1948.

QUEENSLAND

FORTY-EIGHTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

REPORT OF THE DIRECTOR

TO

THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK

(*As required by "The Sugar Experiment Stations Acts, 1900 to 1947"*).

BRISBANE:
BY AUTHORITY: A. H. TUCKER, GOVERNMENT PRINTER.

A 47—1948.

FORTY-EIGHTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

Dear Sir,—I have the honour to present the Forty-Eighth Annual Report of the Bureau of Sugar Experiment Stations, covering the period from 1st July, 1947, to 30th June, 1948. As has occurred in the last several years, submission has been delayed pending the receipt of the final sugar figures for the 1947 season. Through shipping difficulties in the transport of the raw sugar to the refineries, the final return for one mill was not available at the date of this report.

NORMAN J. KING, Director.

8th October, 1948.

Director's Report.

General.

The period 1st July, 1947, to 30th June, 1948, showed little, if any, improvement on the previous year in matters of supply. Many of the larger mills in the State had planned extensive alterations and overhauls after the war period, during which most industrial plant had suffered deterioration. A general shortage of most materials has continued to hold up these major works and the increasing restrictions on imports from dollar countries has accentuated the difficulty. Although a considerable proportion of sugar-mill machinery and equipment is manufactured in Australia the magnitude of the demand, and the inadequate coal supplies have combined to create a steel shortage which is preventing the extensive alterations planned. Sugar industry labour has, however, been much more plentiful for the start of the 1948 season than for many years. For the first time since 1941 neither mills nor farms have been seriously handicapped by deficiencies of labour.

The 1948 crop, which was estimated at 5,600,000 tons of cane, is the largest since 1939 and will be the second largest on record. Good weather conditions in practically all districts and the absence of damaging floods and cyclones in the early part of the year resulted in above-average crops in all areas. Favourable growing conditions during the autumn and winter of 1948 tended to increase the estimated tonnage and it is probable that the above figure will be exceeded substantially. The season began at Goondi and Macknade mills on 19th May and all north-of-Bowen mills were in operation by the end of June. Mackay and Bundaberg mills all started crushing between 30th June and 20th July. Returns for the first two months of the season showed a marked improvement in the crushing rate as compared with the previous year; early in August the northern mills averaged 86 per cent. of normal weekly value as against approximately 50 per cent. at the same period in the previous year.

The early start of crushing operations was made necessary by the large tonnages of cane available for harvesting, but, despite this effort to deal with the crop expeditiously, some mills will probably have to crush into January, 1949. The sugar storage and shipping position is occasioning grave concern to the industry and it is feared that crushing operations may be hampered at some mills if sufficient ships are not made available regularly to clear accumulated stocks.

The season has been, climatically, a very favourable one in most areas. Favourable spring rains in all northern areas except the Burdekin gave an excellent start to the crop and good conditions continued throughout the summer and autumn. No major floods occurred and there was no cyclone damage. The Burdekin and Mackay areas did not experience the usual heavy wet season, but irrigation at the former centre and good rain distribution at the latter resulted in crops which are better than average. In the south a good spring was followed by a summer which was rather too dry, but autumn and winter rains gave sufficient late growth to ensure good harvests.

In Table I. are shown the monthly rainfall figures for the several cane-producing districts together with the number of wet days in each instance. Two methods of recording wet days have been adopted—(1) those days when precipitations of more than 1 point were recorded, and (2) those days when more than 20 points were recorded. The former is the meteorologists' definition of a wet day, whilst the latter has been included in an attempt to determine the periods when weather conditions may have influenced operations. It is realised, of course, that the direct influence of 20 points, or more, of rain will vary considerably, depending, *inter alia*, on the actual time of the day that the rain falls and the general weather over the immediately preceding days.

TABLE 1.—RAINFALLS IN CHIEF CENTRES OF PRODUCTION DURING PERIOD JULY, 1947, TO JUNE, 1948, INCLUSIVELY.

(Showing Rainfall (in Points), Number of Wet Days and Number of Days on which 20, or More, Points were Recorded, Monthly, for each 6-Month Period and for the Whole 12-Month Period).

Centre.	July.			August.			September.			October.			November.			December.			Period: 6 Months.			January.			February.			March.			April.			May.			June.			Period: 6 Months.			Period: 12 Months.			Average Annual Rainfalls.
	Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		
		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		
Mossman	173	6	3	528	12	4	521	10	3	274	9	4	465	6	3	321	9	4	2,282	52	21	2,350	19	15	1,427	18	11	1,211	17	8	508	13	6	97	7	1	323	12	4	8,198	86	45	19,480	138	66	9,276
Cairns ..	140	8	4	494	14	6	292	9	4	244	7	4	531	9	7	155	12	3	1,856	57	28	2,708	21	18	964	19	11	1,238	18	11	417	15	5	210	10	4	402	15	6	5,930	98	55	7,786	155	83	8,875
Babinda ..	231	7	6	1,285	12	10	639	9	8	285	9	5	226	5	4	106	7	1	2,772	49	34	4,019	16	14	1,550	12	10	3,438	13	8	1,278	13	11	509	7	6	1,065	12	10	11,859	73	59	14,631	122	93	16,617
Innisfail ..	284	11	4	939	15	10	743	14	7	324	7	5	555	8	7	261	11	5	3,106	66	38	4,458	19	16	1,428	19	12	1,884	16	10	1,066	14	11	345	9	7	682	16	11	9,863	91	67	12,969	157	105	14,378
Tully ..	668	12	7	1,799	10	9	1,195	12	8	433	9	5	337	4	4	300	7	4	4,732	54	37	5,295	15	13	1,738	14	12	1,789	8	9	1,998	12	12	596	10	8	1,562	11	10	12,978	70	65	17,710	124	112	18,071
Ingham ..	79	6	1	141	9	2	309	8	2	66	7	1	319	5	3	112	5	2	1,026	40	11	1,706	13	11	794	20	13	1,108	11	9	355	11	8	88	5	2	312	7	6	4,363	67	49	5,389	107	60	7,992
Giru ..	0	..	..	135	3	2	264	3	3	0	..	..	678	5	5	221	3	2	1,298	14	12	823	10	9	545	6	4	204	7	3	320	2	2	21	1	1	0	..	..	1,913	26	19	3,211	40	31	4,596
Ayr ..	0	..	..	93	4	3	249	6	2	11	1	..	287	4	3	237	4	3	877	19	11	414	6	6	565	10	5	389	9	3	103	2	2	121	2	1	26	1	1	1,618	30	18	2,495	49	29	4,154
Proserpine	63	3	2	210	10	4	426	8	4	110	5	3	307	10	5	137	4	2	1,253	40	20	1,178	14	8	1,784	18	7	592	16	9	587	11	5	91	3	2	243	12	6	4,475	74	37	5,728	114	57	7,151
Mackay ..	18	3	..	158	5	2	126	10	2	92	3	1	270	5	3	313	7	4	977	33	12	624	12	6	1,048	15	9	310	20	7	256	8	1	89	4	2	254	13	6	2,581	72	31	3,558	105	43	6,691
Sarina ..	44	4	2	188	3	2	147	8	3	134	6	2	481	9	3	63	5	2	1,057	35	14	808	12	7	1,537	13	8	626	11	9	256	2	2	74	3	2	152	7	4	3,453	48	32	4,510	83	46	6,989
Bundaberg	22	1	1	147	7	3	556	12	4	122	4	2	766	15	8	807	12	7	2,420	51	25	294	11	2	487	9	5	509	18	6	528	9	3	813	6	2	467	6	1	3,098	59	19	5,518	110	44	4,347
Childers ..	22	2	1	211	9	3	485	8	3	131	5	3	655	13	8	428	14	5	1,932	51	23	213	8	3	325	10	3	914	17	9	365	12	2	685	6	3	544	10	1	3,046	57	21	4,978	108	44	4,178
Maryborough	25	1	1	130	10	3	457	11	3	146	7	4	498	14	7	393	11	6	1,649	54	24	356	13	5	477	11	4	829	13	7	481	10	6	736	8	4	523	10	4	3,402	65	30	5,051	119	54	4,563
Nambour	87	2	1	143	9	4	507	11	7	194	9	3	773	13	10	661	14	8	2,365	58	33	554	11	8	533	14	7	1,417	15	9	832	12	8	786	7	3	586	10	4	4,708	69	39	7,073	127	72	6,416
Beenleigh	53	1	1	58	3	2	255	9	4	273	9	6	285	7	5	1,033	15	9	1,957	44	27	325	6	4	217	9	6	793	9	8	467	9	5	719	4	4	1,261	8	7	3,782	45	34	5,739	89	61	4,749

Wet Days: Columns "A"—Total Days on which Rainfalls were recorded. Columns "B"—Total Days on which 20, or more, points of rain were recorded.

Estimate of the 1948 Crop.

The preliminary estimate of the 1948 crop, made in May, revealed that some 5,600,000 tons of cane would be available for crushing, and it was calculated that there would be manufactured therefrom approximately 800,000 tons of 94 net titre sugar, which is equivalent to 780,000 tons of bagged raw sugar. This figure, if attained, will constitute the second largest production on record, being second only to the tonnage manufactured in 1939. The area available for harvest was estimated at 264,000 acres.

A good season has been experienced in all areas except the Burdekin and Mackay districts. These localities experienced a sub-normal wet season, but good crops were grown in the Burdekin by constant attention to irrigation, and the Central District, despite some dry spells, produced an excellent crop. Since the May estimate very good rains have been recorded on two occasions in the southern areas and it would appear that estimates will increase in those districts. There is also a tendency to increase the estimated cane tonnage in some of the northern mill areas so that any unpredicted frost damage in parts of the south should be more than offset by late growth in other localities.

In addition it is estimated that the New South Wales mills will crush some 291,000 tons of cane, from which approximately 34,200 tons of bagged sugar may be expected. The estimated total Australian production for 1948 may therefore be placed at 846,000 tons of 94 n.t.

A perusal of the estimates given in Table II. will indicate that compared with the actual tonnages crushed in 1947 season the estimated figures for 1948 show considerable increase in all districts except the Burdekin, where anticipated production is not greatly in excess of the 1947 figure.

TABLE II.—SUGAR CANE HARVESTED, 1947—ESTIMATED, 1948.

Domestic Crushing.	Actual Crushing.			Estimates 1948.
	Purchased.	Condemned.		
138,444	138,444	58	Mossman	150,000
133,754	133,754	..	Hambledon	240,000
185,460	185,514	..	Mulgrave	275,000
253,041	252,987	..	Babinda	240,800
174,871	174,871	..	Goondi	196,000
216,254	216,254	44	South Johnstone	259,800
147,825	147,825	..	Mourilyan	180,000
221,675	221,675	..	Tully	240,000
207,290	204,962	3	Victoria	276,000
197,523	199,851	15	Macknade	280,000
1,876,137	1,876,137	120	District Totals	2,337,600
66,133	66,133	..	Invicta	124,000
193,877	193,701	..	Pioneer	192,000
209,124	209,124	..	Kalamia	217,000
265,078	265,254	6	Inkerman	266,000
734,212	734,212	6	District Totals	799,000
69,344	69,344	..	Proserpine	180,000
43,977	43,977	..	Cattle Creek	80,000
101,330	101,313	..	Racecourse	180,000
104,335	104,335	..	Farleigh	180,000
51,296	51,198	..	North Eton	100,000
82,590	82,265	..	Marian	200,000
112,448	112,888	..	Pleystowe	190,000
80,836	80,836	..	Plane Creek	190,000
646,156	646,156	..	District Totals	1,300,000
72,183	70,724	34	Qunaba	94,000
144,399	144,374	109	Millaquin	200,000
153,716	153,692	53	Bingera	220,000
157,870	159,378	1,110	Fairymead	205,000
39,550	39,550	5	Gin Gin	48,000
111,282	111,351	12	Isis	170,000
44,894	44,894	11	Maryborough	59,000
30,455	30,386	..	Mount Bauple	35,000
124,740	124,740	6	Moreton	115,000
15,393	15,393	5	Rocky Point	14,000
894,482	894,482	1,345	District Totals	1,160,000
4,150,987	4,150,987	1,471	State Totals	5,596,600

1947 Crop Statistics.

The total tonnage crushed during the 1947 season was 4,150,987 tons (excluding cane below 7 c.c.s. and therefore condemned). This figure was a distinct improvement on the previous year, when the crop amounted to only 3,714,475 tons but was still considerably below average production for the State. Many mills experienced short seasons and the only ones to exceed their peak allocation of sugar were Pioneer, Inkerman, Kalamia, and Moreton. The harvesting season started on 11th June at Inkerman and finished at Tully on 20th January, 1948. Altogether six mills crushed after 31st December, the longest seasons being at Tully 29½ weeks, Inkerman and South Johnstone 28 weeks, and Babinda 27 weeks. The seven Mackay mills crushed only for from ten to fourteen weeks.

A certain amount of condemned cane—i.e., cane below 7.0 c.c.s.—was delivered to some mills and this figure is shown in Table II. Such cane is generally crushed before it is known that it is below the minimum sugar content allowed, but this tonnage is deducted from the figures used for calculation of mill performance. As explained in last year's report, it was decided that it would not be correct to include the condemned cane and credit it with the average sugar content of all the cane purchased by analysis.

The yield of sugar in the 1947 season, which includes 191 tons for local sales, was 571,658 tons at 94 net titre.

This represents an increase of 59,572 tons on that of the 1946 season but is still below the 1944 and 1945 production and is less than two-thirds of the record figure of 1939. The tonnage of cane required to make one ton of 94 n.t. sugar was 7·26, which was practically the same as the previous year and is the highest since 1927. It is of interest to note that although the average ratio for the State was, to all intents and purposes, unchanged when compared with the previous year a distinct improvement was recorded in the central and southern district figures and a deterioration in the Northern district. This was, in the latter case, due to the unusually low average c.c.s. in that district.

The seasonal effects are best illustrated by the district production data in Table III. Both north and south of Townsville districts show an increase over 1946, the deficiency caused by the drought in Mackay being more than offset by the favourable southern crop.

TABLE III.—SUGAR PRODUCTION, 1943–1947 (tons 94 n.t.).

District.	1943.	1944.	1945.	1946.	1947.
	Tons.	Tons.	Tons.	Tons.	Tons.
North of Townsville	206,634	259,573	282,034	233,732	255,958
South of Townsville	279,813	383,967	362,627	278,354	315,700
Totals	486,447	643,540	644,661	512,086	571,658

The severe drought in the central districts was responsible for a further reduction in the acreage harvested for milling. The figure of 220,649 acres was 7,746 below that of 1946 and 45,089 acres below the record of 1940. A further 15,119 acres were harvested for plants throughout the State. The distribution between plant, ratoon and standover cane of the total area harvested for milling was as follows:—

District.	Plant.		Ratoons.		Standover.		Total.
	Acres.	Per Cent.	Acres.	Per Cent.	Acres.	Per Cent.	Acres.
Northern	35,589	38·2	57,421	61·7	131	0·1	93,141
Burdekin	17,271	68·4	7,936	31·5	33	0·1	25,240
Mackay	29,477	49·5	29,973	50·3	90	0·2	59,540
Southern	16,678	39·0	20,264	47·4	5,786	13·6	42,728
Totals	99,015	44·9	115,594	52·4	6,040	2·7	220,649

The cane harvested for milling was produced at the rates of 18.81 and 2.59 tons of cane and sugar per acre respectively, these figures being an improvement on the 16.26 and 2.24 of the previous year. The sugar-per-acre figure is quite favourable when the Central District figure of 1.59 is considered. As is usual, the Lower Burdekin area put up the best performance in tonnage of both cane and sugar per acre. The average yields of cane and sugar per acre, together with the tonnage crushed in the various districts, are set out in Table IV.

TABLE IV.—TOTAL AND AVERAGE YIELDS BY DISTRICTS, 1947 (DOMESTIC CRUSHING).

District.	Tons Cane Crushed.	Tons Cane per Acre.	Tons 94 n.t. Sugar per Acre.
Mossman-Ingham	1,876,137	20·14	2·75
Lower Burdekin	734,212	29·09	4·45
Proserpine	69,344	9·09	1·32
Mackay	576,812	11·11	1·59
Bundaberg-Gin Gin	567,718	21·27	2·58
Childers-Maryborough	186,631	17·24	2·22
Nambour-Beenleigh	140,133	26·86	3·42
State Totals and Averages	4,150,987	18·81	2·59

In Table V. the production data for the ten-year period 1938-1947 are set out. Despite the lower acreage harvested for milling all figures show an improvement on the previous season.

TABLE V.—ACRES CULTIVATED AND HARVESTED, YIELDS OF CANE AND SUGAR, ACRE YIELDS, AND QUALITY OF CANE, 1938–1947.

Year.	Acres Cultivated. *	Acres Harvested for Milling.	Total Yields.		Yields per Acre.		Tons Cane per Ton Sugar.
			Cane.	Sugar.	Cane.	Sugar.	
			Tons.	Tons.	Tons.	Tons.	
1938	347,199	251,064	5,342,085	778,136	21·28	3·10	6·87
1939	353,996	261,047	6,038,821	891,422	23·14	3·41	6·77
1940	350,851	265,738	5,180,756	759,446	19·50	2·86	6·82
1941	334,787	246,939	4,793,589	697,345	19·41	2·82	6·87
1942	316,798	238,213	4,350,642	605,680	18·26	2·54	7·18
1943	326,478	228,895	3,397,424	486,747	14·84	2·12	6·98
1944	317,386	222,215	4,398,190	643,540	19·79	2·90	6·83
1945	326,247	239,826	4,551,982	644,661	18·98	2·69	7·06
1946	317,766	228,395	3,714,475	512,086	16·26	2·24	7·25
1947	332,516	220,649	4,150,987	571,658	18·81	2·59	7·26
True Averages, 10 Years ..	332,402	240,298	4,591,895	659,072	19·11	2·73	6·90

* Data supplied by Government Statistician.

The quantity of molasses produced, although nearly 3,000,000 gallons below that of 1946, was still high. It is pleasing to note that the amount being utilised for fertilizer is a record figure and that the amount run to waste is less than in any previous year. The quantities utilized for various purposes over the past ten years are shown in Table VI.

TABLE VI.—DETAILS OF DISPOSAL OF MOLASSES FOR THE TEN-YEAR PERIOD, 1938-1947. DATA SUPPLIED BY THE GOVERNMENT STATISTICIAN.

Method of Usage.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Distilleries	8,275,887	9,581,241	11,531,396	12,882,397	10,457,747	7,345,596	9,136,862	9,380,679	10,691,581	8,256,892
Fertilizer	3,293,543	4,295,289	3,334,372	1,510,650	1,857,300	2,122,220	2,745,617	3,074,755	2,899,167	3,558,155
Stock Feed	4,237,196	4,727,170	5,380,242	3,490,937	3,071,918	3,055,728	4,719,517	4,675,909	6,932,902	5,320,970
Mill Fuel	3,748,590	3,834,653	1,781,425	1,232,338	3,024,370	2,176,926	2,251,737	1,748,299	954,970	1,427,775
Other Purposes ..	232,049	188,889	228,450	158,821	303,240	441,522	254,358	423,085	241,045	312,930
To Waste	498,926	457,541	47,069	55,237	31,153	97,643	16,660	50,902	63,466	15,035
Total ..	20,286,191	23,084,783	22,302,954	19,330,380	18,745,728	15,239,635	19,124,751	19,353,629	21,783,131	18,891,757

Sugar Values, 1947 Season.

The Sugar Board has declared the final price for the 1947 season's sugar as follows:—

—	No. 1 Pool.			No. 2 Pool.	Total.
	Home Consumption.	Surplus.	Total.	Excess.	
Tons	476,164	78,720	554,884	16,539	571,423
Per cent.	85·8132	14·1868	100	..	..
Price	£24 0s. 0d.	£29 12s. 6d.	£24 16s. 0d.	..	£24 18s. 9d.

In addition, the values for the New South Wales production were:—

—	Home Consumption.	Surplus.	Total.
Tons	22,294	11,257	33,551
Per cent.	66·4487	33·5513	100
Price	£24 0s. 0d.	£29 12s. 6d.	£25 17s. 9d.

On the basis of these figures the value of the Queensland sugar crop was approximately £14,250,000, which is an all-time record. The total value is, of course, influenced greatly by recent increases in overseas price, and bears little relation to the actual production. The importance of the export price factor can be appreciated from the fact that the 1939 record production of 890,896 tons of 94 net titre sugar was worth just over £14,000,000.

Maffra Sugar Beet Factory.

In earlier Annual Reports of the Bureau of Sugar Experiment Stations it was customary to include the production of white sugar from the beet factory at Maffra, in Victoria. During the war period this production ceased for several years, but now efforts are being made to restore it to its pre-war scale. As a matter of interest, the following table shows the annual production of white sugar at this factory since 1920:—

Year.	Tons.	Year.	Tons.	Year.	Tons.
1930	3,457	1937	4,153	1944	689
1931	5,057	1938	5,596	1945	..
1932	5,418	1939	1,478	1946	..
1933	5,656	1940	6,220	1947	1,014
1934	5,253	1941	3,219	1948	583
1935	4,566	1942	2,754		
1936	5,042	1943	663		

The following data in respect of the Maffra Sugar Factory, Victoria, are supplied through the courtesy of the Manager:—

CROP YIELDS—1948 SEASON.

