,000	57,500	"
Gin Gin	30,000	23,481	"
Childers	50,000	28,000	"
Doolbi	16,000	15,500	"
Isis Central	17,000	17,500	Slight increase
Maryborough	15,000	15,000	..
Mount Bauple	30,000	23,728	Decrease
Moreton	49,000	48,000	"
Steiglitz	2,500	2,000	"
Eagleby	1,800	1,501	"
Carbrook	800	700	"
Alberton	900	724	"
Rocky Point	7,000	5,100	"
	1,944,000	1,952,822	

From the above table it will be gathered that every mill north of Townsville anticipates an increased yield, while practically every mill south of Townsville shows a decrease.

The commercial cane sugar content this season has been good, so that if the estimate of 1,952,822 tons of cane is realised, it should be safe to assume that a ton of sugar will be manufactured from at least 7.5 tons of cane. This should give a yield of approximately 260,000 tons of sugar. The production in New South Wales will probably be about 18,000 tons of sugar, which, with Victoria's yield of 2,800 tons of beet sugar, added to the Queensland production, may result in a yield of about 280,800 tons of sugar as the Australian production.

The prospects for next year are not satisfactory at time of writing, but should good rains fall in the sugar districts sufficiently early, there

should be a good crop, as large areas have been planted and the young cane on the whole is so far holding out well, though in some of the districts the moisture in the soil is running very low.

COMPARATIVE PROGRESS OF THE INDUSTRY DURING THE PAST TWENTY-FOUR YEARS.

Taking the yield of cane and sugar per acre and the tons of cane required to make 1 ton of sugar over twenty years, as shown in the following table, it may be noted that during the ten years from 1909 to 1918, there has been an average increase in the production of cane and sugar and a decrease in the amount of cane required to make 1 ton of sugar. The last figure is even better than it appears, as it is only during recent years that the yield of sugar has been calculated to the basis of 94 net titre:—

Table showing Yield of Cane and Sugar per Acre and Tons of Cane required to make One Ton of Sugar during Twenty-four Years.

Year.	Tons Cane per Acre.	Tons Sugar per Acre.	Tons Cane to 1 Ton Sugar.
1899	14.81	1.55	9.54
1900	11.68	1.28	9.44
1901	15.10	1.55	9.76
1902	10.86	1.30	8.38
1903	13.65	1.52	8.97
1904	16.04	1.78	8.99
1905	14.73	1.59	9.27
1906	17.61	1.88	9.38
1907	17.64	2.00	8.84
1908	15.54	1.64	9.49
Ten Years' Average	14.76	1.60	9.20
1909	14.53	1.68	8.65
1910	19.45	2.23	8.73
1911	16.02	1.81	8.85
1912	12.72	1.45	8.79
1913	20.29	2.36	8.59
1914	17.80	2.09	8.51
1915	12.20	1.49	8.20
1916	20.81	2.33	8.93
1917	24.88	2.83	8.79
1918	15.01	1.70	8.82
Ten Years' Average	17.37	1.99	8.68
1919	14.83	1.91	7.76
1920	15.03	1.88	8.0
1921	18.60	2.30	8.11
1922	15.39	2.04	7.53

The average yield of cane per acre for the last four years, due to dry seasons, has not been quite so good, though the yield of sugar per acre is slightly better.

It will be seen from the above figures, after allowing for better efficiency in the mills, that the work of the Sugar Experiment Stations—in constantly advocating and demonstrating better methods of cultivation, the use of green manures, lime, and fertilisers, together with the

introduction and distribution of improved varieties of sugar-cane, has been highly successful, and will be still more so in the future; but allowance must always be made for droughty years.

In the following table is shown the improvement in area and amounts of cane harvested and sugar made during the past twenty-four years:—

Table showing Total Acres Cultivated and Crushed and Total Yields of Cane and Sugar per Acre for a Period of Twenty-four Years.

Year.	Acres Cultivated.	Acres Crushed.	Yield.	
			Tons Cane.	Tons Sugar.
1899	110,657	79,435	1,176,466	123,289
1900	108,535	72,651	848,328	92,554
1901	112,031	78,160	1,180,091	120,858
1902	85,838	59,102	641,027	76,626
1903	111,536	60,375	823,875	91,828
1904	120,317	82,741	1,326,989	147,688
1905	134,107	96,093	1,415,745	152,722
1906	133,284	98,194	1,728,780	184,377
1907	126,810	94,384	1,665,028	188,307
1908	123,902	92,219	1,433,315	151,098
1909	128,178	80,095	1,163,569	134,584
1910	141,779	94,641	1,840,447	210,756
1911	130,376	95,766	1,534,451	173,296
1912	141,652	78,142	994,212	113,060
1913	147,743	102,803	2,085,588	242,837
1914	161,195	108,013	1,922,633	225,847
1915	153,027	94,459	1,152,516	140,496
1916	167,221	75,914	1,579,514	176,973
1917	175,762	108,707	2,704,211	307,714
1918	160,534	111,572	1,674,829	189,978
1919	148,469	84,877	1,258,760	162,136
1920	162,619	89,142	1,339,455	167,401
1921	184,513	122,956	2,287,416	282,198
1922	202,303	140,850	2,167,990	287,785

3.—GENERAL WORK, WITH BRIEF SUMMARY OF SUGAR DISTRICTS.

The Bureau of Sugar Experiment Stations comprises Sugar Experiment Stations at South Johnstone, Mackay, and Bundaberg, with laboratories attached; and an Entomological Laboratory at Meringa, near Cairns.

Arrangements are now being made to add a plant pathology division to the Bureau, and advantage was taken of the Pan-Pacific Congress recently sitting in Australia, to endeavour to secure the appointment of a suitable scientist in this capacity.

In the canefields outside the Experiment Stations material and useful assistance is rendered to the Director by Messrs. J. C. Murray (Southern) and E. H. Osborn (Northern) Field Assistants. It is regretted that Mr. Murray has been very ill during the past four months, but it is trusted he is now well on the way to recovery.

Both Field Assistants have carried out their duties creditably; and their visits and instructions to growers, particularly beginners in cane cultivation, are much appreciated. They are both carrying out good work in the interests of the industry, and it is satisfactory to know that this is acknowledged generally by growers.

In addition to instructing farmers, the Field Assistants are instructed to make observations on the following details at each farm visited; these notes being tabulated and sent to the head office every month:—Soils, crops, lime, green manure, fertilisers, drainage, irrigation, weather, ploughing, planting, cultivation, harvesting, labour, trashing, ratooning, pests and diseases, varieties of cane grown, climatic conditions, and arrowing of cane.

In pursuance of these instructions, the Field Officers have so far sent in reports upon 3,258 farms. Upon these 305 farmers have used lime, 634 have practised green manuring, and 688 have used fertilisers.

The percentage of farmers using lime, green manure, and fertilisers is far too small, and although more fertilisers have been used during the last two years the cane farmer is still far behind in this respect.

The Director and Field Assistants have, during the past twelve months, visited every sugar district in Queensland. A number of farmers' meetings have also been held in various centres, at which addresses on cane cultivation and fertilising were given by the Director. These are followed by conversational discussions, which are of great value in bringing out useful information. Good results invariably follow these meetings, and they enable the writer to come into touch with a large body of practical canegrowers.

It is found that a much larger interest is being taken in the sugar experimental 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. Farmers are

invited to submit their difficulties, and they are now doing this to a very much greater extent than hitherto, either by writing direct or putting their questions to the Field Assistants for transmission. Upwards of 1,000 soil samples have now been analysed for canegrowers. With the result a letter of advice is also sent. Every possible effort is being made to assist cane farmers, and it is gratifying to record that the efforts made in this direction are appreciated.

The supervision of the Sugar Experiment Stations at Bundaberg, Mackay, and South Johnstone, and the initiation of new experiments upon these stations, occupy a large part of the writer's time.

Successful Field Days, to which allusion will be made later, were held at Bundaberg, Mackay, and South Johnstone during the year.

The writer attended the Pan-Pacific Science Congress held at Sydney and Melbourne, and read two papers in connection with the sugar industry.

BRIEF SURVEY OF DISTRICTS VISITED BY OFFICERS.

Mossman (One Mill).—This district presented a very prosperous appearance this year. The mill was doing good work, the average commercial cane sugar in the cane to date being over 15 per cent. The mill authorities are hoping to be able to extend their tramline to the Daintree River, which would add a considerable area to their existing lands. This year Mossman expects to crush 72,000 tons of cane, and new machinery has been added to the existing plant. Scarcely any disease was noticed in the cane and there were no grubs reported this year in the district.

Regarding manures large quantities are now being used. Quite a few farms are also growing green manures, several good crops of same were noticed. Tractor power is represented by some six of various makes, whilst inquiries are being made for others. Grubs have not made any appearance so far.

Cairns District (Two Mills).—This district was suffering from droughty conditions, but crops were cutting out well and the mills were doing good work, although large areas of burnt cane were giving trouble at Mulgrave. The young cane for next year, of which there is a great deal, was looking very fine and generally green. The commercial cane sugar in the cane being harvested was high. Fortunately little damage has been done by grubs this year. This has been generally attributed to the abnormally dry season. The whole of the Cairns district is most prosperous and it is apparent that a great future awaits this port.

A disease in cane which was termed "Leaf Scald" was prevalent in parts of the Mulgrave area, particularly in two fields at Aloomba and Mount Sophia. The disease affects the leaf of the cane, in many cases depriving it of chlorophyll so that the leaves are either quite white or only have a few green stripes. The sticks become dwindled and oval. The Mulgrave Mill are carefully watching the fields in question and are proposing to conduct a survey of the whole district. This disease has been seen for many years past but has done little or no

damage. It is possible it may disappear if proper precautions are taken to prevent the planting out of sets from diseased fields. Excellent crops of cane were being harvested in the Freshwater district near Cairns; this area is sending about 50,000 tons of cane to the Haubledon Sugar Mill.

Additions were being made to the Cairns wharves of a most substantial character. A new sugar store is also being erected, so that this important port will be able to store 13,000 tons of sugar. Mechanical loaders are being installed.

Babinda (One Mill).—Large cane fires were breaking out at Babinda in October, and about 4,000 to 5,000 tons of cane were burnt in one fire alone. The Central Mill is doing fine work and now expects to cut a much larger tonnage than estimated earlier in this year. In fact, if anticipations are realised there is every possibility of this mill turning out 20,000 tons of sugar this year, which would be the largest yield of sugar ever produced by any one mill in Queensland. The commercial cane sugar is fairly high, very much better than it was some years ago when the land was new and the cane rank. No damage from grubs has been reported. The young cane has an excellent appearance and the outlook for next year is highly promising. It is anticipated that the mill will cut cane from 8,000 acres this year, and the manager, Mr. A. McColl, stated that a fresh area of 800 acres of new scrub land was being added to the mill's area.

Improvements have been carried out on the main tramline running into the mill, such as raising a long bank up to 4 feet in places and taking off about the same depth from a cutting on the northern side of Babinda Creek. These alterations of grade mean that far bigger loads can now be hauled with the same power. In the township itself, a number of new and substantial houses have recently been built, and an up-to-date and well-equipped hospital has been opened. Steps are being taken to completely light the town up with electricity, and to install a telephone system connecting up the farms.

Innisfail District (Three Mills).—This district, usually the wettest in Australia, was in October perhaps one of the most dusty. The majority of householders and business premises were buying water for domestic use and baths were at a premium. The rainfall from the beginning of the year had only been 78 inches, about half the average, and the condition of the grass was exceedingly dry; but, as usual, a comparatively dry season suits the Johnstone River, and the cane crop and sugar yield was higher this year than it has ever been previously. Goondi Mill was doing very fine work and expected 135,000 tons of cane. South Johnstone Mill was also doing good work, but was badly handicapped by the men refusing duty on Sundays. This was holding the mill back and shortening the weekly tonnage of cane being crushed, which was considerably less than its capacity. This may seriously affect the position towards the end of the crushing as the South Johnstone Mill has a very large tonnage to deal with and will have to crush well into January. Many growers are uneasy as to whether they will get all their cane cut this year. A good deal of burning is also taking place.

The average commercial cane sugar in the cane at Mourilyan was 15.4, to the end of October. This mill commenced work somewhat late, due to waiting for new machinery. The improvements carried out include new carrier, new shredder, new crushing mill, electric gantry, and large new sugar store. The carrier is designed to handle cane by the tipping of the trucks on to the movable platform and so do away with the usual machine unloaders. The management say the scheme is economical and is working satisfactorily. Altogether upwards of £50,000 had been spent last year in mill improvements and further additions are yet to be made.

Tractors are coming into use in this fine sugar district.

Innisfail has earned the name of the 'million pound town,' but this year if all the mills crush to their estimates the value of the sugar produced should approach £1,300,000.

Should good rains fall in the immediate future there should be a tremendous crop next season. The young cane has made a splendid strike everywhere and looks beautiful.

The whole South Johnstone area shows signs of prosperity. New houses and substantial cane-cutters' quarters are to be seen throughout the district, and large areas of land are being got ready for the plough.

Maria Creek Soldiers' Settlement.—This area has gone ahead rapidly, and is now quite a compact little township, carrying a school, with an attendance of about thirty, and two general stores. As one of these stores delivers its goods by means of a motor lorry, it will be easily understood by older visitors to the district how much improved the roads are to those of, say, two years ago.

Of the settlers there are now eighty, of whom twenty-five are married, mostly living in the compact little houses built by the Department. Most of the cane (all Badila) seen was very fair, but in some cases rather backward in growth, as, although light and beneficial showers had fallen lately, so far the ground has not had the good soaking which this country requires whilst such good growing weather prevails. Some 14,000 tons of cane are expected for the coming year. A very large amount of clearing and planting is now being carried out, and so 1924 should show a large increase on all the above figures.

The Tully River and Banyan, a new cane district south of Innisfail, presents a scene of great activity. Farmers are busy clearing their new holdings preparatory to planting cane. A number of sales have taken place, and there is already a considerable population and four stores. The mill site is being cleared, and preparations are being made for the erection of the mill buildings. It is understood that the construction work will be in the hands of Messrs. Barbat and Sons, of Ipswich, who will act for Walkers Limited in the erection work.

Herbert River District (Two Mills).—Only about 28 to 30 inches of rain had fallen in this area up to the middle of October. The country was very dry and dusty, but the cane crops were cutting out splendidly and giving a heavy yield. The two mills were getting through the crops rapidly and turning out large quantities of sugar for shipment South. A large area of new land was being put under cane, both in the

Herbert River district and also between Ingham and Rollingstone. The Colonial Sugar Refining Company evidently intend making a much larger use of Queensland molasses in future, and are erecting a large storage tank at Lucinda Point to supply molasses to their tank steamers for shipment to Sydney. The commercial cane sugar content in the cane is remarkably good on the Herbert River this year, ranging from 15 to 18 per cent. The Haughton Sugar Mill was taking the surplus cane from Rollingstone to Ingham, but as they only had a small crop the mill ceased operations early in October. The cane on the Herbert River was fairly healthy, but a large amount of gummed cane was visible on the Macknade side of the river, principally in the variety known as Clark's Seedling or H.Q. 426.

The dry weather, although unfavourable to this year's growth, has enabled a very large area of ground to be planted early for next season—the resultant strike in most cases being very good. Most of the young cane is clean, and with favourable conditions should result in a heavy crop for 1924. Although the pasturage so far looked fair, there was very little water in the creeks or river. For instance, "Geddes Crossing" has been fordable with a vehicle continuously this year, whilst in an average year this is very rare during the first months of each year.

Tractor Power.—Using tractors has been the means of enabling several growers to plant fairly large areas in good time this season. One farmer with 60 acres, and another with 50 acres of forward young cane, each attribute its healthy appearance to their being able to take full advantage of the weather conditions.

Varieties.—H.Q. 426 (Clark's Seedling), Badila, H.Q. 409, the Gorus, Black Innis, D. 1135, Nanemo, Korpi, Orambo, and Q. 813 are all being grown in this area, the last seven in much smaller quantities. Of these varieties Q. 813 is steadily gaining favour. Mr. Blackburn, of Macknade, is so satisfied with it after a two years' trial that he has planted out some 13 acres this year, and mentions that it is the only variety which he has not had to supply. Most of his March planting of this cane shows far better growth than canes of other varieties of a similar age planted elsewhere—especially when the very medium quality of the soil whereon it is planted is taken into consideration.

Lower Burdekin District (Four Mills).—The drought in the Lower Burdekin has been probably more severe than in any other cane-growing district in Queensland, judging by the rainfall, as will be seen from the following figures:—

	Ayr.	Home Hill.	Giru.
January .. .. .	.32 inches	1.93 inches	2.67 inches
February .. .. .	.12 inches	.05 inches	.39 inches
March .. .. .	.63 inches	.10 inches	3.34 inches
April .. .. .	.55 inches	1.09 inches	.04 inches
May	Nil	Nil	Nil
June	3.93 inches	4.12 inches	3.93 inches
July .. .. .	.06 inches	.61 inches	.02 inches
August	1.02 inches	.65 inches	1.02 inches
September	1.38 inches	1.02 inches	Nil
	8.01 inches	9.57 inches	11.41 inches

With such a scanty rainfall it has been absolutely necessary to constantly irrigate the Burdekin lands, one grower mentioning that he had watered his cane twelve times, and it then required another flooding. Despite such unfavourable conditions some really splendid cane was to be seen; in fact, to see some of this cane in the various mill yards it would be difficult to believe that the farmers were having such a bad time.

Throughout the Burdekin a large amount of planting has taken place (more especially upon the Inkerman side), but, although some very fine early-planted cane was seen, a fair proportion of the later-planted cane struck the cold conditions and had only made a medium strike.

The cane varieties principally planted upon the Burdekin are B. 208, H.Q. 426, (Clark's Seedling), the Gorus, Badila, Hybrid No. 1, Q. 903, Q. 813, Striped Singapore, &c. Many inquiries were made for E.K. 28, and the State Farm distributed as much as was available. The variety known as Q. 813 was found to be doing well in the Lower Burdekin, one farmer reporting 60 tons per acre last year, with a c.c.s. of 15½ per cent. Tractors are obtaining a great hold in this district also, and many of

them are proving a big success in pumping water for irrigation.

Manures, &c.—The use of fertilisers is becoming more popular every year upon the Burdekin. Several experienced growers also expressed their intention of using cowpea as a green crop. Where the same has been in use the soil shows great improvement, both in texture and its power of retaining moisture.

Diseases and Pests.—The Burdekin so far has been fairly free from either of these troubles. Of the former B. 208 and M. 1900 were noticed to be suffering from a form of leaf affection consisting of white spots and blotches withering away at edges and tips of leaves in many places. This is most marked in the former cane, as its side shoots also show the discoloration in places. Evidently the dry times make this more marked this season than in former years. Growers are again strongly advised against planting any but the very best seed.

Grubs, as mentioned in my last report, although prevalent to a large extent in one or two farms, have not done as much damage as one would have expected, from the very large amount of beetles that were flying about Plantation Creek early last December.

Pioneer and Inkerman were anticipating an early finish of the crushing. Each mill was enjoying a splendid run and the quality of the cane was very high. Unfortunately, Kalamia was having a bad time due to a number of stoppages in the mill.

The new irrigation scheme at Home Hill was working well, and upwards of 126 farmers have now been supplied with water.

Proserpine (One Mill).—In this centre extremely cold and dry conditions had been experienced during the past winter. Regarding the rainfall, this latter up to the end of August amounted to only 23.25 inches, and as the average annual fall in Proserpine is over 76 inches, it will be easily seen what a shortage has been experienced.

Very many frosts had also been felt, old residents saying that they could not recall anything approaching such severe conditions. Considering two such very harassing factors, it is really surprising how well the cane has survived them. Probably the good cultivation that is now noticeable on a large number of the farms is responsible for this.

The mill, despite a few minor stoppages, was working satisfactorily. Owing to the dry weather and then the frost, the density of the canes was under the average generally found in this district, and also the fluctuations of same were more marked than usually found here.

Amongst parts of the district visited was the new area at Banana Pocket. The tram line (about 6 miles in length) connecting the pocket with the Government railway at Thompson's Creek was finished and was being used by local growers. At present it is a horse line, but with the full area under crop it will take a locomotive to haul same.

Another new area for the Proserpine Mill is the locality known as the Bloomsbury, on the Mackay Railway line, where some 60 acres of good land will be under crop for next year, with a further area it is to be hoped for 1925. Nearer the mill and upon land situated say, roughly, between Myrtle Creek, the river, and Foxdale, several new blocks have also been planted up.

In fact throughout all the Proserpine area a large acreage of land has gone under cane, and despite the dry conditions, a fair strike seems assured. As a whole the conditions in this district are certainly improving rapidly. Cultivation methods are good, and fertilising is being carried out to a large extent. Liming has been successfully used by several of the growers, and a number of farmers who so far have not used green manure intend giving it a trial. Quite a number of soil samples were sent away to the Sugar Bureau lately, and the senders intend following out the advice to be given.

The Bowen district has also suffered from a very dry time. Up to the end of August the amount of rain registered amounted to only 7.89 inches. As the average rainfall for Bowen amounts to about 40 inches per annum, it will be seen how bad the situation has been.

Naturally crop conditions have been bad, and in nearly all cases the cane being harvested has been irrigated by the aid of small plants, not big enough to keep up the water supply needed by growing cane, especially when the ground

has not had a soaking for such a very long period.

Mackay (Eight Mills).—Conditions at Mackay have been exceptionally severe, and the cane crops, particularly around the old lands of Pleystowe, Palms, and Racecourse, had made poor growth. Grubs were found to be doing more damage than usual in parts of the district. A large amount of cane for next year had been planted and fortunately, at the commencement of June, good rains fell which were of the greatest service to the young cane.

Notes made in October of this year stated the district was still suffering severely from the prolonged dry weather. The rainfall last year was only half the average and has been followed by a very dry time in 1923. The crops have cut out much below the average, and small tonnages have been experienced at all the district mills. The young cane is holding out well at present, and provided good rains fall within the next month should not get very far behind. All growers are hoping earnestly for a beneficial downpour, which it is hoped will speedily come to their relief.

The sugar yield in Mackay will probably be about 34,000 tons this season.

Bundaberg and Gin Gin (Five Mills).—Notes made in February indicated that the continued absence of any regular wet season was giving rise to much uneasiness amongst farmers generally. Although rains had fallen earlier in the year, these had not been followed with further falls, and the cane, while looking well on the whole, had not made the growth usual at this time of year. A good deal of the cane in the Bundaberg district was backward and some of it had a distinct yellow appearance. At Bingera the cane was more uniform and had a better appearance than immediately around Bundaberg.

During October, after a few showers, the district looked much greener and the young cane was of a good colour, the ratoons coming away well. The crop harvested, however, had turned out much lighter than anticipated.

The Gin Gin crops were also on the light side this year, due to adverse weather conditions.

Isis District (Three Mills).—This important cane-growing centre, in common with nearly all the Southern areas, was badly hit by the prolonged drought. As is usual with this district, the farms are clean and present a well-ordered appearance. There is very little disease in the cane as far as could be observed, and parasitic agencies that make sugar-cane their host were not greatly in evidence. Green manuring is being carried on fairly extensively, also the growers are taking an active interest regarding local experiment with varieties and fertilisers. Local experiment is a very important matter on these lands with regard to fertiliser.

Maryborough and Pialba (One Mill).—Due to the drought, only light crops were harvested this year. Some good yields, however, were cut in places.

Mount Bauple (One Mill).—While the cane on this area did not make a heavy crop it was as a whole well cultivated and cared for, and the early planted cane for next year had germinated well and was looking healthy.

Cane varieties that are making a fair showing at Bauple are D. 1135, M. 1900, H.Q. 285, N.G. 22, M. 89, Q. 822, and E.K. 1, also Meerah. With the possible exception of N.G. 22 and M. 89, the farmers are very satisfied with these varieties. H.Q. 285 is a variety that will ultimately do well here on a larger scale than at present. This cane, under fair conditions, is a quick grower, and shows, as a rule, a good sugar content as early as July. Unlike many of the other varieties, H.Q. 285 shows no inclination to bleed if cut early.

Moreton (One Mill).—Land improvement and settlement are making rapid progress in these districts. Farmers are extending their existing areas, new settlers are coming in, the Company is improving its cane haulage facilities, and growers are determined to equalise the ups and downs of the sugar market by better farming, and consequently higher tonnages per acre. With this end in view, both on Petrie's Creek and the Maroochy River, the drainage systems are being extended and a greater use of lime is being made.

Regarding general methods of agriculture in these districts, the farmers are cultivating more intensively than hitherto. Green manure crops are more frequently seen than in previous years. A far greater interest is being taken in cane varieties and recognition of disease. Some of the growers are very efficient in this latter respect. An active interest is being taken in the control of insect parasites.

Beenleigh (Five Mills).—At Pimpama Island, Mr. Heck is contemplating considerable extension of tramlines, which should greatly increase the district's output. This gentleman has brought his mill to a high standard of efficiency.

Cane varieties making a satisfactory showing in the Beenleigh district are D. 1135, Q. 813, Badila, B. 208, and Mahona. The farmers are advised to concentrate on growing the two first named, with a small acreage of Badila and B. 208, provided the latter remains healthy. They are advised to discard most of the other canes that are not included in the above list.

4.—WORK OF THE NORTHERN SUGAR EXPERIMENT STATION AT SOUTH JOHNSTONE, NEAR INNISFAIL.

The piece of land used as a site for the Northern Sugar Experiment Station was selected owing to its being Crown land. It is situated at the foot of the Basilisk Range, upon the opposite side of the river to the South Johnstone Mill. The land is of poor quality, low in available phosphoric acid and lime, and, like most of the soils in the neighbourhood, contains a larger percentage of magnesia than lime.

The chemist in charge of this station, Mr. P. H. McWalters, has carried out his duties in a satisfactory manner, with zeal and energy both in his chemical and field work and the raising of new seedling canes. The analytical crop tables in this section have been prepared by Mr. McWalters, together with some notes on varieties, &c. A well-appointed laboratory is installed at the station so that Northern cane farmers are able to get soils, waters, limestones, fertilisers, sugar-canes, &c., tested free of charge.

METEOROLOGICAL.

The following notes as to weather conditions during the growing period have been furnished by the Chemist in Charge:—

The period September, 1922, to August, 1923, was marked by conditions of weather favourable for the sturdy growth of canes. Although the wet season was considerably late and embraced a much diminished rainfall, yet the cane continued to make steady growth during the months of March and April.

The limited rainfall from November to February was more favourable to the growth of varieties other than Badila, but the improved condition of early and advanced canes was considerably discounted during the month of

March, owing to the effects of severe wind and rain, resulting in a high percentage of fallen canes, though little damage was done to the Badila crops.

With regard to the earlier months of the growing period, it may be stated that the ratoons were slow in coming away, owing to the cold and unusual dry weather experienced during July and August, 1922. The Spring plantings were also slow in germinating, and the young canes were considerably backward and languishing by the middle of October. The improved warmth and favourable rains, amounting to 4 inches and spread over a period of six days, from the 18th to 23rd October, put the crops on a good basis for progress.

For the months of November and December scattered thunderstorms throughout the district partly maintained soil moistures and kept the cane slowly growing. The rainfall for the months of January and February of 19 in. was considerably below the average, but the cane had made good progress.

An unusually dry period for the first fortnight in March and the occurrence of cool westerly breezes retarded the growth of cane at this stage, but improved weather conditions, with beneficial rains extending from the 15th March to the end of April, brought pronounced growth to crops, and the canes continued to make headway well into the winter months. The severe rain squalls, accompanied by wind of cyclonic tendencies, on the 26th March, caused a good deal of damage to the advanced crops in parts of the district. Two of the mills, however, were able to commence early crushings on canes of moderate length, and under the fairly dry and cool months of May and

June were available for an early milling campaign. The winter months have been remarkably cool, and particularly cold nights with slight frosts were experienced during the first two weeks of July. The results of the season's

weather have produced stalks only of moderate length, but the unexpected low fibres in canes, and the favourable winter inducing high sucrose contents, have created tonnages much in excess of estimates.

Rainfall recorded at the Sugar Experiment Station, South Johnstone, during the Growing Period September, 1922, to August, 1923.

	Inches.		Inches.
September, 1922	1.65	April, 1923	14.32
October, 1922	4.52	May, 1923	2.09
November, 1922	1.67	June, 1923	2.93
December, 1922	2.29	July, 1923	1.63
January, 1923	8.34	August, 1923	2.01
February, 1923	10.46		
March, 1923	26.40	Total	78.31

Number of wet days, 129.

EXPERIMENT WORK.

The experiments dealt with in the following section comprise:—

- (1) Continuation of fertilising experiments with a third ratoon crop (Badila).
- (2) Experiments to determine the value of subsoiling against no subsoiling, with and without mixed fertilisers—second ratoons (Badila).
- (3) Liming and fertilising experiments—plant crop (Badila).
- (4) Tests of different variety canes.

(1)—Continuation of Fertilising Experiments with a Third Ratoon Crop (Badila).

In September of 1919 a series of plots were laid out on a large scale to test the effect of fertilisers. At that time manures were very

difficult to obtain, and it was not possible to lay out complete fertiliser tests. All that could be done was to make use of such fertilisers as could be then purchased.

The series consisted of fourteen plots, occupying about $5\frac{1}{2}$ acres. The cane used for the experiments was Badila or N.G. 15. The results of the plant, first and second ratoon crops, have already appeared in previous reports.