Area harvested	532 acres.	Sugar produced	583 tons
Beet purchased	6,363 tons	Price paid for beet	60s. per ton
Beet sliced	5,340 tons	Average yield beet per acre	11·9 tons
Average sugar content	16·01 per cent.	Average yield refined sugar per acre	1·09 tons

Review of the Industry.

The year through which we are passing has demonstrated in no uncertain manner the resilience of the industry and the capacity of the sugar-producing lands to return to pre-war production levels with reasonable climatic conditions. During the war years production dropped from over 6,000,000 tons of cane in 1939 to less than 3,500,000 tons in 1943, and has been climbing only gradually since that time. This serious production debacle was brought about by acute shortages of machinery, equipment, labour, and fertilizers, and the return to normal has been hampered by a continuation of many of these deficiencies, as well as by a succession of below-average seasons. The 1947-48 growth year has been a favourable one in all portions of the sugar belt except the Burdekin and Mackay, and in the former area the rainfall deficiency has been largely made good by increased attention to irrigation. Despite the lack of a wet season in the central district and a scarcity of sulphate of ammonia in all areas at the period of the year when it was required, a crop of over 5,500,000 tons of cane has been estimated as being available for harvest. Given a favourable season in all districts there is no doubt but that past record production can be exceeded in future years when the fertilizer and labour positions have returned to normal.

Sugar Removals.—Considerable concern was felt by the industry at the large amount of 1947 season's sugar still stored at mills and on wharves at the beginning of the 1948 season. It was faced with the possibility of having to cease crushing as a result of slow removals and the filling up of available storage space. The prospects for a high tonnage crushing in 1948 promised to mark the emergence of the industry from the doldrums in which it had lain becalmed for several years through factors outside its control, but this happy position was threatened by the scale of sugar shipments. The comparatively favourable field labour supply promises that the tonnage available will be harvested, but unfortunately sugar cannot be manufactured in the absence of storage space. Plans now being implemented provide for the removal of 529,000 tons of sugar from North Queensland ports between April and December, 1948, but even if the programme is fully achieved there will remain in store at the end of December approximatly 250,000 tons, easily the highest amount in the history of the industry, although the presence of 216,000 tons in stock at the end of 1947 contributed largely to this critical position.

Refined Sugar Shortages.—Shortage of refined sugar in Southern States has occurred on a few occasions. This was not the result of either sugar scarcity or insufficient refinery capacity. As in most industries, certain factors govern the continuity of maximum production and in the case of the refineries the problems which had to be faced were—(1) an irregular and inadequate supply of raw sugar as the result of lack of shipping space and slow "turn-round" of ships, (2) an insufficiency of labour in the refineries, and (3) an irregular and inadequate supply of power and fuel caused by industrial unrest on the coalfields.

Review of the Sugar Agreement.—On 17th October, 1947, an amendment of the Sugar Agreement, providing an increase in the price of 1A grade sugar from £33 4s. to £37 6s. 8d. per ton, was signed by the Prime Minister and the Premier of Queensland. The Act was assented to on 3rd December, and became effective as from 5th December, 1947. This Act restored retail sugar prices to 4½d. per lb. in all capital cities, but only a portion of the ½d. increase will be received by the industry. Of the £4 13s. 4d. per ton £1 2s. 4d. is taken up by extra allowances to wholesalers and retailers and the loss of the 10s. per ton shipping freight subsidy, which previously applied.

The effect of this increase on pool prices is dependent on the trend of export prices and the relative proportions of home consumption and export sugar in the pool. The increase applies to only a portion of the 1947 sugar output, but will be applicable to the whole of the 1948 home consumption tonnage. When the retail sugar price was reduced to 4½d. per lb. in 1923 and again to 4d. per lb. in 1933 it was only by considerable increase in efficiency that the industry was enabled to continue to supply sugar at the reduced rates. In the face of continuing sharp rises in costs the industry must again face up to the urgent necessity for improving its efficiency, as a buoyant overseas market cannot be relied upon for the maintenance of stability.

On 1st January, 1948, the base price for export sugar, under the bulk purchase arrangements with the United Kingdom Ministry of Food, was increased from £24 5s. sterling to £27 5s. sterling per ton, equivalent to £29 5s. net per ton in Australian currency after payment of freight and other charges.

Manpower and Immigration.—Mention was made in the last Annual Report of the difficult field labour position and the effect which canecutter shortage was having on mill crushing rates. The 1947 season as a whole showed no improvement in this respect over those of 1945 and 1946, the reduced daily cane supply resulting in prolongation of the season at many mills into periods of low sugar content. The weighted average weekly crushing rate

for Queensland mills was only 76 per cent. The failure of large numbers of pre-war canecutters to return to the industry and the lack of response to advertising for new recruits left immigration as the only logical source of new labour. Whereas before the war over 9,000 canecutters were required to maintain all mills in full cane supply, the maximum number of professional canecutters available in any one week during the 1947 season was 5,500. As the result of representations made by the sugar organisations to the Federal Government for some 2,200 displaced persons to be made available, negotiations were made through the International Refugee Organisation, and the Minister for Immigration announced that he would endeavour to arrange for 1,000 Balts to be allotted in time for the 1948 harvest. At the time of writing over 700 have been placed in the industry and a further 140 are to be made available for late-starting mills as required. The mill labour position is also more satisfactory this year, and for the first occasion since the outbreak of war labour shortage is not a problem of any great magnitude in the industry.

Despite this fortunate position the study of mechanisation of harvesting is proceeding. The industry committee which was formed in collaboration with the Bureau and the Commonwealth Department of Commerce and Agriculture persisted with the plans for developing cane-loading equipment. Two units of a basically new type of loader were constructed by a large agricultural implement firm and have been forwarded to North Queensland for trial under field conditions. It is felt that if a satisfactory loader could be evolved a major advance would be achieved in the cane-harvesting field.

Certain criteria of factory performance are shown in the following table. Although overall recovery shows an improvement over the previous year the coefficient of work has dropped by 1.4 units. Some pre-war average figures of efficiency are given for comparison.

	1947.	1946.	Approximate Averages 1937–1940.
Overall Recovery	84·37	82·57	87·5
Overall Recovery E.S.G.	84·04	82·24	87·1
Boiling House Efficiency	92·66	93·42	96·3
Boiling House Efficiency E.S.G.	92·34	93·05	95·9
Coefficient of Work	95·44	96·84	..
Coefficient of Work E.S.G.	90·56	91·89	..

War Service Land Settlement.—During the year under review the work of the committee appointed under "*The War Service (Sugar Industry) Land Settlement Act of* 1946" has proceeded, and the results of the preliminary investigational work are now being made evident. Of approximately 1,000 original applicants under the three categories some were eliminated by personnel classification committees on the basis of ineligibility or unsuitability, and others owing to unsuitability of land for the purpose. Provision was made for the granting of 154 assignments to landless men, 116 assignments to landholders, and 120 increased assignments. As at 30th June, 90 actual assignments have been granted to eligible persons, and, in addition, the farm peaks of 21 have been increased.

The investigation of lands in the 32 mill areas has been completed, and the final recommendations forwarded to the Central Cane Prices Board. In all, upwards of 50,000 acres of land were intensively investigated for the settlement of landless men and many thousands of acres in addition in connection with the other categories. Some few mill areas have been unable to utilise the additional 3 per cent. of sugar allowed under the Act owing to the scarcity of suitable arable land within reasonable distance of the mill.

Fertilizer.—The fertilizer position continues to provide cause for some concern. A world-wide shortage of nitrogen fertilizers prevails, and this is seriously affecting the supply of sulphate of ammonia. Strenuous efforts had to be maintained during the first half of 1948 in order to obtain delivery of the sugar industry quota, portion of which has been delivered to growers. Farmers were advised to take delivery even though it might not be required until later in the year. Hopes that an increased quantity might be available were not realised owing to the effect of the continued shortage of coal and coke on output in New South Wales and Victoria. A drastic reduction in overseas supplies accentuated the problem and the ultimate effect will probably be that we will obtain about the same quantity of sulphate of ammonia as in the corresponding period of last year. Lack of transport facilities may reduce this figure.

Authoritative opinion is that there is little possibility of a return to normal supplies of sulphate of ammonia for several years. Even with peak production in the coal industry Australia will still be faced with the importation of considerable tonnages from overseas until such time as the local industry in Tasmania reaches full-scale production.

The supply of meatworks fertilizer is still far short of demand and no alleviation of this position appears possible, since supply is related to cattle killings and the demand for meat and bone meals for stock food. On the other hand, the superphosphate position is good and supplies are quite equal to the demand.

The sound basis of potash supply has received a severe shock as a result of the international position in Palestine and Europe, and to date the position has not been clarified. It is to be hoped that the factor of potash shortage will not operate to the extent of necessitating the reintroduction of rationing.

The prevailing world conditions make the transport of fertilizer, whether from overseas or within Australia, a difficult undertaking which is fraught with many vexatious problems.

WORK OF THE BUREAU.

Several staff changes took place during the year under review. Mr. N. J. King, Senior Adviser at Bundaberg, was appointed Assistant Director in July, 1947, thus filling the position vacated by Mr. E. R. Behne when he became Director a month earlier. Later in the year Mr. Behne tendered his resignation so as to accept employment with Pioneer Sugar Mills Ltd. and Mr. King was appointed Director in May, 1948. Mr. L. G. Vallance, Chemist, was successively appointed to the positions of Senior Soils Technologist and Assistant Director, while Messrs. J. H. Nicklin and J. L. Clayton were appointed respectively Senior Technologist (Engineer) and Senior Mill Technologist. On the field staff the status of Mr. J. H. Buzacott, Entomologist, was changed to Senior Plant Breeder, and a new Entomologist, Mr. G. Wilson, was appointed in his stead. Three Advisers, Messrs. H. G. Knust, G. A. Christie, and C. G. Story, were made Senior Advisers and located at Bundaberg, Ayr, and Mackay respectively. Mr. G. Bates was transferred to Meringa and Mr. S. O. Skinner to Innisfail. Mr. J. R. Burge was appointed Cadet in the Chemical Laboratory. On the clerical side the only staff change was the replacement of Miss P. Holden at Bundaberg by Miss Searle.

Mill Technology staff did not attempt any programme of research during the 1947 season, but the opportunity was taken to train the younger staff members in general milling work. Accordingly Messrs. C. B. Venton, L. R. Brain, and B. G. Adkins spent the season at Maryborough, Pleystowe, and Racecourse respectively. During the remainder of the year detailed studies have been made on molasses exhaustion and wax extraction from filter muds and a pilot plant has been designed and manufactured for investigational studies on the latter process. Mr. J. L. Clayton proceeded to Hawaii in March, 1948, and spent three months at Hawaiian sugar mills and the laboratories of the H.S.P.A. investigating certain phases of sugar manufacture which might be of considerable value to this State.

In June, 1948, Mr. Vallance (Assistant Director) left Australia on a visit to several overseas countries to investigate methods being used to prevent soil deterioration and to obtain the benefits of overseas experience in regenerating worn-out soils. This problem has been exercising the minds of industry leaders for some years and, following Mr. Vallance's return, Bureau soil research will be focussed on the solution of the problem in the sugar-producing areas.

The Division of Soils and Agriculture, although somewhat short of extension staff, carried out a very large programme of field experimental work. Fertility surveys were completed in Mossman, Innisfail, North Eton, and South Maroochy areas and the extensive Tully survey was continued by the Tully Mill staff in collaboration with the Bureau. The results of these surveys indicate that the plant-food status of many of the soils is still low and that adequate and intelligent fertilizing is necessary to restore the plant foods depleted during the period of fertilizer shortage during the war years. The large series of lime trials laid down in 1946 began to give results during the year. Fifty-two of these trials were harvested and thirty-eight gave positive responses to lime. Although our most acid soils were selected for the trials the results demonstrate that more consideration must be given to this important soil amendment. Much effort and fertilizer are undoubtedly being wasted in attempting to grow cane on soils which are too acid in their present state.

Minor element trials again gave negative results on all soil types except the poor sandy sections at Bli Bli in the Moreton area. Here copper and zinc in combination appear to exert a beneficial influence but confirmatory work is required. In fertilizer trial work the outstanding result was the necessity for correct balance between nitrogen and potash; the use of the former without adequate supplies of the latter on soils where the potash status is low would appear to be of little value.

New legume crops received considerable attention. The outstanding success of Reeve's Selection, Q.1582, in the northern and central districts, where its resistance to "wilt" was of such a high order, justified its rapid propagation. Arrangements were made through district canegrowers organisations to have the seed stocks propagated commercially in seed-growing areas and it is hoped that marketing of this variety will begin in 1949. In all districts the velvet beans produced excellent crops under a variety of conditions and, for the south in particular, they appear to be well adapted; drought and bean-fly resistance are two of their characteristics.

Investigation work with hormone-type weedicides was continued during the 1947-48 summer months. "Methoxone," "2:4 Di-weed," "Hardy's 2:4D," "Weedone" and "Hormex" were used in several trials, but emphasis was placed on the effects of these substances on nut-grass (*Cyperus rotundus*). Some interesting results were obtained in the killing back of the nut-grass to such an extent as to give freedom from this pest in young cane for up to six weeks, but the cost of treatment made it uneconomical at present-day costs of the weedicide. A comprehensive list of weeds which are found in canefields has been prepared indicating resistance, tolerance, and susceptibility to these products.

It was mentioned in the last Annual Report that negotiations were in train for the acquirement of a property in the Lower Burdekin district for a new Experiment Station. This matter is now practically finalised and developmental work will begin in the near future. The property adjoins Pioneer Mill and is of approximately 90 acres. An adequate water supply has been located. The necessity for a Station in this important sugar-producing area for the purposes of local seedling raising and irrigation investigations has been long recognised. Some difficulty is being experienced in obtaining essential materials for inauguration of station activities and this may cause delay.

Seedling production work proceeded as usual at all stations and at the substation at Bartle Frere. Following this extension of seedling activities into localities with special environments a seedling plot was also established this year on the scrub soil of Mackay. The majority of seedling canes are specially adapted for the conditions under which they are selected, and it becomes increasingly obvious that seedling plots are desirable features of all major canegrowing areas. Selection is then possible under the local soil and climatic conditions.

The varietal composition of the crop shows that some major changes have again taken place. In 1946 Badila, Q.28, and Trojan held the first three places, in that order, but due to the drought in Mackay Q.28 has now fallen to fifth place, while Trojan has shown a slight increase. C.P.29/116 has had a phenomenal increase to 10.2 per cent. of the total crop. P.O.J. 2878 is stationary, Co. 290 has fallen to eighth place in the census, and M.1900, once a major variety, now constitutes only 1·25 per cent. of the production. Q.44 has increased to 3·5 per cent. Queensland-bred varieties now represent 41·8 per cent. of the total crop and it is confidently expected that this figure will keep increasing during the coming years.

The overall disease position gives a general degree of satisfaction, with some feeling of concern for the Southern area. In the North leaf scald still causes an amount of disquiet in relation to Trojan and Q.44, but apart from that and the chlorotic streak of the wet belt no major diseases have been reported. The Lower Burdekin and Mackay are apparently free of major ailments, but Bundaberg and Moreton present a disease problem of some magnitude. The Woongarra district in Bundaberg is the only part of the sugar belt in which downy mildew is known to exist and it is apparent that present control measures are not capable of completely eradicating it. Legislative measures prohibiting the growing of P.O.J.2878 are essential. The Fiji disease position also warrants serious consideration in the Bingera area and at Nambour. In both localities roguing combined with eradication orders do not appear to be dealing effectively with the disease and the variety is again the limiting factor. In both areas sufficient resistant varieties are now available to justify a change-over from the susceptible P.O.J. 2878.

The Mackay Q.28 "trouble" is still being investigated but to date no explanation or solution of the problem has been found. The rapid advance of Q.50, which promises to oust Q.28 as the district cane, will solve the difficulty in one way, but in the meantime the pathologists will continue to seek an explanation of the Q.28 ratoon failures.

Mercurial fungicide treatment of cane setts has given excellent results in many areas and in that section of the Inkerman area affected badly with pineapple disease the method has become a standard treatment. Investigation is still proceeding in other districts with Agrosan Ceresan, and Aretan. An unexplained feature of these mercurial compounds is the undoubted stimulus which they give to root and shoot development as distinct from the protection from fungus attack.

During the year plant distributions were made in several districts, the varieties including Trojan and Q.50 in Mackay, Q.28 in Bundaberg, Co. 301, Q.28 and Q.49 in Isis, and Q.47, Q.49 and Vesta in Moreton.

Throughout the whole sugar belt pest damage to cane crops was generally light. Whilst the previous year's drought was responsible for an appreciable reduction in insect populations, there can be no doubt that this year's favourable growing conditions had an equally profound effect, since they served to cushion the attacks of those that had managed to build up to pest proportions.

White grubs caused some heavy localised damage on a few farms in the Burdekin, whilst more extensive but lighter attacks characterised their appearance in the Mulgrave and Innisfail areas. This year was notable for the change over from the purely experimental approach to the problem of destroying grubs by means of "Gammexane" (benzene hexachloride) to the widespread adoption of this chemical as a sound practical method of dealing effectively with these most serious cane pests. In this connection, upwards of 3,000 acres of cane were dressed with "Gammexane" during the past season. Judging by results, potential losses were considerably curtailed, and a larger acreage will undoubtedly be treated during the coming season.

Equally important was the advance made in preventing wireworm damage in newly planted fields, and large-scale confirmatory trials demonstrated the value of a "Gammexane"-fertilizer mixture when applied to the drill at planting time. As far as growers farming the lower-lying soils of the central districts are concerned, this precautionary measure removes the chief element of risk in securing a full stand of cane, and they demonstrated their confidence in its effectiveness by treating several thousand acres of their 1948 plantings.

The annual Pest Board Conference was held at Cairns on 11th May. Field days were arranged at all three stations and in each case large attendances were recorded. In the aggregate over nine hundred growers attended the three field days where, following the new procedure, they were taken on a tour of the experimental blocks in small groups by members of the staff. The increasing numbers attending these functions demonstrate the growing interest in Bureau matters displayed by both growers and millers.

The Quarterly Bulletin was issued regularly and the Mill Technology Division published News Letters. The Mutual Control system functioned in full.

The Bureau levy for the 1947 season was one penny per ton of cane. During the year an amendment to the Act was made whereby the maximum levy permissible was altered from one penny to threepence. The original maximum was fixed in 1900 when cane was worth about 13s. per ton. Receipts and disbursements for the year under review and totals since the inception of the Sugar Fund in 1900 are shown in Appendix I., whilst for the benefit of readers outside the Queensland sugar industry the derivation of the C.C.S. formula is given in Appendix II.

Appendix I.

"*The Sugar Experiment Stations Acts*, 1900 *to* 1947."

SUGAR FUND.

Statement of Receipts and Disbursements from 1st July, 1947, to 30th June, 1948.

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
To Balance	23,141	9	1	By Salaries	17,600	16	7
,, Assessments	17,294	15	3	,, Contingencies	11,320	7	3
,, Endowment	7,000	0	0	,, Bundaberg Contingencies	2,665	17	8
,, Bundaberg	828	19	10	,, Mackay Contingencies	3,207	19	7
,, Mackay	1,154	13	6	,, Meringa Contingencies	3,003	18	0
,, Meringa	1,042	16	4	,, Burdekin Contingencies	1,552	1	10
,, Sundries	141	4	2	,, Balance	11,252	17	3
	£50,603	18	2		£50,603	18	2

Statement of Receipts and Disbursements from Inception of Fund, 1st December, 1900, to 30th June, 1948.

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
To Assessments	372,443	18	3	By Disbursements	700,287	18	10
,, Endowment	260,862	3	0	,, Balance	11,252	17	3
,, Sugar Experiment Stations	78,234	14	10				
	£711,540	16	1		£711,540	16	1

Appendix II.

C.C.S. FORMULA.

$$\text{C.C.S. in cane} = \text{Pol in cane} - \frac{\text{Soluble impurities in cane}}{2}$$

In practice, per cent. C.C.S. is calulcated by the empirical formula—

$$\text{C.C.S.} = \frac{3P}{2}\left(1 - \frac{5 + F}{100}\right) - \frac{B}{2}\left(1 - \frac{3 + F}{100}\right)$$

where—

P = pol in first expressed juice.
B = brix in first expressed juice.
F = fibre in cane.

Division of Soils and Agriculture.

REPORT ON SOIL TECHNOLOGY.

(By L. G. VALLANCE, Assistant Director.)

Analytical Work.

The following is a summary of the analytical work performed at the Brisbane Laboratory for the period 1st July, 1947, to 30th June, 1948:—

Soils.	No. of Samples.
Soil fertility surveys	221
Farmers' samples	238
Fertilizer trials	73
Lime trials	320
Miscellaneous.	
Water samples	20
Mill by-products	17
Other samples	13
Total	902

Fertility Surveys.

Soil fertility surveys were carried out during the year in the Mossman, Innisfail, North Eton, and South Maroochy areas. All growers from whose properties the samples were taken were advised of the results of the analyses, and, at the same time, received recommendations regarding fertilizer and lime requirements. In addition, 341 similar advisory notices were forwarded to growers in the Tully area as a result of the soil analytical work being carried out in the Tully Mill laboratory.

Lime Trials.

During the year 52 lime trials were harvested. These were part of a comprehensive series set out on most of the more important sugar-cane soils. Single plots were used on farm properties from Mossman to the Bundaberg district. In each case a check plot—that is, one which had received no lime—was used for comparison purposes, and was immediately adjacent to the plot which had received an application of agricultural lime at the rate of 2 tons per acre. The results indicated that, although the differences between the limed plots and the unlimed areas were relatively small when calculated in tons of cane per acre, the number of cases in which lime exerted a beneficial effect was much greater than those in which no response was obtained. Actually, 38 trials out of the 52 which were harvested showed an increased yield due to the lime application. It is also interesting to note that 6 of the 14 trials which showed no response occurred in the Bundaberg district.

It is expected that the main effects of liming will be shown up in the ratoon crops, and for this reason it will be necessary to continue the experiments for some time before the total responses to lime can be ascertained. Up to the present, in general, the increase in yield per acre has not been sufficient to offset the cost of the lime application. However, it is felt that the very fact that there has been such a very general response to lime indicates that many areas may now be becoming deficient in this respect, and although the responses are not great, any factor which limits the production of cane should be regarded as serious, and steps should be taken to overcome it before the deterioration becomes more marked.

Minor Element Trials.

Seventeen minor element trials were completed. These experiments were widely distributed over the main sugar-producing soils, and it is pleasing to note that the results indicate that, even after many years of cultivation, these soils, with one exception, show no signs of a minor element deficiency insofar as the content of copper, zinc, boron, and manganese is concerned.

The exception occurred on a light-grey sandy soil at Bli Bli, in the Maroochy district. For a number of years cane growing on this and similar soils has been frequently affected by what is locally known as "droopy top." This trouble has been known for some time, and, although it was originally somewhat sporadic and patchy in occurrence, it is now showing sufficient signs of spreading to cause concern. Applications of copper and zinc have given evidence of overcoming the trouble, and treated areas have shown a striking beneficial effect due to the presence of these two substances. Further trials of this nature are being set out in the district.

Fertilizer Trials.

The policy of carrying out the standard type of fertilizer trial in as many mill areas as possible was continued. These trials, in conjunction with the fertility surveys, enable the Bureau to maintain continuous supervision over any change in fertilizer requirement which might occur due to continuous cropping on the major soil types. Although it was possible to harvest only two such trials during the year, further evidence was obtained as to the necessity for using a suitably balanced fertilizer, particularly as regards the application of nitrogen and potash. It is becoming abundantly clear that in many of our soils the application of ammonium sulphate is of little value unless sufficient muriate of potash is also applied.

"The War Service (Sugar Industry) Land Settlement Act of 1946."

Recommendations as to the suitability for soldiers' settlement purposes were made on a large number of properties inspected by the field staff of the Bureau. This work, together with serving on the Land Classification Committee appointed under the abovenamed Act, absorbed approximately two days per week of the writer's time throughout most of the year. Moreover, because of the desirability of finalising these inspections, all Bureau officers concerned gave the Land Administration Board the utmost co-operation possible. This entailed a considerable amount of extra work, particularly in the case of the field staff, who were already committed to a heavy experimental programme. With the exception of a few parcels of new land, these inspections are now complete.

NORTHERN SUGAR EXPERIMENT STATION.

(Mr. J. H. Buzacott, Senior Plant Breeder, Officer in Charge.)

Much better weather conditions prevailed during the latter part of 1947 than during the previous year. Almost 5 inches of rain fell during August and this ensured excellent moisture for spring-planted cane. A little over 2 inches was evenly distributed through September-October and approximately 2 inches fell during both November and December. In consequence of this well-distributed rainfall the crops throughout the district made excellent growth and there is promise of a harvest nearer to that of pre-war days. The wet season was ushered in with 29 inches of rain in January, but thereafter it fell below normal with 10 inches in February and 11 inches in March. There was ample moisture to keep the crops growing yet not sufficient to cause flood damage. Beetle flights were very small and indications were that little grub damage would occur during 1948. However, with the approach of drier weather during April and May quite an appreciable amount of light grub damage commenced to show up in the district, and following good rains in early June the damage became more conspicuous and proved to be much more widespread than was anticipated. In the Mulgrave area over 600 acres were treated with "Gammexane" during 1947—a far greater area than was ever fumigated with carbon bisulphide. Had this not been treated the grub damage would undoubtedly have been far worse than it is.

On the Experiment Station all blocks were treated with "Gammexane" except a 1-acre block which was planted fairly late and the treatment of which was overlooked. With the exception of this 1-acre block there was no grub-damaged cane on the station during the year, in great contrast to previous years and to neighbouring farms.

In the following tables are shown the rainfall records taken at the Northern Sugar Experiment Station over the past 23 years together with an abstract of other meteorological observations:—

Year.	Rainfall in Inches.	Year.	Rainfall in Inches.
1925	76·98	1940	84·58
1926	59·12	1941	84·65
1927	90·16	1942	60·14
1928	66·33	1943	47·31
1929	102·28	1944	60·73
1930	107·61	1945	117·60
1931	98·82	1946	55·18
1932	76·31	1947	43·67
1933	96·06	1948 (6 months)	57·52
1934	91·44		
1935	59·91		
1936	88·81		
1937	46.33	**Average for 23 years**	**77.73**
1938	55.86		
1939	118.08		

Abstract of Meteorological Observations made at Northern Sugar Experiment Station, from 1st July, 1947, to 30th June, 1948.

Month.	Rainfall (Inches).	Number of Wet Days.	Shade Temperatures.						Mean Diurnal Range.	Mean Temperature 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum.			Minimum.					
			High.	Low.	Mean.	High.	Low.	Mean.			
1947—											
July	·49	10	84·5	75·8	81·41	66·0	43·8	57·11	24·30	71·55	77
August	4·95	17	86·0	71·2	81·08	71·5	45·8	62·29	18·79	74·90	80
September	1·30	12	90·5	77·5	84·60	69·0	56·0	63·74	20·86	75·71	77
October	1·07	11	92·8	81·5	87·70	71·5	50·0	63·81	23·89	77·38	69
November	1·90	10	100·0	88·0	92·36	74·5	55·5	67·62	24·74	82·17	64
December	1·89	12	98·0	89·2	93·30	76·0	66·5	70·36	22·94	83·90	68
1948—											
January	29·63	19	98·0	84·1	90·68	75·0	65·0	70·34	19·74	81·67	75
February	9·94	14	97·5	85·0	90·12	74·5	66·0	70·15	19·97	80·90	78
March	11·10	18	94·0	85·0	90·30	76·0	67·0	71·40	18·90	81·08	83
April	3·70	21	91·0	80·0	86·40	76·0	61·0	67·60	18·80	78·40	82
May	·77	10	80·0	80·0	84·08	70·5	56·0	63·19	20·89	74·18	81
June	2·38	16	83·0	78·0	78·91	68·0	47·0	58·50	20·41	69·46	80

Work of the Station.

The second post-war Field Day was held at Meringa on 13th May. As this date coincides with a busy planting period for farmers the attendance was not very large, but nevertheless it was well attended and the visitors evinced considerable interest in the work being carried out. The visitors were conducted on a tour of the station in groups of about ten with officers of the Bureau staff acting as guides.

Seedling selection in the 1947 crop was carried out under better conditions than for some years, due to the fact that the seedling blocks were "Gammexane"-treated. Selection proved much easier in the well-grown standing cane than it did in 1946, when the crops were lodged due to grub attack. A considerable number of seedlings had to be selected from the plant blocks owing to the fact that most of the previous year's seedlings were unable to be ratooned on account of grub damage. Some 168 40-sett plots were planted out as a result of selection. From the 150 varieties planted in 40-sett plots during the previous year, 32 were selected and planted in a yield observation trial with Trojan as a standard.

From a cross-pollination point of view the 1948 season was highly successful. Arrowing of cane was free and early and in consequence it was possible to achieve practically every desired cross by the end of June. In all, 166 crosses were made, and although it is not the highest number of crosses made in one season it did result in a greater amount of seed for storage than ever before. Some trouble with ripening of the seed was experienced due to showery weather in June, but in the few days of fine weather it was possible to harvest most of the seed with very small losses. A full discussion of the seedling selection work appears in the report of the Cane Breeder.

Legume Trials.—Trial plantings were made on the wettest and most wilt-affected blocks with the two legumes Reeves Selection (Q.1582) and Cristaudo pea. Both these varieties stood up very well to wilt long after both Poona pea and Giant cowpea succumbed and they should both prove of great value on the waterlogged soils. In one particular section where Cristaudo was planted it is the first time a good crop of legumes was ever produced on the block. Arrangements were made for the further propagation of both varieties and it is confidently hoped they will soon reach the commercial market.

In addition, a randomised trial with six varieties of velvet bean was carried out. Two of the varieties, White Mauritius and Smith, produced very poor crops; the remaining four—Somerset, Black Mauritius, Marbilee and Jubilack—gave good crops extending over a period of five to six months. The weights of green matter produced by each variety were as follows:—

Variety.	Series 1.	Series 2.	Series 3.	Series 4.	Average.
	Tons. Per Acre.				
White Mauritius	4·35	4·24	4·42	5·18	4·55
Somerset	12·91	12·04	11·48	15·49	12·98
Jubilack	12·00	9·68	13·09	10·95	10·43
Marbilee	11·85	7·50	9·68	9·23	9·57
Black Mauritius	12·07	10·16	13·54	17·71	13·37

Weedicides.—Further trials were carried out with the hormone type weedicides, Methoxone, 2-4, D and Hormex. Again the trials indicated that these weedicides would prove effective for the control of specific weed pests but would not be of general value for use in cane cultivation because they do not affect grasses.

Ramie.—A further planting of ramie was made on good land with root cuttings from the crop perviously planted at Meringa. The cuttings struck well and have grown fairly rapidly. The crop from the previous year was cut and the ratoons have come away strongly. The plant crop was damaged by two insect pests, a beetle *Rhyparida discapunctulata* and an unidentified coccid.

Disease Trials.—Since it was no longer possible to conduct the leaf scald trial at Highleigh it was transferred to a site at Pine Creek. Owing to the sale of the farm at Buchan's Point on which the downy mildew trial was formerly conducted, the new downy mildew trial was also planted at Pine Creek. Both these trials germinated fairly well and grew favourably. A chlorotic streak varietal trial was also conducted at Babinda, and although more information is expected to be gained from the ratoon crop quite a number of the varieties showed disease symptoms in the plant stage. More extensive information regarding these trials appears in the notes of the Division of Entomology and Pathology.

Experiments Harvested During the 1947 Season.—The three seedling trials harvested during the year consisted of a plant trial in the form of an 8 x 3 randomised block on Division A1 and a first ratoon yield observation trial on Division A6. The plant randomised block in which the varieties Trojan, Q.44, D.216, D.221, D.225, D.233, D.271, and D.287 were compared was harvested in September, 1947, at the age of 11 months. C.c.s. figures ranged from 13.02 in Q.44 to 17.36 in D.221 and 17.43 in Trojan. Analysis of the trial indicated that Trojan exceeded all other varieties with 5.3 tons sugar per acre. Then followed D.271 with

5.0 and D.216 with 4.9. Q.44 was the lowest yielder with 3.8 tons sugar per acre. Some wallaby attack occurred in the variety D.287 and slight grub damage was in evidence during 1947, particularly in the variety D.221. D.233 lodged badly and produced poor cover, whilst D.287 was also unsatisfactory in this respect. As both these varieties came away poorly after cutting they are not considered worthy of further attention. D.221 was favoured by the cutter as the best harvesting cane. D.271, D.216, D.221, and D.225 are yielding well and are under further trial in propagation plots throughout the northern areas.

The ratoon yield observation trial on Division A6 consisted of 19 "E" varieties and one "D" variety, compared with Q.13 as the standard. Despite the grub damage in the plant crop a very fair crop of ratoons was produced with the exception of two varieties, E.214 and E.227, which were almost complete failures. E.226 was slow in coming away and E.225 and E.297 also ratooned badly. The most promising varieties were E.209, E.230. E.239, E.247 and E.269. These five canes yielded well with a high sugar content and were planted out in a replicated trial with Trojan as the standard. All germinated well with the exception of E.239. As germinating conditions were good this variety was dug out and E.275 was substituted. E.269 has particular interest as it is a very uniform grower and should be most suitable for mechanical harvesting.

The plant yield observation trial on Division A1 contained 32 "F" varieties with Q.13 as the standard. No selections will be made from this trial until the ratoon crop. The plant crop was harvested and weighed and the best performers were F.305 with 34 tons per acre at 18 c.c.s. and F.304 with 31 tons per acre at 16.6 c.c.s. Q.47 which was also planted in this block yielded well with 30 tons per acre at 16.8 c.c.s. With the exception of one variety, F.345, all came away well after the block was harvested.

Seedling Work at Babinda.—The seedlings planted at Babinda during December, 1946, grew rather poorly due to the extremely dry conditions encountered. However, it was possible to make selections from them in July, 1947, and as a result 25 varieties were selected and planted out in 30-sett plots with Badila and Trojan as standards. In addition 920 new seedlings were planted out in two-sett plantings during the following month. Although the 1946 planted seedlings were ratooned after cutting in 1947, they were cut so late that 1948 selections in the ratoon crop were impossible.

Laboratory Work.

The following is a summary of the analyses carried out during the year:—

Cane (maturity tests and Experiment Station samples)	541
Cane (farm trials)	585
Cane (growers' samples)	28
Soil (lime tests)	7
Soil (moisture determinations)	4

Crop Summary.

Cane sent to mill	382·96	tons
Cane used for plants, samples, &c.	30·0	tons
	412·96	tons
Total area harvested	18·04	acres
Tons per acre harvested	22·89	acres
Class of Cane—		
Plant	59·37	per cent.
Ratoon	40·63	per cent.

CENTRAL SUGAR EXPERIMENT STATION.

(Mr. C. G. STORY, Senior Adviser, Officer in Charge.)

Meteorological and Crop Growth Reports.

No rain of any consequence occurred in the Mackay area in July, and crops were practically at a standstill during the month, although tops remained green and the soil held sufficient moisture for planting. Good rainfall occurred during the latter half of August, and was completely absorbed and of great benefit to the 1947 early plant cane and the fallow blocks which were ready for spring planting. A very large planting programme was undertaken in the Mackay area during 1947 planting season to restore areas depleted by the adverse conditions of the previous year; the August rainfall and the excellent germination of the cane planted was the basis of a promising 1948 crop.

The rainfall for September, following that experienced in August, gave promise of an excellent crop in 1948, and there was a marked difference in the situation compared with the similar period in the previous season. Progress was maintained during October; favourable sugar figures were obtained in the crop being harvested and averages for the season were generally very good. High daily temperatures and good rainfall were experienced during November; both plant and ratoon cane made good progress, and prospects for 1948 were excellent. A disappointingly dry December with hot winds affected crops adversely and altered the situation.

The six-monthly period July-December, 1947, was a vast improvement on the corresponding period in 1946, and crop conditions and prospects were very different. With the favourable January rainfall and ideal growing conditions, the crop position changed considerably following the check in December; crops made very good progress and most of the cane was out of hand. The regular wet season with its wasteful downpour did not eventuate in February, moderate falls being experienced and rain being completely absorbed by the soil. This, combined with hot, humid weather conditions, was favourable for the growth of cane, which developed rapidly throughout the month. Growing conditions in March were very good and the crops made excellent headway.

Forty-two inches of rain occurred in the first three months of 1947 compared with 23.46 in. for the corresponding period in 1948, but the latter rainfall was more beneficial to crops, proving that a smaller amount well distributed and absorbed is better than heavy falls over a shorter period. The underground supplies, however, were not replenished by the lighter rains.

Drier conditions obtained throughout April, but the crops made progress and the 186 points in one storm at the end of the month were beneficial. A large amount of arrowing was evident in the area in May, and crops had a good appearance despite lighter rainfall experienced during the latter portion of the growing period. Cool conditions were experienced in June with heavy frost at Gargett at the end of the month.

The total rainfall for the period under review was 38.40 in. recorded on 108 days, practically 10 in. less than the previous twelve-monthly period (48.09 on 78 days), but better distribution of this lighter rainfall produced a very heavy crop for 1948 harvest. The effect of the poor rainfall, July-December, 1946, mentioned in the last annual report was reflected in the average acreage production for the 1947 crop, which is the lowest for the Station at Te Kowai—16.47 tons per acre; the previous lowest was in 1945 with 16.7 tons per acre. The prospects for 1948 harvest are excellent, with the promise of a large crop in most parts of the district.

The Mackay-raised varieties Q.28 and Q.50 once again demonstrated their value to the district. A large percentage of the cane planted in 1948 was Q.50, this variety tending to replace Q.28.

The following meteorological observations were made at the Station during the year. The rainfalls records (also given below) prior to 1935 were made at the old Sugar Experiment Station, Lagoons, but since that date have been taken at the site of the present Station at Te Kowai.

ANNUAL RAINFALL SINCE 1920 AT THE SUGAR EXPERIMENT STATION, MACKAY.

Year.	Rainfall Inches.	Year.	Rainfall Inches.
1920	57·27	1935	45·15
1921	95·89	1936	97·37
1922	34·47	1937	56·60
1923	25·23	1938	52·18
1924	53·37	1939	56·14
1925	54·80	1940	84·97
1926	34·60	1941	71·38
1927	83·87	1942	77·92
1928	72·28	1943	60·11
1929	64·03	1944	53·16
1930	55·81	1945	46·76
1931	30·01	1946	53·74
1932	48·48	1947	53·39
1933	71·94	1948 (6 months)	29·26
1934	37·57	**Average for 28 years**	**58.16**
		Average at Te Kowai 13 years	**62.22**

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE CENTRAL SUGAR EXPERIMENT STATION, MACKAY, DURING PERIOD 1ST JULY, 1947, TO 30TH JUNE, 1948.

Month.	Rainfall (Inches).	Wet Days.	Average Rainfall (Inches).	Shade Temperature.					
				Maximum.			Minimum.		
				High.	Low.	Mean.	High.	Low.	Mean.
1947.									
July	0·21	3	1·35	81·5	67·5	74·6	57·5	37	47
August	2·36	4	1·01	82	69·5	76·45	65·5	39	55·6
September	1·02	9	1·58	84·5	73	78·5	68	45	58·3
October	1·38	6	1·77	86·5	77·5	81·7	68	48	60·2
November	3·50	7	3·01	94·5	70·5	85·4	75·5	59·5	67·15
December	0·67	7	6·59	94	85·5	88·9	77·5	61·5	67·7
1948.									
January	746	15	13·31	93·5	78·5	85·3	77·5	51	66·5
February	10·41	14	12·33	93	73·5	84·3	74·5	65·5	70·1
March	5·59	17	10·74	91·5	81·5	85	77	66·5	70·3
April	3·10	11	5·20	92	70·5	80·9	71	42·5	62·2
May	0·73	5	3·05	86·5	68·5	77·8	64·5	41·5	54·5
June	1·97	10	2·52	80	68·5	73·8	63	33·5	52·7
Totals and Averages ..	38·40	108	62·36	..	..	..	..	..	..

Work of the Station.

Experiments Harvested During 1947 Season.—Three varietal trials were harvested during the 1947 season, being a plant 5 x 5 Latin Square type trial including Q.50, Q.28, B.174, P.O.J. 2878 and Trojan, a plant yield-observation trial with "F" seedlings, C.140, 32/3575, Q.42, Q.51 and Q.28, and a first ratoon yield-observation trial with "E" seedlings, Q.47 and Q.28. In addition to these, a plant filter mud and fertilizer trial, a plant fertilizer placement trial, a first ratoon minor element trial, a first ratoon cultivation trial, and plant "Gammexane" wireworm observation trial were also harvested.

In the Latin Square trial, B.174, Q.50 and Q.28 germinated quickly and well, with B.174 the most rapid, whilst a rather poor germination occurred in practically all plots of Trojan. The latter variety grew poorly throughout. In the early stages of development Q.50, Q.28 and B.174 were in better condition than the others, the dry spell adversely affecting Trojan in particular. By February Q.50 was well ahead, while Trojan had a poor stool, and the same order persisted into winter, when Trojan showed considerable banded sclerosis. At harvest Q.50 demonstrated a marked superiority both in tonnage and c.c.s. and, under the seasonal conditions which operated, a yield of 19.11 tons per acre with a c.c.s. of 18.7 is very satisfactory. It significantly exceeded all other varieties at the 1 per cent. level and all other varieties significantly exceeded Trojan at the same level.