After cutting the fourteen plots last year in the second ratoon stage, it was determined to allow one half of the experiment, viz.—plots 8 to 14—to go on as a third ratoon crop. These ratoons came away well and not much difference could be noticed during the early stages of growth of the various plots. The chemical and crop results of the third ratoon crop are given in the tables following, which also detail the amounts of fertiliser added to the manured plots:—

Analytical Results of Experiments, with and without Manures—N.G. 15 or Badila 3rd Ratoons.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	1923.							
					Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibr.	% Glucose.	% Sucrose in Cane.	% C.C.S. in Cane.	
8	N.G. 15 or Badila	Nitrate of soda, 266 lb. per acre	13 months	5 Oct.	23.7	22.76	96.0	9.2	.13	19.52	18.88	
9	N.G. 15 or Badila	No manure	13 months	5 Oct.	23.2	21.68	93.7	9.2	.18	18.60	17.72	
10	N.G. 15 or Badila	Sulphate of ammonia, 250 lb.; and super-phosphate 550 lb. per acre	13 months	5 Oct.	22.2	20.35	91.6	9.2	.28	17.46	16.45	
11	N.G. 15 or Badila	No manure	13 months	5 Oct.	22.6	21.02	93.0	9.2	.20	18.03	17.13	
12	N.G. 15 or Badila	Holbourne Island phosphate 485 lb., and sulphate of ammonia 250 lb. per acre	13 months	5 Oct.	20.9	17.39	83.2	9.2	.60	14.92	13.21	
13	N.G. 15 or Badila	No manure	13 months	5 Oct.	23.3	20.42	87.6	9.2	.27	17.52	16.06	
14	N.G. 15 or Badila	Holbourne Island phosphate 485 lb. per acre	13 months	5 Oct.	23.4	20.39	87.1	9.2	.14	17.43	15.88	

Crop Results of Experiments, with and without Manures—N.G. 15 or Badila 3rd Ratoons—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
8	N.G. 15 or Badila	Nitrate of soda, 266 lb. per acre	13 months	28.90	5.64	5.45
9	N.G. 15 or Badila	No manure	13 months	29.37	5.46	5.20
10	N.G. 15 or Badila	Sulphate of ammonia 250 lb., and superphosphate 550 lb. per acre	13 months	32.64	5.70	5.37
11	N.G. 15 or Badila	No manure	13 months	32.96	5.94	5.64
12	N.G. 15 or Badila	Holbourne Island phosphate 485 lb., and sulphate of ammonia 250 lb. per acre	13 months	30.78	4.59	4.07
13	N.G. 15 or Badila	No manure	13 months	32.03	5.61	5.14
14	N.G. 15 or Badila	Holbourne Island phosphate, 485 lb. per acre	13 months	27.42	4.78	4.35

It will be observed that the application of the manures this season has led to a slight loss on every plot, showing that complete mixed fertilisers are wanted. The total tonnage, however, is remarkably good for a third ratoon crop.

The average and total crop results are given below for the four crops:—

Total Crop Results to date of Experiments with and without Manures—Variety N.G. 15 or Badila.

Plot No.	Treatment.	Average Yield of Cane per Acre in English Tons. Four Crops.	Average Yield of Commercial Cane Sugar per Acre in English Tons.	TOTAL RESULTS FOR FOUR CROPS.	
				Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
8	Nitrate of soda, 266 lb. per acre	33.96	5.14	135.8	20.5
9	No manure	32.76	4.72	131.0	18.9
10	Sulphate of ammonia 250 lb., and superphosphate 550 lb. per acre	35.19	5.04	140.8	20.1
11	No manure	36.61	5.21	146.5	20.8
12	Holbourne Island phosphate 485 lb., and sulphate of ammonia 250 lb. per acre	36.02	4.90	144.1	19.6
13	No manure	36.26	5.12	155.0	20.5
14	Holbourne Island phosphate, 485 lb. per acre	36.64	5.41	146.5	21.6

(2)—Experiments to Determine the Value of Subsoiling against no Subsoiling, with and without Mixed Manures.

The results of subsoiling at the Mackay Sugar Experiment Station have invariably given profitable results. It was therefore determined to lay down subsoiled plots versus no subsoiling with and without manure. The opinion was expressed by old farmers in the Innisfail district that, owing to the large quantity of rain

falling during the year and the porous nature of the soil, subsoiling would not be found of any great advantage, and this view was supported in the yield of the plant crop. The crop of first and second ratoons has given a somewhat different result, perhaps owing to the much dryer years.

The crop under review was second ratoon, and the analytical results will be found hereunder:—

Analytical Results of Experiments to determine the Value of Subsoiling—2nd Ratoon Badila—September, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose.	% Sucrose in Cane.	% C.C.S. in Cane.
1	Badila ..	Not subsoiled—no fertiliser	13 months	26 Sept. 1923.	22.1	20.10	90.9	9.0	.40	17.28	16.20
2	Badila ..	Subsoiled—no fertiliser	13 months	26 Sept.	22.2	20.31	91.4	9.0	.35	17.47	16.43
1A	Badila ..	Not subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	13 months	26 Sept.	22.4	20.33	90.7	9.0	.38	17.48	16.37
2A	Badila ..	Subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	13 months	26 Sept.	22.0	19.89	90.4	9.0	.47	17.10	15.97

The results of the crop are given in the following table:—
Crop Results of Experiments to determine the Value of Subsoiling—2nd Ratoon Badila—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	Badila	Not subsoiled—no fertiliser	13 months	31.98	5.52	5.18
2	Badila	Subsoiled—no fertiliser	13 months	34.73	6.07	5.71
1A	Badila	Not subsoiled—fertiliser applied as follows:— 200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	13 months	37.00	6.47	6.06
2A	Badila	Subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	13 months	43.82	7.49	7.00

Difference in favour of subsoiling unfertilised plots, 2.7 tons of cane and .53 tons of Commercial Cane Sugar per acre.
Difference in favour of subsoiling fertilised plots, 6.8 tons of cane and .94 tons of Commercial Cane Sugar per acre.

This year there is again a marked difference in favour of subsoiling, amounting in the unfertilised plots to 2.7 tons of cane and in the fertilised plots to 6.8 tons of cane per acre. Last year the greater difference was in the non-fertilised plots. The result in favour of subsoiling show a profit per acre over the extra cost of the deeper cultivation. In the next table are given the analytical results to date:—

Analytical Results to date of Experiments to determine the Value of Subsoiling—Second Ratoon Badila.

Plot No.	Treatment.	% C.C.S. Plant Crop.	% C.C.S. 1st Ratoon.	% C.C.S. 2nd Ratoon.	Average C.C.S. 3 Crops.	Total Tons. C.C.S. 3 Crops.
1	Not subsoiled—no fertiliser	14.52	14.61	16.20	15.00	17.04
2	Subsoiled—no fertiliser	13.24	12.62	16.43	13.92	17.28
1A	Not subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	12.90	13.13	16.37	13.91	18.79
2A	Subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	13.75	13.70	15.97	14.40	20.89

The crop results to date, including averages, are shown hereunder. It will be seen that the average difference in favour of subsoiling unfertilised plots is 3.52 tons of cane more per acre and of subsoiling fertilised plots 3.33 tons of cane more per acre. The difference in the yield from the total tonnages of subsoiled and not subsoiled unfertilised plots is 10.58 tons of cane per acre, and the difference between subsoiled and not subsoiled fertilised plots amounts to 9.99 tons of cane per acre. This is the total for the three crops—

Crop Results to date of Experiments in Subsoiling versus No Subsoiling—N.G. 15 or Badila.

Plot Number.	Treatment.	PLANT CROP, 1921.		FIRST RATOON CROP, 1922.		SECOND RATOON CROP, 1923.		Average Yield of Cane per Acre in English Tons—Three Crops.	Average Yield of Commercial Cane Sugar per Acre in English Tons.
		Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.		
1	Not subsoiled—no fertiliser	49.74	7.22	31.81	4.64	31.98	5.18	37.85	5.68
2	Subsoiled—no fertiliser	47.76	6.32	41.62	5.25	34.73	5.71	41.37	5.76
1A	Not subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	56.60	7.30	41.38	5.43	37.00	6.06	45.00	6.26
2A	Subsoiled—fertiliser applied as follows:—200 lb. superphosphate, 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, and 100 lb. sulphate of potash	56.38	7.75	44.80	6.14	43.82	7.00	48.33	6.96

Average difference in favour of subsoiling unfertilised plots, 3.52 tons of cane and .08 tons of Commercial Cane Sugar per acre.

Average difference in favour of subsoiling fertilised plots, 3.33 tons of cane and .70 tons of Commercial Cane Sugar per acre.

Total yield of cane per acre from non-subsoiled unfertilised plots—3 crops 113.53 tons

Total yield of cane per acre from subsoiled unfertilised plots—3 crops 124.11 ..

Difference in favour of subsoiling 10.58 ..

Total yield of cane per acre from non-subsoiled fertilised plot—3 crops 135.00 tons

Total yield of cane per acre from subsoiled fertilised plot—3 crops 144.99 ..

Difference in favour of subsoiling 9.99 ..

This experiment will now be carried over to a third ratoon crop.

(3)—Liming and Fertilising Experiments, Plant Crop, N.G. 15 or Badila.

An apparently uniform piece of land was selected for this experiment, and carefully prepared by deep ploughings—four in number.

The object of the experiment was to observe the action of lime, lime and mixed manures, basic superphosphate, and basic superphosphate with potash and nitrogen. The treatment of each plot is given in the third column of the analytical results below—

Analytical Results of Experiments in Liming, with and without Manures, N.G. 15 or Badila Plant Cane—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose.	% Sucrose in Cane.	% C.C.S. in Cane.
1	N.G. 15 or Badila	Lime only, rate of 1 ton per acre	14 months	1923. 10 Oct.	21.85	20.31	92.9	8.6	.57	17.54	16.66
2	N.G. 15 or Badila	Lime applied at rate of 1 ton per acre and fertiliser applied as follows:—250 lb. superphosphate, 100 lb. sulphate of ammonia, 150 lb. nitrate of soda, and 100 lb. sulphate of potash	14 months	10 Oct.	22.4	20.88	93.2	8.6	.30	18.04	17.16
3	N.G. 15 or Badila	No lime and no manure	14 months	10 Oct.	22.3	20.44	91.6	8.6	.36	17.66	16.64
4	N.G. 15 or Badila	No lime. Fertiliser applied as follows:—400 lb. basic superphosphate per acre	14 months	10 Oct.	22.6	21.04	93.1	8.6	.38	18.17	17.27
5	N.G. 15 or Badila	No lime. Fertiliser applied as follows:—400 lb. basic superphosphate, 200 lb. nitrate of soda, and 100 lb. sulphate of potash	14 months	10 Oct.	22.7	21.26	93.6	8.6	.34	18.36	17.51

The Chemist in Charge makes the following remarks on these plots:—

“Up to February no actual difference was noted in the growth of the young cane on four of the differently treated plots. It was, however, remarked that a section of plot 5—towards the top headland and facing the central road—was showing a patch of backward canes.”

In April notes were made as follows:—

Plot 1.—Fair conditions of growth—canes not so advanced as plot 2.

Plot 2.—Fair to good growth—much improved in appearance compared with plots 1 and 3.

Plot 3.—Medium growth and slightly inferior in appearance with growth of plots 2 and 4.

Plot 4.—Fair growth and canes showing greater length than plot 3.

Plot 5.—With the exception of a poor patch running through a section of this plot, the canes show similar growth to plot 4.

The table of crop results of this experiment are now presented:—

Crop Results of Experiments in Liming, with and without Manures, N.G. 15 or Badila—Plant Cane—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	N.G. 15 or Badila	Lime only; rate of 1 ton per acre	14 months	30.15	5.28	5.02
2	N.G. 15 or Badila	Lime applied at rate of 1 ton per acre and fertiliser applied as follows:—250 lb. superphosphate, 100 lb. sulphate of ammonia, 150 lb. nitrate of soda, and 100 lb. sulphate of potash	14 months	40.63	7.33	6.97
3	N.G. 15 or Badila	No lime, no manure	14 months	31.73	5.60	5.28
4	N.G. 15 or Badila	No lime. Fertiliser applied as follows:—400 lb. basic superphosphate per acre	14 months	36.58	6.65	6.32
5	N.G. 15 or Badila	No lime. Fertiliser applied as follows:—400 lb. basic superphosphate, 200 lb. nitrate of soda, and 100 lb. sulphate of potash	14 months	32.00	5.87	5.60

From the above results it appears that the lime applied to plot 1 caused a slight decrease in the plant crop when compared with plot 3, where no lime was applied. The best yield is from plot 2, where lime, sulphate of ammonia, potash, and superphosphate were applied. The sulphate of ammonia was, of course, not applied till some time after the application of the lime. The plot to which basic superphosphate alone was applied at the rate of 400 lb. per acre gave the next best yield of cane and sugar, beating plot 5, where nitrate of soda and potash had

been added to the basic superphosphate to form a mixed fertiliser. The poor yield of this plot may be attributed to the inferior patch of cane noticed in its earlier stages of growth.

(4)—Analytical Tests of Different Variety Canes.

Analyses were made of plant and second ratoon variety canes growing at the Experiment Station in September and October. The results are detailed below:—

Analyses of Varieties—Plant Cane, 13th September, 1923

Variety.	Date of Analysis.	Age of Cane.	Brix of Juice	% Sucrose in Juice.	Purity.	% Fibre.	% Sucrose in Cane.	% C.C.S. in Cane.
Tableland Badila	13 Sept.	13 months	20.8	19.85	95.4	9.0	17.07	16.45
Tableland Goru	13 Sept.	13 months	19.4	18.10	93.3	10.0	15.38	14.67
Tableland Rose Bamboo	13 Sept.	13 months	20.3	18.90	93.0	10.0	16.06	15.26
Tableland Striped Singapore	13 Sept.	13 months	19.1	18.25	95.5	10.0	15.51	14.96
Tableland Meera	13 Sept.	13 months	18.4	17.00	92.3	10.5	14.36	13.58
Q. 813	13 Sept.	13 months	19.5	17.93	91.9	11.0	15.06	14.21
Q. 970	13 Sept.	13 months	21.0	18.97	90.3	10.5	16.03	14.97
Q. 1098	13 Sept.	13 months	19.9	17.94	90.1	11.0	15.07	14.05
Q. 1121	13 Sept.	13 months	18.7	16.59	88.7	9.7	14.15	13.07
Q. 1133	13 Sept.	13 months	19.7	17.04	86.5	11.5	14.22	12.91
N.G. 16	13 Sept.	13 months	19.3	17.23	89.2	9.5	14.73	13.66
N.G. 24	13 Sept.	13 months	20.3	18.79	92.5	10.5	15.88	15.05
N.G. 24A	13 Sept.	13 months	20.9	19.77	90.4	10.5	16.70	16.02
N.G. 24B	13 Sept.	13 months	19.7	17.61	89.4	10.5	14.88	13.80
H.Q. 426	13 Sept.	13 months	20.5	18.91	92.2	10.0	16.07	15.19
H.Q. 458	13 Sept.	13 months	18.4	16.32	88.7	9.5	13.95	12.88
Badila Seedling	13 Sept.	13 months	20.9	19.36	92.6	9.0	16.65	15.77
H. 146	13 Sept.	13 months	18.9	17.16	90.8	9.8	14.62	13.69
H. 227	13 Sept.	13 months	17.1	15.03	87.9	12.2	12.44	11.41
E.K. 1	13 Sept.	13 months	16.3	13.83	84.8	9.7	11.79	10.58
E.K. 2	13 Sept.	13 months	15.6	13.13	84.1	9.8	11.18	9.97
E.K. 28	13 Sept.	13 months	20.1	18.41	91.5	10.6	15.54	14.63
Oba Badila	13 Sept.	13 months	21.5	20.13	93.6	10.0	17.11	16.32
B. 6450	13 Sept.	13 months	19.9	19.04	95.6	10.3	16.12	15.56
B. 4030	13 Sept.	13 months	20.3	19.12	94.1	10.0	16.25	15.55
H.Q. 409	13 Sept.	13 months	19.3	16.99	88.0	11.5	14.18	13.02
M.Q. 1	13 Sept.	13 months	20.4	19.00	93.1	8.2	16.49	15.68

Analyses of Varieties—Second Ratoons, 10th October, 1923.

Variety.	Date of Analysis.	Age of Cane.	Brix of Juice.	% Sucrose in Juice.	Purity.	% Fibre.	% Sucrose in Cane.	% C.C.S. in Cane.
Tableland Badila	10 Oct.	13½ months	22.8	21.58	94.6	10.0	18.34	17.60
Tableland Goru	10 Oct.	13¼ months	21.0	20.02	95.3	11.0	16.82	16.20
Tableland Rose Bamboo	10 Oct.	13½ months	21.1	20.44	96.8	10.5	17.22	16.71
Tableland Striped Singapore	10 Oct.	13½ months	21.4	20.22	94.4	10.5	17.08	16.37
Tableland Meera	10 Oct.	13½ months	20.7	19.42	93.8	11.0	16.31	15.57
Q. 813	10 Oct.	13¼ months	22.7	21.3	93.8	11.5	17.78	16.97
Q. 970	10 Oct.	13½ months	21.2	19.74	93.1	11.0	16.58	15.76
Q. 1098	10 Oct.	13½ months	22.6	21.60	95.5	11.5	18.04	17.40
Q. 1121	10 Oct.	13½ months	21.3	20.13	94.5	10.2	17.07	16.37
Q. 1133	10 Oct.	13½ months	20.8	18.79	90.3	12.0	15.60	14.56
N.G. 16	10 Oct.	13½ months	21.6	18.54	85.8	10.0	15.76	14.25
N.G. 24	10 Oct.	13½ months	21.4	19.85	92.7	11.0	16.67	15.81
N.G. 24A	10 Oct.	13½ months	20.3	18.52	91.2	11.0	15.55	14.60
N.G. 24B	10 Oct.	13½ months	21.8	20.3	93.1	11.0	17.05	16.20
H.Q. 426	10 Oct.	13½ months	22.5	20.94	93.1	10.5	17.69	16.81
H.Q. 458	10 Oct.	12¾ months	20.9	18.87	90.2	10.9	16.04	14.97
Badila Seedling	10 Oct.	13½ months	24.4	23.47	96.2	9.5	20.07	19.43
H. 146	10 Oct.	13½ months	21.8	19.81	90.8	10.3	16.78	15.72
H. 227	10 Oct.	13½ months	20.95	19.16	91.4	12.7	15.76	14.81
E.K. 1	10 Oct.	13½ months	22.1	20.03	90.6	10.2	16.98	15.88
E.K. 2	10 Oct.	13½ months	18.75	16.32	87.0	10.7	13.76	12.59
E.K. 28	10 Oct.	13½ months	19.85	17.70	89.1	10.3	14.99	13.88

The C.C.S. in most of these varieties is remarkably high this season. 19.43 per cent.

The Badila Seedling gave a C.C.S. of

REMARKS ON GROWTH OF CANE VARIETIES, SEASON 1922-23.

The variety canes yielded an average return of 35 tons per acre on the thirteen months' crop.

Of the new canes, the varieties Q. 116 Sport, N.G. 103, B. 6450, and Gingor gave the best returns in weight and sucrose content. The cane M. 55/1182, although making moderately good growth, is inclined to throw spindly stalks and did not show up so well as the previous crop.

In the Mossman seedlings, the cane M.Q. 1 has given the most consistent results—its habits and sucrose content being much similar to Badila. The canes M.Q. 2 and M.Q. 7 made fair to heavy growth. All the Mowbray seedlings during the growing period, with the exception of the cane M.Q. 1, have the tendency to wilt at the top central leaf, giving the appearance of top rot.

With regard to the New Guinea canes—N.G. 165, N.G. 94, N.G. 148, N.G. 90, N.G. 102, and N.G. 81—all these varieties, although making heavy growth, are susceptible to lodge early and appear to be of little commercial value for the Johnstone district. The cane N.G. 103 has a fairly erect habit of good stools, but returned a moderate density of 12.5 and 12.6 c.e.s. for a twelve and thirteen months' crop.

The Queensland seedlings in both crops of plant cane and second ratoons gave heavy yields. The second ratoon crop was considerably affected by the heavy gales in March, owing to the advanced growth at that period.

The cane Q. 813 is inclined to lodge early, and its rooting system appears to require a deep soil.

The Java canes E.K. 1 and E.K. 28 have maintained good sucrose contents. The E.K. 1 is a late maturing cane and requires a long growing period.

Of the Hawaiian canes, H. 146 gave the most favourable returns. The cane H. 227 has made little improvement towards better sucrose content.

In the Mauritius canes, with the exception of the variety M. 55/1182, the remainder appear to make little improvement in densities. The cane M. 168^u, although yielding heavy stalks of good stools, is erratic in sucrose returns and appears to be affected by disease.

The West Indies canes—D. 109, B. 4030, B. 4596, and B. 6450—all returned heavy crops, but the canes D. 109 and B. 4596 have densities on the low side.

Of the older canes, H.Q. 458 has returned satisfactory tonnages in three successive crops. This cane is somewhat similar to Clark's Seedling, and gives good returns on certain soils where Badila has been found unsuitable.

DATES OF ARROWING OF CANE, 1923.

H. 109	.. .. .	12th May
Q. 116 Sport	.. .. .	12th May
M.Q. 2	.. .. .	12th May
M.Q. 7	.. .. .	12th May
M.Q. 3	.. .. .	12th May
M.Q. 6	.. .. .	13th May
M.Q. 4	.. .. .	14th May
M.Q. 5	.. .. .	14th May
B. 4596	.. .. .	14th May
B. 4030	.. .. .	15th May
H.Q. 409	.. .. .	15th May
D. 109	.. .. .	20th May

B. 6450	.. .. .	20th May
N.G. 94	.. .. .	20th May
Q. 1133	.. .. .	22nd May
H.Q. 77	.. .. .	22nd May
7 R. 428	.. .. .	24th May
H. 227	.. .. .	24th May
N.G. 90	.. .. .	25th May
M. 32/10	.. .. .	25th May
Q. 903	.. .. .	27th May
Q. 855	.. .. .	27th May
M. 168 ^u	.. .. .	29th May
N.G. 103	.. .. .	30th May
B. 156	.. .. .	30th May
M. 28/10	.. .. .	30th May
H.Q. 458	.. .. .	30th May
N.G. 16	.. .. .	30th May
E.K. 28	.. .. .	30th May
Q. 1098	.. .. .	1st June
Meera	.. .. .	1st June
H. 146	.. .. .	1st June
Q. 1092	.. .. .	2nd June
Striped Singapore	.. .. .	7th June
Rose Bamboo	.. .. .	12th June
Q. 695	.. .. .	12th June
Gingor	.. .. .	12th June
Q. 1121	.. .. .	16th June
N.G. 24	.. .. .	18th June
N.G. 24B	.. .. .	23rd June
N.G. 24A	.. .. .	25th June
Q. 813	.. .. .	3rd July
M.Q. 1	.. .. .	5th July
Q. 970	.. .. .	6th July

Distribution of Varieties, Season 1923.

The distribution of varieties commenced early in August and extended to the middle of September. About sixty farmers visited the station to obtain plants of new varieties.

Parcels of plants were forwarded to Proserpine, Herbert River, and Mossman. Bags of cane plants were forwarded to the various districts. Forty-four bags of plants were forwarded to farmers along the Babinda-Cairns line. Crates of canes were also forwarded to Ingham and Port Douglas. Altogether 186 bags of plants and 10 crates of canes were distributed in the various districts.

The chief canes applied for were as follows, in order of importance:—

Tableland Badila, E.K. 28, H.Q. 458, Badila Seedling, Q. 813, H. 146, E.K. 1, Q. 903, Tableland Goru, Oba Badila, Q. 116 Sport, Gingor, M.Q. 1, and Q. 1133. Applications were also received for Rose Bamboo, Striped Singapore, H.Q. 426, and the Goru canes.

FIELD DAY.

The first Field Day of the South Johnstone Sugar Experiment Station was held on the 22nd June. The weather was fine and there was a good gathering of farmers, millers, and commercial men. The visitors were conducted over the experiments and took considerable interest in the work being carried out. This was followed by a light luncheon and an address by the Director on fertilising.

SEEDLING WORK.

The propagation of seedlings has been continued at South Johnstone, and a detailed account of this work will be found under section 10.

GENERAL NOTES—PESTS, DISEASES, ETC., 1922-1923.

Rats.—Taking the South Johnstone area, damage to crops by rats has been considerably reduced, and control measures appear to be giving results.

Bottle Borer.—The borer is very widespread throughout the district, and, although unaccountably disappearing from certain blocks after harvesting of a crop, appears to be increasing in the Johnstone area. Measures are being taken to combat this pest by the Entomologist in the liberation of Tachinid flies in the affected areas.

Linear Bug.—This pest is still found throughout the district, and, although exceedingly abundant, does not appear to be multiplying, and is apparently kept in check by natural enemies.

Cane Diseases.—The crops, on the average, have yielded fair tonnages throughout the district, although during the last two seasons the rainfall has been exceptionally low and young canes have experienced abnormally dry periods. No serious disease of any nature has been found associated with the Badila crops. It may be stated, however, that a large percentage of plantings in the Johnstone area do not come up to expectations. This is no doubt the result of insufficient attention in the selection of cane seed. A study of the growth obtained from the introduced Tableland Badila to this station showed that improved tonnages resulted in the first plants from the highland seed, but that a falling off in the results took place later.

The borer is the greatest evil, and little improvement in selection of seed is possible unless farmers bestow more attention to the maintenance of the Tachinid fly.

NEW EXPERIMENTS LAID OUT.

1. *Distance Experiments*—

Series No. 1—

- Rows 5 feet apart and plants spaced 12 inches.
- Plants per acre, 5,090.
- Eyes per acre, 18,230.
- Rows 6 feet apart and plants spaced 12 inches.
- Plants per acre, 4,200.
- Eyes per acre, 15,060.
- Rows 7 feet apart and plants spaced 12 inches.
- Plants per acre, 3,608.
- Eyes per acre, 12,938.

Series No. 2—

- Rows 5 feet apart and plants spaced 6 inches.
- Plants per acre, 6,640.
- Eyes per acre, 20,938.
- Rows 5 feet apart and plants spaced 12 inches.
- Plants per acre, 4,910.
- Eyes per acre, 18,410.
- Rows 5 feet apart and plants spaced 2 feet.
- Plants per acre, 3,177.
- Eyes per acre, 9,710.

Series No. 3—

- Rows 7 feet apart and plants spaced 36 inches.
- Plants per acre, 1,675.
- Eyes per acre, 5,386.

2. *Experiments with Green Manure*—

- Plot 1.—Green manure and fertilisers.
- Plot 2.—Green manure, no fertilisers.
- Plot 3.—No green manure, fertilisers.
- Plot 4.—No green manure, no fertilisers.

TOTAL TONNAGE OF CANE HARVESTED FROM THE SUGAR EXPERIMENT STATION AT SOUTH JOHNSTONE DURING 1923.

Cane sent to mill	495.14
Cane distributed	11.00
Total	506.14

Nature of Crop—

Plant cane	36.6%
First ratoons	7.7%
Second ratoons	37.3%
Third ratoons	18.4%

Tonnages—

Plant cane, Badila	115.52
First ratoons, Badila .. .. .	.. .. .
Second ratoons, Badila	70.84
Third ratoons, Badila	83.74
Plant cane varieties	78.12
First ratoon cane varieties	49.51
Second ratoon cane varieties	108.41
Average under cane	14.56
Average tonnage of cane per acre	34.06

5.—WORK OF THE CENTRAL SUGAR EXPERIMENT STATION AT MACKAY.

Mr. F. Keogh is the chemist in charge of the Central Sugar Experiment Station, and he has performed his duties in a very creditable and commendable manner. During the preparation of the final chemical figures, Mr. Keogh was assisted by Mr. Burgess, attached to the Agricultural Laboratory in Brisbane, and his assistance was capably rendered.

The foreman of the station, Mr. W. Millard, and the remainder of the staff have been employed for many years, and their work and interest in the station are praiseworthy.

The tables presented in this portion of the report have been compiled by the Chemist in Charge, who has also supplied various notes for the use of the Director.

The weather notes now following show how severe the drought has been at Mackay:—

Weather Notes Covering Period from March, 1922, to end of September, 1923.

The weather during the early part of 1922 was fairly good for early planting, and, although there was not a large rainfall during March, sufficient rain fell during February to keep the land in a moist condition for planting in April. The early plant cane struck well, and towards the end of the month the weather was showery, the fall for the month totalling 215 points on fifteen wet days. During May only a few light showers fell and in June the registration was 91 points. The rainfall in the early part of July was much better and this ensured better conditions for Spring planting. All the cane planted during the winter months and August and September struck well. About this time of the year the early plant cane was not making much

growth and the moisture in the soil was hardly enough to force the cane along. The rain for September and October fell in light showers and not sufficient to make a vigorous growth. The Spring planted cane made only moderate growth during these months, and no improvement could be expected even in November, as the fall of 174 points was not sufficient. The registration for all these months was much below the average and there was no reserve moisture to draw on, as the soil had not a good soaking during the summer months.

Conditions improved somewhat in December (485 points), the cane recovering a good deal and continued to make fair growth till the end of January, as during this month, up to the 14th, light rain fell on ten wet days for 595 points.

From the end of January the cane almost ceased growing; the early plant cane from that date made very little headway and the Spring plant struggled on with small growth. The months of February and March were most disappointing, the meagre falls respectively being 244 points and 282 points on ten and sixteen wet days. The showers were too light to do any good, and practically all the moisture that fell was immediately lost by evaporation. The cane at the end of March presented a very yellow appearance in the leaf, and by the middle of April it was almost dead. Looking over a field of cane from a distance, instead of the usual green healthy appearance it was a mass of brown withered leaves. The rain which fell towards the end of April freshened the cane up again, but the month of May was rainless—the average for this month is 361 points—and here the cane received another severe check in growth.

Fortunately, early in June good rain fell on three wet days and this helped the cane again. A few showers later in the month assisted also to keep the cane green and make a slight growth.

On the 1st of July 70 points of rain fell, and the total for the month was only 74 points, and August 90 points, with September rainless.

Comparing the past year with the previous season, conditions were much worse. For the latter part of 1921 very good rains fell and the

cane at that time made splendid growth. The total fall for the six months ending 31st December, 1921, was 33 inches, and for the same period of 1922 approximately 14 inches. For the first six months of 1922 and for the same period this year the total registration was about the same, but following on the dry period ending 1922 the cane during the best growing months of 1923 had a very trying time and very little growth was made from the end of January. The crops harvested this year gave a very low tonnage per acre, and the sugar content is also lower than last year.

Apart from the extremely dry weather, this year the winter was severe and some cane was damaged by frost. A very low grass reading was recorded on the 6th August, viz., 26.6 degrees. At this time there was frost six mornings consecutively.

The rainfall covering the period of 1922-1923 growing season was 20 inches less than the 1921-1922 period, and 46 inches below the 1920-1921 growing season.

The following are the rainfall records taken at this station since 1900:—

Year.	Rainfall in inches.
1900	45.26
1901	63.45
1902	33.93
1903	64.93
1904	60.48
1905	69.50
1906	99.84
1907	51.78
1908	78.88
1909	63.98
1910	101.87
1911	65.35
1912	42.07
1913	85.16
1914	71.71
1915	36.27
1916	82.93
1917	67.92
1918	113.97
1919	38.03
1920	57.27
1921	95.89
1922	34.47
1923 (10 months)	21.84

From the above table it will be seen that the rainfalls for 1922 and 1923 are both very low.

Abstract of Meteorological Observations made at the Sugar Experiment Station, Mackay, from 1st September, 1922, to 31st August, 1923—Covering Growth of Experiment Canes.

Month.	Rainfall in Inches.	Number of Wet Days.	Average Rainfall, 25 Years, 1901-1922.	Highest Shade Maximum.	Lowest Shade Maximum.	Mean Shade Maximum.	Highest Shade Minimum.	Lowest Shade Minimum.	Mean Shade Minimum.	Lowest Terrestrial Min.	Mean Terrestrial Min.	Mean Diurnal Range.	Mean Temperature, 9 a.m.	Mean Relative Humidity of the Air, Saturation equalling 100 at 9 a.m.	Mean Daily Evaporation in Inches.
Sep., 1922	1.45	4	2.10	86.9	75.4	81.9	68.9	49.3	57.1	46.1	53.8	24.8	73.8	69.0	.25
Oct., 1922	1.45	7	2.16	95.2	80.0	87.6	71.7	57.0	63.4	54.0	60.2	24.2	80.8	64.5	.298
Nov., 1922	1.74	3	3.01	97.0	85.5	89.0	73.4	58.6	64.8	61.4	64.2	24.2	84.5	60.0	.353
Dec., 1922	4.85	11	7.27	97.3	88.1	92.0	76.2	64.1	71.1	62.1	69.6	20.9	85.7	66.5	.326
Jan., 1923	5.95	10	18.10	101.2	85.5	90.8	75.2	63.5	70.9	61.2	69.8	19.9	83.6	75.0	.229
Feb., 1923	2.44	10	8.58	96.6	88.1	91.0	79.0	63.2	71.9	60.4	69.1	19.1	82.8	73.0	.337
Mar., 1923	2.82	16	10.45	95.5	80.9	90.2	77.0	67.3	73.0	62.0	70.1	17.2	82.3	68.0	.225
Apr., 1923	3.66	13	6.27	88.9	72.4	83.3	71.2	57.7	66.6	54.0	63.7	16.7	76.2	70.0	.296
May, 1923	Nil	..	3.61	89.5	80.4	83.6	64.2	49.8	57.2	43.5	51.8	26.4	73.5	78.0	.218
June, 1923	5.25	7	2.76	84.0	71.1	77.1	66.0	40.5	50.7	35.9	47.0	26.4	64.9	69.0	.253
July, 1923	.74	2	1.41	82.1	69.7	74.2	58.1	37.8	45.5	32.9	41.6	28.7	61.4	66.0	.254
Aug., 1923	.90	3	1.12	87.8	65.1	76.4	59.4	36.0	47.9	26.6	42.4	28.5	66.0	66.0	.267
	32.05	86	66.84	..	..	..	..	..	..	..	..	..	..	68.7*	..

* Average.

EXPERIMENTS DEALT WITH IN THE
FOLLOWING SECTION.

(1) Conclusion of experiments with varieties of cane from different countries to test their commercial value.

(2) Trials with Muriate and Sulphate of Potash.—Experiments testing the action of muriate of potash versus sulphate of potash and no potash on cane juices. In the application of these fertilisers the same amount of potash was used in both salts.

(3) Competitive trials of the following varieties:—H. 227, H. 146, H. 109, Java 100 Bont, Java 247, Java E.K. 1, Java E.K. 2, Java E.K. 28, M. 168st, H.Q. 77, Shahjahanpur No. 10, N.G. 24B, and Q. 813 for comparison.

(4) Planting Experiments.—Different distances between the rows, viz.—4 feet 6 inches, 5 feet, 6 feet, 7 feet. All plants 6 inches apart in the drill. Different distances between plants in the row, viz.—Continuous and 6, 12, 24, and 36 inches apart, all rows being 5 feet apart.

(5) Analytical tests of miscellaneous canes.

(1)—Conclusion of Experiments with Varieties
of Cane from Different Countries.

After harvesting of the first ratoon crop the land was ploughed and subsoiled to a depth of about 16 inches on the 5th October, 1922. At the time of ratooning the moisture in the soil was fairly good and the ratoons came away well. The rainfall for September was 145 points, and the same amount was registered in October, followed by 174 points in November and 485 points in December. The young ratoons made good growth during this period and continued growing till about the end of January. In this month a fair rainfall was recorded till the 14th, totalling 595 points, but from this date onwards exceedingly small amounts of rain fell and the

cane made slow growth, the resulting crops being of low tonnage per acre. On the second ratoon results Q. 813, 7 R. 428 (Pompey), Q. 1121, Q. 1098, D. 109, D. 1457, and Q. 970 gave the best results. H.Q. 458 gave a fair crop. Q. 903 has proved a failure in this trial. Gingor gave poor results in this crop. The results were much better in the plant and first ratoon. Of the remaining canes, M.Q. No. 1 gave only moderate yields. It requires similar conditions to Badila—good soil and plenty of moisture. The Barbadoes cane B. 4596 can be classed as a failure; the tonnages were good, but c.e.s. content too low. It also developed striped leaf disease, which was noticed to be spreading to other canes in adjoining drills, so all diseased stools were dug out and destroyed. This cane will be discarded. B. 6450 gave moderate tonnages per acre, with good c.e.s. content. It is too sparse a stooler, both in plant and ratoon crops.

On the results of the three crops, Q. 813 and 7 R. 428 (Pompey) have given the highest yield of sugar per acre. The Q. 813 has a higher c.e.s. content and is also a better germinator, although Pompey is also good. D. 1457 runs third, but is a very soft cane, and also rather uncertain as a striker. The best of the other canes are Q. 1121 and Q. 1098. This latter cane is slow in germination, and for that reason is not favoured by farmers, as it requires extra attention during the early stage of growth. H.Q. 458 and Gingor gave very fair returns. The former is a sparse stooler, but the sticks are very thick. Gingor fell away considerably in the second ratoons. D. 109 is a promising cane, the ratoon crops comparing well with the other canes. As this is its first trial, it may improve on further experimenting. Q. 970 has not done as well as in previous trials. The remaining canes are rather poor.

The usual preliminary, progressive, and final analytical examinations are set out below:—

First Preliminary Examination in Experiments with Varieties of Cane from Different Countries—Second Ratoon
Crop—June, 1923.

Country.	Name or Number of Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C. C. S. in Cane.	Purity of Juice.
Demerara	D. 1457	20-6-23	8½ months	18.4	16.66	13.08	90.5
Queensland	M.Q. No. 1	20-6-23	8½ months	20.2	18.87	15.09	93.4
Demerara	D. 109	20-6-23	8½ months	19.3	17.47	13.71	90.5
Barbadoes	B. 4596	20-6-23	8½ months	16.7	14.52	11.11	85.8
Barbadoes	B. 6450	20-6-23	8½ months	19.3	18.53	15.05	96.0
Queensland	Gingor	20-6-23	8½ months	19.4	17.75	14.02	91.5
Fiji	7R. 428 (Pompey)	20-6-23	8½ months	19.1	17.30	13.59	90.6
Queensland	H.Q. 458	20-6-23	8½ months	17.4	15.26	11.75	87.6
Queensland	Q. 813	20-6-23	8½ months	20.5	19.22	15.40	93.7
Queensland	Q. 903	20-6-23	8½ months	19.4	17.39	13.57	89.6
Queensland	Q. 1098	20-6-23	8½ months	19.2	17.36	13.62	90.4
Queensland	Q. 1121	20-6-23	8½ months	19.4	18.23	14.63	93.9
Queensland	Q. 970	20-6-23	8½ months	20.7	19.49	15.66	95.4

Second Progressive Examination in Experiments with Varieties of Cane from Different Countries—Second Ratoon Crop—July, 1923.

Country.	Name or Number of Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C. S. S. in Cane.	Purity of Juice.
Demerara	D. 1457	20-7-23	9½ months	20.4	19.26	15.50	94.4
Queensland	M.Q. No. 1	20-7-23	9½ months	19.6	18.19	14.49	92.8
Demerara	D. 109	20-7-23	9½ months	18.4	16.98	13.48	92.3
Barbadoes	B. 4596	20-7-23	9½ months	17.4	15.71	12.31	90.3
Barbadoes	B. 6450	20-7-23	9½ months	19.2	18.28	14.78	95.2
Queensland	Gingor	20-7-23	9½ months	19.4	17.94	14.26	92.5
Fiji	7R. 428 (Pompey)	20-7-23	9½ months	18.4	16.84	13.31	91.5
Queensland	H.Q. 458	20-7-23	9½ months	18.5	16.68	13.06	90.2
Queensland	Q. 813	20-7-23	9½ months	20.3	18.81	14.97	92.6
Queensland	Q. 903	20-7-23	9½ months	19.6	18.11	14.39	92.4
Queensland	Q. 1098	20-7-23	9½ months	20.1	18.55	14.73	92.3
Queensland	Q. 1121	20-7-23	9½ months	18.7	17.52	14.03	93.7
Queensland	Q. 970	20-7-23	9½ months	21.1	19.87	15.96	94.1

Third Progressive Examination in Experiments with Varieties of Cane from Different Countries—Second Ratoon Crop, August, 1923.

Country.	Name or Number of Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C. S. S. in Cane.	Purity of Juice.
Demerara	D. 1457	22-8-23	10½ months	20.3	19.40	15.72	95.5
Queensland	M.Q. No. 1	22-8-23	10½ months	21.2	19.97	16.05	94.2
Demerara	D. 109	22-8-23	10½ months	19.5	18.16	14.50	93.1
Barbadoes	B. 4596	22-8-23	10½ months	16.9	14.99	11.62	88.7
Barbadoes	B. 6450	22-8-23	10½ months	19.3	18.55	15.07	96.1
Queensland	Gingor	22-8-23	10½ months	18.9	17.87	14.39	94.5
Fiji	7R. 428	22-8-23	10½ months	19.9	18.99	15.37	95.9
Queensland	H.Q. 458	22-8-23	10½ months	19.6	17.96	14.20	91.6
Queensland	Q. 813	22-8-23	10½ months	21.0	20.25	16.49	96.4
Queensland	Q. 903	22-8-23	10½ months	20.8	19.70	15.88	94.7
Queensland	Q. 1098	22-8-23	10½ months	20.4	19.06	15.24	93.4
Queensland	Q. 1121	22-8-23	10½ months	20.0	18.91	15.23	94.5
Queensland	Q. 970	22-8-23	10½ months	20.7	19.65	15.86	94.9

Final Examination in Experiments with Varieties of Cane from Different Countries—Second Ratoon Crop—September, 1923.

Country.	Name or Number of Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	% C. S. S. in Cane.	Purity of Juice.	% Fibre in Cane.
Demerara	D. 1457	25-9-23	11½ months	22.5	21.49	.43	17.51	95.5	10.5
Queensland	M.Q. No. 1	25-9-23	11½ months	22.1	20.69	.30	16.27	93.6	12.5
Demerara	D. 109	25-9-23	11½ months	21.3	19.75	.43	15.44	92.7	12.5
Barbadoes	B. 4596	25-9-23	11½ months	19.5	17.79	.61	13.78	91.2	12.5
Barbadoes	B. 6450	25-9-23	11½ months	20.9	20.05	.19	15.88	95.9	13.0
Queensland	Gingor	25-9-23	11½ months	20.8	19.45	.23	15.66	93.5	11.5
Fiji	7R. 428 (Pompey)	25-9-23	11½ months	21.8	20.26	.30	16.05	92.9	10.5
Queensland	H.Q. 458	25-9-23	11½ months	20.2	18.14	.31	14.68	89.8	8.0
Queensland	Q. 813	25-9-23	11½ months	22.2	20.82	.16	16.79	93.8	10.5
Queensland	Q. 903	25-9-23	11½ months	21.1	19.64	.22	15.58	93.1	11.5
Queensland	Q. 1098	25-9-23	11½ months	21.7	20.0	.26	15.87	92.2	11.0
Queensland	Q. 1121	25-9-23	11½ months	21.4	20.49	.18	16.11	95.7	13.5
Queensland	Q. 970	25-9-23	11½ months	21.8	20.34	.20	16.35	93.4	10.5

The crop results are given hereunder:—

Crop Results in Experiments with Varieties of Cane from Different Countries—Second Ratoon Crop, 1923.

Country.	Name or Number of Variety.	SECOND RATOON CROP.		
		Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
Demerara	D. 1457	11½ months	14.7	2.57
Queensland	M.Q. No. 1	11½ months	7.3	1.18
Demerara	D. 109	11½ months	15.3	2.36
Barbadoes	B. 4596	11½ months	12.2	1.68
Barbadoes	B. 6450	11½ months	10.5	1.67
Queensland	Gingor	11½ months	8.2	1.28
Fiji	7R. 428 (Pompey)	11½ months	15.5	2.48
Queensland	H.Q. 458	11½ months	11.2	1.64
Queensland	Q. 813	11½ months	14.3	2.40
Queensland	Q. 903	11½ months	7.2	1.12
Queensland	Q. 1098	11½ months	14.3	2.26
Queensland	Q. 1121	11½ months	15.5	2.50
Queensland	Q. 970	11½ months	14.9	2.44

Although the above are second ratoons, the yield of cane is very poor, due to the exceptionally dry weather. The following tables give the analytical and crop results to date, the latter including average and total crops for the three years. In spite of the low yields of the present season the average yield of cane and sugar are very fair, 7 R. 428, Q. 813, and Q. 1121 giving the best returns:—

Analytical Results to date in Experiments with Varieties of Cane from Different Countries—Plant, First Ratoon, and Second Ratoon Crops.

Country.	Name or Number of Variety.	Plant Crop—% C. C. S. in Cane.	First Ratoon Crop—% C. C. S. in Cane.	Second Ratoon Crop—% C. C. S. in Cane.	Average C. C. S. for Three Crops.
Queensland	M.Q. No. 1	15.98	16.81	16.27	16.35
Demerara	D. 109	13.96	14.47	15.44	14.66
Barbadoes	B. 4596	12.11	12.49	13.78	12.79
Barbadoes	B. 6450	15.27	15.58	15.88	15.58
Queensland	Gingor	15.08	15.76	15.66	15.50
Fiji	7R. 428 (Pompey)	14.99	14.60	16.05	15.10
Queensland	H.Q. 458	14.74	15.13	14.68	14.85
Queensland	Q. 813	15.15	17.10	16.79	16.31
Queensland	Q. 903	13.63	15.67	15.58	14.96
Queensland	Q. 1098	14.06	15.54	15.87	15.16
Queensland	Q. 1121	12.97	15.94	16.11	15.01
Queensland	Q. 970	14.69	16.26	16.35	15.77

Crop Results to date in Experiments with Varieties of Cane from Different Countries—Plant, First Ratoon, and Second Ratoon Crops.

Country.	Name or Number of Variety.	PLANT CROP, 1921.		FIRST RATOON CROP, 1922.		SECOND RATOON CROP, 1923.		TOTAL FOR THREE YEARS.		AVERAGE OF THREE CROPS.	
		Weight of Cane per acre in English tons.	Yield of Commercial Cane Sugar per acre in English tons.	Weight of Cane per acre in English tons.	Yield of Commercial Cane Sugar per acre in English tons.	Weight of Cane per acre in English tons.	Yield of Commercial Cane Sugar per acre in English tons.	Weight of Cane per acre in English tons.	Yield of Commercial Cane Sugar per acre in English tons.	Weight of Cane per acre in English tons.	Yield of Commercial Cane Sugar per acre in English tons.
Demerara	D. 1457	39.3	6.11	26.3	4.33	14.7	2.57	80.3	13.01	26.8	4.34
Queensland	M.Q. No. 1	35.9	5.74	21.2	3.56	7.3	1.18	64.4	10.48	21.5	3.49
Demerara	D. 109	39.3	5.48	28.8	4.16	15.3	2.36	83.4	12.0	27.8	4.0
Barbadoes	B. 4596	44.9	5.44	27.8	3.47	12.2	1.68	84.9	10.59	28.3	3.53
Barbadoes	B. 6450	32.7	4.99	22.5	3.50	10.5	1.67	65.7	10.16	21.9	3.39
Queensland	Gingor	43.4	6.54	28.7	4.52	8.2	1.28	80.3	12.34	26.8	4.11
Fiji	7R. 428 (Pompey)	45.5	6.82	35.5	5.18	15.5	2.48	96.5	14.48	32.2	4.83
Queensland	H.Q. 458	42.8	6.31	28.2	4.26	11.2	1.64	82.2	12.21	27.4	4.07
Queensland	Q. 813	44.0	6.66	29.5	5.01	14.3	2.40	87.8	14.07	29.3	4.69
Queensland	Q. 903	35.9	4.89	18.6	2.91	7.2	1.12	61.7	8.92	20.6	2.97
Queensland	Q. 1098	44.3	6.23	27.1	4.21	14.3	2.26	85.7	12.70	28.6	4.23
Queensland	Q. 1121	44.9	5.82	27.6	4.40	15.5	2.50	88.0	12.72	29.3	4.24
Queensland	Q. 970	38.3	5.63	24.9	4.05	14.9	2.44	78.1	12.12	26.0	4.04

Mixed manures as under were applied to the above crop:—

Sulphate of Ammonia	100 lb.
Nitrate of Soda	150 lb.
Sulphate of Potash	100 lb.
Superphosphate	250 lb.

In December, 1922, an additional top-dressing of nitrogen was given, viz.—75 lb. sulphate of ammonia and 75 lb. of nitrate of soda.

(2.) **Trials with Muriate and Sulphate of Potash. Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices. In the application of these fertilisers the same amount of potash was used in both salts.**

The object of the above experiments is to ascertain whether muriate of potash has any prejudicial effect upon the cane juice, as is often maintained.

For the purpose of the experiment an area was divided into eight plots of five drills. The manure was applied at the rate per acre as shown in the table, with two plots left unmanured. No other manures were applied; only sulphate and muriate of potash were used.

On the plant crop the muriate of potash gave slightly better results than the sulphate, and where only 1 cwt. of potash was applied per acre, the highest purity and c.c.s. results were obtained. Where the dressings were heavier, at the rate of 2 and 3 cwt. of potash per acre, the purity and c.c.s. contents were lower—even lower than where no manure was used. For the final analyses, 20 running feet of cane were cut from each plot, the weight of cane for each sample being about 2 cwt.

The following table shows the results of the preliminary, progressive, and final examinations of the second ratoon crop.

As the experiment was merely a chemical one, the crop results were not recorded, but this was done in a similar experiment at Bundaberg:—

First Preliminary Examination in Experiments to Test the Action of Muriate of Potash, in comparison with Sulphate of Potash, and no Potash, upon Cane Juices—Second Ratoon Crop, June, 1923—Variety used, Q. 970.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.	Rate of Application per Acre.
Q. 970	22-6-23	8½ months	19.2	16.78	12.89	87.4	282 lb. muriate of potash
Q. 970	22-6-23	8½ months	19.8	18.46	14.75	93.2	188 lb. muriate of potash
Q. 970	22-6-23	8½ months	19.7	18.22	14.49	92.5	94 lb. muriate of potash
Q. 970	22-6-23	8½ months	18.9	17.24	13.60	91.2	No potash
Q. 970	22-6-23	8½ months	18.7	16.68	12.98	89.2	No potash
Q. 970	22-6-23	8½ months	18.7	16.99	13.37	90.8	100 lb. sulphate of potash
Q. 970	22-6-23	8½ months	18.8	17.13	13.50	91.1	200 lb. sulphate of potash
Q. 970	22-6-23	8½ months	19.7	18.19	14.45	92.3	300 lb. sulphate of potash

Second Progressive Examination in Experiments to Test the Action of Muriate of Potash, in comparison with Sulphate of Potash, and no Potash, upon Cane Juices—Second Ratoon Crop, July 1923,—Variety used, Q. 970.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.	Rate of Application per Acre.
Q. 970	24-7-23	9½ months	18.9	17.42	13.82	92.2	282 lb. muriate of potash
Q. 970	24-7-23	9½ months	18.3	16.45	12.86	89.9	188 lb. muriate of potash
Q. 970	24-7-23	9½ months	18.3	16.53	12.96	90.3	94 lb. muriate of potash
Q. 970	24-7-23	9½ months	18.8	17.16	13.54	91.3	No potash
Q. 970	24-7-23	9½ months	18.0	16.0	12.42	88.8	No potash
Q. 970	24-7-23	9½ months	18.2	16.45	12.90	90.4	100 lb. sulphate of potash
Q. 970	24-7-23	9½ months	18.4	16.68	13.11	90.7	200 lb. sulphate of potash
Q. 970	24-7-23	9½ months	19.1	17.52	13.86	91.7	300 lb. sulphate of potash

Third Progressive Examination in Experiments to Test the Action of Muriate of Potash, in comparison with Sulphate of Potash, and no Potash, upon Cane Juices—Second Ratoon Crop, August, 1923—Variety used, Q. 970.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.	Rate of Application per Acre.
Q. 970	22-8-23	10½ months	20.1	19.06	15.37	94.8	282 lb. muriate of potash
Q. 970	22-8-23	10½ months	20.4	19.16	15.37	93.9	188 lb. muriate of potash
Q. 970	22-8-23	10½ months	20.8	19.78	15.98	95.1	94 lb. muriate of potash
Q. 970	22-8-23	10½ months	20.9	19.49	15.57	93.2	No potash
Q. 970	22-8-23	10½ months	21.0	19.78	15.89	94.2	No potash
Q. 970	22-8-23	10½ months	20.2	18.55	14.69	91.8	100 lb. sulphate of potash
Q. 970	22-8-23	10½ months	20.3	18.68	14.81	92.0	200 lb. sulphate of potash
Q. 970	22-8-23	10½ months	20.6	19.20	15.33	93.2	300 lb. sulphate of potash

Final Examination in Experiments to Test the Action of Muriate of Potash, in comparison with Sulphate of Potash, and no Potash, upon Cane Juices—Second Ratoon Crop, September, 1923—Variety used, Q. 970.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	% C.C.S. in Cane.	Purity of Juice.	% Fibre in Cane.	Rate of Application per Acre.
Q. 970	25-9-23	11 months	20.5	19.28	.21	15.01	94.0	14.0	282 lb. muriate of potash
Q. 970	25-9-23	11 months	20.8	19.74	.20	15.45	94.9	13.5	188 lb. muriate of potash
Q. 970	25-9-23	11 months	20.7	19.43	.22	15.11	93.9	13.0	94 lb. muriate of potash
Q. 970	25-9-23	11 months	20.5	19.47	.20	15.24	95.0	13.0	No potash
Q. 970	25-9-23	11 months	20.7	19.69	.23	15.43	95.1	14.5	No potash
Q. 970	25-9-23	11 months	21.2	19.93	.19	15.51	94.1	13.5	100 lb. sulphate of potash
Q. 970	25-9-23	11 months	20.9	19.53	.23	15.15	93.9	13.0	200 lb. sulphate of potash
Q. 970	25-9-23	11 months	21.4	20.07	.20	15.60	93.8	13.5	300 lb. sulphate of potash

From the above it will be observed that the differing salts of potash made scarcely any difference to the juices, and the notes made as to the purity and c.c.s. contents of the plant crop do not apply this year, nor did these differences appear in the first ratoon crop.

The table given hereunder embraces the chemical results for three years for comparative purposes. These figures appear to prove conclusively that muriate of potash has no prejudicial effect on cane juices.

Analytical Results to date in Experiments to Test the Action of Muriate of Potash, in comparison with Sulphate of Potash, and no Potash, upon Cane Juices—Variety used, Q. 970—Plant, First Ratoon, and Second Ratoon Crops.

Variety of Cane.	PLANT CROP.		FIRST RATOON CROP.		SECOND RATOON CROP.		AVERAGE OF THREE YEARS.		Rate of Application per Acre.
	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	
Q. 970	14.84	91.9	15.72	92.5	15.01	94.0	15.19	92.8	282 lb. muriate of potash
Q. 970	14.86	92.2	15.81	93.6	15.45	94.9	15.37	93.6	188 lb. muriate of potash
Q. 970	15.91	93.4	16.04	94.5	15.11	93.9	15.69	93.9	94 lb. muriate of potash
Q. 970	15.09	91.9	15.68	94.3	15.24	95.0	15.34	93.7	No potash
Q. 970	15.11	92.3	16.10	94.5	15.43	95.1	15.55	94.0	No potash
Q. 970	15.47	93.5	16.22	95.1	15.51	94.1	15.73	94.2	100 lb. sulphate of potash
Q. 970	13.96	90.6	16.22	95.4	15.15	93.9	15.11	93.3	200 lb. sulphate of potash
Q. 970	14.06	91.0	16.15	94.1	15.60	93.8	15.27	93.0	300 lb. sulphate of potash

Three Years' Average—

C.C.S., 3 plots, treated with muriate of potash	15.41
Purity, 3 plots, treated with muriate of potash	93.4
C.C.S., 3 plots, treated with sulphate of potash	15.37
Purity, 3 plots, treated with sulphate of potash	93.50
C.C.S., 2 plots, no potash	15.44
Purity, 3 plots, no potash	93.8

- (3.) **Competitive Trials of the following Varieties, viz.—H. 227, H. 146, H. 109, Java 100 Bont, Java 247, Java E.K. 1, E.K. 2, E.K. 28, M. 168⁰⁴, H.Q. 77, Shahjahanpur No. 10, and N.G. 24B and Q. 813 for Comparison.**

The canes in this experiment include five Java varieties, three from the Hawaiian Islands, one from Mauritius, a Hambleton (Queensland) seedling, and the Indian frost-resisting cane Shahjahanpur, in competition with Q. 813 and N.G. 24B, Green Gortu. The canes were planted on the 1st April, 1921, the soil at the time being in fine order, with a good moisture content. The land was first ploughed on the 3rd November, 1920, and planted with cowpea on the 29th of the same month. The crop of peas was ploughed under on the 11th February, 1921. It was again ploughed and subsoiled to a depth of 18 to 19 inches on the 22nd March, and the final ploughing with the disc plough was made on the 31st March, altogether four ploughings. The canes, after planting, struck well, with the exception of Java 100 Bont and Java E.K. 1.

Particulars of the plant crop appeared in the last annual report, and are included in the summary table appearing later on.

After the harvesting of the plant crop the cane was ratooned and the soil subsoiled to a depth of about 16 inches on the 30th September, 1922.

Owing to the dry weather, the canes did not make much progress up till the end of January. After that conditions were worse, and the resulting tonnages for a first ratoon crop were all low. Two canes, Q. 813 and Java E.K. 28, stood out from the others and gave very fair tonnages, viz., 21.7 and 19.9, and the c.c.s. content of these canes was also good. Although Q. 813 is only a surface rooting cane, it stood the dry weather exceptionally well and all the cane cut was sound and healthy. All the Java E.K. 28 sticks were also sound and no sign of disease or dead sticks. Some of the other canes proved failures, viz.—Shahjahanpur, H.Q. 77, M. 168⁰⁴, Java 100 Bont, and H. 109. Another cane, Java 247, is not very promising, and all these are to

be discarded. Java E.K. 1 is fairly promising, with a medium c.c.s. content, but it is too much inclined to trail, also the eyes are very prominent and easily injured when being cut for plants. Java E.K. 2, which gave an exceptionally high tonnage in the plant crop, with a medium c.c.s., did not do so well this year in the first ratoons. H. 146 and H. 227 have so far only given moderate returns, and N.G. 24B did not do as well as usual. On the returns of plant and first ratoon crops, Q. 813 and Java E.K. 28 are easily the best canes; both gave good tonnages, with high sugar content.