The plant yield observation trial included 14 "F" seedlings with C.140, Q.42, Q.51, Q.28 and 32/3575. Plants were rather dry, and the germination was generally only fair. The poor late growth of the cane resulted in final yields being low. Final selections will not be made until the results of the ratoon crop are known.

The ratoon yield observation trial included nineteen "E" seedlings and Q.47, the performance of these being tested against Q.28. The seedlings E.119, E.122, E.124, E.129, E.135 were selected for further trial.

The plant filter mud and fertilizer trial was designed to obtain information on the value of filter mud for cane, with and without fertilizer. The treatments used were mud at 20 and 40 tons per acre with controls and in each section a fertilizer trial was also incorporated in which dressings of 0, 1½ and 3 cwt. per acre of Sugar Bureau No. 1 Planting Mixture were applied. There were no significant differences in the results of the plant crop at harvest. Fertilizer treatments have been repeated in ratoons.

The plant fertilizer placement trial was designed to measure the relative effects of surface and subsurface placement of fertilizer at planting time. Under the seasonal conditions experienced there were no significant differences at harvest. The treatments have been repeated on the first ratoon crop.

The first ratoon crop of the Latin Square type minor element trial was also harvested. This was designed to measure the effect, if any, of dressings of the elements boron, manganese, copper and zinc in addition to normal fertilizer applications. No significant responses were obtained from copper sulphate, zinc sulphate, and borax at the rate of 25 lb. per acre, nor from manganese sulphate at 15 lb. per acre either in the plant or ratoon crop of this trial.

The cultivation trial was inaugurated on a ratoon cane crop to compare the benefits of bumper discing combined with (*a*) grubber and scarifier and (*b*) cotton king and scarifier as against no bumper discing but only the (*a*) and (*b*) treatments. The differences between the treatments were not significant.

Legumes.—Small quantities of nine cowpea varieties (seven of these having been selected the previous year) and Rice bean were planted with Poona pea in a wilt-resistance trial. The Poona pea died out, but five varieties were not affected by the wilt. These were Cristaudo pea, African pea, Large White x (Snake x Poona) 4308, Large White x Skewbald (Q.1565) and Phaseolus ricciardianus. The remainder, (New Era x Poona) x Mammoth (Q.1568) and 4312, Poona x Victor 4313, Victor x (Large White x Skewbald) 4327, and Reeve's Selection (Q.1582), were slightly affected, the wilt in Q.1582 occurring in a water-logged patch. Seed was collected from six of the above ten legumes and was planted in a seed plot. Cristaudo pea and Q.1568 continued to maintain green cover until ploughed under at the end of May.

A larger trial with Cristaudo pea, African pea, and Poona pea was planted on another block. The former was the best of the three varieties and maintained green growth long after Poona died out with wilt. Cristaudo pea was promising on the Station, and will be given further trial on farms in the area.

Observation seed plots of Reeve's Selection Q.1582 were planted on five representative farms in the central area, and the five farmers are satisfied that it is more reliable than Poona pea under their conditions and has definite promise in the district. Seed was obtained for commercial propagation from two properties.

A trial with six varieties of velvet bean was planted and harvested during the period of this report. This included Black Mauritius, Somerset, Marbilee, Jubilack, White Mauritius, and Smith. The first four of these gave good results, and weighings from each plot were made and samples for analyses obtained. Plantings were also made on three farms in the Mackay area. Seed will be collected from these plantings for commercial propagation.

Three perennial legumes—*Calopogonium mucunoides, Centrosema pubescens* and *Pueraria phaseoloides*—were planted for seed purposes. The former was the best under the existing conditions.

Ramie.—Despite irrigation and fertilization the yields were poor from successive crops of this fibre plant, although the yield appears to improve with ratooning.

Experiments initiated during the year.—These included a potash trial to measure the effects of this fertilizer on maturity, Q.28 trouble exploratory trials, and two mercurial trials—(*a*) Whole stalk *v.* setts both treated with mercurials Agrosan, Ceresan, and Aretan; (*b*) Ceresan time of treatment trial. An area of Q.50 was allowed to stand over at 1946 harvest to obtain information on standover characteristics of this variety.

Laboratory Work.

The following is a summary of the cane samples submitted to the laboratory for testing:—

Station samples	481
Field trial samples	40
Field varietal trial samples for maturity testing	109
Farmers' samples for maturity testing	66
Show canes	121
	817

Summary of Crops Harvested on Station.

Cane sent to mill	378·4375	tons
Cane used for plants, etc.	153·5	tons
Total area harvested	32·3	acres
Average tons per acre	16·47	
Class of cane—		
Plant	231·6125	
Area	13·1	acres
Average per acre	17·68	tons
Ratoon	300·325	
Area	19·2	acres
Average per acre	15·64	tons

SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG.

(Mr. H. G. Knust, Senior Adviser, Officer in Charge)

Meteorological and Crop Growth Report.

The winter of 1947 was not so severe as that of 1946, fewer frosts being recorded. Screen minima reached 37 degrees towards the end of July, and following the rain during late August a figure of 35 degrees was recorded accompanied by a frost. Relief from the prevailing dry spell was afforded in August when a fall of 122 points benefited young cane and provided an opportunity for growers to commence spring planting. Good rains and increasing temperatures in September were decidedly beneficial, but the poor precipitation in October—less than 1½ inches—resulted in a lowering of soil moisture levels. However, good rains in November and December—over 7 inches in each month again restored soil moisture and promoted good growth. During the next three months, when temperatures normally ensure maximum development of the crop, rainfall was below average and progress was accordingly slow. Rainfall in April, May, and June was heavier than is normally recorded so that considerable late growth improved the position appreciably. The rainfall for the year 1947-48 was 57.76 inches, which is well above normal and the highest since 1933-34.

Frosty conditions developed during mid-May but did not do any harm to crops, and it appeared that an early severe winter might prevail, but temperatures rose again and remained at reasonable levels until the end of June, when three successive frosts of some intensity were recorded.

Crops.—Growth after the good rainfall of September was satisfactory and was maintained at a favourable level until the summer months, when the usual heavy rains did not materialise and soil moisture was consequently reduced by the demands of the well-grown crops. In the autumn growth rate slackened and did not improve again because of decreased temperatures. Germination of autumn plant was good generally, and good stands of young plant cane are in evidence throughout the district. Arrowing of mature cane is negligible and a crop of almost record proportions should be harvested during the coming crushing season.

Rainfall Records, 1914–1948

Year.	Rainfall Inches.	Year.	Rainfall Inches.
1914–15	31·99	1931–32	22·88
1915–16	28·54	1932–33	36·81
1916–17	58·08	1933–34	71·45
1917–18	49·85	1934–35	40·01
1918–19	24·24	1935–36	44·24
1919–20	28·20	1936–37	31·65
1920–21	45·16	1937–38	44·40
1921–22	44·97	1938–39	41·01
1922–23	37·14	1939–40	41·69
1923–24	34·16	1940–41	43·26
1924–25	50·96	1941–42	33·52
1925–26	37·62	1942–43	40·75
1926–27	68·18	1943–44	45·22
1927–28	74·69	1944–45	28·14
1928–29	31·16	1945–46	26·10
1929–30	43·16	1946–47	44·52
1930–31	47·19	1947–48	57·76
		Average for 34 years	**42·01**

Abstract of Meteorological Observations Made at the Southern Sugar Experiment Station, Bundaberg, from 1st July, 1947, to 30th June, 1948.

Month.	Rainfall (Inches).	Wet Days.	Shade Temperatures.						Mean Diurnal Range.
			Maximum.			Minimum.			
			High.	Low.	Mean.	High.	Low.	Mean.	
1947.									
July	0·14	1	78	65	72·34	52	34	43·11	29·23
August	1·22	4	78	65	73·81	62	35	51·40	22·41
September	6·43	10	82	68	75·70	62	48	56·50	19·20
October	1·44	5	86	66	79·56	67	49	58·39	21·17
November	7·08	13	87	76	81·04	71	56	64·27	16·77
December	7·17	12	86	79	83·14	75	62	67·81	15·33
1948.									
January	4·58	8	88	80	84·52	74	60	65·50	19·02
February	5·55	6	89	76	84·11	*	*	*	*
March	4·52	17	86	76	82·00	*	*	*	*
April	6·50	9	84	76	79·00	66	41	55·60	23·40
May	8·47	5	83	69	75·03	58	39	46·66	28·37
June	4·66	7	76	66	71·46	60	41	45·73	25·73
Totals	57·76	97	..	..	..	..	..	..	..

* No recordings taken.

Work of the Station.

Plant distribution.—A distribution of Q.28 was made in spring, 1947, to all growers who made application in the Qunaba, Millaquin, Bingera, and Fairymead mill areas. Approximately 100 tons were planted out during this distribution, and reports to date indicate that growth has been reasonably good but stooling is somewhat sparse. Early figures suggest that its quality is as good as the existing standard varieties, but much more information is required on this feature of the variety.

New varieties introduced from quarantine during the year were C.P.36-105, C.P.34-120, C.P.36-62, C.P.34-79, C.P.29-320, N.Co.310 and 46 N.B. 4.

Experiments harvested during 1947 *season.*—Since the Experiment Station blocks are largely utilised for the progressive trials associated with seedling production, selection and testing, most of the experiments harvested during the year were of the usual exploratory and confirmatory type. There were two yield observational trials, one first ratoon and one second ratoon, with "D" seedlings, and selections of these trials resulted in the replanting of ten of the canes in an 11 x 4 randomised trial. Of the ten selected two had the parentage P.O.J.2725 x Co.290, four were P.O.J.2878 x Co.290 and the other four Q.37 x Co.290.

In the first ratoon Latin Square trial B.50 and B.56 were planted in competition with Q.28, Q.49, and Q.52. There was little to choose between the varieties at harvest, the crop range being from 24.4 to 26.9 tons per acre. Q.49 was the best performer, with Q.28 and B.50 in next places. Both B.50 and B.56 have been planted out in propagation areas for further trial, the former variety possessing a growth habit which makes it attractive for mechanical harvesting.

The second ratoon Latin Square showed M.1900 in a very unfavourable light. Over a period of three crops this one-time favourite aggregated only 36.7 tons of cane and 5.35 tons of sugar per acre. The best performer among the other varieties was Q.42 with 64.8 tons of cane and 10.22 tons of sugar. Of the other varieties in this trial Q.49 and Q.52 performed satisfactorily, but Q.25 was little better than the M.1900. Q.52 has been discarded owing to extreme susceptibility to red-rot despite its other favourable characteristics.

The fertilizer trial with a 3 x 3 x 3 layout was continued to the second ratoon crop on Block B.3. In this experiment two levels of potash and phosphoric acid were employed in such quantities as to correspond to 3 cwt. and 6 cwt. per acre of Sugar Bureau No. 3 Mixture. The harvest of the plant crop in 1945 showed a slight response to potash and the first ratoon crop in 1946 gave a highly significant increase to this ingredient in the lower level. In the second ratoons the higher level of potash was significantly better than either the smaller dressing or the no-potash treatment. This interesting and valuable trial is now completed. As is usual on this soil type, there was no significant response to phosphate applications.

In the fertilizer and plant residue trial on Block E.4 no significant differences are yet discernible from the trash and green manure treatments. The trial is now in its third rotation. In the first planting both ratoon crops showed marked gains from nitrogen and potash, although no differences showed up in the plant crop. In the plant crop of the second rotation significant increases from fertilizer were again absent, but in the first ratoons the control plots were exceeded by PK, NK, and NPK treatments at the 1 per cent. level, while NK and NPK exceeded PK at the 5 per cent. level. In the present rotation the plant crop once more failed to show any marked differences and it was obvious that the spell during inter-rotation fallowing was responsible for a build up of sufficient nutrients to supply the requirements of one crop of cane. The first ratoon of this rotation shows once more a significant improvement from all fertilizer treatments although lacking in major differences between individual treatments. The lack of response to trash and green manure is no doubt associated with the soil type on which this trial is being carried out and it is considered that better results may be obtained on other soils with a less favourable structure.

The dressings of minor element compounds were repeated on the first ratoons of the trial on Block B.6. Although a favourable crop was produced on this block no responses were recorded from the copper, zinc, boron, or manganese treatments. Despite the long period of years under cultivation, it is pleasing to record that deficiencies of minor elements are so far not exercising any influence on growth.

The Station irrigation water supply did not occasion any concern and supplies of water were sufficient for seedling requirements. The position appears to be satisfactory for the next seedling programme.

New experiments initiated during the year.—A Latin Square trial was established to measure the performance of Pindar against the standard varieties Q.47, Q.49, and C.P.29/116 and a randomised variety trial with ten "D" seedlings and Q.49 was also established.

Legumes.—The six varieties of velvet beans—Marbilee, White and Black Mauritius, Somerset, Jubilack and Smith—which performed so well last year were further tested this year and seed from the most promising—Marbilee, Black Mauritius, Somerset and Jubilack—will be picked for further use and distribution. White Mauritius and Smith will be discarded because of their unsatisfactory performance.

Nine of the original 29 varieties of cowpea supplied by the Departmental Plant Breeder for bean-fly resistance trial work are considered superior to Poona pea in respect of growth and cover period. No bean-fly infestation occurred and it will be of interest to note the performance of the best three varieties—Reeves selection Q.1582, 4312 and 4301—during a year of heavy bean-fly infestation.

Laboratory Work.

The following is a summary of cane and water samples handled during the year:—

Cane samples—	
Station and trial	598
Farmers	566
Irrigation waters	14
	1,178

Summary of Crops Grown on Station.

Varieties harvested 1947 season—	Tons.
P.O.J. 2878	111·9
Q.48	109·8
C.P.29/116	65·4
Q.49	27·9
Q.42	12·8
Q.28	7·9
Q.25	5·1
Co.290	3·9
Seedlings	113·4
Total	458·1
Plant cane harvested	19·0
First ratoon cane	311·1
Second ratoon cane	128·0
Total	458·1
Total cane harvested for mil'	458·1
Used for plants on station	7·9
Used for plants off station	4·7
Sold for plants	3·8
Used for samples	3·5
Total crop	478·0
Total acreage harvested	20·55
Average tonnage per acre	23·26

REPORT ON THE WORK OF THE FIELD STAFF.

By C. G. HUGHES, Pathologist.

There have been several transfers of officers and one addition to the staff during the year. Mr. H. G. Knust, Senior Adviser at Innisfail, has taken charge of the Bundaberg Experiment Station, while Mr. S. O. Skinner has been transferred from Bundaberg to Innisfail. Mr. G. Bates, Senior Adviser at Cairns, has been appointed in charge of the Meringa Experiment Station but has not yet taken over his new duties. The addition to the field staff is Mr. J. H. Barrett, who has commenced duties as a field cadet at Meringa.

The usual annual meeting of technical and field officers was held at Maryborough during April, concurrently with the conference of the Queensland Society of Sugar Cane Technologists, and the field programme discussed in detail.

In addition to the normal advisory services, the field staff was able to render considerable assistance to the Entomology and Pathology Division in the conduct of disease-resistance trials, the supervision of Cane Pest and Disease Control Board activities and the reporting of the occurrence of diseases and insect pests. The Soils section of the Bureau was assisted by farm fertility surveys and the conduct of lime and fertilizer trials; considerable time was also spent on inspections for returned servicemen's rehabilitation schemes. The propagation of new varieties and observations on their growth in plots and trials continued as an important part of the staff's activities; officers also planted and harvested a large number of varietal trails.

Growth of the 1948 Crop.

Although autumn plantings in most districts were restricted by unfavourable weather conditions, every effort was made with later plantings to make good the losses of area under cane resulting from the war years and the 1946 drought. Germinations were generally very good and ratoons came away satisfactorily. Growth was pleasing during spring, although there was some check from Mackay north towards the end of the year. The Queensland crop as a whole will be well above average, most mill areas showing very marked increases over the 1947 yield. An open winter has given some poor early c.c.s. figures but with an appreciable increase in tonnage of cane, and estimates in most areas have had to be increased as the spring approached. Frosts have been rare and have had very little effect on the standing cane.

Following are more detailed notes on the 1948 crop in the various districts:—

Northern Districts (North of Townsville).—The rainfall in the spring months was well above average in the far North and, except for a short period towards the end of the year, growth was maintained at a fairly rapid rate until the wet season. Thereafter conditions were ideal, and although the wet season rains were heavy there was very little flooding and no cyclonic wind. As a result, some huge crops will be harvested from the rich alluvial flats. The wet soil and some wind during May combined to cause the lodging of many of the heavy crops, but harvesting should not be any more difficult than normal. The open winter has given a steady tonnage increment and estimates of most mills are still being raised.

Giru and Burdekin.—This area usually has a heavy wet season from December to March, but the rest of the year is comparatively dry; however, in 1947-48 there were very useful storm rains in September and November and the wet season was abnormally light. The total for the year was only 24.85 inches, which fell on 49 wet days. The heaviest precipitation for twenty-four hours was only a little over two inches, which was much less than the 18 and 15 inches recorded on separate days in the 1947 monsoon. There was no flooding of cane lands on the Burdekin and the underground water level is lower than for many years. Regular irrigation maintained good growth throughout the warmer months and some excellent crops of plant cane were produced. On the other hand, many ratoon fields were poor, due to both the shortage of nitrogenous fertilizers and their late delivery.

Central Districts (Proserpine-Mackay-Sarina).—The open winter of 1947 enabled farmers to plant from April until completion in August without a break and excellent germinations were obtained in all varieties throughout the district. It was fortunate that the germinations were so uniformly good since a much larger area than usual was planted following the extensive ploughing out enforced by the 1946-47 drought. The ratoons also benefited from the good conditions; they could be worked immediately the cutters had left the fields and came away quickly with good strong early growth. The rapid growth of all crops continued until December, when hot drying winds and the absence of rain checked development. However, late December showers and seven inches of rain in early January led to a quick recovery, and the rains of later months maintained growth until the harvesting commenced.

A remarkable feature of the growing season at Mackay was the generally good yield over the whole district obtained on only 38 inches of rain—actually 10 inches less than in the drought in the previous year. Except for December, when only half an inch fell, the distribution of the rainfall was well nigh perfect. It was spread over 108 days and there was no flooding at any time.

Southern Districts (Bundaberg to Rocky Point).—The winter of 1947 was mild in South Queensland and good spring rains generally ensured satisfactory germinations, ratooning and early summer growth, although some localities in the Moreton area suffered from prolonged water-logging. There was no flood damage in the south, although rainfalls were well above average. The late summer rains were less than usual, but harvests will be heavy in Bundaberg and Maryborough districts. At Moreton there will be less cane harvested in 1948 than in 1947, chiefly owing to the comparative lack of standover cane resulting from the cutting of many arrowed fields in 1947 and the check to the young crops from the weed growth in the spring.

The 1949 Crop.

Farmers north of Mackay took advantage of the early cessation of the wet season and absence of floods to make practically all their plantings during the autumn months. Strikes in general have been fair, although in some instances immature planting material appears to have resulted in poor strikes from early April plantings. At Mackay, where normally most plantings are made in the spring, the open winter encouraged many farmers to plant during June and July; the results to date have been satisfactory. In the southern districts the usual so-called autumn planting was finished by March, but later plantings came away quite well during the mild early winter months. At the moment prospects for the planted cane are bright and unusual winter rains have provided sufficient reserves of soil moisture for a successful spring planting.

Isolation Nurseries.

Isolation nurseries for the transfer of canes from one district to another have been maintained during the year in the following localities:—

1. *Koah.*—The plot is on the Atherton Tableland, some eight miles from Kuranda and more than 20 miles from the main commercial cane tract. It is chiefly used for the distribution of seedlings from Meringa.
2. *Bingil Bay.*—This plot serves the Innisfail and Tully areas. Unfortunately leaf scald occurred in this plot during 1947 and distribution had to be confined to those localities where the disease was already present. This occurrence of disease in cane from what were apparently healthy setts is further proof of the necessity for making all inter-district transferences through the isolation plots.
3. *Clare.*—The fact that the Burdekin district is free from all major cane diseases (except mosaic) makes its isolation plot even more important than those in other areas. During the year a crop of Pindar in this plot yielded well and distributions were made to Proserpine, Mackay, and Bundaberg, as well as to the Burdekin mill areas.
4. *Isis.*—The direct introduction of promising Bundaberg seedling canes in bulk to the Isis district is made through this plot. The Isis area is now apparently free from Fiji disease and isolation precautions are more important than ever.
5. *Verrierdale.*—This plot is in hilly country to the north-east of Eumundi and serves the Moreton area.

These plots are an essential adjunct to the division of the State into quarantine districts, and ensure that transference of plants does not involve the risk, as it once did, of transference of disease. The plots are under the general supervision of the field staff, although those in the south are actually maintained by the respective Cane Pest and Disease Control Boards.

Varietal Trials.

Both plant and first ratoon varietal trials were harvested during the 1947 season, the increased numbers pointing to a resumption of field activities more nearly approaching the pre-war scale than in the previous year.