The following mixture of fertiliser was applied

First Preliminary Examination in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru), June, 1923—First Ratoon Crop.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Q. 813	21-6-23	9 months ..	20.6	19.45	15.65	94.4
N.G. 24 B.	21-6-23	9 months ..	18.5	16.87	13.30	91.2
Shahjahanpur	21-6-23	9 months ..	17.3	15.45	12.03	89.3
H.Q. 77	21-6-23	9 months ..	18.3	16.74	13.22	91.4
M. 168 ⁹¹	21-6-23	9 months ..	19.7	18.41	14.73	93.4
Java E.K. 28	21-6-23	9 months ..	18.7	16.91	13.27	90.4
Java E.K. 2	21-6-23	9 months ..	16.6	14.41	11.02	86.8
Java E.K. 1	21-6-23	9 months ..	17.6	15.55	12.02	88.3
Java 247	21-6-23	9 months ..	18.9	17.34	13.72	91.8
Java 100 Bont	21-6-23	9 months ..	18.5	16.49	12.82	89.1
H. 109	21-6-23	9 months ..	18.4	16.98	13.48	92.3
H. 146	21-6-23	9 months ..	17.8	16.34	12.93	91.8
H. 227	21-6-23	9 months ..	18.8	16.94	13.26	90.1

Second Progressive Examination in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru), July, 1923—First Ratoon Crop.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Q. 813	24-7-23	10 months	20.3	19.21	15.48	94.6
N.G. 24 B.	24-7-23	10 months	19.1	17.87	14.30	93.5
Shahjahanpur	24-7-23	10 months	15.5	13.42	10.24	86.6
H.Q. 77	24-7-23	10 months	18.5	17.11	13.60	92.5
M. 168 ⁹¹	24-7-23	10 months	19.2	17.97	14.39	93.6
Java E.K. 28	24-7-23	10 months	19.4	17.86	14.16	92.1
Java E.K. 2	24-7-23	10 months	16.6	15.02	11.79	90.5
Java E.K. 1	24-7-23	10 months	17.3	14.84	11.26	85.8
Java 247	24-7-23	10 months	16.6	14.22	10.78	85.7
Java 100 Bont	24-7-23	10 months	17.2	15.02	11.53	87.3
H. 109	24-7-23	10 months	17.5	16.01	12.65	91.4
H. 146	24-7-23	10 months	14.6	12.45	9.42	85.3
H. 227	24-7-23	10 months	18.6	16.90	13.30	90.9

Third Progressive Examination in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru), August, 1923—First Ratoon Crop.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Q. 813	23-8-23	11 months	21.2	20.18	16.31	95.2
N.G. 24 B.	23-8-23	11 months	20.2	19.54	15.68	95.7
Shahjahanpur	23-8-23	11 months	20.0	18.65	14.90	93.2
H.Q. 77	23-8-23	11 months	19.2	17.10	13.29	89.1
M. 168 ⁹¹	23-8-23	11 months	19.4	18.51	14.77	93.0
Java E.K. 28	23-8-23	11 months	21.2	19.92	15.93	93.9
Java E.K. 2	23-8-23	11 months	15.4	16.74	13.17	90.9
Java E.K. 1	23-8-23	11 months	19.5	17.49	13.65	89.7
Java 247	23-8-23	11 months	19.1	16.68	12.80	87.3
Java 100 Bont	23-8-23	11 months	19.1	17.52	13.23	89.1
H. 109	23-8-23	11 months	19.4	18.40	14.46	93.3
H. 146	23-8-23	11 months	17.2	15.34	11.99	89.2
H. 227	23-8-23	11 months	19.9	18.99	14.24	90.9

at the time of ratooning in the furrow ploughed away from the stools:—

Mixture per Acre.

Sulphate of Ammonia	100 lb.
Nitrate of Soda	150 lb.
Sulphate of Potash	100 lb.
Superphosphate	250 lb.

600 lbs. per acre.

In December a mixture at the rate of 75 lb. nitrate of soda and 75 lb. sulphate of ammonia was also applied as a top-dressing between the drills.

The following tables give the preliminary, progressive, and final analytical results:—

Final Examination in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru), September, 1923—First Ratoon Crop.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix)	% Sucrose in Juice.	% Glucose in Juice.	% C.C.S. in Cane.	Purity of Juice.	% Fibre in Cane.
Q. 813	26-9-23	12 months	22.6	21.31	.21	17.13	94.3	11.0
N.G. 24 B. .. .	26-9-23	12 months	21.6	20.21	.23	16.27	93.6	10.5
Shahjahanpur .. .	26-9-23	12 months	17.5	14.99	1.22	10.54	85.1	17.0
H.Q. 77 .. .	26-9-23	12 months	20.4	18.54	.29	14.32	90.9	12.5
M. 168 ⁰⁴ .. .	26-9-23	12 months	21.3	19.78	.37	15.95	92.9	10.0
Java E.K. 28 .. .	26-9-23	12 months	23.2	21.62	.25	17.16	93.2	11.5
Java E.K. 2 .. .	26-9-23	12 months	20.2	18.16	.50	13.85	89.9	13.0
Java E.K. 1 .. .	26-9-23	12 months	21.7	19.97	.55	15.54	92.0	12.5
Java 247 .. .	26-9-23	12 months	21.2	19.17	.53	14.49	90.4	14.0
Java 100 Bont .. .	26-9-23	12 months	20.8	18.47	1.0	13.81	88.8	14.0
H. 109 .. .	26-9-23	12 months	22.1	20.98	.31	16.73	95.0	12.0
H. 146 .. .	26-9-23	12 months	19.2	17.05	.88	13.23	88.7	11.0
H. 227 .. .	26-9-23	12 months	20.9	19.16	.31	15.15	91.7	11.0

The crop results are given hereunder:—

Crop Results in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru)—First Ratoon Crop—1923.

Variety of Cane.	Age of Cane.	Weight of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.
Q. 813	12 months	21.7	3.71
N.G. 24 B. (Goru) .. .	12 months	12.6	2.05
Shahjahanpur .. .	12 months	15.7	1.65
H.Q. 77 .. .	12 months	12.9	1.85
M. 168 ⁰⁴ .. .	12 months	8.7	1.38
Java E.K. 28 .. .	12 months	19.9	3.41
Java E.K. 2 .. .	12 months	13.5	1.87
Java E.K. 1 .. .	12 months	12.2	1.89
Java 247 .. .	12 months	15.5	2.24
Java 100 Bont .. .	12 months	8.2	1.13
H. 109 .. .	12 months	13.3	2.22
H. 146 .. .	12 months	11.4	1.50
H. 227 .. .	12 months	16.3	2.47

The analytical and crop results of the plant and first ratoon crop are set out in the following tables:—

Analytical Results to date in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru)—Plant and First Ratoon Crop.

Variety of Cane.	Plant Crop, 1922, % C.C.S. in Cane.	First Ratoon Crop, 1923, % C.C.S. in Cane.	Average C.C.S. in Cane for Two Years.
Q. 813	15.81	17.13	16.47
N.G. 24 B. .. .	14.68	16.27	15.47
Shahjahanpur .. .	14.22	10.54	12.38
H.Q. 77 .. .	14.93	14.32	14.62
M. 168 ⁰⁴ .. .	13.30	15.95	14.62
Java E.K. 28 .. .	15.83	17.16	16.49
Java E.K. 2 .. .	11.03	13.85	12.44
Java E.K. 1 .. .	12.86	15.54	14.20
Java 247 .. .	13.67	14.49	14.08
Java 100 Bont .. .	12.22	13.81	13.01
H. 109 .. .	14.73	16.73	15.73
H. 146 .. .	14.97	13.23	14.10
H. 227 .. .	14.89	15.15	15.02

Crop Results to date in Experiments with Varieties of Cane recently introduced, in comparison with Q. 813 and N.G. 24 B. (Green Goru)—Plant and First Ratoon Crop.

Variety.	PLANT CROP, 1922.		1ST RATOON CROP, 1923.		TOTAL FOR TWO YEARS.		AVERAGE OF TWO CROPS.	
	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
Q. 813	46.5	7.35	21.7	3.71	68.2	11.06	34.1	5.53
N.G. 24 B. (Goru)	38.4	5.63	12.6	2.05	51.0	7.68	25.5	3.84
Shahjahanpur	43.5	6.18	15.7	1.65	59.2	7.83	29.6	3.91
H.Q. 77	39.8	5.94	12.9	1.85	52.7	7.79	26.3	3.89
M. 168 ⁰¹	46.1	6.13	8.7	1.38	54.8	7.51	27.4	3.75
Java E.K. 28	48.5	7.67	19.9	3.41	68.4	11.08	34.2	5.54
Java E.K. 2	60.3	6.65	13.5	1.87	73.8	8.52	36.9	4.26
Java E.K. 1	38.8	4.98	12.2	1.89	51.0	6.87	25.5	3.43
Java 247	47.0	6.42	15.5	2.24	62.5	8.66	31.2	4.33
Java 100 Bont	31.2	3.81	8.2	1.13	39.4	4.94	19.7	2.47
H. 109	37.7	5.55	13.3	2.22	51.0	7.77	25.5	3.88
H. 146	36.0	5.39	11.4	1.50	47.4	6.89	23.7	3.44
H. 227	28.6	4.25	16.3	2.47	44.9	6.72	22.4	3.36

The leading varieties from a cane tonnage point of view are Q. 813, Java E.K. 2, and E.K. 28. In average yield of sugar per acre, Q. 813 and Java E.K. 28 are the best.

(4.)—Planting Experiments.

- (a) Planting in rows of different distances, viz.,—4 feet 6 inches, 5 feet, 6 feet, and 7 feet apart. All plants 6 inches apart in the drill.
- (b) Planting at different distances between plants in the row, viz.,—Continuous, 6, 12, 24, and 36 inches apart; all rows being 5 feet apart.

Experiments for determining the most advisable distances between the Plants in the Row, and the distance between the Rows, or the Number of Plants and Weight of Seed per Acre.

Date of Planting.	Number of Plot.	Variety Used.	Width Between Rows.	Width Between Plants in the Row.	Weight of Seed Used per Acre.	Number of 3-Eye Plants Per Acre.
11th April ..	1	Q. 813	4 ft. 6 in. ..	6 in.	1 ton 5 cwt. ..	6,623
11th April ..	2	Q. 813	5 ft.	6 in.	1 ton 2½ cwt. ..	5,954
11th April ..	3	Q. 813	6 ft.	6 in.	18¾ cwt.	4,966
11th April ..	4	Q. 813	7 ft.	6 in.	16 cwt.	4,257
11th April ..	5	Q. 813	5 ft.	Continuous plants	1 ton 18 cwt. ..	10,547
11th April ..	6	Q. 813	5 ft.	6 in.	1 ton 2½ cwt. ..	5,954
11th April ..	7	Q. 813	5 ft.	12 in.	16¾ cwt.	4,494
11th April ..	8	Q. 813	5 ft.	24 in.	10¾ cwt.	2,980
11th April ..	9	Q. 813	5 ft.	36 in.	9 cwt.	2,293

Previous experiments of this description were carried out in 1906, 1907, 1908, and 1909.

The above table shows the number of plants used per acre, also the weight of seed used per acre.

The first series deals with different distances between the rows, the rows 4 ft. 6 in. apart, using 1 ton 5 cwt. plants, and the rows 7 ft. apart only 16 cwt. In the second series the rows are a uniform distance apart, but the plants were placed various distances apart. The continuous plant in the drill took 1 ton 18 cwt., and where the plants were 36 in. apart, only 9 cwt.

These experiments were undertaken to confirm or otherwise previous experiments carried out along similar lines at the Mackay station many years ago. Recently it has been claimed in our Northern district that very wide planting would give superior results. Close planting has invariably given the best yields at the experiment stations so far.

The above experiments received identical treatment, save in the methods of planting. The preliminary cultivation consisted of four ploughings and one subsoiling at a depth of 19 inches. The cane was planted in April of 1922. The table following gives the analytical results of the plant crop:—

Analytical Results in Distance Experiments—Plant Crop, September, 1923.

Variety of Cane.	Treatment.	Date of Analysis.	Age of Cane.	% Total solids in Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	% C.C.S. in Cane.	Purity of Juice.	% Fibre in Cane.
First Series. Plants 6 inches Apart.									
Q. 813	Rows 4 feet 6 inches apart	27-9-23	17½ months	22.1	20.61	.22	16.17	93.3	12.5
Q. 813	Rows 5 feet apart	27-9-23	17½ months	21.8	20.58	.21	16.26	94.4	12.5
Q. 813	Rows 6 feet apart	27-9-23	17½ months	22.6	20.76	.20	16.36	94.4	12.5
Q. 813	Rows 7 feet apart	27-9-23	17½ months	22.1	20.93	.20	16.56	94.7	12.5
Second Series. Rows 5 feet Apart.									
Q. 813	Continuous plant	27-9-23	17½ months	22.4	20.90	.21	16.40	93.3	12.5
Q. 813	6 inches apart	27-9-23	17½ months	22.5	20.98	.21	16.46	93.2	12.5
Q. 813	12 inches apart	27-9-23	17½ months	22.6	21.32	.20	16.83	94.3	12.5
Q. 813	24 inches apart	27-9-23	17½ months	22.4	21.18	.19	16.75	94.6	12.5
Q. 813	36 inches apart	27-9-23	17½ months	22.7	21.40	.20	16.89	94.3	12.5

The crop results are now presented:—

Crop Results in Distance Experiments, Plant Crop, September, 1923.

Variety of Cane.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
First Series. Plants 6 inches Apart.				
Q. 813	Rows 4 feet 6 inches apart	17½ months	26.22	4.24
Q. 813	Rows 5 feet apart	17½ months	24.45	3.97
Q. 813	Rows 6 feet apart	17½ months	23.24	3.81
Q. 813	Rows 7 feet apart	17½ months	19.04	3.15
Second Series. Rows 5 feet Apart.				
Q. 813	Continuous plants	17½ months	24.53	4.02
Q. 813	6 inches apart	17½ months	24.53	4.03
Q. 813	12 inches apart	17½ months	23.61	3.97
Q. 813	24 inches apart	17½ months	22.12	3.70
Q. 813	36 inches apart	17½ months	19.60	3.31

The above results bear out, at any rate in the plant crop, the wisdom of close planting for yield of cane and sugar. There is not so wide a variation in the yields in the above experiments as were noted in 1906, but this is no doubt due to the severe drought experienced, which would somewhat discount the yield of the closer planted cane in such an exceptional year. As recorded in other experiments, the variation in distance between the rows has a far more important bearing on the yield than the variation of the plants in the rows.

Further detailed observations will be made when the results of the ratoon crops are to hand.

(5.) Analytical Tests of Miscellaneous Canes.

The varieties tested in the Miscellaneous Section included four canes reintroduced from the Atherton Tableland, where they have been

grown for a number of years, four new Mauritius canes, a Hambleton (Queensland) seedling H.Q. 409, Q. 116 Sport, and Q. 813 Sport. The four Tableland canes germinated exceptionally well and were all apparently healthy, but on close inspection Rose Bamboo and Striped Singapore showed signs of gum, and consequently will be discarded. Tableland Badila is quite healthy, while Meerah is still doubtful. One of the Mauritius canes, 32/10, also has gum and will be ploughed out. The other Mauritius canes made fair growth, the c.c.s. content being fairly good. Of the remaining canes, H.Q. 409 is not very promising. Q. 116 Sport grew well, with stout sticks, and the c.c.s. content is good. Q. 813 Sport seems a very good cane, stouter in the stick than the ordinary Q. 813. B. 156 is a new cane to the Mackay Station and the c.c.s. so far is good.

First Preliminary Examination of Miscellaneous Canes, Plant Crop, June, 1923.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Tableland Badila	22-6-23	11 months	21.1	20.11	16.27	95.3
Tableland Rose Bamboo	22-6-23	11 months	19.4	18.50	14.97	95.4
Tableland Meerah	22-6-23	11 months	20.8	20.09	15.37	96.6
Tableland Str. Singapore	22-6-23	11 months	20.7	18.73	14.70	90.5
Mauritius 28/10	22-6-23	11 months	17.6	16.01	12.61	90.9
Mauritius 32/10	22-6-23	11 months	18.6	16.53	12.83	88.9
Mauritius 55/11	22-6-23	11 months	19.2	18.03	14.46	93.9
Mauritius 55/1182	22-6-23	11 months	17.7	15.76	12.25	89.0
H.Q. 409	22-6-23	11 months	18.5	16.76	13.16	90.6
Q. 116 Sport	22-6-23	11 months	18.8	17.24	13.64	91.7

Second Progressive Examination of Miscellaneous Canes, Plant Crop, July, 1923.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Tableland Badila	25-7-23	12 months	19.9	18.38	14.60	92.4
Tableland Rose Bamboo	25-7-23	12 months	19.4	18.10	14.46	93.3
Tableland Meerah	25-7-23	12 months	20.4	19.82	16.20	97.1
Tableland Str. Singapore	25-7-23	12 months	19.0	18.03	14.55	94.9
Mauritius 28/10	25-7-23	12 months	17.5	15.87	12.47	90.7
Mauritius 32/10	25-7-23	12 months	18.4	16.84	13.31	91.4
Mauritius 55/11	25-7-23	12 months	18.0	16.88	13.53	93.8
Mauritius 55/1182	25-7-23	12 months	18.5	17.37	13.93	93.9
H.Q. 409	25-7-23	12 months	18.3	16.90	13.43	92.3
Q. 116 Sport	25-7-23	12 months	19.4	18.23	14.63	93.9

Third Progressive Examination of Miscellaneous Canes, Plant Crop, August, 1923.

Variety of Cane.	Date of Analysis.	Age of Cane.	% Total Solids (Brx.)	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.
Tableland Badila	23-8-23	13 months	20.9	19.92	16.11	95.3
Tableland Rose Bamboo	23-8-23	13 months	19.7	19.04	15.52	96.6
Tableland Meerah	23-8-23	13 months	20.6	19.79	16.08	96.1
Tableland Str. Singapore	23-8-23	13 months	20.7	19.07	15.13	92.1
Mauritius 28/10	23-8-23	13 months	19.3	18.25	14.71	94.6
Mauritius 32/10	23-8-23	13 months	19.6	18.69	15.12	95.4
Mauritius 55/11	23-8-23	13 months	19.9	19.12	15.53	96.1
Mauritius 55/1182	23-8-23	13 months	19.5	18.58	15.03	95.3
H.Q. 409	23-8-23	13 months	19.6	18.47	14.84	94.2
Q. 116 Sport	23-8-23	13 months	19.9	18.67	14.97	93.3

Final Examination of Miscellaneous Canes, Plant Crop, September, 1923.

Variety of Cane	Date of Analysis.	Age of Cane.	% Total Solids (Brx.)	% Sucrose in Juice.	% C.C.S. in Cane.	Purity of Juice.	% Fibre in Cane.
Tableland Badila	27-9-23	14 months	23.4	22.30	17.93	95.0	11.5
Tableland Rose Bamboo	27-9-23	14 months	21.7	20.97	16.57	96.6	13.5
Tableland Meerah	27-9-23	14 months	22.0	21.31	16.87	96.9	13.5
Tableland Str. Singapore	27-9-23	14 months	21.1	20.52	15.92	97.3	15.5
Mauritius 28/10	27-9-23	14 months	20.0	18.67	15.21	93.3	9.5
Mauritius 32/10	27-9-23	14 months	21.3	20.33	15.66	95.4	15.0
Mauritius 55/11	27-9-23	14 months	21.2	20.22	15.97	95.4	13.0
Mauritius 55/1182	27-9-23	14 months	21.6	20.42	15.94	94.6	13.5
H.Q. 409	27-9-23	14 months	19.7	18.45	14.60	93.7	12.0
Q. 116 Sport	27-9-23	14 months	21.2	19.89	15.18	93.8	15.0
Q. 813 Sport	27-9-23	14 months	21.6	20.58	15.69	95.3	11.0
B. 156	27-9-23	14 months	21.2	20.25	16.40	95.5	11.0

DISTRIBUTION OF VARIETIES FROM THE MACKAY STATION.

The usual free distribution of varieties was held this year, the number of farmers calling being not quite as many as in previous years.

The farmers usually asked for the cane with the best commercial value. The Queensland seedlings were again in demand, and all the available cane of Java E.K. 28 was taken, while Java E.K. 1 was also taken freely.

Besides the local distribution a number of crates were sent away, and also a large number of parcels by post.

The Improved Forage cane was recommended to the farmers as an excellent feed cane. It is a good ratooner, and very soft. All the available sticks were distributed.

DATES OF ARROWING OF DIFFERENT VARIETIES.

D. 1135	Plant	1st July
Q. 1092	2nd Ratoons	2nd July
H. 227	1st Ratoons	30th July

These were all the varieties that arrowed at the Mackay Station this season.

NEW EXPERIMENTS UNDERTAKEN.

1. Experiments with Lime, viz.—

Plot 1	..	Pulverised limestone at a rate equivalent to 1 ton of burnt lime per acre.
Plot 2	..	No lime.
Plot 3	..	Burnt lime at the rate of 1 ton per acre.
Plot 4	..	No lime.

2. Fertilising Experiments—

Plot 1	..	Meatworks manure applied in drill at time of planting, followed by an application of mixed manure in drills drawn each side of row after cane was up.
Plot 2	..	Equivalent amounts of nitrogen, potash, and phosphoric acid as applied to Plot 1, applied to Plot 2 in drills drawn each side of row after cane was up.
Plot 3	..	No manure.

The object of above experiment is to ascertain whether the preliminary application of meatworks fertiliser in the drill with the plant will give a superior yield of cane.

ANNUAL FIELD DAY.

The Annual Field Day was held on Saturday, 2nd June, and, although, due to showery weather, the attendance was not quite so large, a very interesting day was spent on the field. Farmers, millers, and commercial men were shown over the experiments and the work being carried on was explained. Luncheon was followed by an address from the Director, and a demonstration of farming implements brought the function to a conclusion.

YIELD OF CANE—MACKAY STATION.

The average tonnage of cane per acre on the station this year was much below last year, owing to the abnormally dry weather. The early plant cane gave poor results, only about half the usual tonnage. The Spring planted cane and also ratoons made very poor growth.

		Tons.	Cwt.
Sent to Racecourse Mill	..	122	6
Sold for plants	..	22	1
Free distribution	..	6	0
Used for plants	..	0	0
		157	7
Condition of Crop—			
15 per cent.	..	Plant cane	
50 per cent.	..	First ratoons	
35 per cent.	..	Second ratoons	
Return per acre—			
Plant cane	..	17	tons
First ratoons	..	12	tons
Second ratoons	..	11.3	tons
Average under cane	..	12	
Average tons per acre	..	13.1	

6.—WORK OF THE SOUTHERN SUGAR EXPERIMENT STATION AT BUNDABERG.

At the Bundaberg Station the Director is assisted by Mr. James Pringle, the Chemist in Charge, whose loyal service and energy call for high commendation. The appearance of the station and the careful manner in which the experiments decided upon are carried out are highly creditable. Mr. Pringle states that the staff, viz., Messrs. A. E. Evans (foreman) and J. C. Thomsen (teamster) have carried out their work well and display a keen interest in the station.

The tables appearing in this section, together with weather data and other notes on crop progress for the use of the Director, have been prepared by the Chemist in Charge.

METEOROLOGICAL.

The climatic conditions during the period from August, 1922, to March, 1923, could not be regarded as favourable for the growth of cane. There was a good rainfall during the winter of 1922, which was comparatively mild, but the growth of the cane was considerably retarded by cold atmospheric conditions during August and September, and only a light rainfall of 2½ inches fell from October to the middle of December. After this, good growth was made,

but was checked again by the dry weather from February to the middle of April.

Taking a monthly survey of the growing period, it may be remarked that during the early Spring months, while there was sufficient moisture in the soil, there was not the necessary humidity to produce good growth. October and November were practically dry, the 1½ inches recorded for the former month being in light falls spread over a period of eleven days. At this time the cane showed very little vitality.

Beneficial rains commenced to fall on the 14th December and continued to the 11th January, during which time the cane made rapid growth.

During the period from the 12th January to the 11th April, the rainfall was spasmodic and of a light nature, and, although good falls were recorded during the latter month, it was too late, as the atmosphere was getting cold, consequently the cane made little further growth, and this is reflected in the light tonnages revealed in the various tables.

The past winter was more severe than the previous three years, but, though there was frost each morning for a period of three weeks, it was of a light nature, and did comparatively little damage.

Rainfall at the Southern Sugar Experiment Station, Bundaberg, during the Growing Period.

Month.	Rainfall.	Number of Wet Days.
August, 1922	1-580	5
September, 1922	1-010	4
October, 1922	1-385	6
November, 1922	520	3
December, 1922	6-790	10
January, 1923	7-190	11
February, 1923	1-125	7
March, 1923	940	7
April, 1923	8-410	10
May, 1923	..	..
June, 1923	4-190	2
July, 1923	1-070	3
August, 1923	730	2
September, 1923	2-433	2
October, 1923	190	3
Total	37-563	75

EXPERIMENTS DEALT WITH IN THIS SECTION OF THE REPORT.

(1) Experiments with pulverised limestone *versus* burnt lime. Result of second ratoon crop, 1923, and total results to date.

(2) Experiments to test the action of different quantities of lime per acre. Results of second ratoon crop, 1923, and crop results to date.

(3) Experiments to test the comparative values of using plant cane, first ratoon, second ratoon, and third ratoon cane for plants. Results of second ratoon crop, 1923, and crop results to date.

(4) Experiments to determine the value of subsoiling. Results of second ratoon crop, 1923, and total results to date.

(5) Experiments to test the effect of using different portions of the sticks of cane for plants. Results of second ratoon crop, 1923, and crop results to date.

(6) Experiments testing the action of muriate of potash *versus* sulphate of potash on cane juices. Results of first ratoon crop, 1923, and crop and analytical results to date.

(7) Experiments with different kinds of fertilisers. Results of first ratoon crop, 1923, and crop results to date.

(8) Experiments with cane planted continuously in the row, 6 in., 12 in., 18 in., 24 in., and 36 in. apart. Results of first ratoon crop, 1923, and crop results to date.

(9) Experiments with different methods of planting. Results of first ratoon crop, 1923, and crop results to date.

(10) Competitive experiments with varieties from Java, Hawaii, Mauritius, also D. 1135, and H.Q. 77. Results of first ratoon crop, 1923, and crop results to date.

(11) Competitive experiments with canes from different countries. Results of plant crop (standover), 1923.

(1.) Experiments with Pulverised Limestone versus Burnt Lime and no Lime.

After removing the first ratoon crop in October, 1922, all plots were ratooned in the usual way, and by levelling down with the scuffer. The cane in each plot came away well, no manure being applied. With regard to the growth of the cane for a short time there was apparently little difference in the three plots, except that plot 2 was lighter in colour, and the young shoots were not so strong as in the other two. After a few weeks plots 1 and 3 were in the lead, which was maintained up till time of

cutting this year. During the dry weather in February and March, the cane in each plot fell back considerably, but plots 1 and 3 maintained a little vitality, while plot 2 was almost on the point of dying out in patches when the rain came about the middle of April. The cane was cut in October this year, the tonnages, though light, being consistent with previous crops. This experiment is now concluded.

The analytical and crop results for the second ratoon crop of this experiment are set out below:—

Analytical Examination of Experiments using Pulverised Limestone, Burnt Lime, and No Lime. D. 1135—Second Ratoon Crop—August, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135 ..	One ton pulverised limestone per acre	12 months	22-8-23	19.8	18.13	.37	91.5	16.14	14.33
2	D. 1135 ..	One ton burnt lime per acre	12 months	22-8-23	19.2	17.81	.43	92.7	15.86	14.20
3	D. 1135 ..	No lime	12 months	22-8-23	20.1	18.76	.31	93.3	16.70	14.99

Crop Results of Experiments using Pulverised Limestone, Burnt Lime, and No Lime. D. 1135—Second Ratoon Crop—August, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	One ton of pulverised limestone per acre	12 months	10.85	1.55
2	D. 1135 ..	One ton of burnt lime per acre	12 months	7.76	1.09
3	D. 1135 ..	No lime	12 months	10.08	1.51

The results of the second ratoon crop are the same as in previous years with the plant and first ratoons—*i.e.*, the use of lime has given practically no increase. The falling-off of plot 2 is now accounted for by an analysis of the soil of the three plots in which it was shown that plot 2 is inferior in potash and phosphoric acid

to plots 1 and 3, although in appearance the soil is quite uniform.

In the next table the crop results to date are given, and from the averages in the last column it is seen that the application of the lime has not been worth the expense.

Total Crop Results to Date of Experiments, using Pulverised Limestone, Burnt Lime, and No Lime.

Plot Number.	Variety of Cane.	Treatment.	PLANT CROP, 1921 (STANDOVER.)		FIRST RATOON CROP, 1922.		SECOND RATOON CROP, 1923.		TOTAL RESULTS FOR THREE CROPS.		AVERAGE FOR THREE CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135..	One ton of pulverised limestone per acre	38.33	5.63	21.11	3.16	10.85	1.55	70.29	10.34	23.43	3.45
2	D. 1135..	One ton of burnt lime per acre	29.46	4.06	17.92	2.68	7.76	1.09	55.14	7.83	18.38	2.61
3	D. 1135..	No lime	37.26	5.49	20.62	3.06	10.08	1.51	67.96	10.06	22.65	3.35

(2.) Experiments to Test the Action of Different Quantities of Lime per Acre.

In the light of previous trials with lime, it was a matter of some doubt whether 1 ton of lime was sufficient to apply. In Hawaii, up to 7 tons of pulverised limestone per acre are put on. An experiment, therefore, was laid down in which varying quantities of lime were used—

Plot 1 received no lime.

Plot 2 received 1 ton per acre.

Plot 3 received 2 tons per acre.

Plot 4 received 3 tons per acre.

Plot 5 received 4 tons per acre.

Plot 6 received 5 tons per acre.

Plot 7 received 6 tons per acre.

The results of the standover plant and first ratoon crops have already appeared in last year's report.

On taking off the first ratoon crop all plots were ratooned as usual, and the cane came away very well, each plot being apparently uniform both in growth and colour. During the early spring months the cane did not make very rapid growth owing to the cool atmospheric conditions, but later on when warmer weather prevailed the growth was very vigorous up till the end of

January when dry conditions retarded the progress, and though good rains fell in April it was too late, and the cane made but little further headway. The cane was cut in August this year, and the tonnages are fairly good for an eleven months' crop under the unfavourable conditions.

The analytical and crop figures for the second ratoon crop appear below:—

Analytical Examination of Experiments to Test the Action of Different Quantities of Lime per Acre on Cane Crops, the Quantities of Lime in the form of Pulverised Limestone varying from 1 to 6 Tons per Acre. D. 1135—Second Ratoon Crop—August, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135 ..	No lime	11 months	31-8-23	20.2	19.00	.16	93.5	16.91	15.20
2	D. 1135 ..	One ton pulverised limestone per acre	11 months	31-8-23	20.3	18.96	.15	93.4	16.88	15.17
3	D. 1135 ..	Two tons pulverised limestone per acre	11 months	31-8-23	20.3	18.87	.16	92.9	16.80	15.04
4	D. 1135 ..	Three tons pulverised limestone per acre	11 months	31-8-23	20.4	18.99	.16	93.1	16.91	15.14
5	D. 1135 ..	Four tons pulverised limestone per acre	11 months	31-8-23	20.3	18.81	.18	92.6	16.74	14.98
6	D. 1135 ..	Five tons pulverised limestone per acre	11 months	31-8-23	20.1	18.61	.20	92.5	16.57	14.79
7	D. 1135 ..	Six tons pulverised limestone per acre	11 months	31-8-23	20.3	19.23	.15	94.7	17.12	15.38

Crop Results of Experiments to Test the Action of Different Quantities of Lime per Acre on Cane Crops, the Quantities of Lime in the form of Pulverised Limestone varying from 1 to 6 Tons per Acre. D. 1135—Second Ratoon Crop—August, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	No lime	11 months	13.72	2.08
2	D. 1135 ..	One ton pulverised limestone per acre	11 months	15.15	2.30
3	D. 1135 ..	Two tons pulverised limestone per acre	11 months	15.74	2.32
4	D. 1135 ..	Three tons pulverised limestone per acre	11 months	14.73	2.17
5	D. 1135 ..	Four tons pulverised limestone per acre	11 months	13.24	1.98
6	D. 1135 ..	Five tons pulverised limestone per acre	11 months	15.15	2.24
7	D. 1135 ..	Six tons pulverised limestone per acre	11 months	13.78	2.12

The crop results to date are given hereunder, including the averages:—

Crop Results to Date of Experiments to Test the Action of Different Quantities of Lime per Acre on Cane Crops, the Quantities of Lime in the form of Pulverised Limestone varying from 1 to 6 Tons per Acre.

Plot Number.	Treatment.	PLANT CROP, 1921. (STANDOVER.)		FIRST RATOON CROP, 1922. Age 13 Months.		SECOND RATOON CROP, 1923. Age 11 Months.		AVERAGE FOR THREE CROPS.	
		Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	No lime	35.42	5.06	19.70	3.05	13.72	2.08	22.94	3.39
2	One ton pulverised limestone per acre ..	37.21	5.64	21.74	3.45	15.15	2.30	24.70	3.79
3	Two tons pulverised limestone per acre ..	37.65	5.91	24.15	3.73	15.74	2.32	25.84	3.98
4	Three tons pulverised limestone per acre ..	38.74	6.09	23.82	3.85	14.73	2.17	25.76	4.33
5	Four tons pulverised limestone per acre ..	32.83	4.80	21.67	3.39	13.24	1.98	22.58	3.39
6	Five tons pulverised limestone per acre ..	38.18	5.78	24.01	3.62	15.15	2.24	25.78	3.84
7	Six tons pulverised limestone per acre ..	37.21	5.75	22.86	3.38	13.78	2.12	24.61	3.75

It will be seen from the above average results that the application of lime in varying quantities up to 6 tons per acre has had very little effect on the succeeding crops of cane. Plot 7, with 6 tons of lime per acre, is not so good as plots 3 and 4 with 2 and 3 tons of lime respectively. These plots have all been analysed, but the chemical results do not shed much light on the problem. One thing is apparent, which is that lime on the red soils is not a paying proposition. This fact, at any rate, has been borne out time

after time. The average lime content in these soils is about .52. The average increase for lime on the whole six plots was 1.93 tons for an average application of 3.5 tons of lime. This would not pay for the lime applied. Plot 5, with an application of 4 tons of lime per acre, has been consistently under the other limed plots in yield of cane, but analysis of the soil in this plot does not disclose any reason for this when compared with the analyses of the other plots.

(3.) Experiments to Test the Comparative Value of Using Plant, First Ratoon, Second Ratoon, and Third Ratoon Cane for Plants.

These experiments were undertaken to try and ascertain if any difference would result from planting cane cut from plant, first ratoon, second ratoon, and third ratoon cane. The use of second and third ratoon cane is usually condemned in most sugar districts, though plants cut from such crops are often made use of in Southern districts.

After the first ratoon crop was cut in September, 1922, the plots were ratooned as usual. Dry conditions in February caused a set-back from which the cane never recovered. In the middle of November, 1922, these plots were fertilised with a mixed manure at the following rate per acre:—100 lb. sulphate of ammonia; 100 lb. sulphate of potash; and 200 lb. superphosphate.

Following are the analytical and crop results of the second ratoons:—

Analytical Examination of Experiments to Test the Comparative Values of using Plant Cane, First Ratoon Cane, Second Ratoon Cane, and Third Ratoon Cane for providing Plants. D. 1135—Second Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Plants Cut from—	Age of Cane.	Date of Analysis.	Density of	% Sucrose in	% Glucose in	Purity of	% Sucrose in	% C.C.S. in
					Juice.	Juice.	Juice.	Juice.	Cane.	Cane.
1	D. 1135 ..	Plant cane	12 months	11-9-23	18.2	16.46	.27	90.4	14.65	12.80
2	D. 1135 ..	First ratoons	12 months	11-9-23	18.5	17.06	.24	92.2	15.19	13.53
3	D. 1135 ..	Second ratoons	12 months	11-9-23	19.5	18.35	.16	94.1	16.34	14.74
4	D. 1135 ..	Third ratoons	12 months	11-9-23	19.3	18.04	.21	93.4	16.16	14.42

Crop Results of Experiments to Test the Comparative Values of using Plant Cane, First Ratoon Cane, Second Ratoon Cane, and Third Ratoon Cane for Providing Plants. D. 1135—Second Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Plants Cut from—	Age of Cane.	Yield of	Yield of
				Cane per Acre in English Tons.	Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	Plant cane	12 months	9.30	1.19
2	D. 1135 ..	First ratoon cane	12 months	7.10	.96
3	D. 1135 ..	Second ratoon cane	12 months	7.04	1.04
4	D. 1135 ..	Third ratoon cane	12 months	8.17	1.18

The crop results to date, including totals and averages, are set out below:—

Crop Results to Date of Experiments to Test the Comparative Values of using Plant Cane, First Ratoon Cane, Second Ratoon Cane, and Third Ratoon Cane for Providing Plants.

Plot Number.	Variety of Cane.	Plants Cut from—	PLANT CROP (STANDOVER), 1921.		FIRST RATOON CROP, 1922. AGE TWELVE MONTHS.		SECOND RATOON CROP, 1923. AGE TWELVE MONTHS.		TOTAL RESULTS FOR THREE CROPS.		AVERAGE FOR THREE CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English tons.	Yield of C.C.S. per Acre in English tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135..	Plant cane	29.88	4.88	18.76	2.85	9.30	1.19	57.94	8.92	19.31	2.97
2	D. 1135..	First ratoon cane	26.56	4.13	16.11	2.59	7.10	.96	49.77	7.68	16.59	2.56
3	D. 1135..	Second ratoon cane	27.38	3.97	18.06	2.78	7.04	1.04	52.48	7.70	17.49	2.56
4	D. 1135..	Third ratoon cane	31.09	4.43	19.56	3.03	8.17	1.18	58.82	8.64	19.61	2.88

The average return shows that at Bundaberg third ratoons may make good plants, seeing that the average return for plot 4 is slightly higher than plot 1 where plant cane was used, and better than either plot 2 or 3. As previously

stated, however, it is doubtful if these results would be obtained from planting third ratoons in the more northerly sugar areas.

This experiment is now concluded.

(4.) Experiments to Determine the Value of Subsoiling.

A further effort is being made to ascertain whether an increased yield can be obtained from subsoiling the red soils. So far, little difference has been obtained in previous experiments in this class of soil. A portion of land was therefore subsoiled to 20 in. deep, and another portion, adjacent, of uniform land, left unsubsoiled, being only ploughed to ordinary depth. With these exceptions, the remaining cultural operations were the same. The results of the

plant and first ratoon crops have already appeared in previous reports.

After removing the first ratoon crop, in October of last year, plot 1 was subsoiled to a depth of from 18 to 20 in., while plot 2 was ratooned in the usual way to 9 in. deep. The cane came away well in each plot, and during its growth appeared to be uniform, though plot 1 was darker in colour. Both plots made very little growth after February.

The tables of analytical and crop results appear hereunder:—

Analytical Examination of Experiments to Determine the Value of Subsoiling. D. 1135—Second Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135 ..	Ratooned in the usual way, and subsoiled to 20 inches	11 months	19-9-23	18.4	17.40	.22	94.5	15.49	14.02
2	D. 1135 ..	Ratooned by ploughing 9 inches deep, not subsoiled	11 months	19-9-23	18.6	17.04	.23	91.6	15.17	13.45

Crop Results of Experiments to Determine the Value of Subsoiling. D. 1135—Second Ratoon Crop—September, 1923.

Plot Number	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	Ratooned in usual way, and subsoiled to 20 inches	11 months	3.53	.49
2	D. 1135 ..	Ratooned by ploughing 9 inches deep; not subsoiled	11 months	4.97	.67

The yield of cane on these plots this season has been remarkably light. The soil is very poor on the part of the station where this cane was planted, and no fertiliser was applied.

In the following table the crop results to date, including averages and totals, are set out:—

Total Crop Results to Date of Experiments to Determine the Value of Subsoiling.

Plot Number.	Variety of Cane.	Treatment.	PLANT CROP (STANDOVER) 1921.		FIRST RATOON CROP 1922—AGE TWELVE MONTHS.		SECOND RATOON CROP 1923—AGE ELEVEN MONTHS.		TOTAL RESULTS FOR THREE CROPS.		AVERAGE FOR THREE CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135..	Plant and ratoon crop subsoiled	27.96	4.18	12.14	1.87	3.53	.49	43.63	6.54	14.54	2.18
2	D. 1135..	Plant crop not subsoiled and succeeding crop ratooned by ploughing 9 inches deep	32.93	4.65	14.76	2.21	4.97	.67	52.68	7.53	17.56	2.51

The average decrease apparently caused by subsoiling is 3.02 ton per acre. These results are contrary to those experienced in the alluvial soils of Mackay, but are due probably to the open porous nature of the red soils on the Woorangarra area. This experiment is now concluded.

(5.) Experiments using Different Parts of the Stick for Plants.

This has been tried in so far as tops, middles, and middles and bottoms are concerned, but in this experiment all the plants in a stick are being used separately—i.e., top plants, second three eyes, third three eyes, and so on, including bottoms.

After cutting the first ratoon crop in October, 1922, the plots were ratooned in the usual

manner, and mixed manure applied at the following rate per acre:—100 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 200 lb. superphosphate. During growth the cane appeared to be very uniform, but progress was not rapid at any period. The cane suffered a serious set-back during February and March from which it did not recover, which fact is reflected in the very light tonnages.

Tables comprising the analytical and crop results are given below:—

Analytical Examination of Experiments Testing the effect of using Different Parts of the Sticks of Cane for Plants. 1900 Seedling. Second Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Portion of Stick used.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
2	1900 Seedling	Second three eyes ..	11 months	18-9-23	19.5	17.66	.23	90.5	15.90	14.02
3	1900 Seedling	Third three eyes ..	11 months	18-9-23	19.4	17.51	.23	90.4	15.76	13.87
4	1900 Seedling	Fourth three eyes ..	11 months	18-9-23	20.6	19.38	.17	94.0	17.36	15.73
5	1900 Seedling	Fifth three eyes ..	11 months	18-9-23	20.4	18.66	.19	91.4	16.80	15.72
6	1900 Seedling	Sixth three eyes ..	11 months	18-9-23	20.5	19.12	.18	93.2	17.21	15.46
7	1900 Seedling	Seventh three eyes (butts)	11 months	18-9-23	20.4	19.16	.18	93.9	17.25	15.55

Crop Results of Experiments Testing the effect of using Different Parts of the Sticks of Cane for Plants. 1900 Seedling—Second Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Portion of Stick used.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	1900 Seedling	Top plants three eyes ..	11 months	4.81	.72
2	1900 Seedling	Second three eyes ..	11 months	5.15	.72
3	1900 Seedling	Third three eyes ..	11 months	3.91	.54
4	1900 Seedling	Fourth three eyes ..	11 months	5.04	.79
5	1900 Seedling	Fifth three eyes ..	11 months	5.06	.79
6	1900 Seedling	Sixth three eyes ..	11 months	5.45	.74
7	1900 Seedling	Seventh three eyes (butts)	11 months	5.69	.88

The crop results of the plant and first and second ratoon crops, with totals and averages, now follow:—

Crop Results to Date of Experiments Testing the effect of using Different Parts of the Sticks of Cane for Plants.

Plot Number.	Variety of Cane.	Portion of Stick Used.	PLANT CROP (STANDOVER), 1921.		FIRST RATOON CROP, 1922, AGE, TWELVE MONTHS.		SECOND RATOON CROP, 1923, AGE, ELEVEN MONTHS.		TOTAL RESULTS OF THREE CROPS.		AVERAGE FOR THREE CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	1900 Seedling	Top plants, three eyes ..	31.25	4.87	15.07	2.47	4.81	.72	51.13	8.06	17.04	2.68
2	1900 Seedling	Second three eyes ..	35.13	5.61	16.83	2.77	5.15	.72	57.11	9.0	19.03	3.03
3	1900 Seedling	Third three eyes ..	31.42	5.02	15.09	2.56	3.91	.54	50.42	8.12	16.81	2.71
4	1900 Seedling	Fourth three eyes ..	31.57	5.12	14.83	2.40	5.04	.79	51.44	8.31	17.14	2.77
5	1900 Seedling	Fifth three eyes ..	31.02	4.91	14.56	2.45	5.06	.79	50.64	8.15	16.88	2.72
6	1900 Seedling	Sixth three eyes ..	25.46	3.72	13.32	2.19	5.45	.74	44.23	6.65	14.74	2.21
7	1900 Seedling	Seventh three eyes (butts)	36.00	5.66	14.57	2.53	5.69	.88	56.26	9.07	18.75	2.92

From the average crop results in this experiment the second three eyes and the bottom plants are in the lead. This experiment is now concluded.

(6.) **Potash Tests.—Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices.**

In the application of these fertilisers the same amount of potash has been used in both salts.

After harvesting the plant crop in July, 1922, the plots were ratooned in the ordinary manner, and the ratoons came away very well, the unmanured plots being lighter in colour. The potash was carefully applied according to the quantity for each plot in November, and the effect of the manure was very soon apparent. During its growth the cane in the manured plots was soon well in the lead, especially the plots with the largest application of potash, the other four plots following, while the unmanured plots were at a big disadvantage. All plots suffered a severe set-back in February and March of this year, those receiving no manure being very yellow a considerable time before the manured plots began to fall off. After the rain fell in

April the untreated plots did not make any recovery, and were stunted and yellow up till time of cutting, but the manured plots made a good recovery and grew slowly until the cold weather set in. Comparing the sulphate and muriate plots, there was no difference in colour at any time during growth.

This experiment is an additional one to that already reported upon at the Mackay Station, only, being on a much larger scale, it is possible to give the weights as well as the chemical data.

Primarily, however, this experiment is a chemical test of cane juices, so that the analytical tables are the more important.

The assertion has been made that muriate of potash has a prejudicial effect on cane juices.

The tests of the juices from the plant crop appeared in last year's report, and are summarised also later on. The chemical examinations made this year are as under:

Preliminary Examination of Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices. D. 1135—First Ratoon Crop—June, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	11 months	18-6-23	18.4	16.16	88.9	14.32	12.44
2	D. 1135	188 lb. muriate of potash per acre	11 months	18-6-23	18.0	15.84	88.0	14.10	12.24
3	D. 1135	94 lb. muriate of potash per acre	11 months	18-6-23	17.6	15.29	86.8	13.61	11.70
4	D. 1135	No manure applied	11 months	18-6-23	17.2	14.22	82.6	12.66	10.56
5	D. 1135	No manure applied	11 months	18-6-23	17.2	14.41	83.7	12.93	10.77
6	D. 1135	100 lb. sulphate of potash per acre	11 months	18-6-23	18.0	15.56	86.4	13.78	11.88
7	D. 1135	200 lb. sulphate of potash per acre	11 months	18-6-23	18.2	16.11	88.5	14.34	12.50
8	D. 1135	300 lb. sulphate of potash per acre	11 months	18-6-23	18.3	16.42	89.7	14.62	12.82

First Progressive Examination of Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices. D. 1135—First Ratoon Crop—July, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	12 months	18-7-23	19.7	17.89	91.2	16.01	14.19
2	D. 1135	188 lb. muriate of potash per acre	12 months	18-7-23	19.4	17.54	90.4	15.52	13.75
3	D. 1135	94 lb. muriate of potash per acre	12 months	18-7-23	18.9	16.78	88.7	14.94	13.02
4	D. 1135	No manure applied	12 months	18-7-23	18.9	16.75	88.6	14.91	13.00
5	D. 1135	No manure applied	12 months	18-7-23	18.8	16.51	87.8	14.70	12.74
6	D. 1135	100 lb. sulphate of potash per acre	12 months	18-7-23	19.3	17.43	90.3	15.52	13.68
7	D. 1135	200 lb. sulphate of potash per acre	12 months	18-7-23	19.5	17.64	90.4	15.70	13.84
8	D. 1135	300 lb. sulphate of potash per acre	12 months	18-7-23	19.8	17.45	88.1	15.53	13.48

Second Progressive Examination of Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices. D. 1135—First Ratoon Crop—August, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	13 months	24-8-23	19.4	17.91	92.3	15.94	14.25
2	D. 1135	188 lb. muriate of potash per acre	13 months	24-8-23	20.0	18.26	91.3	16.26	14.38
3	D. 1135	94 lb. muriate of potash per acre	13 months	24-8-23	19.7	17.95	91.1	15.98	14.16
4	D. 1135	No manure applied	13 months	24-8-23	19.6	17.93	91.3	15.96	14.20
5	D. 1135	No manure applied	13 months	24-8-23	20.1	18.44	91.7	16.42	14.56
6	D. 1135	100 lb. sulphate of potash per acre	13 months	24-8-23	19.3	17.75	91.9	15.81	14.08
7	D. 1135	200 lb. sulphate of potash per acre	13 months	24-8-23	20.3	18.81	92.6	16.75	14.93
8	D. 1135	300 lb. sulphate of potash per acre	13 months	24-8-23	19.5	18.05	92.6	16.07	14.37

Final Examination of Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices. D. 1135—First Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	14 months	20-9-23	19.7	18.66	.17	94.7	16.61	15.01
2	D. 1135	188 lb. muriate of potash per acre	14 months	20-9-23	19.7	18.72	.16	95.0	16.67	15.13
3	D. 1135	94 lb. muriate of potash per acre	14 months	20-9-23	18.8	17.84	.24	94.8	15.89	14.41
4	D. 1135	No manure applied	14 months	20-9-23	18.8	17.84	.22	94.8	15.89	14.41
5	D. 1135	No manure applied	14 months	20-9-23	18.8	17.71	.21	94.1	15.77	14.25
6	D. 1135	100 lb. sulphate of potash per acre	14 months	20-9-23	19.2	18.04	.20	93.9	16.06	14.50
7	D. 1135	200 lb. sulphate of potash per acre	14 months	20-9-23	19.4	18.43	.15	95.0	16.42	14.86
8	D. 1135	300 lb. sulphate of potash per acre	14 months	20-9-23	19.4	18.38	.15	94.7	16.26	14.80

Taking the purities and commercial cane sugar in the cane from the last of the above tables, it will be seen that the averages are as follows:—

Quotient of purity in three muriate of potash plots	94.8
Commercial cane sugar in three muriate of potash plots	14.85
Quotient of purity in three sulphate of potash plots	94.50
Commercial cane sugar in three sulphate of potash plots	14.73

It is apparent, therefore, that muriate of potash does not exercise any prejudicial effect on the purities or sugar content of cane juices, and these results are borne out at the Mackay Station.

The crop results of the present first ratoons are shown next:—

Crop Results of Experiments to Test the Action of Muriate of Potash in Comparison with Sulphate of Potash on Cane Juices. First Ratoon Crop—September, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135	282 lb. muriate of potash per acre	14 months	13.87	2.08
2	D. 1135	188 lb. muriate of potash per acre	14 months	12.75	1.93
3	D. 1135	94 lb. muriate of potash per acre	14 months	11.55	1.66
4	D. 1135	No manure applied	14 months	6.75	0.97
5	D. 1135	No manure applied	14 months	7.27	1.03
6	D. 1135	100 lb. sulphate of potash per acre	14 months	10.95	1.59
7	D. 1135	200 lb. sulphate of potash per acre	14 months	12.82	1.96
8	D. 1135	300 lb. sulphate of potash per acre	14 months	14.62	2.16

Considering the season the crop results are good. As in the plant crop the highest yield is found in plot 8, to which 300 lb. of sulphate of potash were applied.

Below are set out the crop results to date, including averages for the plant and first ratoons:—

Crop Results to Date of Experiments to Test the Action of Muriate of Potash in Comparison with Sulphate of Potash on Cane Juices.

Plot Number.	Variety of Cane.	Treatment.	PLANT CROP, 1922. AGE, TWENTY-ONE MONTHS.		FIRST RATOON CROP, 1923. AGE, FOURTEEN MONTHS.		AVERAGE FOR TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135	282 lb. muriate of potash per acre	41.75	5.24	13.87	2.08	27.81	3.66
2	D. 1135	188 lb. muriate of potash per acre	39.68	5.60	12.75	1.93	26.21	3.79
3	D. 1135	94 lb. muriate of potash per acre	35.53	4.06	11.55	1.66	23.54	2.87
4	D. 1135	No manure applied	26.26	3.51	6.75	.97	16.52	2.24
5	D. 1135	No manure applied	28.54	3.47	7.27	1.03	17.50	2.25
6	D. 1135	100 lb. sulphate of potash per acre	38.25	4.38	10.95	1.59	24.50	2.98
7	D. 1135	200 lb. sulphate of potash per acre	37.90	4.35	12.82	1.96	25.36	3.12
8	D. 1135	300 lb. sulphate of potash per acre	47.67	6.10	14.62	2.16	30.64	4.13

It has been evident for some years past that potash is urgently required in the Bundaberg red soils, and the above crop results amply bear this out. It is interesting to compare the averages of the treated plots with those receiving no potash:—

- 3 plots receiving muriate of potash—Average yield, 25.85 tons.
 - 2 plots receiving no potash—Average yield, 17.21 tons.
 - 3 plots receiving sulphate of potash—Average yield, 26.86 tons.
- Increase due to muriate of potash = 8.64 tons.
Increase due to sulphate of potash = 9.65 tons.

The average difference between the non-treated plots and plots 1 and 8 (where the largest application of potash was made) is 10.60 tons and 13.43 tons respectively—a very satisfactory result, and one to be commended to Woongarra farmers. From analyses it appears that the available potash on plot 5 is somewhat better than on plot 4, which would account for the difference in the two unmanured plots.

The following table gives the analytical results to date:—

* Analytical Results to Date of Experiments Testing the Action of Muriate of Potash versus Sulphate of Potash on Cane Juices.

Plot Number.	Variety of Cane.	Treatment.	1921.				1922.							
			DECEMBER.		JANUARY.		FEBRUARY.		MARCH.		JUNE.		JULY.	
			Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	91.6	15.43	89.9	11.82	84.0	8.80	77.1	7.09	88.2	13.45	87.5	12.55
2	D. 1135	188 lb. muriate of potash per acre	94.2	15.70	90.1	11.71	81.4	8.11	76.4	6.77	90.5	13.44	91.4	14.28
3	D. 1135	94 lb. muriate of potash per acre	93.1	15.68	91.0	12.10	78.0	7.00	75.4	6.43	85.4	11.39	87.9	12.07
4	D. 1135	No manure	91.6	14.90	87.1	10.00	76.3	6.80	68.4	3.82	88.4	13.12	91.9	13.36
5	D. 1135	No manure	91.1	14.63	86.7	9.81	71.5	5.53	66.5	4.28	79.0	8.99	90.2	12.21
6	D. 1135	100 lb. sulphate of potash per acre	93.4	15.39	87.7	10.60	74.8	6.29	68.4	4.61	80.3	10.32	86.0	11.44
7	D. 1135	200 lb. sulphate of potash per acre	94.1	15.63	87.3	10.19	72.2	5.86	63.6	3.75	80.3	9.22	87.0	11.47
8	D. 1135	300 lb. sulphate of potash per acre	93.2	15.28	88.7	10.80	79.9	7.75	67.9	4.83	80.7	10.03	89.5	12.80

Plot Number.	Variety of Cane.	Treatment.	1923.							
			JUNE.		JULY.		AUGUST.		SEPTEMBER.	
			Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.	Purity of Juice.	% C.C.S. in Cane.
1	D. 1135	282 lb. muriate of potash per acre	88.9	12.44	91.2	14.19	92.3	14.25	94.7	15.01
2	D. 1135	188 lb. muriate of potash per acre	88.0	12.24	90.4	13.75	91.3	14.38	95.0	15.13
3	D. 1135	94 lb. muriate of potash per acre	86.8	11.70	88.7	13.02	91.1	14.16	94.8	14.41
4	D. 1135	No manure	82.6	10.56	88.6	13.00	91.3	14.20	94.8	14.41
5	D. 1135	No manure	83.7	10.77	87.8	12.74	91.7	14.56	94.1	14.25
6	D. 1135	100 lb. sulphate of potash per acre	86.4	11.88	90.3	13.68	91.9	14.08	93.9	14.50
7	D. 1135	200 lb. sulphate of potash per acre	88.5	12.50	90.4	13.84	92.6	14.93	95.0	14.86
8	D. 1135	300 lb. sulphate of potash per acre	89.7	12.82	88.1	13.48	92.6	14.37	94.7	14.80

(7.) Experiments with Different Forms of Fertilisers.

The results of the plant crop appeared in last year's report.

After taking off the plant crop in October, 1922, the plots were ratooned, and the manures carefully applied in November. The ratoons came away well, and appeared to be quite uniform until after the manures were applied, when those plots receiving mixed manures and

that receiving sulphate of potash were very soon in the lead, followed by the two plots receiving nitrogen, all the others appearing practically the same. While the weather was favourable the plots made good progress, those already mentioned as being in the lead maintaining their position. Shortly after the dry conditions set in at the end of January there was a distinct falling away in all plots except Nos. 1, 9, 10, 11, and 12, which maintained their

colour though the growth was retarded. During the dry spell from the end of January to the 11th of April all plots had a dry appearance, and when rain came in April plot 1 was in the lead, followed by 9, 10, 11, and 12. This order was maintained till the cane was cut.

The analytical and crop results of this year's first ratoons appear below:—

Analytical Examination of Experiments with Different Kinds of Fertilisers. D. 1135—First Ratoon Crop—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135	300 lb. sulphate of potash per acre	11 months	2-10-23	20.8	19.67	.27	94.5	17.52	15.82
2	D. 1135	200 lb. sulphate of ammonia per acre	11 months	2-10-23	19.2	17.72	.41	92.2	15.77	14.10
3	D. 1135	265 lb. nitrate of soda per acre	11 months	2-10-23	19.8	18.34	.35	92.6	16.33	14.56
4	D. 1135	300 lb. superphosphate per acre	11 months	2-10-23	19.3	17.87	.37	92.3	15.91	14.22
5	D. 1135	300 lb. basic superphosphate per acre	11 months	2-10-23	19.6	18.30	.33	93.3	16.29	14.61
6	D. 1135	No manure	11 months	2-10-23	19.3	18.05	.46	93.4	16.07	14.45
7	D. 1135	190 lb. bone meal per acre	11 months	2-10-23	18.4	16.94	.25	92.0	15.08	13.45
8	D. 1135	300 lb. Holbourne Island phosphate per acre	11 months	2-10-23	18.7	17.68	.42	94.5	15.74	14.23
9	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate	11 months	2-10-23	20.1	18.89	.28	93.9	16.82	15.14
10	D. 1135	600 lb. mixed manure per acre as in plot 9 applied in two dressings, second application two months after the first	11 months	2-10-23	19.6	18.27	.36	93.2	16.27	14.58
11	D. 1135	600 lb. mixed manure per acre as in plot 9, in one application	11 months	2-10-23	19.7	18.56	.31	94.0	16.52	14.89
12	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate. The nitrogen in this mixture was applied in two dressings.	11 months	2-10-23	19.2	18.00	.34	93.7	16.02	14.34
13	D. 1135	No manure	11 months	2-10-23	18.6	17.06	.26	91.7	15.19	13.50

Crop Results of Experiments with Different Kinds of Fertilisers. D. 1135—First Ratoon Crop—October, 1923.

Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135	300 lb. sulphate of potash per acre	11 months	13.78	2.18
2	D. 1135	200 lb. sulphate of ammonia per acre	11 months	8.45	1.19
3	D. 1135	265 lb. nitrate of soda per acre	11 months	10.11	1.47
4	D. 1135	300 lb. superphosphate per acre	11 months	9.52	1.36
5	D. 1135	300 lb. basic superphosphate per acre	11 months	6.62	.88
6	D. 1135	No manure applied	11 months	9.01	1.16
7	D. 1135	190 lb. bone meal per acre	11 months	6.67	.89
8	D. 1135	300 lb. Holbourne Island phosphate per acre	11 months	5.58	1.34
9	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate	11 months	12.19	1.84
10	D. 1135	600 lb. mixed manure per acre as in plot 9, in two dressings, second application two months after the first	11 months	11.48	1.68
11	D. 1135	600 lb. mixed manure per acre as in plot 9, in one application	11 months	12.26	1.82
12	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate. The nitrogen in this mixture was applied in two dressings.	11 months	12.24	1.75
13	D. 1135	No manure applied	11 months	6.91	.93

This season plot 1, with 300 lb. potash per acre, has given the highest yield, followed by the four plots receiving mixed manures. Further consideration will be given to the average crop results, which are now set out hereunder after the table containing the analytical results to date:—

Analytical Results to Date of Experiments with Different Kinds of Fertilisers.