A ratoon trial at Mossman included Eros, Trojan, and P.O.J.2878 and, in marked contrast to the plant crop, showed Trojan yielding very much less than the other two varieties. Considering results from both crops, the Eros gave two tons of sugar per acre more than the others, which were about equal. At Mourilyan, ratoons of a trial with Eros, 32-8560, and Badila, following a low-yielding plant crop, did not produce a heavy crop. Eros was better than the others in both cane and sugar per acre. A ratoon trial at Mackay was not a success owing to the severe drought in 1946 affecting the young ratoons and causing the loss of the Trojan and Q.28 plots. However, results from the other varieties showed that Q.50 with 19 tons per acre was significantly better than the seedlings, A.130 and A.147. An irrigated ratoon trial on red forest soil at Bundaberg showed that Q.47 and Q.49 yielded more sugar per acre than Q.48 and P.O.J.2878, although the c.c.s. figures were much the same for all varieties. There were two ratoon trials on a grey clay loam harvested at Bundaberg in 1947. Yields varied from 34 to 48 tons per acre, with C.P.29/116 showing as the outstanding variety and Q.48 in second place. Q.25 was amongst the poorest in each trial while Q.47, Q.49, and the standard Co.290 gave equal returns. A ratoon trial on red volcanic soil at Childers showed Co.301, with a yield of 33 tons of cane, to be the heaviest cropper, but a c.c.s. figure one to four units below other canes may be a limiting factor in its commercial propagation; Q.28 yielded well and its sugar test was the same as Q.48 and Q.49; Q.47 gave a favourable return.

The plant trials harvested in 1947 were chiefly of the dispersed type—i.e., they consisted of duplicate plantings of the varieties on a number of separate farms. One such trial with plantings in both Mulgrave and the neighbouring Hambledon areas included Trojan, Cato, Q.53, B.212, and B.338. Trojan with 28.5 tons per acre gave the best yield and was better than Cato, B.338, and Q.53 in tons of sugar per acre. The dispersed trial on four farms in the Innisfail area showed that there were no significant differences in yield of sugar from Badila, Q.54, or S.J.4, although the latter gave the best tonnage. The trial on the Burdekin was rendered incomplete when one of the plantings was lost; yields averaged 57 tons per acre, and there were indications that the E.K.28 and Trojan both gave better yields than the Badila. The Mackay dispersed trial included A.130, A.147, Q.28, Q.44, and Q.50 and results showed that Q.44 is not a promising cane for this district. Q.50 yielded 5.76 tons of sugar per acre and was well ahead of Trojan, A.130 (whose low c.c.s. negatived a good yield of cane), and Q.28. A.147 was not significantly different from Q.50 but Q.44 performed very poorly. One trial at Bundaberg included C.P.29/116, Co.290, Q.28, and Q.52 on three farms; C.P.29/116 outyielded Q.52 and both these canes were significantly heavier than the other varieties; C.P.29/116 gave the best return of sugar per acre with over one and a-half times the yield from Co.290; Q.28 and Q.52 were also better than the standard. In another dispersed trial in the same district, consisting of two plantings on a red sandy loam, Q.47, Q.49, and Q.52 all proved superior to P.O.J.2878. A randomised block trial planted on a Bundaberg farm in a grey clay loam showed little difference between C.P.29/116, Co.290, Q.28, and Q.52 when harvested at twelve months of age. In the trial on the Maroochy River in the Moreton area C.P.29/116, Q.47, and Q.28 yielded more cane than P.O.J.2878, whilst in sugar per acre C.P.29/116 and Q.28 exceeded both Co.290 and P.O.J.2878 and Q.47 was superior to P.O.J.2878.

In addition to harvesting all these trials in 1947 the field staff planted a large number for harvest in 1948 and the following years. These have in general grown well and should yield some interesting results.

Green Manure Crops.

Chief interest during the year has centred on further trials with velvet beans and the cowpea selection known as Reeve's Selection or Q.1582. In the far north, where difficulties in obtaining seed have restricted the growth of Mauritius beans for many years, the demand is still very much greater than the supply. Farmers in the south, who normally plant in the spring or summer, are also interested in this long-fallow legume and results of trials with the six varieties, White Mauritius, Black Mauritius, Somerset, Marbilee, Smith, and Jubilack show that heavy yields can be obtained under suitable conditions and that good crops can be grown even in very wet or very dry seasons. At Mackay, where the land is prepared for planting immediately after the finish of the wet season, there is not the same demand.

Reeve's Selection is a vigorous cowpea type of legume, with a longer growing period and more resistance to wilt than Poona pea. It is being propagated to the limit of supplies and should prove a more reliable cropper than the other variety. It has impressed in every district except Bundaberg and arrangements are in hand for the building up of adequate stocks of seed.

Cristaudo pea, which is very similar to clay cowpea, is another legume under trial. It has the disadvantage of poor early cover and is not suitable for weedy areas.

Weedicides.

Further experiments with the hormone-type weedicides have been confined chiefly to the treatment of the cane-killing weed, nut grass, and the wild heliotrope. The cane-killing weed (*Striga* sp.) is a parasite on the roots of cane and on account of its tuberous rooting system and close association with the cane plant cannot be controlled by the usual methods. However, trials with hormone-type weedicides show that a complete kill of both underground and aerial growth can be obtained with a single spraying of one pound of active ingredient per acre.

Earlier experiments having shown that the above-ground parts of nut grass (*Cyperus rotundus*) could be easily killed by these weedicides, further trials were initiated at Bundaberg and Mackay to determine whether a schedule of treatment could be evolved for the destruction of nuts in the soil. Various strengths of sprays, using several different proprietary brands of weedicide, were tested and the general conclusion was that the control of nut grass by these preparations was not permanent. Their chief use would appear to be in their ability to destroy the surface growth of the pest in young cane for a sufficient period to allow of the establishment of the crop. However, at least four pounds of active ingredient per acre would be necessary, which on present costs would not appear to be economical.

The wild heliotrope (*Heliotropum amplexicaule*), or "wild verbena," as it is sometimes incorrectly known, is a very serious weed in grazing paddocks in Bundaberg, and its persistent underground parts make control by either poisons or chipping impracticable. Although preliminary work had shown that the weed was resistant to hormone-type weedicides, as mentioned in this report for last year, it was thought that the importance of the weed

warranted more extensive tests. Four preparations were used, at strengths from one to three pounds per acre, with up to three sprays at intervals of about two weeks. Plants were also chipped off at ground level and either dabbed or sprayed with 0.2 to 0.6 per cent solutions. The only method showing any promise of success was the dabbing of the chipped plants with 0.6 per cent. solutions. This should be applicable for small patches of the weed but might not be economical for larger areas.

Implements.

The compaction of the soil about the newly planted sett is an important part of the planting operation but very frequently it is overlooked, or else done in an unsatisfactory manner. A heavy cover, later raked off, is an expensive method, and many rollers, logs of wood, &c., dragged behind the planter are ineffective. An attachment for direct mounting on the cutter-planter just to the rear of the chute has been developed by Mr. C. W. Jordan of Home Hill and appears to be an excellent arrangement. It consists of a wide steel wheel, 15 inches in diameter, which can be adjusted to the varying weight of the planter and the depth of the drill. It is easily operated, does not add to the draught of the machine and, what is quite important, is readily lifted for turning.

The cane lift designed by Mr. D. Treacy of Mackay is hardly an implement but, as a useful adjunct to the harvesting of cane, is worthy of mention here. In operation the rear wheels of the loaded truck are driven on to steel rollers geared to a winch operating an overhead lift; the rotation of the wheels lifts the bundle of cane and a manually operated brake holds the load in the air until the motor truck has been moved and a tram truck pushed underneath. Three to four tons are readily handled in the one load and the carriers speak highly of the efficiency and ease of operation of this new lift.

The mechanisation of fertilizer distribution has not proceeded at the same rapid rate as have most of the other farm operations, and it is pleasing to note that some attention is now being paid to this important operation. Two new machines were seen during the year. The first attachment was mounted on a light, fast tractor and cost about £29. It could be used in combination with practically all tractor operations except planting. The second, developed by Mr. W. Hamilton of Meringa. was also chain driven, but the material was delivered ahead of the front wheels of the tractor. It was designed primarily for the distribution of "Gammexane," and the dosage could be made as low as 40 to 50 lb. per acre, but it also handled fertilizer in normal amounts quite satisfactorily.

A machine designed by Mr. J. Camuglia of Innisfail is for use as a legume planter. Twelve drills, nine and a-half inches apart, are sown at the one time and provision is made for restricting the number of drills. The seeds have to be covered by a scarifier, but a covering device could easily be attached to the machine.

REPORT ON CANE BREEDING.

By J. H. Buzacott, Senior Plant Breeder.

The spring of 1947 was introduced at the Northern Sugar Experiment Station by five inches of rain during August and, although thereafter there were no heavy falls until January, sufficient rain fell during each month to keep the crop growing well. The wet season ceased rather abruptly early in March, but, despite this, the 1948 arrowing season proved to be the most profuse experienced at Meringa and Freshwater for very many years. A consideration of the growing conditions for this crop leads to the conclusion that flowering may be influenced more by conditions during early growth than during the normal wet season. Not only was the arrowing profuse, but it was also very regular, and the arrows of most parents for commercial crosses were ready for use towards the end of May, whilst practically all arrows which were required were available before the end of June. The result was that all the crosses planned for the year were set up between the 19th May and 30th June. The most notable exception to the generally free arrowing was the variety S.J.4, which usually arrows quite prolifically. This year no arrows of it were available in the breeding plots.

Weather conditions were very unfavourable during June, when most of the cross-pollination work was carried out. There were seventeen wet days in that month and in July further wet weather seriously interfered with the ripening of the seed and affected pollen shedding to some extent. In spite of the continued showery weather, however, very little of the seed was lost and the few arrows which died were practically all of varieties which are difficult to keep in solution at any time. With the exception of two field crosses with Co.270, all the crossing was carried out in the normal sulphurous acid-phosphoric acid solution. During the six weeks of the crossing season 166 crosses were made; these are listed in Table VII. The parent canes denoted by "C," "D," "E," "F," "G," "I," and "J.B." are Meringa seedlings which have either not yet been given "Q" numbers, or are selections for breeding purposes only. Among these, particular interest lies in those varieties which contain either Turkestan cold-resistant *spontaneum* or Uba Marot blood.

Once again practically all the early-harvested fuzz was dried in the electric drier although, when the weather improved in late July, it was possible to dry some of the fuzz out of doors. Most of the tins of fuzz were stored in the cool room as usual although several crosses, which it was desired to examine with the minimum of delay, were planted out as fresh seed. Since an abundance of fuzz was available it was possible to send further small supplies of seed to South Africa and Egypt, from whom requests for fuzz had been received.

Fuzz was sown as usual at all three stations. Two main sowings were made at Meringa —one in July, 1947, and the other during April, 1948. The latter sowing was originally intended for planting out on good soil without irrigation, but owing to harvesting trouble experienced with seedlings planted on rich soil it was decided to plant these early seedlings on a normal irrigated block, but rather earlier than usual. At Mackay, fuzz was sown in a single planting during early April, 1948, whilst at Bundaberg the normal fuzz planting was carried out during July, 1947.

The July-sown fuzz on the Northern Sugar Experiment Station produced 6,741 seedlings, which were transferred to the field on irrigated land during November. In addition, there were 2,547 seedlings, which had been planted on a non-irrigated block during June, 1947. The seedling blocks were again treated successfully with "Gammexane," and selections were made during July from both plant and first ratoons.

The method of transferring original seedlings from Meringa to Babinda was somewhat modified during 1947. The planting of original seedlings in 1946 at Babinda was not very successful owing to the drought, and to avoid a repetition of this failure the seedlings were transferred from Meringa in 1947 as setts from grown stools, two setts of each seedling being planted. In this way 920 seedlings, represented by a planting of 1,840 setts, were transferred to Babinda; eleven different families were included.

Two batches of seedlings were planted out in the field at Mackay; one, consisting of 7,014 seedlings, representing 58 families, was planted on the Experiment Station and the other, consisting of 1,882 seedlings (21 families), was planted out at Lansdowne Road on good alluvial soil.

At Bundaberg, 5,900 seedlings from 33 families were planted in the field during November, 1947. In contrast to 1946, when very dry weather was experienced and no irrigation water was available, the seedlings last year received good rains both prior to and during the planting. This was followed by further rains and the seedlings grew practically without a check.

Selection from 40-sett plots at Meringa yielded 32 seedlings for planting in a yield-observation trial. They made excellent growth and are showing some good types of canes, but selection will not be made until the first ratoon crop. The first ratoon yield-observation trial of "F" seedlings made fair growth during the period under review. Unfortunately, most of the better yielding varieties have proved too susceptible to one or other of the major diseases in disease trials and selections will be limited by this factor. At the present time it looks as if not more than three or four varieties will be planted further. At Mackay, the growth of "F" seedlings in the yield-observation trial was generally very poor. Only one or two varieties gave yields comparable with those of the standard Q.28. Selections will not be made till the ratoon crop in 1948. In Bundaberg 26 "F" seedling selections were made and planted out in a yield-observation trial.

Five "E" seedlings were selected from the ratoon yield-observation trial (planted 1945) at Meringa and planted in a randomised plot with Trojan as a standard. Growth of all varieties was good and two or three of the seedlings show some promise. At Mackay, five "E" seedlings were selected and planted out in a randomised block trial with Q.28 as a standard. Two other "E" seedlings were also planted out for further observation. At Bundaberg there were no "E" seedlings.

None of the "D" seedlings in the randomised block trial at Meringa gave as high a yield as Trojan in the plant crop. It is possible that one of the varieties at least may find a place as a purpose cane and its fate will depend on its yield in the ratoon crop. All "D" seedlings have been discarded at Mackay, whilst ten "D" seedlings were planted out at Bundaberg in a randomised block trial.

Of the "B" varieties two are still under observation at Meringa, one at Mackay, and two at Bundaberg.

Brief notes on some of the newer varieties in the Northern, Central and Southern districts follow:—

Northern Districts.

Eros was approved for most of the northern districts. Although it has produced some good crops, especially in ratoons, it is not likely to become very popular. The variety arrows very early, often produces poor cover and has a very straggly early habit of growth. One of its virtues is its high resistance to leaf scald.

Pindar is another variety produced by the C.S.R. Company which is being propagated rapidly throughout the North. It germinated well and produced good crops with a higher early sugar content than Trojan. It promises to be a useful variety, particularly since it is resistant to leaf scald.

Q.44 is gradually finding its correct place among northern varieties. Harvesting trouble now prevents the planting of it on good lands and it is grown more on the class of country to which it is best suited. Under these conditions it produces good crops with good sugar content and it ratoons very well. Leaf scald is still a problem in this variety.

Q.50 shows promise of being a very useful variety for the poorer North Queensland soils. Although rather thinner than most northern types of cane it is usually a rapid and good germinator, stools well and ratoons strongly. The sugar content has been good and it appears to be resistant to leaf scald. Q.50 will probably be approved for planting during 1949 in at least one northern district.

Q.53 has been discarded owing to its susceptibility to leaf scald disease, high susceptibility to grub attack, and poor growth under droughty conditions.

Q.54 is now being propagated in several northern districts. It is, however, being kept under observation for a further year on account of its susceptibility to red stripe. The variety appears capable of producing good crops on rich soils and is being tried out largely as a variety for Badila lands.

Trojan was planted out to such an extent during 1946 that in the 1947 harvest it attained second place for tonnage in Queensland. Considerable trouble has been experienced in harvesting crops of it on the lower lands due to its lodging. Sugar content has been high from mid-season onwards but generally low early in the season. Leaf scald is a problem in this variety in some districts.

Central Districts.

C.P.29/116 is under trial in the central districts but it seems unlikely to prove a serious competitor for Q.50, which arrows less freely and has a higher sugar content.

Q.50 was easily the most popular variety planted in the Mackay district during 1947, and in 1948 formed such a high percentage of the total area planted that it should soon displace Q.28 as the leading Mackay cane.

Trojan has been grown in several trials and produced very poor crops, except in some plots on the river lands. It would appear that its growth will be restricted to the better-class soils.

Southern Districts.

Co.301 produced vigorous crops but the sticks were very thin. In all instances the sugar content was rather low and it is not anticipated that the variety will ever become very popular.

Q.28 plantings have been extended and the variety appears to yield well under Bundaberg conditions.

Q.50 is still only in small plots in the southern districts, where its high sugar content should prove an asset. The reaction to red rot in the South is not known, but it has come through bad red-rot years at Mackay without much damage and should not suffer unduly.

Varietal Statistics.

Table IX. presents the varietal composition of the 1947 crop as tonnages and percentages for the four main districts and for the whole of Queensland. The total tonnage of cane crushed was some 433,000 tons greater than in 1946; this was represented by increased crushings in all districts except Mackay-Proserpine, where the crushing was some 400,000 tons less than during the previous year.

An analysis of the varietal position shows some significant changes. Badila still heads the list, with a slight rise to 28.3 per cent. of the crop, but Q.28, which was second in 1946, has now fallen to fifth place. Trojan is second to Badila, providing 11.3 per cent. of the total Queensland crop and 24.6 per cent. of the crop north of Townsville; a large proportion of this was crushed at the two Ingham mills. C.P.29/116, the third most important cane, has made a spectacular rise from tenth position in 1946; all of its 423,000 tons was produced in the Bundaberg and South district. P.O.J.2878 occupied fourth position with the same percentage of the crop as in the previous year. This variety has maintained its popularity in Bundaberg and on the heavier soils in the Mackay district. E.K.28 remained more or less static in sixth position by virtue of its popularity in the Burdekin district, while Q.44 made a rise from less than 1 per cent. to 3.5 per cent. of the State total; it produced the third highest tonnage north of Townsville with 7.6 per cent. of the crop, thus relegating H.Q.426 to fourth position in the north of Townsville district. S.J.4 showed a further decline due to its restriction in the Mossman area. Of the newer varieties Q.49 has risen from 0.1 per cent. to 0.9 per cent. of the crop, whilst Q.50 makes its first appearance on the list with .01 per cent. of the crop. The latter variety will increase in importance owing to very large plantings in the Mackay district, and by 1949 harvest should occupy a prominent position.

The arrangement of varietal production on the basis of country of origin, as given in Table VIII., shows some slight changes when compared with 1946. Canes of Queensland origin still show a substantial lead with 41.8 per cent. of the total. There has been a slight increase in varieties of New Guinea origin—the group in second place—due to the comparatively good crops north of Townsville. The figure for varieties bred in the United States of America rose from 2.7 per cent. to 10.2 per cent. with the good crop of C.P.29/116 harvested in the Bundaberg district. Indian canes, represented mainly by Co.290, declined considerably, as also did M.1900S., the Mauritius variety.

TABLE VII.—LIST OF CROSSES MADE DURING 1948 SEASON.

Atlas	Comus
Badila	Co.290, Co.301, F.363, G.269, P.O.J.2878, Q.27, Uba Marot
Co.270	Badila, J.B.3, Oramboo, Q.27, Q.31, Q.39
Co.301	H.Q.409, P.O.J.2878, Q.34
Co.419	C.P.29/116, M.1900S., Q.34
D.209	H.Q.409, M.1900S., Oramboo, P.O.J. 2878, Q.31
D.216	Co.281
Eros	P.O.J. 2878, Q.31
G.217	Badila, Co.290, P.O.J. 2878
G.252	Badila, Oramboo, Q.27
G.261	Q.27
G.263	M.1900S., Q.31
G.266	Badila
I.203	Q.31
I.205	E.K.28
I.207	Q.27
I.209	Q.39
I.190	I.208
I.211	P.O.J.2878
J.B.4	Co.290, E.K.28, Q.36, Uba Marot
Korpi	Badila, C.279, Co.290, Co.301, Eros, F.363, G.257, G.270, H.Q.409, I.201, I.204, I.206, J.B.3, P.O.J. 2878, Q.27, Q.39, Q.41, Trojan
N.G.24	Uba Marot
Oramboo	Co.290, Co.301, F.363, G.255, I.202, I.204, Q.27, Q.41, Trojan, Uba Marot
Pindar	Badila, G.269, Q.27
P.O.J.2364	Comus, M.1900S.
P.O.J.2725	Co.281, Co.290, C.P.29/116, C.P.36/105, Eros, M.1900S, P.O.J. 2878
P.O.J.2875	Co.281, Co.301, C.P.29/116, C.P.36/105, Comus, Co.290, M.1900S, P.O.J.2878, Q.27, Q.36
P.O.J.2878	Badila, Co.290, Co.301, C.P.29/116, Eros, I.211, M.1900S, Q.27
Q.10	G.269, J.B.3, Q.27, Uba Marot
Q.13	Badila, Eros, G.269, P.O.J.2878, Q.27, Trojan
Q.27	Badila, Co.290, Eros, G.257, G.261, N.G.24, Oramboo, P.O.J. 2878, Q.39, Trojan
Q.37	C.P.29/116, E.K.28, Q.33
Q.44	Badila, Co.290, Eros, G.253, Q.29, Q.31, Q.39, Trojan
Q.47	Co.301, H.Q.409, M.1900S, Q.31, Q.34
Q.49	H.456
Q.50	E.282, E.K.28, J.B.6, M.1900S, Q.31
Trojan	D.216, Eros, E.K.28, J.B.3, Korpi, Oramboo, M.1900S, Q.27, Q.31, Q.36, Q.39, Q.1098

TABLE VIII.—COMPOSITION OF 1947 CROP ON BASIS OF COUNTRY OF ORIGIN.