Plot Number.	Variety of Cane.	Treatment.	PLANT CROP, 1922—AGE THIRTEEN MONTHS.	FIRST RATOON CROP, 1923— AGE ELEVEN MONTHS.	AVERAGE FOR TWO CROPS.
			% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.
1	D. 1135	300 lb. sulphate of potash per acre	16.61	15.82	16.24
2	D. 1135	200 lb. sulphate of ammonia per acre	16.45	14.10	15.27
3	D. 1135	265 lb. nitrate of soda per acre	16.07	14.56	15.31
4	D. 1135	300 lb. superphosphate per acre	15.64	14.22	14.93
5	D. 1135	300 lb. basic superphosphate per acre	15.60	14.61	15.10
6	D. 1135	No manure	14.99	14.45	14.72
7	D. 1135	190 lb. bonemeal per acre	15.91	13.45	14.68
8	D. 1135	300 lb. Holbourne Island phosphate per acre	14.81	14.23	14.52
9	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate	15.50	15.14	15.32
10	D. 1135	600 lb. mixed manure per acre as in plot 9, applied in dressings, second application two months after the first	15.02	14.58	14.80
11	D. 1135	600 lb. mixed manure per acre as in plot 9, in one dressing	14.85	14.89	14.87
12	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate. The nitrogen in this mixture was applied in two dressings	14.88	14.43	14.65
13	D. 1135	No manure	14.19	13.50	13.84

Crop Results to Date of Experiments with Different Kinds of Fertilisers.

Plot Number.	Variety of Cane.	Treatment.	PLANT CROP, 1922, AGE THIRTEEN MONTHS.		FIRST RATOON CROP, 1923, AGE ELEVEN MONTHS.		AVERAGE RESULTS FOR TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135	300 lb. sulphate of potash per acre	22.17	3.68	13.78	2.18	17.97	2.93
2	D. 1135	200 lb. sulphate of ammonia per acre	18.09	2.97	8.45	1.89	13.27	2.43
3	D. 1135	265 lb. nitrate of soda per acre	19.36	3.11	10.11	1.47	14.73	2.29
4	D. 1135	300 lb. superphosphate per acre	13.48	2.11	9.62	1.36	11.55	1.73
5	D. 1135	300 lb. basic superphosphate per acre	14.19	2.22	6.01	.88	10.10	1.55
6	D. 1135	No manure	15.38	2.30	9.01	1.10	12.19	1.70
7	D. 1135	190 lb. bonemeal per acre	16.43	2.62	6.67	.89	11.55	1.75
8	D. 1135	300 lb. Holbourne Island phosphate per acre	16.08	2.38	5.58	.79	10.83	1.58
9	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lbs. superphosphate	16.28	2.52	12.19	1.84	14.23	2.18
10	D. 1135	600 lb. mixed manure as in plot 9 in two dressings. Second application two months after the first	20.95	3.15	11.48	1.68	16.21	2.41
11	D. 1135	600 lb. mixed manure as in plot 9, applied in one dressing	21.76	3.23	12.26	1.82	16.96	2.52
12	D. 1135	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 100 lb. muriate of potash, and 300 lb. superphosphate. The nitrogen in this mixture was applied in two dressings	23.40	3.48	12.24	1.75	17.82	2.61
13	D. 1135	No manure	17.00	2.41	6.91	.93	11.95	1.67

In the crop results to date the average yield of cane for the two crops is given. Plot No. 1, with 300 lb. potash per acre, is slightly leading, followed by plot 12—mixed manure, with two dressings of nitrogen. Plot 12 last season gave the highest yield. In plots 2 and 3, where nitrogen only is applied in the form of sulphate of ammonia to plot 2 and nitrate of soda to plot 3, the latter form of nitrogen has given the largest average yield. The applications of different forms of phosphates have given no

results compared with the plots which received no manure. The difference between the average of the potash plot and the average of the two unmanured plots amounts to 5.90 tons of cane per acre, further emphasizing the necessity for potash on our red soils of Bundaberg. Analyses made of the soils from plot 9 and plot 11 fail to reveal any reason for the lower tonnage given by plot 9, except that the nitrogen content in plot 11 is somewhat higher.

(8.) Experiments with Cane Planted Continuously in the Row and 6 inches, 12 inches, 18 inches, 24 inches, and 36 inches apart.

This is another planting experiment testing different methods of planting in the rows.

Experiments testing different widths of rows were previously carried out at this station. The crop now being dealt with is first ratoons. The result of the plant crop appeared in last year's report. The following are the analytical and crop results:—

Analytical Examination of Experiments with Different Widths between the Plants in the Row. D. 1135
First Ratoon Crop October, 1923.

Plot Number.	Variety of Cane.	Distance between Plants.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135 ..	Continuously in row ..	11 months	2-10-23	19.6	18.69	.34	95.3	16.64	15.10
2	D. 1135 ..	6 inches apart ..	11 months	2-10-23	19.4	18.46	.37	95.1	16.43	14.90
3	D. 1135 ..	12 inches apart ..	11 months	2-10-23	19.4	18.38	.38	94.6	16.36	14.80
4	D. 1135 ..	18 inches apart ..	11 months	2-10-23	19.2	17.89	.40	92.8	15.93	14.29
5	D. 1135 ..	24 inches apart ..	11 months	2-10-23	20.0	18.89	.32	94.4	16.72	15.18
6	D. 1135 ..	36 inches apart ..	11 months	2-10-23	19.2	17.99	.39	93.7	16.02	14.42

Crop Results of Experiments with Different Widths between the Plants in the Row. D. 1135
First Ratoon Crop—October, 1923.

Plot Number.	Variety of Cane.	Distance between Plants.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	Continuously in row ..	11 months	9.41	1.42
2	D. 1135 ..	6 inches apart ..	11 months	9.43	1.41
3	D. 1135 ..	12 inches apart ..	11 months	8.40	1.24
4	D. 1135 ..	18 inches apart ..	11 months	7.84	1.12
5	D. 1135 ..	24 inches apart ..	11 months	9.36	1.22
6	D. 1135 ..	36 inches apart ..	11 months	7.60	1.09

Not much difference is shown in the crop results of the various plots. For some unexplained reason plot 5 has given a much better result than it did last year. In the table below is given the crop results to date:—

Crop Results to Date of Experiments with Different Widths between the Plants in the Row.

Plot Number.	Variety of Cane.	Distance between Plants.	PLANT CROP, 1922. AGE, THIRTEEN MONTHS.		FIRST RATOON CROP, 1923. AGE, ELEVEN MONTHS.		AVERAGE FOR TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135 ..	Continuously in row ..	16.58	2.67	9.41	1.42	12.99	2.04
2	D. 1135 ..	6 inches apart ..	17.63	2.96	9.43	1.41	13.53	2.18
3	D. 1135 ..	12 inches apart ..	14.16	2.21	8.40	1.24	11.28	1.72
4	D. 1135 ..	18 inches apart ..	13.48	2.14	7.84	1.12	10.66	1.63
5	D. 1135 ..	24 inches apart ..	12.09	1.85	9.36	1.22	10.72	1.53
6	D. 1135 ..	36 inches apart ..	12.64	1.95	7.60	1.09	10.12	1.52

From a study of the above table it is noticed that the closer planting gives the best yields, and it confirms previous experiments that variation in the distance between the rows has a far more important bearing on the yield than the variation of the plants in the row. It will be noticed that the results from plots 4, 5, and 6, where the plants were placed 18, 24, and 36 in. apart, do not show much difference.

(9.) Experiments in Different Methods of Planting.

(a) Planted and covered by hand;

(b) Planted by hand and covered with cultivator; and

(c) Planted and covered with the machine known as the "Cane Planter."

On taking off the plant crop in October, 1922, the plots were ratooned in the ordinary manner, and the cane came away well. During the growth of the cane up till the end of January the plots were uniform, but during the dry weather in February and March plot 3 fell away considerably followed by plot 2.

The results of the plant crop have already appeared. The analytical and crop results of the first ratoons are now shown:—

Analytical Examination of Experiments in Different Methods of Planting. D. 1135—First Ratoon Crop—October, 1923.

Plot Number.	Variety of Cane.	Method of Planting.	Age of Cane.	Date of Analysis.	Density of Jutes (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
1	D. 1135 ..	Planted and covered by hand	11 months	2-10-23	19.8	18.50	.29	93.4	16.46	14.78
2	D. 1135 ..	Planted by hand and covered with the Planet Junior Cultivator	11 months	2-10-23	19.9	18.81	.27	94.5	16.65	15.14
3	D. 1135 ..	Machine planted and covered	11 months	2-10-23	19.8	18.61	.32	94.0	16.56	14.93

Crop Results of Experiments in Different Methods of Planting. D. 1135—First Ratoon Crop—October, 1923.

Plot Number.	Variety of Cane.	Method of Planting	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
1	D. 1135 ..	Planted and covered by hand	11 months	11.19	1.65
2	D. 1135 ..	Planted by hand and covered with the Planet Junior Cultivator	11 months	9.22	1.39
3	D. 1135 ..	Machine planted and covered	11 months	7.41	1.11

The results differ from those of the plant crop, which, with the present crop, are given in the table of crop results appearing below:—

Crop Results to Date of Experiments in Different Methods of Planting.

Plot Number.	Variety of Cane.	Method of Planting.	PLANT CROP 1922—THIRTEEN MONTHS OLD		FIRST RATOON CROP 1923—ELEVEN MONTHS OLD.		AVERAGE FOR TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
1	D. 1135	Planted and covered by hand	12.10	1.88	11.19	1.65	11.64	1.76
2	D. 1135	Planted by hand and covered with the Planet Junior Cultivator	16.24	2.41	9.22	1.39	12.73	1.90
3	D. 1135	Machine planted and covered	14.52	2.31	7.41	1.11	10.97	1.71

As the dry weather this season evidently affected these crops, the average yields of the three crops which should come to hand next year will be awaited.

(10.) Competitive Experiment with Varieties from Java, Hawaii, Mauritius, and India; also One North Queensland Seedling, and D. 1135 (Reintroduced).

The plant crop (standover) results appeared in last Annual Report.

After taking off the standover plant crop in August, 1922, the cane was ratooned in the usual way, and mixed manure applied in November at the following rate per acre:—100 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 200 lb.

superphosphate. E.K. 1 did not ratoon at all well, while E.K. 28 and H.Q. 77 were very fair, and D. 1135, H. 227, H. 146, and M. 168⁰¹ were good. Included in this experiment when laid out in 1920 were the varieties H. 109, J.247, 100 Bont, and Shahjahanpur No. 10, but during the growth of the plant crop in 1921 H. 109 appeared to be developing "Top rot" and was ploughed out; it had also gummied. After harvesting the standover crop in August 1922, J. 247 Generatic and 100 Bont ratooned so very poorly that they were discarded. Shahjahanpur No. 10 developed Mosaic and was ploughed out. A brief description of these canes was given in the report for 1921, and a few notes as to the general characteristics of each were given in last year's report.

Preliminary, progressive, and final analytical tables with the crop results of the first ratoon are given hereunder:—

Preliminary Examination of New Canes from Java, Hawaii, and Mauritius, also one Hambleton Seedling and D. 1135—First Ratoon Crop—July, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Java	E.K. 1	10 months	19-7-23	17.0	13.82	81.3	10.4	12.31	10.18
Java	E.K. 2	10 months	19-7-23	16.7	13.93	83.4	11.6	12.23	10.29
Java	E.K. 28	10 months	19-7-23	19.1	17.09	90.0	9.3	15.51	13.59
Hawaii	H. 146	10 months	19-7-23	16.4	13.61	82.9	11.5	12.05	10.03
Hawaii	H. 227	10 months	19-7-23	17.8	15.27	85.7	11.7	13.49	11.33
Mauritius	168 ⁹⁴	10 months	19-7-23	18.7	16.96	90.7	10.9	15.12	13.34
Demerara	D. 1135	10 months	19-7-23	19.0	16.83	88.5	11.0	14.98	13.03
Queensland	H.Q. 77	10 months	19-7-23	18.2	16.44	90.3	10.9	14.65	12.90

Progressive Examination of New Canes from Java, Hawaii, and Mauritius, also one North Queensland Seedling and D. 1135—First Ratoon Crop—August, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Java	E.K. 1	11 months	24-8-23	18.5	16.42	88.7	10.4	14.71	12.83
Java	E.K. 2	11 months	24-8-23	18.2	16.31	89.6	11.6	14.42	12.73
Java	E.K. 28	11 months	24-8-23	18.9	17.01	90.0	9.3	15.40	14.57
Hawaii	H. 146	11 months	24-8-23	17.8	16.09	90.4	11.5	14.14	12.54
Hawaii	H. 227	11 months	24-8-23	20.3	18.42	90.7	11.7	16.27	14.36
Mauritius	M. 168 ⁹⁴	11 months	24-8-23	19.8	18.27	92.2	9.8	16.93	14.86
Demerara	D. 1135	11 months	24-8-23	19.9	18.19	91.4	11.0	16.19	14.25
Queensland	H.Q. 77	11 months	24-8-23	18.8	17.39	92.5	10.9	15.50	13.84

Final Examination of New Canes from Java, Hawaii, Mauritius, also one North Queensland Seedling and D. 1135—First Ratoon Crop—September, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Java	E.K. 1	12 months	27-9-23	20.0	19.03	.26	95.1	10.4	17.05	15.48
Java	E.K. 2	12 months	27-9-23	17.8	16.49	.62	92.6	11.6	14.58	13.02
Java	E.K. 28	12 months	27-9-23	20.4	19.38	.28	95.0	9.3	17.51	14.49
Hawaii	H. 146	12 months	27-9-23	17.9	16.91	.36	94.4	11.5	14.97	13.57
Hawaii	H. 227	12 months	27-9-23	17.9	16.60	.28	92.6	11.7	14.66	13.07
Mauritius	M. 168 ⁹⁴	12 months	27-9-23	19.2	18.23	.21	94.9	9.8	16.54	14.97
Demerara	D. 1135	12 months	27-9-23	20.0	19.14	.19	95.7	11.0	17.04	15.51
Queensland	H.Q. 77	12 months	27-9-23	18.1	17.16	.57	95.2	10.9	15.39	13.86

Crop Results of New Cane from Java, Hawaii, Mauritius, also one North Queensland Seedling and D. 1135—First Ratoon Crop—September, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
Java	E.K. 1	12 months	6.92	1.07
Java	E.K. 2	12 months	8.18	1.06
Java	E.K. 28	12 months	6.92	1.00
Hawaii	H. 146	12 months	10.33	1.40
Hawaii	H. 227	12 months	7.91	1.03
Mauritius	M. 168 ⁹⁴	12 months	6.29	.94
Demerara	D. 1135	12 months	10.06	1.56
Hambleton, Queensland	H.Q. 77	12 months	8.81	1.22

In the following table the analytical results to date are presented:—
Total Analytical Results of Experiments with New Canes from Java, Mauritius, Hawaii, also one North Queensland Seedling, and D. 1135.

Country.	Name or Number of Variety.	PLANT CROP, 1922. (STANDOVER).	FIRST RATOON CROP, 1923. AGE, TWELVE MONTHS.	AVERAGE FOR TWO CROPS.
		% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.
Java	E.K. 1	14.48	15.48	14.98
Java	E.K. 2	11.77	13.02	12.39
Java	E.K. 38	12.87	14.49	13.68
Hawaii	H. 146	15.16	13.57	14.36
Hawaii	H. 227	14.91	13.07	13.99
Mauritius	M. 168 ⁰¹	15.24	14.97	15.10
Demerara	D. 1135	13.91	15.51	14.71
Queensland	H.Q. 77	15.12	13.86	14.49

In the table now to be given it is interesting to see the decline between the yield of the plant standover crop and the twelve-months-old first ratoons grown during the present dry season. The largest average yield was from the variety known as Java E.K.1. This is followed by E.K. 2 and D. 1135. A factor entering into this experiment, however, is the power to make a good stand of ratoons after a standover crop:—

Total Crop Results of New Canes from Java, Hawaii, and Mauritius, also one North Queensland Seedling, and D. 1135.

Country.	Name or Number of Variety.	PLANT CROP, 1922. (STANDOVER.)		FIRST RATOON CROP, 1923. AGE TWELVE MONTHS.		TOTAL RESULTS OF TWO CROPS.		AVERAGE OF TWO CROPS.	
		Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
Java	E.K. 1	54.80	7.93	6.92	1.07	61.72	9.00	30.86	4.50
Java	E.K. 2	50.68	5.97	8.18	1.06	58.86	7.03	29.43	3.51
Java	E.K. 28	26.94	3.47	6.92	1.00	33.86	4.47	16.93	2.23
Hawaii	H. 146	26.89	4.11	10.33	1.40	37.22	5.51	18.61	2.75
Hawaii	H. 227	34.27	5.11	7.91	1.03	42.18	6.14	21.09	3.07
Mauritius	M. 168 ⁰¹	17.08	2.60	6.29	.94	23.37	3.54	11.68	1.77
Demerara	D. 1135	36.41	5.06	10.06	1.56	46.47	6.62	23.23	3.31
Queensland	H.Q. 77	31.37	4.74	8.81	1.22	40.18	5.96	20.09	2.98

(11.) Competitive Experiments with Canes from Different Countries. Plant Crop (Standover).

After ploughing out the stools from the previous crop in October, 1920, the land received an application of burnt lime at the rate of 1 ton per acre which was harrowed in. Early in November the block was sown with cowpea which germinated well, and in February, 1921, a fairly good crop of green manure was turned under and allowed to decay. After receiving two further cross ploughings and harrowings the cane was planted on 2nd September, 1921. With regard to germination, M. 32/10 was through first on the 12th, followed by Q. 116, M.Q. 1, M.Q. 2, and Oba Badila on the 15th, M. 28/10, B. 4596, 7 R. 428, Gingor, Q. 903, and H.Q. 409 were all through on the 16th, M. 55/11, M. 55/1182, and B. 4030 on the 18th, while B. 6450 and D. 109 did not appear till the 22nd.

The germination of Oba Badila, M.Q. 1, M. 32/10, and M.Q. 2 was very good, all coming through practically without a miss. M. 28/10, B. 4596, 7 R. 428, Gingor, Q. 903, and H.Q. 409 were good, but there were a few misses: M. 55/1182 was fairly good, but M. 55/11 and B. 4030 were poor, while D. 109 and B. 6450 were very poor.

A brief description of the four Mauritius canes was given in the report for 1921, while the others which are not new varieties have appeared in various other reports. The following are a few notes as to the general characteristics of each variety:—

M.28/10.—Is a good striker and rapid grower. The trash falls freely. It is a good stooler and ratooner, and a heavy cropper, but the quality is on the low side.

M.32/10.—Is a fairly good striker and fast grower; the trash falls freely. It is a good stooler and ratooner, but is not a good standover cane, as there was about 20 per cent. dead when cut. It is a good cropper, but the quality is low.

M.55/11.—Is a very fair striker, and rapid grower of medium quality. The trash falls freely. It is a good stooler and ratooner, but does not come up to the mark as a standover cane.

M.55/1182.—Is a good striker and rapid grower, of good quality. The trash falls freely. It is a good stooler and ratooner, and also a good standover variety. This is the most promising of the four Mauritius canes in this experiment.

B.4030.—Is a medium striker and fairly rapid grower, of good quality. Trashes easily. Is a fair stooler and ratooner, but a very poor standover cane, as there was a large quantity of dead stuff when cut.

- B.4596.—Is a good striker, and fast grower of fair quality; the trash falls freely. It is a good stooler, and stood well as a standover crop, there being very few dead sticks when cut.
- E.6450.—Is a poor striker, and somewhat slow grower of medium quality. A good stooler and ratooner, but not a good standover variety. It is a worthless cane as far as this district is concerned.
- 7R.428.—Is a good striker, and medium rapid grower with somewhat short, but stout, heavy sticks of good quality. It trashes easily. It is a good ratooner and stooler, and also a splendid standover cane. A heavy cropper, standing well under drought conditions.
- D. 109.—A poor striker, but a rapid grower. The trash falls freely. Is a poor ratooner, and sparse stooler, but a good standover variety. It does not come up to the requirements of this district. The quality is on the low side.
- Gingor.—A cross between Mauritius Gingham and N.G. 24A. It is a good striker and rapid grower, of high quality, maturing very early. A good stooler and ratooner, and also good as a standover cane. It is a very heavy cropper, but is inclined to go down and tangle very badly in a heavy crop. This cane can be well recommended for anyone requiring a variety of the Goru type.
- Q. 903.—Is a good striker, and medium fast grower of fair quality. Does not stand well under dry conditions. The trash is inclined to cling. It is a fair stooler and ratooner, but a very poor standover cane, there being at least 50 per cent. dead when cut. Is not a suitable cane for this district.
- Q. 116 Sport.—Is a good striker and rapid grower of good quality. The trash falls freely. It is a heavy cropper, and very fair standover cane. A good stooler and ratooner. It is inclined to lodge, and goes down in wet weather. Can be recommended to those desiring a heavy cropper of medium quality.
- M.Q. 1.—Is a good striker, but inclined to be a slow grower, though of good quality. The trash is inclined to cling to the stick, especially in dry weather. It is a good stooler and ratooner.
- M.Q. 2.—A poor striker, but rapid grower of good quality. Trash falls freely. A poor ratooner, particularly after a standover crop, and sparse stooler. Is inclined to lodge. A poor standover cane, with 35 per cent. dead when cut. Not at all suitable for this district.
- H.Q. 409.—Is a good striker, and rapid grower of good quality. Practically a self-trasher. It is a poor ratooner and sparse stooler, but stands over well.
- Oba Badila.—Is a very good striker, but like the ordinary Badila (N.G. 15) is a slow grower of very high quality. The trash falls fairly freely. It is a good stooler and ratooner, and also a good standover variety. In all respects it is similar to the N.G. 15.
- In the following tables the preliminary, progressive, and final analytical examinations are set out:—

Preliminary Examination of Experiments with Varieties of Cane from Different Countries—Plant Crop (Standover) July, 1923.

Country	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.)	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Mauritius	M. 28/10	23 months	19-7-23	13.7	11.91	86.9	9.8	10.86	9.23
Mauritius	M. 32/10	23 months	19-7-23	18.1	15.82	87.4	12.6	13.83	11.91
Mauritius	M. 55/11	23 months	19-7-23	17.9	16.38	91.5	12.7	14.30	12.68
Mauritius	M. 55/1182	23 months	19-7-23	16.3	14.47	88.7	10.9	12.90	11.13
Barbadoes	B. 4030	23 months	19-7-23	18.1	16.71	92.3	10.7	14.93	13.31
Barbadoes	B. 4596	23 months	19-7-23	15.8	14.55	92.0	10.3	13.06	11.49
Barbadoes	B. 6450	23 months	19-7-23	17.1	15.78	92.2	10.8	14.10	12.55
Fiji	7 R. 428 (Pompey)	23 months	19-7-23	17.8	15.84	88.9	10.2	14.23	12.42
Demerara	D. 109	23 months	19-7-23	17.7	15.56	87.9	11.0	13.85	12.06
Queensland	Gingor	23 months	19-7-23	18.1	16.41	90.6	8.6	15.00	13.26
Queensland	Q. 903	23 months	19-7-23	18.0	16.55	91.9	10.8	14.64	13.15
Queensland	Q. 116 Sport	23 months	19-7-23	16.4	14.47	88.2	12.5	12.67	10.97
Queensland	M.Q. 1	23 months	19-7-23	19.6	17.85	91.0	11.5	15.80	14.03
Queensland	M.Q. 2	23 months	19-7-23	16.8	14.22	84.6	11.0	12.66	10.69
Queensland	H.Q. 409	23 months	19-7-23	17.0	15.75	90.0	12.0	13.86	12.17
New Guinea	Oba Badila	23 months	19-7-23	20.5	19.68	96.0	10.6	17.60	16.05

Final Examination of Experiments with Varieties of Cane from Different Countries. Plant Crop (Standover) August, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.)	% Sucrose in Juice.	% Chlorose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Mauritius	M. 28/10	24 months	19-8-23	15.8	13.35	1.00	84.5	9.8	12.04	10.17
Mauritius	M. 32/10	24 months	19-8-23	14.9	13.21	.40	88.6	12.6	11.55	10.04
Mauritius	M. 55/11	24 months	19-8-23	16.6	15.11	.40	91.0	12.7	13.20	11.65
Mauritius	M. 55/1182	24 months	19-8-23	16.6	15.16	.27	91.3	10.9	13.52	11.97
Barbadoes	B. 4030	24 months	19-8-23	19.8	18.49	.17	93.3	10.7	16.51	14.83
Barbadoes	B. 4596	24 months	19-8-23	17.4	15.83	.61	90.9	10.3	14.20	12.57
Barbadoes	B. 6450	24 months	19-8-23	18.2	17.16	.25	94.2	10.8	15.31	13.82
Fiji	7 R. 428 (Pompey)	24 months	19-8-23	20.1	18.95	.17	94.2	10.2	17.02	15.38
Demerara	D. 109	24 months	19-8-23	18.1	16.25	.33	89.7	11.0	14.49	12.70
Queensland	Gingor	24 months	19-8-23	18.5	16.94	.44	91.6	8.6	15.39	13.79
Queensland	Q. 903	24 months	19-8-23	18.4	16.14	.48	87.7	10.8	14.40	12.92
Queensland	Q. 116 Sport	24 months	19-8-23	18.2	16.42	.46	90.2	12.5	14.37	12.63
Queensland	M.Q. 1	24 months	19-8-23	19.6	17.85	.47	91.0	11.5	15.80	14.15
Queensland	M.Q. 2	24 months	19-8-23	17.4	14.97	.53	86.0	11.0	13.33	11.38
Queensland	H.Q. 409	24 months	19-8-23	18.4	16.61	.45	90.2	12.0	14.62	12.81
New Guinea	Oba Badila	24 months	19-8-23	19.9	18.89	.21	94.9	10.6	16.89	15.32

According to the results of the plant crop, M. 28/10 is in the lead followed by 7 R. 428:—
Crop Results of Experiments with Varieties of Cane from Different Countries. Plant Crop (Standover) August, 1923.

Country.	Name or Number of Variety.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
Mauritius	M. 28/10	24 months	22.74	2.31
Mauritius	M. 32/10	24 months	10.00	1.00
Mauritius	M. 55/11	24 months	16.19	1.88
Mauritius	M. 55/1182	24 months	19.12	2.30
Barbadoes	B. 4030	24 months	9.47	1.40
Barbadoes	B. 4596	24 months	17.22	2.16
Barbadoes	B. 6450	24 months	10.85	1.50
Fiji	7 R. 428 (Pompey)	24 months	22.05	3.39
Demerara	D. 109	24 months	18.60	2.36
Queensland	Gingor	24 months	19.12	2.64
Queensland	Q. 903	24 months	9.81	1.27
Queensland	Q. 116 Sport	24 months	14.81	1.87
Queensland	M.Q. 1	24 months	11.54	1.63
Queensland	M.Q. 2	24 months	12.79	1.45
Queensland	H.Q. 409	24 months	17.05	2.18
New Guinea	Oba Badila	24 months	15.26	2.34

NEW EXPERIMENTS.

1. *Plot Experiments with D. 1135*—It was stated in last year's report that differences appear to exist in plots of apparently uniform land on the same division, and that it would be necessary to lay down a series of plots to endeavour if possible to find out what variation exists between them.

Eight plots have accordingly been laid down. Four of these will be fertilised and four not fertilised. The cane from each plot will be harvested and weighed separately, and the results should come to hand next year for the plant crop. Samples of soil from each plot will be analysed.

2. *Standover Badila*.—Manured and not manured.

3. *Continued growth of cane* upon the same land by immediately replanting after ploughing out *versus* treatment by rotation and resting of soil before replanting.

4. *Application of manure* containing a heavy dressing of potash to poor land on Station.

DISTRIBUTION OF VARIETIES.

A free distribution of varieties was made on the 20th August of this year, when sixty-four growers attended at the Station, and 178 bundles were sent to various mills, farmers' associations, and individuals along the lines north and south of Bundaberg. It is estimated that about 3 tons were given away on the Station, and 9 tons sent to places along the lines. The varieties most in demand were:—E.K. 1, H.Q. 285, H. 227, Q. 1098, Q. 813, Q. 970, N.G. 103, and H. 146.

FIELD DAY.

The Annual Field Day of the Southern Sugar Experiment Station was held on Saturday, 26th May, when upwards of 325 visitors from Nambour, Yandina, Tiaro, Bauple, Maryborough, Pialba, Childers, Gin Gin, Rosedale, Yandaran, Avondale, and Bundaberg were present, this being the largest attendance to date. After the visitors had been welcomed they were shown over the Station and the various experiments were explained, while the visitors also took advantage of the opportunity to inspect the different varieties of cane. After luncheon the Director delivered an address, and a demonstration of field implements and tractors during the afternoon concluded a pleasant and instructive day.

TOTAL TONNAGE OF CANE HARVESTED FROM THE EXPERIMENT STATION AT BUNDABERG DURING 1923.

	Tons.
Cane sent to mill	164.55
Cane used for plants	3.06
Cane distributed	12.50
Total	180.05

Condition of Crops—

5.68 per cent.	Plant, 12 months
13.16 per cent.	Plant, standover
38.98 per cent.	First ratoons
31.39 per cent.	Second ratoons
10.79 per cent.	Third ratoons
D.1135, 1st ratoon	37.33 tons
D.1135, 2nd ratoon	52.50 tons
Varieties, plant	33.93 tons
Varieties, ratoon	56.29 tons

Return per acre—

D.1135, 1st ratoon	9.28 tons
D.1135, 2nd ratoon	8.30 tons
Variety, plant	8.48 tons
Variety, ratoon	6.24 tons
Acreeage harvested	23
Average tons per acre	8.28

7.—WORK OF THE LABORATORIES.

A comparatively small amount of chemical work performed by the laboratories of the Sugar Experiment Stations is represented by the foregoing tables. Soil tests, fertiliser analyses, and other agricultural analyses are made free for farmers. In addition to this large numbers of sugar-cane analyses are carried out every year free for canegrowers. This year 842 cane juices were analysed at the Bundaberg Sugar Experiment Station, about 709 being for outside parties.

In addition to the chemical work undertaken at the Experiment Stations a large number of soil, fertiliser, water, and other analyses are carried out at the Agricultural Laboratory, Brisbane, where a member of the staff is located.

Thanks are due to the Agricultural Chemist (Mr. Brümlich) for his co-operation along soil investigation and other chemical lines.

The quantity of analytical work performed at the various laboratories is set out in the accompanying tables:—

DETAILED REPORT OF ANALYTICAL WORK PERFORMED BY THE LABORATORY OF THE SUGAR EXPERIMENT STATION, BUNDABERG, FOR THE SEASON 1922-1923.

Materials.	No. of Analyses.
Sugar-canes and juices for growers	409
Sugar-cane and juices for Agricultural Show, Bundaberg	173
Sugar-cane and juices for Agricultural Show, Gin Gin	98
Sugar-cane and juices for Agricultural Show, Maryborough	29
Sugar-canes and juices for the Experiment Station	133
Sugar-cane fibres for the Experiment Station	8
Total	850

DETAILED REPORT OF ANALYTICAL WORK PERFORMED BY THE LABORATORY OF THE SUGAR EXPERIMENT STATION, MACKAY, FOR THE SEASON 1922-1923.

Materials.	No. of Analyses.
Sugar-canes for farmers	276
Sugar-canes for Mackay Show	10
Sugar-canes for Experiment Station	252
Sugar-cane fibres	51
Limestones	8
Fertilisers	10
Waters	3
Total	610

DETAILED REPORT OF ANALYTICAL WORK PERFORMED BY THE LABORATORY OF THE SUGAR EXPERIMENT STATION AT SOUTH JOHNSTONE FOR THE SEASON 1922-1923.

Materials.	No. of Analyses.
Fertilisers	4
Lime	3
Lime Earth	1
Soils	6
Cane fibres	10
Sugar-cane juices for station	295
Sugar-cane juices for farmers	8
Spirituons liquors for Police Department	5
Miscellaneous	7
Total	339

ANALYSES CARRIED OUT FOR THE BUREAU OF SUGAR EXPERIMENT STATIONS BY THE AGRICULTURAL LABORATORY, BRISBANE.

Materials.	No. of Analyses.
Soils	126
Waters	8
Rocks	1
Fertilisers	3
Limestones	6
Total	144

COMPARATIVE RESULTS OF ANALYSES MADE AT RACECOURSE MILL WITH ANALYSES OF JUICE EXPRESSED BY THE LABORATORY MILL AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM THE SAME VARIETIES OF CANE.

In order to get some information as to the average difference between the juice expressed at the first rollers of a large sugar mill and juice expressed by a laboratory mill from the same varieties of cane, a large number of samples have been compared, and the results appeared last year. Further comparisons were made this year with a few individual canes and some mixed loads of cane, between the station analyses and those from Racecourse Mill. The difference (.49 higher) was practically the same as last year when it was .47 higher. The results are set out hereunder:—

The laboratory mill at the station is a powerful one, having rollers of 6 $\frac{3}{4}$ in. diameter, which can be adjusted to crush light or heavy.

Comparison of Laboratory Results and Analyses Received from Racecourse Mill.

Variety of Cane.	LABORATORY MILL.	RACECOURSE MILL.
Q. 970	C.C.S. 15.29	C.C.S. 14.9
Q. 970	15.31	15.30
Q. 813	16.17	15.6
Q. 813	16.26	16.2
Q. 813	16.39	15.2
Q. 813	16.56	16.3
Q. 813	16.40	16.2
Q. 813	16.75	14.9
Q. 903, 1098, and 1121 Mixed	15.85	15.8
Cangor, B. 4596, B. 6450 Mixed	15.71	14.6
D. 1457, D. 109 Mixed	16.47	16.2
Average	16.05	15.56

Difference, .49.

Chemical tests were also made to determine the rate of deterioration of cut green and burnt cane, and relative loss in weight during a period of eleven days.

Experiments to Test the Rate of Deterioration of Green and Burnt Cane, also Relative Loss in Weight.

Q. 813. GREEN.						Q. 813. BURNT.					
Day of Analysis.	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.	Day of Analysis	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.
1st day	19.5	17.87	91.17	13.79	..	1st day	20.2	18.63	91.77	14.43	..
2nd day	20.8	19.34	92.9	15.05	2.82	2nd day	20.7	19.16	92.6	14.87	3.16
3rd day	20.4	18.67	91.5	14.40	4.23	3rd day	20.3	18.59	91.5	14.34	4.74
4th day	21.0	19.21	91.5	14.81	6.58	4th day	20.2	18.36	90.9	14.10	6.32
5th day	21.0	19.34	92.1	14.97	8.46	5th day	20.5	18.79	91.7	14.50	7.90
7th day	22.3	19.96	89.5	15.18	11.28	7th day	21.7	19.75	90.6	15.19	11.06
8th day	21.6	18.51	85.7	13.69	12.69	8th day	22.1	20.15	91.2	15.50	12.63
9th day	22.5	18.86	83.9	13.74	14.10	9th day	22.2	19.61	88.3	14.75	13.68
10th day	23.0	19.39	84.3	14.19	15.73	10th day	22.6	19.98	88.4	15.08	14.91
11th day	23.2	19.0	81.9	13.63	17.63	11th day	22.5	19.67	87.4	14.74	17.01

Q. 970. GREEN.						Q. 970. BURNT.					
Day of Analysis	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.	Day of Analysis	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.
1st day	20.8	19.53	93.9	15.29	..	1st day	20.1	18.76	93.4	14.63	..
2nd day	21.1	20.0	94.8	15.74	2.35	2nd day	20.8	19.42	93.4	15.15	2.32
4th day	22.4	20.48	91.5	15.78	6.09	4th day	21.6	20.12	93.1	15.68	5.58
5th day	22.5	20.61	91.6	15.90	7.95	5th day	21.1	19.48	92.3	15.10	6.97
6th day	23.0	21.14	91.9	16.34	9.34	6th day	22.1	20.34	92.0	15.73	8.37
7th day	22.9	20.55	89.7	15.66	11.20	7th day	21.6	19.78	91.6	15.25	10.23
8th day	23.1	20.83	90.2	15.92	12.62	8th day	22.4	20.82	92.9	16.20	12.09
9th day	24.1	21.16	87.8	16.02	14.95	9th day	22.7	20.88	91.9	16.15	13.95
11th day	24.8	21.15	85.3	15.20	18.20	11th day	23.6	21.39	90.6	16.40	17.65

H.Q. 458. GREEN.						H.Q. 458. BURNT.					
Day of Analysis	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.	Day of Analysis	% Total Solids (Brix.)	% Sucrose in Juice.	Purity of Juice.	% C. C.S. in Cane.	% Loss in Weight.
1st day	19.7	17.90	90.9	13.74	..	1st day	19.2	17.24	89.8	13.14	..
2nd day	20.0	18.53	92.7	14.39	2.02	2nd day	19.6	18.18	92.7	14.13	1.75
4th day	20.8	18.50	88.9	14.02	4.04	4th day	20.4	18.33	89.9	13.98	3.79
5th day	20.9	18.76	89.8	14.30	5.26	5th day	20.5	18.67	91.1	14.35	4.47
6th day	20.3	18.46	90.9	14.18	6.48	6th day	20.3	18.62	91.7	14.37	5.84
7th day	20.7	18.54	89.5	14.11	7.70	7th day	20.4	18.41	90.2	14.07	7.21
8th day	21.1	18.95	89.8	14.45	9.72	8th day	20.7	18.99	91.7	14.66	8.59
9th day	21.2	18.48	87.1	13.82	10.52	9th day	21.0	19.08	90.9	14.65	9.61
11th day	22.1	18.71	84.6	13.73	13.55	11th day	21.3	18.73	87.9	14.09	12.98

For the above experiments about 120 sticks of cane were selected for each test, and forty sticks were tied in a bundle and weighed each day for the loss in weight. For each analysis, ten sticks were taken and passed through the rollers twice, and the extraction would approximate 45 to 50 per cent. As variations in samples must be allowed for, the results can only be judged on the general average of the analyses from day to day. Some anomalous figures are almost certain to appear, as samples cannot be selected having precisely the same sugar content.

By studying the tables it will be seen that cut green cane goes off slightly quicker than cut burnt cane, the average drop of purity in green cane is 8 per cent. against 4 per cent. in burnt cane. The loss of weight is also greater in green than in burnt cane. The loss in weight is very considerable, and amounts approximately to 1 ton in 6 tons cane at the end of eleven days.

In these experiments the canes were kept in the shade for the whole period, if exposed to the sun the loss would be much greater. The idea governing this was that the cane would, under field conditions, be possibly loaded into trucks. In some experiments carried out in Hawaii, it was stated that the cane on the cars (or trucks) had apparently kept better than the cane in the field. In the Hawaiian experiments a considerable drop in the quotients of purity were observed, and the drop recorded in the above experiments is also great.

The above tests seem to show that cut burnt cane does not deteriorate so rapidly as cut green cane, but it has been objected to the above results that the analyses of burnt cane should have been done by the Clerget Method, and an endeavour will be made next season to do this.

8.—WORK OF THE DIVISION OF ENTOMOLOGY.

The importance of the work of this division cannot be overstated, for, on it depends, we hope, the finding of a remedy for the greatest enemy the sugar-cane possesses, viz.—the white grub.

Mr. Edmund Jarvis, the Entomologist in charge of this division, is doing fine work, and his efforts to assist cane-growers is highly appreciated. Mr. Jarvis is assisted by Mr. Cottrell Dormer and Mr. G. Bates, whose work has been very satisfactory.

Annual Report of Entomologist, 1922-23.

To the Director,

Bureau of Sugar Experiment Stations.

SIR,—With regard to work of the Division of Entomology during the year ending October, 1923, I have the honour to report as follows:—

Recent field experimentation with soil fumigants during the period January to August has yielded results of a very encouraging nature in connection with control of the grub-stage of our principal cane pest, the notorious grey-back cockchafer beetle (*Lepidoderma albohirtum* Waterh.).

The attainment of such results must necessarily be considered as being a decided step forward, seeing that this Experiment Station was originally established for the express purpose of combating the insect in question, which, as you are well aware, occasions an annual loss to the State amounting, it has been estimated, to hundreds of thousands of pounds sterling.

Allusion was made in my last annual report to the success attending our laboratory experiments with paradichloro-benzene as a fumigant for cane-grubs, and the likelihood of its proving equally effective under field conditions.

The following notes regarding the action of this compound on grub-affected cane will be of interest to economic entomologists:—

Paradichlor Plots at Meringa.

These consisted of a strip of land 605 ft. long containing eight rows of first ratoons of D1135, growing on friable red volcanic soil situated on a ridge of high land.

This cane had not ratooned well, owing to injury during the previous season from grubs and dry weather. When treated on 25th January the plants were from 2 to 3 ft. high, but gaps of several feet occurred in places, while in other parts the ratoons were weakly or stunted both on the treated and check areas.

Injections of $\frac{1}{2}$ oz. of paradichlor were put in with the "Jarvis Injector" (designed for injecting dry crystals) on both sides of rows, from 12 to 18 in. apart, 6 in. deep, and $\frac{1}{4}$ in. from the lines of stools. Owing to the average cultivation being only about 6 in. the crystals were in many cases embedded in unbroken subsoil. When examined a fortnight later the odour of paradichlor was noticeable an inch or so below injections, and had also penetrated upwards to the surface, and throughout the soil laterally between the points of injection. In loose soil it could be smelt 9 or 10 in. away. The injections at that time were found to weigh about five scruples, so that impregnation of the soil had been accomplished by an evaporation of only one-twenty-fourth of an ounce of paradichlor.

Three months after application, the cane on these plots was 7 to 8 ft. high, but while the foliage of that on the fumigated area was dark-green and of upright growth, the cane on adjoining control plots had become more or less yellow in places owing to the presence of grubs. This contrast was very marked on the strip where injections had been made 18 in. apart, which happened to pass through grub-infested patches. Looking down on the plots from a height of 10 or 12 ft. one could distinctly notice the green edges of the treated areas sharply bounded by the yellowing borders of the check plots. Not a single yellow patch appeared in the treated plots, which continued of a uniform dark, healthy green throughout their entire length. When examined about three weeks later (17th May) the contrast between these green and grub-smitten lines of stools had become very marked indeed, interesting evidence being afforded at this time in connection with the work of injecting these stools in January. This was carried out by men who treated different rows, some of the stools in which had been accidentally missed, and the position of such stools was now clearly revealed, about fourteen weeks after application, by slight yellowing of the foliage, due to some of the grubs at these points having escaped fumigation. A careful count of all the stools in six treated and a similar number, of untreated rows gave the following results:—

Plot 1. Treated (three rows, 900 stools)—
20 stools grub-affected.

Plot 2. Untreated (three rows, 900 stools)
—575 stools grub-affected.

Plot 3. Treated (three rows, 900 stools)—
49 stools grub-affected.

Plot 4. Untreated (three rows, 900 stools)
—779 stools grub-affected.

Affected stools occurring in treated rows were often surrounded by, or growing alongside green injected cane, thus showing that such occurrence was in many cases not due to failure of the fumigant, but to defective treatment or non-application. This was very clearly exemplified in the case of a row consisting of 300 stools that had been injected by the one man, and which happened to form the edge of a treated plot. This row presented an unbroken line of green foliage without a single grub-affected stool; showing that it had been carefully and uniformly injected throughout the entire length. Running parallel to it, and only 4 ft. 6 in. away, the edge of an adjoining check plot formed an almost continuous row of stunted, yellow, grub-eaten cane. The unmistakable contrast between these two rows growing side by side was amply sufficient in itself to prove the effectiveness of the fumigant.

"The cane on these plots was cut about the middle of September, seven and a-half months after fumigation with paradichlor, during which period it received less than half our average amount of rain. In spite of prolonged drought and poor cultural conditions, however, the rows of injected stools continued greener, more upright, and considerably higher than those alongside in the check plots. Photos, taken at this time, and reproduced in the "Australian Sugar Journal," indicate these differences very clearly.

"In conclusion, it may be mentioned that about a month after the crop on this high land had been cut, Assistant H. Knust reported that the stools fumigated in January had ratooned uniformly along the rows, whereas in the lines of check cane alongside very few ratoons had appeared, and these were uneven and much stunted, thus indicating unmistakably the damage that had been caused by grubs to stools in the untreated area.

Effect of Paradichlor on Cane Plants.

"About a fortnight after injecting cane on the Meringa plots it was remarked that two or three leaves on plants here and there had commenced to wither from the tip downwards. This characteristic browning, which appears mostly on outer leaves, seldom extends farther than from 8 to 12 in.; the basal portions of such affected leaves remaining green and continuing to grow in a normal manner. This browning is more likely to occur when the main roots of a plant chance to have been bruised or broken, allowing the fumes of paradichlor to enter the injured portions and interfere with normal action of the cellular tissue. Plants affected in this manner, however, soon recover, the injury seldom or never extending to the heart-leaves. Such browning usually appears when fumigation in dry weather is followed by a continuance of drought conditions; or, again, on open friable land under shallow cultivation in dry weather. On our plots on better cultivated ground at Greenhills, for example, no such leaf-browning was noticed among Badila cane treated with this fumigant.

Introduction of Scoliid-Wasp Parasites.

"This fascinating branch of natural control work was touched on in my last annual report, an arrangement having at that time been made with Professor Leefmans for an exchange of Digger-Wasp parasites.

"On 28th April our first consignment of cocoons of *Campsomerys tasmaniensis* and *C. radula* Fabr. were shipped to Buitenzorg, leaving Townsville 8th May and reaching Java on 13th June, after a voyage of thirty-six days. They were packed in a tin-box filled with powdered charcoal slightly moistened with water, in order to minimise risk of injury from development of mould during transit, each cocoon being first enclosed in a cylinder of paper tied at each end.

"Upon arrival, however, four cocoons were found to have been smashed from pressure, although the remainder were in good condition. A third consignment, consisting of 160 cocoons, left Townsville on 7th June, reaching Buitenzorg about forty-two days later. When opened up, nearly all these were looking healthy, so it

is hoped some of them may ultimately produce parasites. The following month (July) another lot of fifty-two cocoons were sent away, most of which arrived free from mechanical injury or fungi, &c.

"The above-mentioned 219 cocoons were packed in direct contact with moist charcoal dust, and in order to prevent injury from pressure were enclosed in a number of small tins having perforated ends, each holding four cocoons, these little tins being then placed one over the other in a larger box.

"The first consignment of Javanese digger-wasps left Buitenzorg on 14th July, arriving at our Experiment Station fifty-three days later (5th September). This consisted of cocoons of the Genera *Dielis* and *Triscobia*, and were supplemented by a further sending of cocoons of *Dielis tristis* and *dreuseni* Sauss., despatched from Java on 31st July, and arriving here 7th September, after a journey of thirty-seven days.

"The work of breeding digger-wasps for us in Java is being continued by Professor Leefmans, and I am hoping to soon receive specimens of *Dielis thoracica* F. and *D. javana*, the former of which appears likely to meet our requirements in North Queensland.

The Influence of Chemotropism on Cane Beetles.

"As previously pointed out, the chemotropic response of insects to artificial stimuli opens up a wide field of research in connection with the control of destructive insects.

"At the present day entomologists are fully aware of the economic value of this method of combating insect pests, and splendid work is being done by such men as Tragardh, Rudolfs, and others, the latter scientist being specially interested in the chemotropism of mosquitoes. Having, as before stated in previous reports, very good reasons for assuming our grey-back cane-beetle to be sensibly affected by forces of a chemotropic nature, experimentation in this direction was continued during the past season. There is little doubt that the highly specialised antennae of *alohirtum*—the lamellae of which are provided with from 18,000 to 24,000 olfactory—pits or pori—enable these beetles to locate the position of favourite feeding-trees.

"We may reasonably suppose that the various subtle odours emanating from the foliage, twigs, or bark of such food-plants—inappreciable of course to our coarser sense of smell—are doubtless due to the presence of definite organic or chemical substances possessing distinctive aromas, some of which could probably be isolated by careful analysis. The services of a good bio-chemist would be invaluable to us in research work of this nature, and might, before long, lead to the discovery of some simple odour having an irresistible attraction for the grey-back cockchafer. Should such an odour be found it would go a long way towards solving the cane-grub problem, since it would be a comparatively easy matter to design suitable traps that when baited with the attractive substance might be so arranged on plantations as to lure to destruction most of the invading egg-laden cane-beetles.

"I am pleased to be able to record that results of an encouraging kind in connection with this phase of control were obtained last season

against *Lepidiota frenchi* Blackb. a scarabæid beetle second only in economic importance to the grey-back. Chemotropic reaction was apparently displayed by this species one evening last January, at a time when I was putting aromas in bait-traps placed about 200 ft. apart on open forest country at Meringa.

Whilst carrying a small tray of tubes containing different aromas some of which had been emptied—although moisture still remained around the mouth of these—a dozen or more frenchi beetles suddenly, and without warning, flew on to the tray, buzzed about the tubes, and even alighted on my fingers, which had been wetted with solutions that had been poured into traps already baited. Although remaining on the tray for about a quarter of a minute only, this was long enough to indicate that something had attracted them in the first instance.

Possibly movement of the tray as I walked may have caused them to fly off. Positive reaction perhaps resulted from a combination of different aromas arising from the assortment of tubes, but was probably of a fugitive nature, since no further reaction was noticed on that evening.

Subsequent exposures of aromas afforded additional hopes of success, specimens of *Lepidiota frenchi* being found in four of the traps.

In one instance two females had been attracted, while another trap containing water in which two chemicals had been dissolved, had captured four beetles, all of the male sex.

Injury from Moth-borers.

Large Moth-borer (Phragmatiphila truncata Walk.).

Serious infestation by this insect was noticed during August to October among mature crops of Badila and D. 1135 on low-lying ground, near Aloomba. The caterpillars occurred mostly in the tops of cane sticks, and often in the central and basal portions. From reports to hand during October this moth-pest appears to have been very prevalent towards the close of 1922, both at Meringa and Gordonvale, owing probably to climatic conditions at that time of year having operated as a check on the increase of its various parasitic or predaceous enemies. The chief natural controlling factor of *truncata* in the Cairns district appears to be a tiny Braconid wasp parasite named *Apanteles nonagriæ* Oliff, which has a life-cycle here of from fifteen to twenty-three days. Attempts to secure additional specimens of this useful insect during November, 1922, proved unsuccessful. On the 6th of that month fifty-eight ratoons having dead-hearts collected at Banna yielded forty healthy caterpillars of this noctuid, these pupating in due course, and the moths making their first appearance about twelve days later.

Small Moth-borer (Polyocha sp.).

Whilst searching for the abovementioned parasite in December, numbers of young ratoons with dead-hearts collected at Riverstone, near Gordonvale, were found to harbour larvæ and pupæ of this borer.

Although a minor pest of cane, it must be considered responsible at times for injuries of a rather serious character, but, fortunately, so far as observed, affecting only a small percentage of the crop.

During November, 1920, the present writer collected from within an area of one square chain no less than forty-four dead-hearts from ratoons 18 in. high at Pyramid, which, upon examination, yielded thirty-three larvæ of this small moth-borer. During the present season, however, about 8 per cent. of dead-hearts collected contained caterpillars, many of which were parasitised by a braconid wasp (not yet identified).

Tineid Moth-borer (Unidentified).

Specimens of this tiny lepidopteron were noticed this season affecting ratoons at Riverstone.

Liberation of Tachinid-Fly Parasites.

The work of breeding *Ceromasia sphencophari* for controlling the ravages of the weevil-borer (*Rhabdocnemis obscurus* Boisd.) has been continued from month to month; this activity of our Experiment Station being second only in importance to research work connected with cane-grub control. In view of the extensive area under sugar in the Herbert River district, we considered it advisable for our Sugar Bureau to unite forces with the Colonial Sugar Refining Company, in order that parasites might be liberated at many different centres, so that losses due to borers might be reduced throughout this area with as little delay as possible. An additional breeding-cage was accordingly erected at our laboratory, with a floor-space of 56 square ft., and a height of 7 ft. 6 in.

Improved methods of handling and tending tachinid flies during captivity have been evolved by the writer, of which the following will interest economic entomologists:—In place of using split cane for feeding purposes we section the stick transversely into 4-in. lengths, and stand each piece with buds pointing upwards in a small pot of water (such as a 2-in. vaseline jar), cotton-wool being used to stop any space between the cane and sides of mouth of jar.

The water rising by capillarity keeps the exposed upper ends of these pieces constantly moist for a couple of days or longer, so that the food remains succulent all the time, and need not be renewed each day. Canna plants, about 18 in. high, shifted into kerosene-tins of soil provide excellent broad and cool leafage for spraying and sheltering the flies from intense heat, as water adheres slightly to the surface of these leaves in large globules that do not evaporate quickly. Canes used for holding borer grubs for placing in breeding cages should have all side roots cut away close up to the stick, the rooting basal portion washed to remove soil or ants, and when stocked with weevil grubs at each internode (excepting three or four at top), should be planted about 6 in. apart in tins of soil, holding, for convenience when handling, from six to eight sticks.

Kerosene-tins with one side cut out make good tins for holding these canes. Wads for plugging holes after inserting grubs should consist of fragments of borer cocoons, and the substance of these wads should, on no account, be tightly compressed, but inserted loosely in the holes with just sufficient grip to keep them from falling out.

For making the holes we find a 5/16 in. cork-punch answers very well.

"Specimens of *Ceromasia sphenophori* were liberated in various districts on the following dates:—

- 26th August—60 flies—South Johnstone.
- 29th August—25 flies—Aloomba.
- 27th October—84 flies—Macknade.
- 29th October—25 flies—Goondi.
- 1st November—40 flies—Gordonvale.
- 7th November—40 flies—Highleigh.
- 27th November—25 flies—Aloomba.
- 27th December—50 flies—Babinda.
- 20th September—60 flies—South Johnstone.

Cane Damaged by Army Worm.

"This pest, which usually occurs more or less abundantly each year and effects quite appreciable damage to leaves of young ratoon and plant cane, proved sufficiently in evidence last season to excite comment from canegrowers, several instances of such outbreaks having been brought under our observation.

"At Mr. Rushworth's farm, on the Upper Mulgrave River, a couple of acres of cane were completely eaten down, only the mid-ribs of leaves being left. Many of these caterpillars were collected from which to breed parasites. A large ichneumon fly was noticed in the field by my assistant, Mr. Dormer, parasitising pupae of this moth.

"A more extensive infestation occurred at Highleigh on the selection of Skeen Brothers, where these caterpillars were very common on headlands in low-lying situations, but mostly hidden as usual among unfolding heart-leaves and behind the older leaf-sheaths.

"Hundreds of specimens of a large tachinid fly were noticed here, being probably parasitic on larvae of this pest.

"The occurrence of *Cirphis unipuncta* Haw., however, in the Cairns district is not only very local, but appears also to be followed almost at once by natural checks in the shape of parasitic and predaceous insects, bacterial diseases, &c., proving so effective that these caterpillars seldom reappear injuriously in the same situation for several years.

Heavy Mortality among Cane-beetles resulting from Climatic Control.

"A severe check to the increase of *albohirtum* was experienced last season owing to a long spell of dry weather during the closing months of 1922. Rain did not fall until the end of December, when, upon cultivation being resumed, many growers ploughed up quantities of dead grey-back beetles which had been unable to emerge from the hard, dry soil. These specimens were probably the offspring of beetles that appeared at the beginning of November, 1921, whose grubs—having pupated at an early date (July to August)—produced beetles which probably transformed in their subterranean pupal cells during September last 1922. These beetles would not be able to remain alive underground in dry soil longer than about ten weeks, so consequently must have perished about the beginning of December, just before the abovementioned dry spell broke up. If the first rain had fallen six weeks earlier (beginning of November) we should probably have been faced with a heavy emergence of grey-back beetles.

"Unfortunately, canegrowers did not reap the full benefit of such wholesale destruction of the beetles, because of the continuance of abnormally dry weather. Instead of getting our usual average rainfall of 76.95 in. during the period January to September we received less than half this amount, so that on high volcanic lands where grubs usually cause most damage to cane, freedom from severe infestation was counter-balanced this season by a lack of sufficient moisture.

Visits to other Sugar Districts.

"A trip was undertaken during March to the Burdekin to investigate and report on damage to cane caused by white-grubs, termites, moth, borers, &c. Owing to cordial co-operation of the growers a considerable tract of country was covered, including Kalamia, Seaforth, Rita Island, Pioneer, Jarvisfield, and part of Maida-vale. A lecture was delivered at Ayr on "Control of the Grey-back Cane-beetle," followed by a general discussion regarding certain cane pests that are causing trouble on the Burdekin.

"The most interesting insect met with was *Mastotermes darwiniensis* Progg., a species of white-ant occasioning very serious injury in some of the plantations. It tunnels in living cane sticks above ground, completely devouring the interior and leaving only the rind. In final stages of destruction the stick is killed, and if cut open is seen to be merely a hollow pipe.

"Fumigation of the soil with paradichlor, at a time when cane is from 6 to 9 in. high, should prove effective against any of these termites chancing to be present in the ground and that might be entering the sets, and would, at the same time, protect the cane from cockchafer grubs. The introduction of such ants as *Pheidole megacephala* into infested fields would doubtless help to control termites when entering a plantation during the fledging season, at a time when the females were settling on the ground with a view to trying to make their way into cane stools to start new colonies.

"On irrigated areas the crops appeared to be flourishing and unaffected by grubs, borers, or other pests.

"During July I attended a Field Day at the South Johnstone Experiment Station, where opportunity was afforded for observing the growth and general appearance of different named varieties of cane, together with that of numerous seedlings which had been propagated at this Station by the Chemist in Charge, Mr. P. H. McWalters.

Pan-Pacific Congress.

"During August last I was asked to attend the Melbourne and Sydney meetings of the Pan-Pacific Congress, at which I contributed a treatise dealing with the life history and control of insects affecting sugar-cane in North Queensland, and a few other notes relating to beneficial North Queensland insects, whose introduction into other sugar-growing countries might prove advantageous. These contributions were accompanied by pinned insects, photographs, and living specimens of parasitic and predaceous useful insects."

Station Staff.

Since reporting last year, charge of the Cadet's Quarters has been in the hands of Mr. J. Milton and his wife, who, since 22nd January up to the present date, have filled this position in a highly satisfactory manner.

During the period 9th January to 5th May, Mr. T. K. Scheibel was temporarily employed in the capacity of Field Assistant, and proved himself a willing and capable worker, being especially interested in the welfare and upkeep of our Office collection, and efficient at the work of breeding our Digger-wasps, numerous cocoons of which were ultimately shipped to Java.

Assistance in the office and laboratory experimentation is at present being rendered by Mr. W. C. Dormer and Mr. G. Bates, the latter cadet, who was appointed last May, having since that time been instructed in the work of breeding tachinid fly parasites, the manipulation of insects, and general collecting of specimens required for experimental work.

Assistant Herbert Knust, who during the past twenty-one months has been engaged here in miscellaneous field and station duties, in which he has invariably displayed reliability and foresight, has lately been advanced, and will in the future receive training in experimental field work.

Entomological Exhibits at Shows.

Our Experiment Station was again represented at the annual meeting of the Cairns Agricultural, Pastoral, and Mining Association held on the 6th and 7th of June.