Country of Origin.	Tonnage Harvested.	Per Cent. of Crop.
Queensland	1,735,115	41·8
New Guinea	1,175,816	28·3
Java	547,605	13·2
U.S.A.	422,651	10·2
India	150,333	3·6
Mauritius	52,196	1·3
Fiji	40,864	1·0
West Indies	26,560	·6
	4,150,387	100·0

TABLE IX.—VARIETAL COMPOSITION AND DISTRIBUTION IN THE FOUR MAIN DISTRICTS AND THE STATE AS A WHOLE: 1947 CROP.

Variety.	North of Townsville.		Giru and Burdekin.		Proserpine and Mackay.		Bundaberg and South.		Whole State.	
	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per. Cent. Crop.	Tons.	Per Cent. Crop.
1. Badila	798,540	41·9	361,323	51·2	14,827	2·3	..	..	1,174,690	28·3
2. Trojan	468,183	24·6	827	0·1	663	0·1	..	..	469,673	11·3
3. C.P.29/116	..	..	..	..	..	..	422,651	47·3	422,651	10·2
4. P.O.J.2878	16,822	0·9	4,443	0·6	92,604	14·3	223,252	24·9	337,121	8·1
5. Q.28	..	..	..	..	327,046	50·6	9,792	1·1	336,838	8·1
6. E.K.28	..	..	140,765	20·0	46,021	7·1	..	..	186,786	4·5
7. H.Q.426	133,953	7·0	15,308	2·2	8,643	1·3	582	0·1	158,486	3·8
8. Co.290	..	..	..	..	46,814	7·3	103,429	11·6	150,243	3·6
9. Q.44	144,093	7·6	..	..	..	..	..	..	144,093	3·5
10. Camus	45,581	2·4	45,025	6·4	33,610	5·2	..	..	124,216	3·0
11. S.J.4	105,134	5·5	10,114	1·4	..	..	..	..	115,248	2·8
12. S.J.16	..	..	73,516	10·4	..	..	..	..	73,516	1·8
13. Eros	70,637	3·7	..	..	..	..	..	..	70,637	1·7
14. Cato	58,363	3.1	..	..	..	..	..	..	58,363	1·4
15. M.1906S.	..	..	..	..	49.743	7·7	2,300	0·3	52,043	1·25
16. Pompey	40,804	2·1	..	..	..	..	..	..	40,804	1·0
17. Q.49	..	..	..	..	..	..	35,842	4·0	35,842	0·9
18. S.J.2	1,784	0·1	29,588	4·2	2,177	0·3	..	..	33,549	0·8
19. Q.42	..	..	..	..	..	..	32,370	3·6	32,370	0·8
20. Q.25	..	..	..	..	..	..	28,151	3·2	28,151	0·7
21. B.208	..	..	21,292	3·0	..	..	..	..	21,292	0·5
22. P.O.J.2725	2,489	0·1	..	..	5,830	0·9	9,812	1·1	18,131	0·4
23. Q.45	..	..	..	..	13,169	2·0	..	..	13,169	0·3
24. Q.48	..	..	..	..	..	..	9,160	1·0	9,160	0·2
25. Q.47	..	..	..	..	..	..	6,459	0·7	6,459	0·15
26. Q.10	5,133	0·3	..	..	..	..	..	..	5,133	0·1
27. Q.813	224	0·01	..	..	2,800	0·4	1,483	0·2	4,507	0·1
28. Atlas	..	..	..	..	..	..	3,677	0·4	3,677	0·1
29. D.1135	3,566	0·2	..	..	83	0·01	..	..	3,649	0·1
30. P.O.J.213	..	..	..	..	..	..	3,503	0·4	3,503	0·1
31. P.O.J.2714	..	..	1,462	0·2	569	0·1	..	..	2,031	0·05
32. Orion	1,743	0·1	..	..	..	..	..	..	1,743	0·04
33. H.Q.409	1,738	0·1	..	..	..	..	..	..	1,738	0·04
34. Q.20	25	..	1,445	0·2	150	0·02	..	..	1,620	0·04
35. B.147	1,619	·01	..	..	..	..	..	..	1,619	0·04
36. Q.2	886	0·05	..	..	..	..	..	..	886	0·02
37. Oramboo	202	0·01	..	..	..	..	421	0·05	623	0·02
38. Q.50	..	..	..	..	575	0·1	..	..	575	0·01
39. Juno	554	0·03	..	..	..	..	..	..	554	0·01
40. Vesta	..	..	..	..	..	..	390	0·04	390	0·01
41. Korpi	344	0·02	..	..	..	..	24	..	368	0·01
42. Q.52	..	..	..	..	..	..	342	0·04	342	0·01
43. Pindar	247	0·01	..	..	..	..	..	..	247	0·01
44. Endor	212	0·01	..	..	..	..	..	..	212	0·01
45. Others	2,066	0·1	299	0·04	832	0·1	842	0·09	4,039	0·08
Totals	1,904,942	..	705,407	..	646,156	..	894,482	..	4,150,987	..

Report of the Division of Entomology and Pathology.

By R. W. Mungomery, Officer in Charge.

Noticeable losses attributable directly to pest attack and to the incidence of diseases during the 1947-48 season were fortunately light throughout all the sugar-producing districts of Queensland, and where heavier damage did occur it was generally localised. Weather conditions which were for the most part almost ideal for crop growth, combined with low insect populations, plus the greater exploitation of some of the newer high-yielding varieties resistant to pests and diseases, were largely responsible for this happy state of affairs, and for a yield which is expected to have been exceeded only by the record production of 1939.

A severe loss to the entomological staff was sustained by Mr. J. H. Buzacott's transfer to the plant-breeding section. Mr. Buzacott had completed over twenty-one years of entomological work in North Queensland, and during that time he amassed a detailed knowledge of the life histories and habits of the many pests which attack sugarcane in Queensland, as well as the associated problems of control.

His place was taken by Mr. G. Wilson, who was previously identified with cane pest and disease control in the South Johnstone mill area. Mr. Wilson's specialised knowledge in this direction has therefore ensured continuity in the important experimental work with benzene hexachloride against "white grubs," a project which has been accorded top priority in sugar-cane entomological investigations over the past two years.

The main legislation enacted during the year, which had a bearing on this phase of the Bureau's activities, dealt with a number of cancellations and amendments to certain Proclamations that had been issued some years earlier in respect of Fiji disease. These alterations were rendered necessary either because of the changed varietal situation or because of the disappearance of disease from the area concerned. The Isis area is one from which Fiji disease is thought to have been eradicated—at least this disease has not been located there during the past two years—and accordingly Proclamation No. 10, which declared that area a quarantine, was cancelled. Proclamation No. 5 was brought up to date by deleting P.O.J.213, P.O.J.234, and P.O.J.2875 from the list of varieties that could be grown under certain restrictions, since these canes were no longer being grown in the Bundaberg-Childers area; on the other hand, Q.25 was added. Similarly, C.P.29/116 was placed in the same category as P.O.J.2878 in accordance with the amended clauses of Proclamation 13 (Moreton mill district quarantine) since it showed moderate susceptibility to Fiji disease, and in some instances older crops of that variety were acting as substantial reservoirs of this disease. Finally, Proclamation No. 2 was amended to make more watertight the prohibition relative to the planting of cane from diseased sources. These various modifications should result in the more efficient functioning of many Cane Pest and Disease Control Boards.

In accordance with the established practice of holding an annual conference of Cane Pest and Disease Control Boards this year's meeting took place at Cairns on 12th May, 1948. Forty-one delegates representing Boards from Mossman to Nambour answered the roll-call, whilst nine Bureau officers were also in attendance in an advisory capacity. The chief items discussed were the supply of "Gammexane" (benzene hexachloride) and recommendations regarding its use for the control of different sugar-cane pests. In addition, various machines for the application of this insecticide were described and demonstrated. Another matter which engaged the attention of delegates was the necessity for compiling, on some uniform basis, all data in connection with pest incidence and control.

The position in regard to individual pests and diseases is as follows:—

The Greyback Cane Beetle (*Dermolepida albohirtum* Waterh.)

The heaviest infestations of "white grubs" this year were seen in the Lower Burdekin and Giru cane areas, where early summer rains ensured adequate moisture during the period when beetles were ovipositing and also when the eggs were hatching. As a result individual stools of cane in some instances were found to harbour as many as twenty-two grubs, and under these circumstances an appreciable reduction in both tonnage and quality occurred. Fortunately, these heavily infested areas were localised and all damaged cane was either used for plants or sent to the mill as soon as crushing commenced; consequently no complete loss of crop from any field was reported. In this area various tree-poisoning schemes have been sponsored by the local Boards for a number of years, and in some sub-districts where extensive tracts of beetle feeding trees were destroyed some freedom from attack has been claimed from time to time. In other cases these tree-killing operations apparently served to concentrate the emerging beetles on to the fringe of the remaining feeding trees with resultant infestation in the nearby areas. However, these infestations are likely to be only temporary, and no doubt they reflected the excellent conditions for grub survival which obtained there this year. Any real benefit accruing from these tree-poisoning projects is difficult to assess, since new areas are being dealt with each year and the position does not remain static for any length of time; moreover, weather conditions are so variable from year to year that they tend to obscure the true influence any such schemes may have in bringing about some degree of permanent control.

Further north the Mulgrave area experienced some of the most extensive of this season's grub infestations, approximately 1,200 acres suffering patchy to moderate damage. This was rather remarkable considering the paucity of beetles seen during the flighting period. Beetle collecting was again carried out in this area, but only little more than 3 cwt. of beetles were delivered to receivers for bonus payments. Beetles were well dispersed over their various feeding trees, and collecting proved an arduous undertaking. Nevertheless, the whole campaign served to demonstrate the futility of trying to achieve satisfactory control in that district by such means. The beetle flighting period was no doubt largely influenced by the lateness of the previous season's flight, and beetles first appeared on the wing in January, 1948. As a result, grub damage to cane occurred correspondingly late, and with the early commencement of harvesting operations this cane was milled before any serious deterioration in quality took place. Still, there was some secondary loss in uprooting of grub-affected stools following on rain and wind early in June.

Beetle emergence in the Babinda and Johnstone areas followed a fairly normal course, and occurred in October, 1947. As usual, the Babinda district suffered only light sporadic damage, but in the Johnstone area infestations were extensive though for the most part light. This area, in common with the Mulgrave area, would have suffered heavier losses had it not been for the widespread use of "Gammexane" which was applied to those fields where infestations were anticipated. Throughout the northern cane areas over 2,900 acres were treated last season with "Gammexane" and a much larger acreage would have been protected had additional supplies been available. On the other hand, only 137 acres were fumigated with carbon bisulphide. This presumably was done as a matter of expediency and this method of control has so fallen into disfavour that several Boards unloaded their stocks wherever reasonable purchase offers were made. It is estimated that in the northern areas 4,500 acres were lightly infested with grubs during the past season for a loss of somewhere in the vicinity of 14,000 tons of cane.

In the Mackay district the beetle flight which took place in January, 1948, was light, and approximately 1,200 lb. of beetles were collected and destroyed at a cost of £70. As a result of grub surveys 23 acres were successfully fumigated with carbon bisulphide, but some damaged fields were subsequently seen at Millicent, O'Connel River, the Pleystowe-Wallingford area, Cameron's Pocket, Barren Pocket, and Silent Grove. Nevertheless, the total loss from visible grub damage in those areas was less than 300 tons.

The resistance of P.O.J.2878 to grub damage in Central Queensland and its susceptibility in North Queensland have previously been the subject of comment, so it was not surprising to find that Trojan reacted differently in the various districts where it was being grown. In the grub-infested fields of the far north this variety along with Cato, showed considerable uprooting, whereas in the Burdekin, E.K.28, S.J.16, and Trojan all showed some resistance in the same fields where Badila was extensively damaged and where S.J.2 proved extremely sensitive to attack. In the Mackay area under the rather limited rainfall conditions of the past summer Trojan was found to be susceptible to the light and patchy grub infestations experienced there whilst Q.50 was not seriously troubled by the few grubs present.

Experimental.—Preliminary laboratory and field tests with the new insecticide "Chlordane" ($C_{10}H_6Cl_8$) against greyback grubs gave such poor toxicity results that it was considered further work with this chemical against these pests was scarcely warranted at this juncture. Apart from this, the remainder of the experimental work centred around the most efficient use of "Gammexane" for grub control, particularly since these investigations gave promise of providing information of greater and more immediate benefit to a large number of growers.

Attention had been drawn earlier to the tendency of the 10 per cent. "Gammexane"—pyrophyllite dust to "fly," and the need for a quicker settling diluent became more and more emphasised as the use of the dust extended. Amongst various materials tested in respect of their suitability as carriers, finely ground rock phosphate was found to be promising, and this product had the added advantage of possessing some value as a fertilizer. Unfortunately grub infestation was neither sufficiently heavy nor uniform to yield conclusive results in the field trials set out to assess the relative values of various "Gammexane" diluents. However, in view of the satisfactory nature of the rock phosphate carrier and the increased scarcity of pyrophyllite, the manufacturers decided on an immediate change over to a dust having the following composition:—Crude benzene hexachloride 10 per cent., ground rock phosphate 75 per cent., pyrophyllite 15 per cent., the last mentioned being used to prevent caking during grinding and mixing operations. This dust has now become the standard 10 per cent. "Gammexane" dust used for grub control.

All evidence available from the various field trials went to show that a high percentage kill of grubs depended largely on the correct placement of the "Gammexane" dust in relationship to the cane to be protected, and it now seems to be well established that in so far as greyback grub control is concerned drill applications made after the cane has germinated are superior to all other methods of application. Broadcast "Gammexane" dressings incorporated into the soil by various methods had some limited value, but in all cases it took approximately three times the amount of insecticide to effect the same degree of grub control as that achieved with drill dressings; hence they are obviously uneconomical when used for this purpose. The

data available from experiments set out in North Queensland to determine optimum rates per acre for drill applications were rather inconclusive because of the absence of any really dense and even infestations in the experimental areas. However, with low grub populations causing light to moderate damage a drill dressing of 50 lb. of 10 per cent. dust per acre was found effective on the heavier soils, whilst 75 lb. per acre gave satisfactory control in the friable schist soils. It can be inferred that the lower successful limits observed this year would probably prove the minimum dressings that could be used with any degree of safety, since the precautionary measure of applying "Gammexane" for grub control would presumably have to cater for potential damage not less than that met with during the past season.

In the Mackay area investigations were similarly hampered by the low grub populations that occurred in the experimental plots, but indications pointed to the possibility that an initial acre dosage of 75 lb. applied as a band dressing along the drills before beetle flight would give complete control of the pest in the plant crop. Results from applications made after the beetle flight were indefinite.

In the Burdekin district, where some growers had treated their own areas, it became apparent that dressings of 75-80 lb. per acre were not wholly effective in coping with the heavy infestations encountered. No doubt in these instances it would have been more prudent for these growers to have applied their quotas of "Gammexane" at the recommended rate of 100 lb. of 10 per cent. dust (1·3 per cent. gamma isomer) per acre, but another factor which may have militated against securing adequate control there is the practice of hilling the cane rows when making provision for irrigating. In this case more efficient placement of the insecticide may go a long way towards solving the particular problem of control, and provision has been made to experiment with different rates and methods of placement during the current season.

Another important point brought to light during the past season was the extraordinary length of time during which "Gammexane" soil dressings remained toxic to grubs. Although this was previously suspected, it was scarcely anticipated that the capacity of "Gammexane" to kill grubs from one crop to another would be of such a high order. However, a number of experiments had previously been set out in an attempt to measure this residual toxicity and to ascertain what "booster" treatments might be needed to ensure adequate control in the succeeding ratoon crop. The results from some of these trials proved very enlightening.

In the Johnstone area two ratoon trials which carried light to moderate infestations on heavy soils showed residual toxic effects towards grubs from plant crop dressings as low as 50 lb. "Gammexane" dust per acre, but neither benefited from a further 50 lb. per acre retreatment of the young first ratoons. In another trial on light red soil in the same district plant crop dressings of 50 lb. to 400 lb. per acre gave fair to good protection respectively against light grub populations in the following ratoon crop, and there was a noticeable difference in favour of the 50 lb. "booster" retreatment in those plots that received 50 lb. and 75 lb. per acre dressings originally.

However, the best clear-cut evidence of the residual effect from "Gammexane" applications was obtained in the Highleigh district of the Mulgrave mill area, where some plots of cane treated in November, 1946, showed freedom from grub attack in May, 1948, At the same time the cane in the adjacent untreated control plots was badly damaged by an average infestation of eleven grubs per stool. Detailed examinations revealed that original plant crop treatments of 125 lb. per acre and over showed virtually no loss in the succeeding first-ratoon crops, whilst treatments of 100 lb. down to 12½ lb per acre disclosed slight to severe damage respectively, and the damage increased in intensity in accordance with the decreased rate of the original "Gammexane" dressings. In this case there was no apparent benefit from a 50 lb. first-ratoon retreatment of those plots that had received 75 lb. or more per acre originally. This important disclosure has now placed a different aspect on the treatment schedule originally recommended, and instead of attempting to apply minimum dressings to the crops needing immediate protection, it may eventually prove more economical to apply sufficient "Gammexane" in the first instance to ensure freedom from grub attack in the plant and first-ratoon crops at least, rather than to apply two small dressings of an equivalent amount separately to the plant and first-ratoon crops, and thereby run the risk of securing incomplete control in both crops. Since grubs of *Lepidiota frenchi* Blkb. and similar species apparently require a higher concentration of "Gammexane" for their control than those of *D. albohirtum* a policy such as that outlined above would tend to fit in more closely with the control of all species, particularly since grubs of *D. albohirtum* and some two-year cycle species frequently occur together in the same fields.

No data were available regarding the persistence of this insecticidal effect beyond the first-ratoon crop.

Miscellaneous "White Grubs."

During the year under review, grubs of *Lepidiota frenchi* Blkb. and *Lepidiota consobrina* Gir. occasioned only slight to moderate damage in the areas where they are known generally to be troublesome; however, a rather unexpected record of damage from the Pilerwa section of the Maryborough district was found to be caused by *L. frenchi*.

In the Isis area infestations of *Pseudoholophylla furfuracea* Burm. were lighter than usual, whilst in the Bundaberg district grubs of *Lepidiota trichosterna* Lea caused losses in only a few small patches. These were reported from the South Kolan, Branyan, and Burnett Heads areas. Various dosage levels of "Gammexane" and methods of placement were tried in an effort to find an effective means of combating these pests, but results were inconclusive because of the light infestations encountered.

In the Moreton area an isolated case of grub attack occurred on a sandy hillside farm where a species of *Anoplognathus* and a Melolonthid were found associated.

Wireworms (*Lacon variabilis* Cand.).

There was a tendency on the part of many growers in the Mackay area to plant their low-lying blocks (the ones usually infested with wireworms) earlier than in former years chiefly because of the labour shortage and a consequent desire on their part to have their plantings completed prior to the commencement of the crushing season. This departure from customary practice was responsible for a considerable increase in the extent and severity of wireworm damage although there was no noticeable increase in the numbers of this pest, since weather conditions during 1947-48 were not particularly favourable for the survival of the younger larval stages.

In 1946, investigations showed that effective wireworm control could be obtained by applying 20 lb. of 10 per cent. "Gammexane" dust per acre mixed with the appropriate fertilizer at planting time. During the spring of 1947 this work was intensified when some 80 acres of field trials were set out. Shoot and stool counts were made in the treated and untreated plots, and it is expected that yield figures will give a fairly clear indication of the amount of wireworm damage which can be tolerated before yields begin to show any appreciable decline. However, since the complete results from this work will not be forthcoming until the plots are harvested, final conclusions must necessarily be delayed until this information is available. These trials did, nevertheless, serve to confirm the efficacy of the control measures evolved in the previous year, and it became clear in ample time before the commencement of planting operations that "Gammexane" could be recommended with confidence to growers as a safe and sound means of combating wireworms if applied in the manner indicated above.

Fertilizer companies co-operated by placing "Gammexane"-fertilizer mixtures on the market with quantities so adjusted that thecorrect amount of "Gammexane" was applied when the "Gammexane" fertilizer mixture was used at the rate of two bags per acre.

Outstanding results in treated fields in contrast to the untreated checks, served to demonstrate how effectively wireworms could be controlled with "Gammexane." The cost was about £1 per acre, and there was no trouble in getting growers to adopt this new method of control. During the recent planting season in the Mackay district "Gammexane" was applied to some 3,000 acres in order to circumvent almost certain wireworm attack, and a larger acreage would undoubtedly have received this protective dressing had not supplies been disorganised because of transport difficulties following a major industrial dispute. There now appears to be no doubt that future demands for "Gammexane"-fertilizer mixtures will be heavy in the central districts.

Locusts.

A few loose and small swarms of locusts were present during the summer in the more western parts of the Mackay district, the predominant species being *Chortoicetes terminifera* Walk., but no damage of any importance was recorded. Elsewhere throughout the Queensland cane areas neither *Gastrimargus musicus* Fabr. nor *Locusta migratoria* L. appeared in the gregarious phase during 1947.

Replicated defoliation experiments simulating locust or army worm damage were set out in the central and northern areas in an attempt to estimate the extent of the losses sustained by the periodical depredations of these pests, but it will not be possible to assess the full effect of the various defoliations on ultimate crop yields until harvesting results are available.

Termites.

The giant termite, *Mastotermes darwiniensis* Frogg., was responsible for a small amount of damage in the Burdekin area, and opportunity was taken to set out trials using "Gammexane" applied (*a*) in a drill along the headland as a barrier, and (*b*) in the cane rows at planting time as a sett protectant. Drill dressings as high as 40 lb. of 10 per cent. dust per acre failed to give protection, but no information was secured regarding the value of the barrier applications. It seems evident that any approach towards permanent freedom from their inroads will be obtained only by destroying the termitaria in the uncultivated lands immediately adjacent to the canefields. Some localised damage from another species (as yet unidentified) was reported from the Mossman area.

Ants.

Some complaints were received from the Tully and nearby districts concerning the activities of the funnel ant, *Aphaenogaster pythia* Forel, which in the more heavily infested centres undermined a noticeable proportion of the cane stools and caused localised stunting. Steps were taken to determine the relative efficiencies of some of the newer insecticides in comparison with carbon bisulphide and paradichlorbenzene, both of which fumigants were formerly used to suppress this pest whenever it commenced to prove troublesome.

Borers.

Infestations of cane by the weevil borer, *Rhabdoscelus obscurus* Boisd., did not reach serious proportions this year presumably due in a large measure to the continued practice of burning all crops prior to harvesting. However, there was evidence also to show that some credit for this comparative freedom from damage was due to othe increased plantings of some of the newer varieties possessing harder rinds.

In the Burdekin area the variety Comus was reported to have suffered some destruction of its buds by caterpillars of the Tineid, *Opogona glycyphaga* Meyr., boring into them, but this damage was confined mainly to stools near the headlands, and suitable planting material was usually obtainable some little distance inside the block.

Miscellaneous Insect Pests.

A minor outbreak of the Chrysomelid, *Rhyparida morosa* Jacq., caused some concern at Yakapari in the central district, but only two acres of poorly grown cane were affected by this pest. At Nikenbah in South Queensland a heavy infestation of *Margarodes* sp. was found established on the roots of P.O.J.2878 ratoons, and in the Isis district "wireworms," which were identified as Tenebrionid larvae, *Dasus* sp., were found rather plentifully in a block of newly planted cane following the turning under of a large amount of dead cane which had been left on the field after the 1946 drought. Although their presence in the field was viewed with some apprehension by the grower concerned, they caused no damage to the germinating setts apart from a small number boring a little distance into the cut ends.

Animal Pests.

No severe or sustained attack on cane by rats was reported during the year although all northern areas recorded an appreciable increase above the low populations of *Rattus conatus* Thomas that existed during the preceding droughty seasons. Some moderate crop damage occurred on farms adjacent to rivers, creeks, and gullies, and where fresh attacks were noticed systematic poisoning was carried out with phosphorus or zinc phosphide baits.

In the central districts the continued harsh conditions proved unsuitable for field research and they also curtailed dormitory work. Some preliminary studies were undertaken in breeding the khaki climbing rat, *Melomys littoralis* Lönn., whilst toxicological tests of an exploratory nature were commenced with the rodenticide "1080" (sodium fluoracetate) prior to more extensive investigations being undertaken with this poison and "Castrix."

Pigs and wallabies maintained their status as sporadic pests of sugar-cane. The greater proportion of the damage attributable to wild pigs occurred on farms adjacent to scrub country in North Queensland. In some instances their localised depredations were viewed so seriously that some Cane Pest and Disease Control Boards sought authority to make an increase in bonus payments to £1 per scalp in an effort to encourage pig-shooters to operate in their areas. The continued shortage of suitable galvanised wire netting precluded growers adopting preventive measures against these pests. Wallabies caused most concern in the Mackay and Burdekin districts. In the latter area additional beagle hounds were made available to new owners, and growers spoke in appreciative terms of their sustained efforts against these pests whenever any appeared in the vicinity of the canelands. Although the number of wallabies in the Mackay district receded from the high peak of the previous year, these marsupials again raided the cane areas during the spring and early summer months of 1947, and almost 4,000 scalps were collected for a bonus payment approaching £400. The fact that the surrounding pastoral areas carried better grass this year was no doubt responsible in a large measure for the decrease in their activities against young cane.

Damage caused by hares and foxes could be detected throughout the greater part of the year on some South Queensland canefields; in these instances foxes concentrated their efforts against millable cane, whilst hares singled out fields of young cane. The district populations of both these animals showed an appreciable upward tendency.

Leaf Scald (*Xanthomonas albilineans* Ashby).

Leaf-scald disease was not so obvious in the 1947-48 crop as in the previous year and, while there may be some grounds for hoping that the disease can be controlled even while susceptible varieties such as Q.44 and Trojan are being grown, the situation will still have to be watched carefully for several years. The 1947 crop showed a good deal of leaf scald, particularly in the wetter areas of the Mulgrave and Babinda districts in the far North, but the same localities have this year shown a considerable improvement. This improvement is partly real and partly apparent and it remains to be seen which has had the most influence on the crop now being harvested. The real improvement in the Mulgrave area, in particular, has been due to the fact that in 1946 the drought severely curtailed the supply of plants from disease-free sources and a good deal of cane from suspect sources was planted. The results were disastrous in many instances and whole fields were ploughed out after harvesting the plant crop. On the other hand the plants for the 1948 crop could be and were obtained from the drier, disease-free areas and so practically all fields of plant cane got away to a clean start. The insistence on plants from the disease-free localities has paid handsome dividends and many farms in the recognised leaf-scald belt have not shown any disease at all for the past year; the benefits will also show in the ratoons. The apparent improvement in the leaf-scald position is due to the fact that the disease may remain masked for long periods, especially when, as in the growing season just passed, growth of the cane has been continuous well into winter. Stunting or other damage to the diseased stools is then at a minimum and, in addition, the characteristic diagnotic symptoms of the disease are either inconspicious or entirely absent.

The leaf-scald resistance trial at Pine Creek, near Cairns, included Meringa and Colonial Sugar Refining Company seedlings and several "Q" canes, as well as the standard canes of known commercial reaction. Each variety was represented in two plots, one of which was planted with setts inoculated before planting with juice extracted from diseased sticks; the other, untreated plot served as a control and check on any natural spread of the disease. A satisfactory amount of disease developed in the trial and Q.54 and Orion, amongst the named canes, showed susceptibility.

Gumming Disease (*Xanthomonas vasculorum* (Cobb) Grieg-Smith).

Mossman is the only mill area in Queensland where gumming disease is known to occur. There the disease did not show any further spread during the year and the quarantine proclaimed in the early part of 1947 still embraces all known diseased farms. In view of the ready transmission of the disease it would not be wise to state that the disease has been checked at its present limits; however, in the meantime, extra-quarantine areas are able to grow the susceptible varieties S.J.4 and H.Q.426 and the whole district has had time to build up adequate stocks of resistant varieties.

The last known focus of gumming disease, prior to this at Mossman, was in the Smithfield locality in the Hambledon Mill area and—perhaps not without significance for the Mossman outbreak—on the Cairns-Mossman road. The disease had spread to Hambledon from the neighbouring Mulgrave Mill area and the reintroduction of the susceptible H.Q.426 to Mulgrave revives the whole question of the growing of susceptible varieties following the apparent eradication of the disease. It is well known that gumming disease can persist for fairly long periods in commercial plantings without becoming obvious either in the field or in the juices at the mill; the disease organism can also occur naturally in plants other than sugarcane. In the Mulgrave and Hambledon areas, however, the varieties which have been grown since the disease outbreaks are comparatively resistant to the disease and even the less resistant canes, such as D.1135 and Badila, are not sufficiently susceptible to maintain the disease without outside infection, provided reasonable care is taken in the selection of healthy planting material. Alternate hosts, such as various grasses and palms, do grow there, but the disease has never been observed to occur naturally in these in Queensland, nor have we observed gumming disease to spread naturally from such hosts to sugar cane. Considering both the resistance of the commercial canes and the lack of infection in natural hosts, the conclusion appears to be warranted that the standard of resistance required of new canes may safely be lowered. In the Ingham district, where the disease forced a varietal revolution some years ago, the new varieties proved so superior to the old that there has not been a single request for the return of the former major canes. At Mackay, for reasons which are not apparent, the disease never assumed importance and has not been seen since 1935; in the meantime, the new resistant "Q" canes have become dominant owing to their superior yields and agricultural characteristics. In the southern districts there has been scarcely any appeal for the return of the old varieties, M.1900S., D.1135 and M.189, whose failure in the widespread epiphytotics of the nineteen twenties almost ruined the industry. Very highly resistant varieties have formed practically the entire southern crop for more than a decade and the propagation of relatively susceptible new varieties could, it is thought, be undertaken without any risk of infection.

Although gumming disease has ceased to count as a threat in such a large portion of the Queensland cane belt, the reactions of all new seedlings to the disease are still determined per medium of a trial conducted in Brisbane. The trial concluded in the spring of 1947 comprised seedlings which had reached advanced trials on one or other of the Experiment Stations; it yielded rather poor results owing to the small amount of infection occurring in the standard canes, H.Q.426 and M.1900S. Promising seedlings will be tested further.

Chlorotic Streak.

The distribution of chlorotic streak in a particular district appears to depend considerably on the duration and intensity of the wet season and in a year of light rainfall such as 1947-1948 the disease remains confined to the lower wetter localities, while the crops on the higher well-drained soils are free. The disease occurred in the north, and at Maryborough and Moreton in the south, and no fresh outbreaks were observed. In certain northern mill areas the practice of bringing plants from the high lands for the control of leaf scald (q.v.) should aid in the control of chlorotic streak disease although the rapidity of infection by chlorotic streak on the lowlands will probably prevent its eradication by such methods alone.

Attempts to transmit the disease by means of nymphs and adults of the insects *Perkinsiella saccharicida* and *Cicadella albida* were unsuccessful. The former was bred on diseased shoots and then transferred to small metal gauze and calico bags which enclosed the young spindle on shoots of a susceptible variety. The canes were kept under observation until well into the ratoon crop.

An observation trial in chlorotic streak country in the Babinda area showed that certain varieties readily become infected during the growth of the plant crop. Some disease showed in Orion and two seedlings within four months of planting and, within nine months, Orion showed 36 per cent. of the stools diseased, and Pindar 12 per cent. Badila in the same trial did not show any disease; it normally does not in the plant crop when healthy setts have been used. The reactions of the various canes will be judged on the amount of disease in the ratoons, but its occurrence in the plant crop probably indicates a fairly high degree of susceptibility. The other observation trial was on alluvial soil at Moreton and did not show any chlorotic streak during the plant crop. The ratoon crop showed some disease in Akbar, Vesta, Q.28, and Q.49, indicating that these varieties are more susceptible than P.O.J.2878, which had none. P.O.J.2878 is regarded as susceptible in that it suffers considerable losses in commercial fields, and any variety showing more susceptibility than this cane will have to be carefully watched.

Two yield trials, in which healthy and diseased planting material both with and without hot-water treatment were compared, have been harvested during the year under review. The trial on alluvial soil at Babinda with Badila did not show any significant differences with regard to sources of plants or treatments. The plants for the diseased plots came from a diseased field but not necessarily from diseased stools; however, the diseased plots showed up to 35 per cent. disease in counts made two months after planting and the actual percentage of diseased stools was certainly greater.

The second yield trial was on Maroochy River alluvial in the Moreton Mill area with the variety P.O.J.2878. Growth was not very satisfactory and yields from the best plots were only moderate when the trial was harvested at twenty-four months. The diseased-untreated plots gave poorer germinations than all the others and were backward throughout the whole growing period of the crop. Two months after planting, these plots showed 50 per cent. of the emerged shoots with chlorotic streak symptoms, but as usual the proportion showing the disease decreased as the crop advanced. Only an occasional diseased stool showed in the healthy or treated plots. The mean values of the yields of cane from each series were as under:—

Diseased-treated.—33.5 tons per acre.	Diseased-untreated.—24.1 tons per acre.
Healthy-treated.—36.4 tons per acre.	Healthy-untreated.—34.5 tons per acre.

All other treatments exceeded the diseased-untreated at the one per cent. level of significance and the difference between healthy-treated and diseased-treated was significant at the five per cent level. C.C.S. value for each series was identical. This loss of 10 tons of cane per acre in a potential crop of 34 tons represents a decrease of nearly 30 per cent., due to the direct effects of the disease, for variation in planting material was eliminated as far as possible by the use of plants from sticks of the same size and from comparable crops.

Several trials were initiated in an endeavour to ascertain the time of the year at which spread of the disease occurs. The general method was to make plantings of healthy setts in a badly diseased area at intervals of one month and to observe the development of the disease through the plant crop and subsequent first ratoons. The trial with Trojan at Babinda showed that there was a decrease in the amount of disease in the ratoons corresponding with increasing lateness of planting. Dates of planting were from June to early November, 1946, and the ratoons early in 1948 showed 19 per cent. diseased stools in the June planting, 24 per cent. in the July, 13 in the August, four in the September and none in the early November. From this it would appear that the time of planting has a definite effect on the spread of the disease to healthy plants, but whether it is due to the time of planting in itself, to the longer exposure to infection, or to the stage of growth at some particular time is not clear. At Moreton there was a somewhat different trial; there, setts or young stools were taken from a block of treated P.O.J.2878 at intervals after planting and transplanted to the Brisbane pathology plot, where transmission of chlorotic streak does not normally occur. The first removal was made in December, 1946, two months after planting and the others followed at approximately monthly intervals until June, 1947. The early batches included the whole stool but the later consisted of setts. Only one diseased stool appeared in the transplantings at Brisbane and no conclusions could be drawn.

Fiji Disease.

Fiji disease continues to be a serious problem in parts of the Bundaberg and Moreton districts, but particularly in the latter. In other areas where this disease has occurred during the past ten years the position is very satisfactory.

In the Bundaberg district the roguing gangs of the Cane Pest and Disease Control Board have destroyed 2,466 Fiji-diseased stools which were found in the 12,044 acres inspected during the year. Of these, 1,448 stools were found in the 3,138 acres inspected on Bingera plantation. However, it is hoped that with the replacement of a large proportion of the susceptible P.O.J.2878 and P.O.J.2725 by the more resistant varieties now being grown, a substantial improvement in the disease situation will be seen. In addition, cutter planters have been introduced to the plantation, and this method of planting will facilitate the early locating and removal of diseased plants, since all setts from one stick are planted

together. In the Avondale and Tantitha quarantine areas the number of diseased stools found was 40 and five respectively, which is a further decrease from the combined total of 134 diseased stools found last year, and is additional evidence of the control of this disease by the use of resistant varieties.

For the second year in succession no Fiji disease was reported from the Isis district although routine inspections were made. It will be of interest to see if the disease reappears after the good growing conditions experienced during the past year. However, the large-scale replacement of P.O.J.2878 by C.P.29/116 should assist in the permanent eradication of the disease.

In the Maryborough district a total of six Fiji-diseased stools were found on three farms in the Urraween-Dundowran area. In each case the variety was P.O.J.2878.

There was a slight decrease in the number of Fiji-diseased stools rogued in the Moreton area this year, a total of 8,091 being destroyed in the 3,680 acres inspected. The total number of diseased stools rogued in this district over the past five years is approaching the 50,000 mark. The difficulties associated with the control of Fiji disease in this district were discussed in last year's report, and to be added to these is the fact that the varietal position has not improved to any extent because the somewhat susceptible C.P.29/116 which has replaced some P.O.J.2878 has also replaced a good deal of the very resistant Co.290, thus making the roguing programme more difficult. For this reason Proclamation No. 13 under "The Sugar Experiment Stations Acts, 1900 to 1947," has been amended to restrict the growing of C.P.29/116 beyond the third calendar year after the year of planting, where Fiji disease is known to be present. Measures are also being taken to prohibit any further plantings of P.O.J.2878 in this district, as there is now a satisfactory range of new, commercially resistant varieties available in sufficient quantities to meet all requirements. These varieties include Q.28, Q.47, Q49, Trojan and Vesta.

The Rocky Point Cane Pest and Disease Control Board, during its second year of operation, inspected 312 acres of cane, from which 109 Fiji-diseased stools were rogued. In addition three acres of P.O.J.2878 on two farms were found to be heavily diseased and will be destroyed after this harvest.

The Fiji-disease resistance trial which would have given results this year was destroyed in the serious flood in January 1947, together with two ratoon trials which had not been completed, hence the disease reactions of a number of the newer seedlings are not yet known. As many of these varieties as possible were included in the trial planted in spring 1947 and results should be available next year.

Dwarf Disease.

During the period under review the Mackay Cane Pest and Disease Control Board destroyed 1,062 stools of dwarf disease which were located on 16 farms. These figures are approximately half those for the previous year, and the reduction is no doubt largely due to the decreasing amount of susceptible varieties grown in the recognised dwarf area, and to the dry conditions of last year. The main dwarf disease area has extended to the south of Walkerston, and odd stools have again been found in the outlying areas of Eimeo Road and Pindi Pindi.

Early in 1947 a number of transmission experiments with dwarf disease were set out; these included mechanical inoculations as well as the use of several sap-sucking insects. Regular inspections over the past fifteen months have not shown any positive results.

Mosaic Disease.

In the Burdekin district this disease is present in small amounts, and the Inkerman and Lower Burdekin Cane Pest and Disease Control Boards are making an effort to eradicate it from infected farms, but owing to the lack of co-operation by some growers a fair amount of spread is taking place through the use of diseased planting material.

The disease is scattered throughout the Mackay district but in general is causing little damage. However, it is very prevalent along the Proserpine River farms in Comus, H.Q.426 and E.K.28. It has been found in two fields of Q.45 and in a few stools of Q.50. In the Bundaberg district mosaic disease is prevalent in most river-bank areas in the varieties Q.25 and Q.42, the former variety suffering a fair amount of damage from the disease. Several propagation plots of Co.301 in the Gin Gin area also showed some mosaic.

Further south the disease is present in Q.42 but appears to be doing very little damage. Several fields of Q.28 and Q.49 have also shown mosaic disease in the Moreton area.

During 1946 mosaic disease resistance trials were planted at Bundaberg and Nambour. Half of each plot was inoculated by the Sein method and half was not inoculated. Results from inoculation have been very satisfactory, but natural spread of the disease was only fair at Nambour and poor at Bundaberg. In the past, natural spread in mosaic trials has always been unreliable, and it appears that all trials should be artificially inoculated.

Downymildew (*Sclerospora sacchari* T. Miy.).

Ten years ago downymildew was considered the most serious disease of sugar cane in Queensland, but by a vigorous programme of roguing diseased stools, issuing ploughout orders on severely diseased fields, selecting clean planting material, and substituting resistant varieties for susceptible ones, the disease has been eliminated from all districts in Queensland except Bundaberg. During the period under review a total of 725 downy-mildew diseased stools were destroyed in the 12,044 acres inspected by the Bundaberg Cane Pest and Disease Control Board, and all of these were in the red volcanic soil of the "Woongarra." In this area the disease has remained fairly static since 1941, the number of diseased stools found each year fluctuating between 1,000 and 5,000, depending mainly on seasonal conditions. However, during the last few years the rapid replacement of P.O.J.2878 by the very resistant C.P.29/116, and to a lesser extent Q.49, has materially helped in the reduction of this disease, and it was considered an opportune time to remove P.O.J.2878 from the planting list in that area, in an effort to eliminate the downymildew. It was therefore decided to issue a proclamation prohibiting further plantings of P.O.J.2878 in the Woongarra, which embraces the Qunaba Mill area and part of the Millaquin Mill area, and includes about 11,400 acres of assigned land. Approximately 20 per cent. of the land under cane in this area is at present planted to P.O.J.2878. The operation of a permit system will allow P.O.J.2878 to be planted in sections of the area where the disease does not exist.

It is now two years since downymildew has been found in the Mossman district, and other districts have been apparently free for much longer periods. However, following the good growing conditions throughout the cane belt during the past year, after a succession of droughts, it is quite possible that this disease may show up again, and a close watch will have to be made for it during the coming summer months.

The usual downy-mildew resistance trials were conducted in isolated areas of the Cairns and Bundaberg districts, and both were reasonably successful, although the poor soil at these sites is not conducive to vigorous growth. The varieties Pindar and Orion appear to be resistant to the disease, while several seedling canes proved highly susceptible. The promising Bureau variety Q.50 appears to be moderately resistant, but would have to be watched if grown in the presence of the disease. It is interesting to note that downymildew has never been observed in the variety C.P.29/116, although large areas of this variety have been grown in close proximity to the disease, and it has been included in many disease-resistance trials.