This exhibit took the form of coloured diagrams and charts, illustrative for the most part of the underground workings and life-cycle stages of our chief cane-beetle, *Lepidoderma albohirtum* Waterh., together with the effect produced by grubs of this insect on the growing cane crop during each month of the year.

A general collection of insects, and of the grubs, pupæ, and adults of root-eating scarabæidæ affecting cane was also on view, as well as other exhibits of a more or less scientific nature.

Many growers availed themselves of the invitation to freely discuss various phases of the cane-grub question, and obtain information respecting insect pests attacking their cane, so that much interesting interchange of opinions took place.

Our bureau was represented this year for the first time at Ingham Show during September last by an entomological exhibit, which included some of our best charts and show-cases prepared by the writer during the last two years. This exhibit was sent under the charge of Mr. Dormer, and because of its unique character naturally

attracted considerable notice, and was much appreciated by the members of the Herbert River Farmers' League.

Museum and Collections.

The space set aside at our laboratory for exhibiting to growers various natural objects and diagrams illustrating economic entomology as applied to organisms affecting sugar-cane is becoming somewhat overcrowded, and if more room were available it would be worth while preparing additional diagrams, &c., so as to make a more comprehensive display. Our office collection of insects of all orders of the class Insecta has been added to of late, and most of our commoner species have been named from Southern collections.

Station Improvements.

Although drought conditions have interfered somewhat with the planting of trees, &c., various improvements have been effected, while the general upkeep of the station grounds has not been neglected.

An additional acre of land has been cleared, ploughed, and put under crop, and application has just been made to the Lands Department for the transference of 2 acres of land from the Prison Reserve to the Bureau of Sugar Experiment Stations, which if granted will be cultivated by us during the coming season.

Publications.

Monthly Progress Reports.—These appeared in the "Queensland Agricultural Journal" and other publications.

The following references to their occurrence in our "Agricultural Journal" will be useful to entomologists interested in the sugar industry:—Vol. XVIII., p. 227; Vol. XVIII., p. 392; Vol. XIX., p. 86; Vol. XIX., p. 206; Vol. XIX., p. 282; Vol. XIX., p. 371; Vol. XIX., p. 472; Vol. XX., p. 15.

Science Notes.

The following will be found in the pages of our "Queensland Agricultural Journal":—

The Influence of Chemotropism on *Lepidoderma albohirtum* Waterh., Vol. XVIII., p. 307.

Natural Enemies of Sugar Cane Beetles in Queensland. (Illustrative of Notes on Factors Limiting the Increase of Scoliid Parasites, Vol. XVIII., p. 231); 5 plates, 3 coloured; Vol. XIX., pp. 88 to 97.

On the Habits and Coloration of Queensland Rutellidæ. Vol. XIX., p. 333, one coloured plate.

Special Report. An Efficient Soil Fumigant for Cane-grubs. Vol. XVIII., p. 142.

9.—IRRIGATION EXPERIMENTS WITH SUGAR CANE AT HOME HILL STATE FARM (INKERMAN DISTRICT).

Some small irrigation experiments were carried out on this farm, which is under the management of Mr. C. G. Munro, with the consent of the Department of Agriculture.

The object was to compare (a) the Hawaiian system of frequently irrigating in the furrow itself; (b) frequent irrigation between the rows; and (c) ordinary methods of irrigating used in the Lower Burdekin district.

The following are extracts from Mr. Munro's report on the experiments:—

"Irrigation comparison experiment: Three small plots of $\frac{1}{4}$ acre each were planted with Badila on 26th August, 1922, and harvested between the 9th and 16th of September last.

"All three plots had exactly the same cultivation prior to planting, namely:—four ploughings 12 in. in depth, with two crops of cowpea ploughed in, and earth lime at the rate of 1 ton per acre distributed over the surface.

"After planting, and in accordance with instructions, half of each plot was fertilised with 'mixed manures' at the rate of 650 lb. per acre.

"No. 1 plot, after planting, was cultivated and irrigated in a manner similar to that of the average farm in the district.

"No. 2 plot was irrigated between the rows of cane at the rate of 2 in. per acre one week after planting, and thence every third week, until the crop was four months old. The quantity of water was then increased to 3 in. per acre each watering, until two months before cutting.

"No. 3 plot (Hawaiian system) was planted in deep drills, the soil from which formed a high bank between each row, and the water was let into the cane rows immediately after planting, at the rate of $\frac{1}{2}$ in. per acre, and repeated each week until the sixth week, when the quantity was increased to 1 in. per acre for four months, after which the volume was increased to 2 in. per acre each watering, up to within two months of harvesting.

"No. 1 and 2 plots were kept clear of weeds by frequent scarifying with a planet junior implement and chipping between the cane stools. No. 3 plot had no after cultivation, but hand chipping. No. 2 plot developed some 'top rot' disease early in the year, which had a decidedly bad effect on the growth of the cane, more especially on the unfertilised portion.

"The results of the abovementioned plots are as follow:—

Plot No. 1—	Tons.	cwt.
Total yield per acre	35	16
Yield per acre, fertilised portion ..	32	8
Yield per acre, unfertilised portion ..	39	4
Average c.e.s. of cane, 14.3 per cent.		

Plot No. 2—	Tons.	cwt.
Total yield per acre	28	6
Yield per acre, fertilised	32	16
Yield per acre, unfertilised	23	16
Average c.e.s. of cane, 14.1 per cent.		

Plot No. 3 (Hawaiian System)—	Tons.	cwt.
Total yield per acre	60	7
Yield per acre, fertilised	64	0
Yield per acre, unfertilised	56	14
Average c.e.s. of cane, 13.5 per cent.		

"Although the costs per acre were high on these plots it is due mainly to the fact that the areas being small, the wasted time on headlands and workmen's time coming and going was much greater than would have been the case on larger blocks, as, for instance, the cost of the experiment on No. 7 field, where the 4 acres were in one block and were worked and irrigated under normal conditions prevailing on the farm.

"*Experiment with Green Manure and Lime.*—Four acres were prepared as follows:—Four deep ploughings (10 in.) with harrowing and rolling after each ploughing. Owing to the prevailing drought during the winter of last year this area had to be irrigated before its final ploughing, and nearly all subsequent growth of cane on this area was due to irrigation. Cultivation over these plots was as uniform as possible, and each acre had similar treatment so far as after-cultivation, weeding, and irrigation were concerned.

"Ploughing operations were completed on 13th June, 1922, and harvesting was over by the 14th October of this year.

"Badila plants were used and the rows of cane were 5 ft. apart, with the plants spaced 18 in. from centre to centre.

"Tabulated results are as under:—

Plots 1 and 2, containing 2 acres, were limed and green-manured—

Total yield of cane .. 59 tons 10 cwt. 2 qr.
Average c.e.s. of cane, 15.35 per cent.

Plot No. 3, containing 1 acre green-manured, but no lime—

Total yield of cane .. 44 tons 8 cwt. 3 qr.
Average c.e.s. of cane, 14.2 per cent.

Plot No. 4, containing 1 acre, but without any green manure or lime—

Total yield of cane .. 40 tons 1 cwt. 2 qr.
Average c.e.s. of cane, 14.5 per cent."

10.—SEEDLING PROPAGATION AT SOUTH JOHNSTONE SUGAR EXPERIMENT STATION. BUD VARIATION EXPERIMENTS. VARIETIES OF CANE, ETC.

It was determined in 1921 to endeavour to raise new seedling canes at the South Johnstone Sugar Experiment Station. Previous attempts that were made at the Mackay Experiment Station over a series of years and at the Kamerunga State Nursery ended in failure. With the favourable environment at South Johnstone it was considered that success might be obtained. Accordingly, early in 1921, the Chemist in Charge was advised by the Director to commence work as soon as the arrows were sufficiently mature. Full instructions were sent, based on the experience of the Colonial Sugar Refining Company, who raised a large number of seedlings at Hambledon many years ago, and who, in 1905, kindly supplied the writer of this report with their methods.

Proper soil and boxes were prepared, and as soon as the arrows became "fluffy" they were sown separately.

Particulars regarding the seedlings raised in 1921 and 1922 have appeared in previous annual reports. In 1921, 736 seedlings were raised, and 246 in 1922. The following are reports on the 1921 and 1922 seedlings made by the Chemist in Charge, Mr. McWalters:—

PROGRESS REPORT ON 1921 AND 1922 SEEDLING VARIETIES.

The seedlings raised in 1921 were cut during March and April of this year and sets planted out. These canes had reached an age of twenty months from the time of seed propagation. The most promising canes were selected, and these represented 170 seedlings raised from the following canes:—

	Seedlings.
Badila	42
Q. 903	30
H.Q. 77	41
N.G. 16	32
E.K. 28	10
H. 109	9
N.G. 24	5
Q. 813	1

These canes have all made good strikes, and an average of 85 per cent. germinations. The seedlings from Badila, Q. 903, and N.G. 24 have made the most progress in growth.

Seedling Varieties, 1922.—These canes are now fourteen months old and represent seedlings raised from the following varieties:—N.G. 94, N.G. 102, N.G. 103, Q. 903, Q. 855, H.Q. 77, and 7 R. 428. A number of the seedlings are at present showing 2 to 4 feet of cane. The weather conditions for the season under review were more favourable for the growth of canes than the previous season, with the result that a good number of 1922 seedlings on the nursery will be in a fit stage from which to obtain sets to plant out this summer.

SEEDLING WORK, 1923.

A commencement was made in the raising of seedlings in the second week of July, 1923. Arrows were collected from the following canes:—Q. 903, N.G. 16, N.G. 102, N.G. 94, Badila, E.K. 28, and N.G. 103. Very few

germinations were obtained, and the young shoots were only noticeable after twelve to fourteen days from time of planting seed. The following results were obtained from the first planting:—

Q. 903	10 germinations
N.G. 16	Nil
N.G. 102	Nil
N.G. 94	35 germinations
Badila	Nil
E.K. 28	2 germinations
N.G. 103	Nil

A further lot of seed was planted out on the 1st and 3rd of August, and a few germinations took place in seven to eight days. The following germinations resulted:—

Box 6	E.K. 28	29 germinations
Box 8	Q. 903	Nil (in one box)
Box 10	Q. 903	200 germinations
Box 22	Q. 855	No germinations
Box 23	Q. 855	" "
Box 4	N.G. 16	" "
Box 24	Badila	" "
Box 2	Badila	" "

Plantings were continued from the 17th to 28th August, with the following result:—

N.G. 94	10 germinations
N.G. 103	12 "
Q. 903	3 "
Badila	Nil
N.G. 24	9 "
E.K. 28	4 "
B. 4596	5 "
H.Q. 77	25 "

With the exception of plantings from Q. 903, germinations on the whole were very unsatisfactory this year. A rich scrub soil—sterilised—was used for propagation.

BUD VARIATION AND SPORT PLANTINGS —SEASON 1923.

Canes showing distinct sports were collected and planted out. Single buds were cut out, also sets from each cane of two and three eye plants were selected and planted out. All the sets were soaked for a short period in Bordeaux Mixture.

The cane Q. 903 was included in the experiment, owing to this cane exhibiting in some cases changes in stooling out and a development of more erect canes, often showing double eyes, and in some instances a faint green stripe passing through the length of the internode.

The following canes were planted out on the 30th July, but, owing to the dry period that followed, germinations were limited, particularly so in the case of single bud plantings:—

- No. 1 Striped Singapore—Showing tendency to revert to original stock "Rose Bamboo"; lower half of stalk only showing stripe.
- No. 2 Meera Variation—Cane of similar appearance to Striped Singapore.
- No. 3 Q. 813 Variation—Cane showing narrow green streak, but otherwise identical to stock.
- No. 4 Q. 855 Variation—Cane showing green stripes—"appearance of Tama" stalks found. These appear not so prone to arrow as original stock.
- No. 5 Ginger Variation—Heavy green cane, somewhat descriptive of N.G. 24B.
- No. 6 Q. 116 Sport Variation—Stout, erect, red to purple coloured cane—similar to original stock.
- No. 7 H.Q. 426 Variation—Heavy, sound, stool of canes, showing fairly broad stripe.

The following results in germinations were obtained:—

No. 1—*Striped Singapore*—

- 1 bud, planted 30th July—Germination failed.
 1 bud, planted 30th July—Germination failed.
 3-eye set, planted 30th July—Germination 5th September.
 Single bud, planted 30th July—Germination 4th September.
 Single bud, planted 30th July—Germination failed.
 Single bud, planted 30th July—Germination failed.
 3-eye set, planted 30th July—Germination 3rd September.
 3-eye set, planted 30th July—Germination 27th August.
 2-eye set, planted 30th July—Germination 5th September.
 2-eye set, planted 30th July—Germination 6th September.

No. 2—*Meera Variation*—

- 3-eye set, planted 30th July—Germination 19th August.
 3-eye set, planted 30th July—Germination 20th August.
 3-eye set, planted 30th July—Germination 1st September.
 Single bud, planted 30th July—Germination 3rd September.
 Single bud, planted 30th July—Germination 19th August.
 Single bud, planted 30th July—Germination failed.

No. 3—*Q. 813 Variation*—

- 2-eye set, planted 30th July—Germination 23rd August.
 2-eye set, planted 30th July—Germination 22nd August.
 2-eye set, planted 30th July—Germination 18th August.
 2-eye set, planted 11th September—Germination 29th September.
 2-eye set, planted 11th September—Germination 29th September.

No. 4—*Q. 855 Variation*—

- 2-eye set, planted 30th July—Germination 14th August.

- 2-eye set, planted 30th July—Germination 12th August.
 2-eye set, planted 30th July—Germination 11th August.
 Single bud, planted 30th July—Germination 12th August.
 Single bud, planted 30th July—Germination 19th August.
 Single bud, planted 30th July—Germination 19th August.

No. 5—*Gingor Variation*—

- 3-eye set, planted 30th July—Germination 14th August.
 3-eye set, planted 30th July—Germination 22nd August.
 3-eye set, planted 30th July—Germination 14th August.
 Single bud, planted 30th July—Germination 24th August.
 Single bud, planted 30th July—Germination failed.
 Single bud, planted 30th July—Germination 24th August.

No. 6—*Q. 116 Variation*—

- 3-eye set, planted 30th July—Germination 5th September.
 3-eye set, planted 30th July—Germination 6th September.
 3-eye set, planted 30th July—Germination 1st September.
 Single bud, planted 30th July—Germination 3rd September.
 Single bud, planted 30th July—Germination failed.
 Single bud, planted 30th July—Germination 3rd September.

No. 7—*H.Q. 426 Variation*—

- 3 (3-eye sets), planted 30th September—Germination 26th September.

VARIETIES OF CANE.

The following table gives the varieties of cane which have been distributed from the Sugar Experiment Station, together with their commercial cane sugar contents taken at the best time of year:—

Canes Distributed from the Sugar Experiment Stations.

Name or Number of Variety.	Commercial Cane Sugar.	Name or Number of Variety	Commercial Cane Sugar.
New Guinea 15 (Badila)	18-85	Queensland 1098	15-6
" 16	15-10	" 1121	15-1
" 22	16-00	" 1133	13-5
" 24 (Goru)	16-40	Badila Seedling	17-2
" 24A (Striped Goru)	15-81	Hybrid No. 1	16-1
" 24B (Green Goru)	15-70	New Guinea 81	14-9
" 40	14-00	" 83	15-0
" 38	13-62	" 88	13-5
" 47	13-90	" 89	14-7
" 48	14-00	" 103	15-1
" 54	14-93	" 130	13-0
Malagache	15-00	Shahjahanpur No. 10	15-0
B. 147	17-20	Tableland Badila	18-0
B. 208	18-50	" Goru	16-0
Q. 116	14-50	" Rose Bamboo	15-5
H.Q. 5	13-50	" Striped Singapore	15-3
" 10	15-00	" Meera	14-5
" 77	14-30	Mauritius 168 ⁴	16-3
" 114	14-00	Petite Senneville	14-0
" 222	14-00	7 R. 428	13-9
" 285	15-16	H. 109	15-0
" 426	18-00	H. 146	15-5
" 458	13-80	H. 227	14-7
Mauritius 55	13-50	Java E.K. 1	16-5
" 87	14-00	" E.K. 2	15-7
" 89	13-00	" E.K. 28	16-7
Queensland 135	15-00	" 247	15-4
" 695	13-80	" 100 Bont	13-5
" 855	15-00	Mossman No. 1	15-8
" 812A	15-00	Gingor	16-2
" 813	16-70	D. 1457	15-6
" 903	16-0	Q. 116 Sport	14-5
" 970	16-2	1900 Seedling	16-0
" 1001	14-5	D. 1135	14-5
" 1092	14-0	Gingila	14-8

New varieties introduced during 1923:—

(a) From India—

1. Sahranpur Black.
2. Co 210.
3. Co 213.
4. Co 227.
5. Co 239.

Luzon 1 (failed).

Luzon 2.

Luzon 3.

Luzon 4.

H. 27.

Yellow Caledonia.

(b) From the Philippine Islands. (Repeat consign-
ment of a previous shipment)—Particulars and analyses of different
varieties:—Analyses of Cane from Crees Bros.' Nursery, Booroondara Farm, Mossman. Plant Cane, Twelve Months Old.
August 15th, 1923.

Variety.	Length of Stick.	Weight (lb.)	° Brix.	% C.S.	Q. Purity.	% C.C.S.	Lb. C.C.S. in Stick.	Tons Cane per ton 94 N.T.
	ft. in.							
N.G. 15	5 3	6.0	22.37	21.06	94.14	16.70	1.002	6.65
N.G. 241	6 0	3.5	22.90	21.35	92.79	16.70	.5845	6.65
N.G. 190	7 3	5.5	22.60	21.02	93.00	16.57	.9113	6.69
Q. 903	7 0	5.0	21.37	19.50	91.24	15.20	.760	7.30
E.K. 28	9 0	6.75	20.70	19.08	92.10	14.97	1.0105	7.42
B. 147	12 0	7.0	19.70	17.35	88.10	13.23	.9261	8.39
H.Q. 458	10 0	10.0	18.87	16.79	88.97	12.88	1.288	8.62
H. 109	10 0	6.0	17.87	15.77	88.24	12.03	.7218	9.23
E.K. 1	12 3	8.0	17.50	15.31	87.40	11.63	.9304	9.54
M.Q. 1	6 6	6.5	19.30	15.76	81.66	11.40	.7410	9.74

In each case the fibre has been taken at 12.0 per cent. and the tons cane per ton 94 N.T. is worked on a basis of 90 co-efficient of work.

Analyses supplied by Mr. F. C. Curlewis, of Haubledon, as to variety Java E.K. 28 compared with Badila:—

Details of Variety Tests—

Cane planted—3rd May, 1922.

Tested—13th July, 1923.

Variety.	No. of Sticks.	Average Length.	Average Weight.	C.C.S.
E. K. 28	4	6 ft.	8 lbs.	15.1
Badila	3	5 ft. 8 in.	6 lbs.	15.1

Badila was not arrowed; E.K. 28 had arrowed about a month previously.

Particulars of Experiment Plot at Brooloo, Supplied by Mr. Thomas Bath.

Planted about the middle of August, 1922—

	Length of Cane Stick.	Stooler.	Trashes.	Stands Dry Spell.	Stands Cold.
H. 227	4 feet	Good	Fair	Well	Well.
E. K. 1	3 to 4 feet	Poor	Poor	Developed a black smut	Moderate.
Q. 970	5 feet	Fair	Fair	Well	Fair.
Shahjahanpur No. 10	5 feet	Very good	Poor	Very good	Splendid.
Q. 1,098	5½ feet	Good	Good	Good	Very fair.
*Q. 813	6 feet	Very good	Very good	Well	Well.
†E.K. 28	4 feet	Good	Good	Good	Moderate
‡H. 146	6 feet	Very fair	Good	Good	Very good indeed
H.Q. 285	5 feet	Good	Good	Fair	Good
§D. 1135	6 feet	Very good	Very fair	Very fair	Good

* Q. 813 has stoolled out well, has good stout sticks, and has stood the frost remarkably well—I think as well as the D. 1135.

† This cane has developed a lodging habit, and I think would get damaged with horse work.

‡ I notice that this cane has stood the frost well. It has showed good growth. Habit erect with me.

§ This cane appears to be well clad with trash, but, despite same, the Q. 813 and H. 146 have stood the frost just as well, in my opinion.

The above cane has been well cared for in keeping it clean, hardly ever a weed appearing, and at present looks a picture. I intend to plant all the available sets I can get from this plot. A little later a sample from each row will be forwarded to the Bundaberg Experiment Station.

11.—LIME, GREEN MANURES, AND FERTILISERS.

Lime is still sold at too high a price to enable canegrowers to apply this remedial agent to their soils in sufficient quantities.

With respect to green manures, the use of this crop is very small. Unfortunately, this season seed has been exceedingly difficult to procure, and the price has been correspondingly high. As shown on a previous page, only a small proportion of growers use green manure, while, as

a matter of necessity, they should practically all sow this crop as a means of rotation, restoring humus and adding to the nitrogen content of the soil.

Fertilisers are beginning to get somewhat more reasonable in price, and a great improvement has taken place in their use recently, more particularly in North Queensland.

12.—ECONOMICS OF THE INDUSTRY.

If the estimate of 260,000 tons of raw sugar for Queensland is realised, the crop should be of the value of £7,020,000 to this State.

The second highest yield of sugar in Queensland was produced last year, viz., 287,780 tons, the record output being 307,714 tons in the year 1917. Although the yield of sugar was so good in 1922, it was the result of the greatly increased acreage of cane planted as the outcome of the 1920 agreement between the Federal and State Governments and the high sugar content in the cane, rather than of an increased yield of cane per acre, as climatic conditions generally were unfavourable to a maximum crop. During the wet season period—January to April—1922, the usual volume of rain did not fall, the Southern rainfall being particularly low. Good rains were experienced in June and July, which considerably improved the crop for the time being, but the remainder of the year, unfortunately, proved very dry. The 1922 season was the last one covered by the agreement whereby the price of raw sugar was fixed at £30 6s. 8d.

Under this agreement the sugar industry progressed very considerably. At the commencement of the three-year period there was a feeling of security in knowing that the industry was not to be interfered with for that time. As pointed out in last year's report, this led to the bringing of new areas under cane, the opening up of new districts, and the increasing of the capacity and efficiency of nearly every sugar-mill. The yield of sugar in 1921 and 1922 overtook the consumption and conclusively proved what could be done if stability were afforded to the industry.

The total acreage under cane in 1922 was estimated by the Government Statistician to be 202,303 acres—the greatest area ever put under

this crop, being an increase of 39,584 acres above that of 1920 and 17,690 above that of 1921. Of this area 140,850 acres were crushed, this being also the largest area of cane ever cut, exceeding by 17,894 the acreage cut in 1921.

The balance of 61,353 acres not cut during the 1922 season included cane allowed to stand over till 1923, cane cut for plants, and cane planted for 1923. The average yield of cane per acre, due to the drought, was not so good as in the previous year, being only 15.39 tons, as against a yield of 18.60 tons in 1921. The total tonnage of cane harvested was 2,167,990 tons, a decrease on the previous year's figures. The yield of sugar per acre was 2.04 tons per acre, also lower than the yield of 1921.

It is pleasing to note that, due to the activities of the Bureau of Sugar Experiment Stations and the Cane Prices Board creating a demand for better varieties of cane, and also due to the higher efficiency in our raw sugar-mills, the tons of cane taken to make 1 ton of sugar has improved considerably in recent years, but the year 1922 saw the lowest figure yet obtained in this respect, viz., 7.53 tons of cane to 1 ton of sugar. This was, however, partly owing to the drier season producing a higher density cane in the wetter areas, such as Babinda and Innisfail.

The return of molasses manufactured is given as 10,318,879 gallons, made up as follows:—

	Gallons.
Sold to distillers	1,671,484
Burnt as fuel	2,539,142
Used or sold for feed	1,916,393
Sold for other purposes	102,740
In stock	803,050
Used for manure	322,113
Run to waste	2,963,957
	10,318,879

13.—BALANCE SHEET OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

"THE SUGAR EXPERIMENT STATIONS ACT OF 1900."

For the past three years a levy of 1d. per ton of cane crushed has been made. As this Fund was in credit at the 30th June £21,979 19s. 1d., the levy for the forthcoming season has been reduced to $\frac{1}{2}$ d. per ton.

Hereunder is a statement of the receipts and payments for the financial year 1922-23 :—

SUGAR FUND, 1922-23.

RECEIPTS.				PAYMENTS.							
	£	s.	d.	£	s.	d.	£	s.	d.		
To Balance, 1st July, 1922				11,648	6	11	By Salaries	3,221	6	8	
" Assessments	9,503	5	3				" Wages, Travelling Expenses, &c.	1,350	17	1	
" Endowment	9,503	5	3				" Subsidy, destruction cane grub	1,855	19	2	
" Fine	2	12	0				" Contingencies—				
" Sundries	18	15	8				Bundaberg S.E.S.	911	5	0	
" S.E.S. Bundaberg	1,138	11	9				Mackay S.E.S.	1,573	18	4	
" S.E.S. Mackay	814	1	0				Gordonvale S.E.S.	1,114	10	1	
" S.E.S. South Johnstone	1,129	5	0				Johnstone S.E.S.	1,750	7	5	
				22,109	15	11					
							" Balance, 30th June, 1923		11,778	3	9
									21,979	19	1
				£33,758	2	10			£33,758	2	10

14.—GENERAL.

FOREIGN SETTLEMENT.

Considerable interest has been aroused by the influx of Italians and other foreigners to certain Queensland sugar districts, and exaggerated statements in this connection are not uncommon. For the purpose of obtaining reliable figures, the various mills from Mossman district to the Herbert River district were asked to furnish figures, and this information was most courteously supplied. The proportions of non-British farmers and cane-cutters in these districts are as under :—

MOSSMAN.			
British Farmers	98	British Cane-cutters	120
Non-British Farmers	13	Non-British Cane-cutters	40
CAIRNS.			
(a) <i>Hambleton</i> —			
British Farmers	113	British Cane-cutters	149
Non-British Farmers	25	Non-British Cane-cutters	85
(b) <i>Mulgrave</i> —			
British Farmers	125	British Cane-cutters	110
Non-British Farmers	15	Non-British Cane-cutters	95
(c) <i>Babinda</i> —			
British Farmers	132	British Cane-cutters	67
Non-British Farmers	40	Non-British Cane-cutters	176
JOHNSTONE RIVER.			
(a) <i>Goondi</i> —			
British Farmers	120	British Cane-cutters	20
Non-British Farmers	22	Non-British Cane-cutters	215
(b) <i>South Johnstone</i> —			
British Farmers	182	British Cane-cutters	171
Non-British Farmers	107	Non-British Cane-cutters	69
(c) <i>Mowilyan</i> —			
British Farmers	23	British Cane-cutters	14
Non-British Farmers	78	Non-British Cane-cutters	186
HERBERT RIVER.			
(a) <i>Victoria</i> —			
British Farmers	131	British Cane-cutters	27
Non-British Farmers	81	Non-British Cane-cutters	137
(b) <i>Macknade</i> —			
British Farmers	57	British Cane-cutters	9
Non-British Farmers	101	Non-British Cane-cutters	266

It will be observed that the bulk of non-British settlement is on the Herbert River and Mourilyan. The further north one goes from these centres the less is the foreign cane-farmer

in evidence. No figures were collected from the mills south of the Herbert, as foreign settlement in these districts is negligible.

The total number of non-British farmers given in the above returns is 482. As the entire number of sugar-farmers in Queensland is now estimated to be 4,900, the percentage of foreign farmers engaged in sugar-growing is less than 10 per cent.

DISEASE IN CANE.

Mosaic disease has been observed both at the South Johnstone and Bundaberg Sugar Experiment Stations for the first time this year. All varieties showing this affection are being discarded.

At Bundaberg, Mr. Pringle remarks with regard to Mosaic disease that "it does not seem to be confined to sugar-cane, since on carefully examining a clump of yellowish coloured Rhodes grass, it was found to be affected with Mosaic. The grass was growing on this station."

The following paragraph in this connection is also of interest :—

MOSAIC DISEASE IN JAMAICA.

The eradication of Mosaic disease is giving the planters some thought, writes the Kingston (Jamaica) correspondent of the "Louisiana Planter." The disease is said to have got established in the island during the war, when, due to shortage in exports, we planted corn between the cane. It was found (by the Government Microbiologist's report) that "the planting of corn in or near the cane results in a more rapid spread of the disease." "In consequence of these facts an order is being framed to prevent the growing of corn on sugar estates and in sugar cultivations." Of course, this will prove a hardship to the small cane farmer, who usually plants a plot of corn near his cane-field. The microbiologist also found that the spread of this disease was more rapid in areas having a heavy rainfall.

“COMMERCIAL CANE SUGAR.”

The expression “commercial cane sugar” is one that has been adopted by the Queensland Cane Prices Board, and is calculated as follows:—

$$\text{Total soluble solids in juice} \times \frac{100 - (3 + \text{Fibre})}{100}$$

= total soluble solids in cane.

$$\text{Sucrose in juice} \times \frac{100 - (5 + \text{Fibre})}{100}$$

= sucrose in cane.

$$\text{Total soluble solids in cane} - \text{sucrose in cane}$$

= impurities in cane.

$$\text{Sucrose in cane} - \frac{\text{Impurities in cane}}{2}$$

= commercial cane sugar.

The thanks of the Bureau are due to the various cane farmers' associations, the presidents

and secretaries, also to the managers and officers of the various sugar mills, for their courtesy and attention, and for their willingness to assist the work of the Bureau in every way possible.

The metropolitan and country Press are of great service to the Bureau in the dissemination of general information and reports, while the “Australian Sugar Journal” and “The Producers' Review” afford a good deal of space for the work of the Sugar Experiment Stations.

The Bureau is also indebted to the Government Printer for the care taken in printing technical bulletins and reports.

H. T. EASTERBY,
Director.

Brisbane, 15th December, 1923.

Price 1s. 6d.]

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