Red Rot (*Physalospora tucumanensis*).

During the 1947 harvest red rot was serious in South Queensland and many fields had to be cut prematurely to avoid excessive deterioration due to the disease. Co.290 suffered most severely, but as the season advanced Vesta, Q.49, and Q.28 also showed some infection. The susceptible Q.52, the distribution of which had been planned for 1947, developed the expected damage as the season progressed; there is no doubt that the variety is too susceptible for general cultivation. At Mackay, it was also a bad red-rot season and, as well as Co.290 Q.28, and, to a lesser extent, Q.50 became infected, particularly late in the crushing. The continued growth of cane until well into the winter of 1948 has reduced red rot to a minimum this season and to date there have been very few reports of infection.

Q.28 Trouble.

Some very serious losses were experienced in ratoon crops of Q.28 for the 1947 harvest in the Mackay district, due possibly to the use of plants lacking in primary vigour. This trouble has been noticed in previous years, but this year it was more widespread, and, owing to the very dry conditions during the growth of the crop, the yields from affected fields were lower than before and many crops died before they could be harvested. The disorder is again apparent in the 1948 crop, and heavy losses will result, although, due to the good growing conditions, the damage to the cane is not so spectacular as it was last year.

The cause of the trouble has not been determined, but a number of trials have been set out on various soil types using different sources of planting material. Other trials have been set out to determine the effect of different treatments on the poor plants and attempts at transmitting the trouble have also been made. Results of this work should be available next year.

In the meantime growers have been warned to exercise care in the selection of Q.28 planting material, and many farmers have ceased to plant this variety.

Cane Killing Weed (*Striga* sp.).

This parasitic weed appeared in the Mackay district during the summer and autumn of 1947-48 after an absence of several years. In all instances it has been found on new forest lands, or forest lands which have been brought back to cultivation after a number of years under pasture. Some of the affected areas were quite large, and severe damage to the cane had resulted. Many of these new areas were planted with the popular variety Q.50 to ensure supplies of planting material for 1948, and consequently this variety has suffered most.

Striga was also recorded in the Isis district during the year.

It has been mentioned elsewhere in this report that trials with the new hormone weedicides indicate that *Striga* can be controlled by these materials.

Miscellaneous.

Top rot (*Xanthomonas rubrilineans* Lee et al.) was not serious in the northern crops this summer, but a good deal of the red-stripe stage appeared in South Queensland, particularly in the variety Q.49.

Pineapple disease (*Ceratostomella paradoxa*) again was a cause of poor germinations in the Down River area at Inkerman, N.Q., and also affected some fields elsewhere in the same district and in other parts of the sugar belt. Usually the bad strikes due to pineapple disease occur when the farmer takes a risk on planting under conditions not satisfactory for germination, but in the Down River area the disease affects strikes every year and farmers there are making a practice of treating all planting material with mercurial preparations. One farmer has mounted a tank on rollers and fitted a crane which dips the detachable planter boxes full of plants into the solution. With three such boxes there is very little delay in the planting operations, except, of course, that the sticks must be cut into setts for treatment. The solution used contains .015 per cent. mercury and the plants are kept immersed in it for approximately five minutes. A little over 140 tons of cane were dipped by farmers this year.

Germination trials conducted in several areas demonstrated that, under adverse conditions, excellent responses could be obtained by dipping in mercurial solutions, even when pineapple disease was not obviously present. The majority of the trials were in single-row plots and so not suitable for harvesting, but larger trials are due to be harvested this season. However, even if the tonnage from treated plots be only the same as the untreated in many instances, the farmers would be saved some expensive cultivation and supplying of "misses," and in bad years, of course, could be easily saved complete replantings.

Rind disease due to *Pleocyta sacchari* (Mas.) Petr. and Syd. was prevalent in some standover crops of Q.47 and Q.49 in South Queensland. It was sometimes associated with arrowing or damage by mill mud during the first year of growth, but it does appear that Q.49 is more susceptible to the disease than other popular canes.

Importations of cane through the Bureau quarantine house included two canes from New South Wales and six—M.171/30, M.134/32, M.112/34, M165/38, M.63/39 and M.76/39—from Mauritius. A cane from South Africa showed an unidentified freckle and was destroyed, but arrangements have been made to introduce the variety again. Setts of Queensland varieties were sent to America, East Africa, Mauritius, and the Philippines.

The Bureau has continued its service of supplying canegrowers with cultures for the inoculation of legumes. There were requests from 118 farmers during the year and sufficient cultures were supplied for the inoculation of 802 bushels of cowpeas, 3,200 lb. of Gambia pea, and 36 bushels of miscellaneous legumes.

Publications.

Officers of the Division submitted the following papers to the 1948 conference of the Queensland Society of Sugar Cane Technologists held at Maryborough in April:—

"The Field Indentification of Cane Grubs," by J. H. Buzacott.

"The Bureau Quarantine House," by C. G. Hughes.

"The Use of Benzene Hexachloride in Controlling 'White Grubs' in Queensland Cane Fields," by R. W. Mungomery.

In addition, publications not previously referred to in these reports include the following:—

"An Investigation of the Rat Pest Problem in Queensland Canefields: 4. Breeding and Life Histories," by W. A. McDougall. Queensland Journal of Agricultural Science. Vol. 3, No. 1, pp. 1-43, March, 1946.

"An Investigation of the Rat Pest Problem in Queensland Canefields: 5. Populations," by W. A. McDougall. Queensland Journal of Agricultural Science. Vol. 3, No. 4, pp. 157-237, December, 1946.

Report of the Division of Mill Technology.

By J. H. Nicklin, Senior Technologist (Engineer), and J. L. Clayton, Senior Mill Technologist.

Staff.

Following the resignation of Mr. E. R. Behne the Mill Technology Division lost the hand which had guided its activities for many years. The staff now consists of Messrs. J. H. Nicklin and J. L. Clayton, Senior Technologists, and Messrs. C. B. Venton, L. R. Brain, B. G. Adkins, and D. L. McBryde, Assistants.

Routine Operations.

The Mutual Control scheme was carried on throughout the crushing season. Figures were contributed regularly by 23 mills, and one further mill provided seasonal figures for inclusion in the Annual Synopsis.

Apparatus was tested as follows:—

Brix Spindles—115 tested, 93 approved.
Polariscope Tubes—23 tested and approved.
Pipettes—11 tested, 9 approved.
Weights—5 sets standardised.

In addition three polariscopes and one hand refractometer were overhauled, and a viscosimeter was tested to determine its suitability for use with molasses.

The number of brix spindles tested represents a considerable decrease on previous annual figures. This results from a decision to test only those spindles which have ranges suitable for the analysis of juice. The standard of quality of the brix spindles now available to the mills is very high, and the demand for accuracy in brix measurements on materials other than juice is not exacting.

News Letters Nos. 16, 17, and 18 were published during the year. This publication forms a very convenient medium in which to report items of interest both from local observation and from the world's sugar press and also offers a fairly speedy means of announcing the results of test work carried out by the Division. Bound volumes of Nos. 1 to 16 were compiled on behalf of a group of mills. The manufacturing section of the report by Mr. Clayton on his overseas visit (see later) will be published in the News Letter.

Officers of the Mill Technology Division contributed three papers to the 1948 Conference of the Queensland Society of Sugar Cane Technologists in Maryborough, as follows:—

"Notes on Lagging," by J. H. Nicklin.
"Observations on pH Determination," by J. L. Clayton.
"The Recovery of Wax from Factory Mud," by C. B. Venton.

Seasonal Activities.

During the 1947 sugar season three junior members of the Technology staff were each stationed at a mill for the purpose of gaining experience in sugar-mill procedure. Mr. Venton was stationed at Maryborough, Mr. Brain at Pleystowe, and Mr. Adkins at Racecourse. Messrs. Nicklin and Clayton made official visits to all the mills.

Early in the season a series of investigations into the properties of molasses was conducted at Babinda mill. These tests were necessary to provide information for a series of recommendations made later to that mill for a major increase in the capacity of the plant and the efficiency of recovery of sugar.

Preliminary tests were made on a Werkspoor crystalliser at Plane Creek—the first of this type in Queensland.

Slack Season Work.

Cane Wax.—During the 1947 season a group of mills conducted tests, sponsored by the Bureau, on the recovery of cane wax from the filter mud. The results of these tests, together with the proposed design of a pilot plant for wax extraction, were incorporated in the paper by Mr. C. B. Venton.

Subsequently, in response to an appeal by the Australian Sugar Producers' Association, it was decided to have a pilot plant of this type erected. The complete design was drawn up by the Technology Division and at the end of the year the equipment was almost ready for operation. Meanwhile, preliminary tests with various solvents and methods have been conducted in the laboratory.

Molasses.—Further research has been conducted into the properties of molasses. It is now clear that the equipment available in the Bureau laboratories is unsuitable for the specialised treatment processes involved and the design of additional units is proceeding. There appears little doubt that further research on molasses is needed and fortunately this material is suitable for slack seasonal investigations.

General.—With the introduction of the 40-hour week many mills became interested in increasing their crushing rates so that the seasonal period for a normal crop would not be unduly lengthened. A double gain is obtained from shortening the season—milling costs are reduced and, due to a higher average quality of the cane more sugar is obtainable from any given crop. To obtain these benefits without sacrificing efficiency, however, expenditure on additional plant is necessary and the problem of determining what expenditure (or in other words what reduction in crushing season) is justified, is rather a complicated one. The Bureau was requested by several mills to offer suggestions in this matter and it is felt that the reports submitted have been of assistance to them in deciding future policy.

In the reports submitted to three mills by the Engineer Technologist covering increase in power plant, stress was laid on planning the mill electrical system so as to be able to take full advantage of the possibilities of interconnection with a Regional Electricity Board. Several mills are at present both taking power from and, at certain times, supplying power to a Regional Board, but such interchange of power could be very much extended. During the crushing season the fuel cost for electricity generated by a mill is practically nil and if any surplus power can be made available to a Regional Board it would definitely result in a saving of coal to the Board and, at the same time, offset the cost of electricity taken by the mill during the slack season. This interconnection scheme has been endorsed by the State Electricity Commissioner and at a meeting of Regional Board Managers a draft agreement was drawn up to cover the general case. It is therefore felt that in future a mill should have no difficulty in arranging for interchange of power with the Regional Board in its particular area.

Overseas Visit by Mr. J. L. Clayton.

From 14th March, 1948, Mr. J. L. Clayton spent approximately three months in Hawaii investigating certain aspects of the Hawaiian sugar industry. His report includes recommendations for the adoption by the Bureau of several practices of the Sugar Experiment Station in Hawaii.

The 1947 Season.

Production Data.—Table X. shows the production data for the 1947 season. The figures represent the overall performance of the three districts and the State as a whole without reference to the work of the individual mills.

The figures in this table show that the quality of the cane in the northern district was far below normal. The average c.c.s. of 13·66 was very low for this district, and the yield of sugar per ton of cane suffered accordingly. The quantity of molasses produced was high, and despite improved boiling-house performance the loss of sugar in molasses was serious.

The quality of the cane in the central district was not outstanding, but appreciably better than in 1945 or 1946. Unfortunately the crop was the smallest for many years. The southern district crop rose to a reasonable level following the disastrous 1946 season. The quality of the cane was only fair and the ratio of cane to sugar again exceeded eight.

Performance Data.

Referring to the factory performance figures, set out in Table XIII., it is noted that, as usual, the recovery figures are inferior to those shown in the Production Data Tables. This results from the fact that, in general, the larger mills are superior in performance to the smaller units.

The milling work was better in all districts, and the overall average of 95·90 for the reduced extraction is very commendable. The final bagasse moistures were low throughout the State.

Juice and syrup purities were fairly uniform between the northern and central districts, but in the south the purities were below normal—though considerably better than in 1946. It is interesting to note that, whereas in the north a syrup of 88·21 purity yielded 4·47 gallons of molasses per ton of cane, in the central district the purity was slightly higher—88·34—yet the yield of molasses was 5·19 gallons per ton of cane. This is only partly attributable to the higher sugar content of the cane in the central district. Actually the yields of molasses in both central and southern districts were considerably below those of 1946, which were abnormally high.

The final mud quantities were reasonable in all districts, and the average performance of the filters was the best for some years.

All the recovery figures recorded represent an improvement over the 1946 figures, but the undetermined losses were seriously high. The continued upward trend of undetermined loss is worthy of investigation. Attention was directed to this matter in the 1945 report, when the average undetermined loss of 2·96. This was followed by a corresponding figure of 3·58 in the 1946 report, 3·13 in 1947, and now 4·34 in the present table. Factory operating conditions have improved during the period to which these figures refer, so that the undetermined loss might have been expected to decrease. The one factor which has not improved during this period is the physical condition of the cane as received at the mill—both as regards cleanliness and deterioration due to delay between burning and crushing. It is reasonable to suspect that this factor has operated to raise the undetermined loss to its present high value.

The losses of sugar in molasses rose to alarming heights for the 1946 season, and those for this last season were considerably more moderate. Nevertheless it has now been realised generally throughout the industry that the losses of sugar in molasses have been too high in the past and that the best means of improving sugar recovery lies in extracting more sucrose from the final molasses. It is pleasing to record that a high proportion of the mills has now installed or plans to install improved equipment for the treatment of the low-grade products in the boiling house. This represents a significant advance in factory standards in Queensland, and the coming seasons should witness a steady decline in the purity of the final molasses and improved recovery as a result of this.

The average quality of the sugar produced in Queensland remained at a high standard. During the season most of the mills paid particular attention to the keeping quality of the sugar produced, realising that it might be kept in storage for a long period—as much of it was. There are still mills which produce sugar of relatively poor quality for storage. These are fortunate in that they are not called upon to bear the full cost of the subsequent deterioration.

The fuel figures in Tables XIII. and XVIII. show a substantial reduction in the quantity of added fuel in all districts. As usual the most extensive use of added fuel occurred in the southern district, where conditions should be the most favourable. Despite this the southern mills as usual consumed far more fuel in bagasse alone than the total fuel consumed by the northern or central group. The probable reason for this is that the southern area contains the majority of the smaller mills in which fuel economy is generally poor. Actually in all areas the reduction in added fuel resulted mainly from increased supplies of bagasse, and the overall consumption of fuel was still above pre-war levels. To summarise, it may be stated that the 1947 season represented a progressive step in the return to pre-war levels of performance. For this improvement to continue the excessive lost time must be reduced, crushing rates must be raised and the quality of the cane improved. However, no substantial improvements in factory work may be expected until a more generous supply of stable and industrious labour is available to the mills. In the 1947 season, as in others of recent years, there has been no opportunity to exercise rigid control over each station of the factory and to carry the performance of the plant to the limit of its efficiency. The mills have done well to achieve such good results in the face of so many difficulties.

TABLE X.—PRODUCTION DATA FOR THE QUEENSLAND SUGAR INDUSTRY FOR THE SEASONS 1941 TO 1947, INCLUSIVE. (TOTALS AND WEIGHTED AVERAGES.)

NORTHERN DISTRICT.*

——	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Cane—							
Tons	2,062,518	1,963,175	1,430,006	1,819,552	1,943,613	1,551,959	1,876,137
Pol per cent.	16·27	15·06	16·10	15·69	15·56	16·68	14·81
Fibre per cent.	9·71	9·89	10·62	10·39	10·51	10·57	10·62
C.C.S.	15·21	13·93	14·99	14·64	14·47	15·54	13·66
Purity first expressed juice	90·01	89·00	89·95	90·38	89·75	90·08	88·60
Sugar—							
Tons (94 net titre)	305,819	263,908	206,634	259,573	281,998	233,732	255,958
Cane per ton sugar	6·74	7·44	6·92	7·01	6·89	6·64	7·33
Pol per cent.	98·46	98·59	98·58	98·67	98·59	98·70	98·48
Net titre	96·91	97·20	97·14	97·42	97·26	97·45	96·91
Dilution indicator	34·62	33·81	32·31	28·50	31·44	28·90	33·00
Pol per cent. pol cane	87·23	86·43	86·07	86·49	86·72	85·65	84·89
Mud—							
Tons	40,446	34,864	23,045	32,285	31,614	26,009	33,152
Mud per cent. cane	3·23	3·01	2·58	2·98	2·93	3·04	2·85
Pol per cent.	3·67	4·32	4·08	4·75	4·57	3·80	3·41
Pol per cent. pol cane	0·73	0·86	0·65	0·90	0·86	0·69	0·66
Molasses—							
Gallons	4,875,551	4,816,269	3,738,134	4,174,420	4,415,061	3,979,612	5,065,600
Gallons per ton cane	3·89	4·16	4·19	3·86	4·09	4·66	4·36
Brix	85·40	85·05	84·91	84·71	87·14	85·92	86·74
Apparent purity	35·32	32·85	35·01	35·83	35·32	36·18	32·41
True purity	48·74	47·41	47·73	48·25	47·80	48·92	..
Reducing sugars	15·69	17·31	16·35	14·72	16·56	14·88	17·50
Pol per cent. pol cane	4·67	4·98	4·99	4·81	5·28	5·52	5·35
Final Bagasse—							
Tons	262,501	240,685	197,909	235,132	234,022	194,494	258,536
Bagasse per cent. cane	20·96	20·68	22·01	21·72	21·68	22·75	22·34
Pol per cent.	3·30	2·67	2·83	2·79	2·72	3·03	2·45
Dry substance	50·51	51·34	51·77	51·45	51·62	50·40	51·04
Pol per cent. pol cane	4·25	3·69	3·90	3·87	3·79	4·13	3·68
Undetermined loss—							
Pol per cent. pol cane	3·12	4·04	4·39	3·93	3·35	4·01	5·42
Fuels—							
Tons wood	8,622	8,433	6,936	6,353	11,143	10,291	7,389
Tons coal	..	..	..	..	..	..	16·00
Tons molasses	5,970	16,908	12,539	12,144	9,951	5,232	9,057

* The figures for tons of cane, tons of sugar, and tons of cane per ton of sugar refer to all mills. All others exclude C.S.R. Co. mills.

CENTRAL DISTRICT.†

——	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Cane——							
Tons	1,724,922	1,631,976	1,176,802	1,700,451	1,699,803	1,716,764	1,380,368
Pol per cent.	15·98	16·14	16·58	16·87	15·83	15·21	16·44
Fibre per cent.	11·37	11·22	11·95	12·07	12·34	11·34	12·16
C.C.S.	14·92	15·17	15·56	15·81	14·79	13·69	15·36
Purity first expressed juice	90·46	91·40	91·19	90·98	90·48	85·64	90·59
Sugar—							
Tons (94 net titre)	256,923	240,458	177,527	262,254	242,673	227,754	204,780
Cane per ton sugar	6·71	6·79	6·63	6·48	7·00	7·54	6·74
Pol per cent.	98·71	98·74	98·80	98·91	98·93	98·87	98·91
Net titre	97·20	97·36	97·52	97·77	97·80	97·63	97·57
Dilution indicator	32·83	31·78	29·35	26·95	24·58	27·16	30·00
Pol per cent. pol cane	88·98	87·03	86·65	86·94	85·75	82·96	85·94
Mud—							
Tons	60,631	66,194	47,653	66,339	64,449	70,807	49,767
Mud per cent. cane	3·52	4·06	4·05	3·91	3·79	4·12	3·61
Pol per cent.	1·80	1·89	1·80	1·85	1·78	2·15	1·88
Pol per cent. pol cane	0·40	0·47	0·44	0·43	0·43	0·58	0·41
Molasses—							
Gallons	6,826,234	6,269,265	4,773,416	7,474,610	7,902,266	11,146,914	6,777,400
Gallons per ton cane	3·96	3·84	4·06	4·40	4·65	6·69	4·91
Brix	88·79	86·81	88·15	87·36	87·46	88·02	88·32
Apparent purity	35·21	38·10	37·11	37·36	38·99	34·44	37·69
True purity	46·24	47·00	46·40	47·20	48·71	45·68	..
Reducing sugars	15·22	13·02	14·68	14·34	13·54	23·81	14·57
Pol per cent. pol cane	5·09	5·12	5·24	5·55	6·54	8·44	6·51
Final bagasse—							
Tons	417,549	418,048	303,907	435,253	437,701	426,219	344,687
Bagasse per cent. cane	24·21	25·62	25·82	25·60	25·75	24·82	24·97
Pol per cent.	2·81	2·76	2·93	2·91	2·67	3·03	2·62
Dry substance	49·54	49·42	49·42	50·22	51·43	49·71	52·14
Pol per cent. pol cane	4·26	4·38	4·56	4·42	4·34	4·94	3·97
Undetermined loss—							
Pol per cent. pol cane	1·27	3·00	3·11	2·66	2·94	3·08	3·17
Fuels—							
Tons wood	6,270	6,936	10,759	11,422	7,240	15,322	4,988
Tons coal	250	171	559	642	514	637	271
Tons molasses	1,557	1,024	886	1,152	1,299	1,083	..

† The fuel figures exclude Pioneer and Inkerman mills. All others include all mills.

TABLE X.—*continued.*

SOUTHERN DISTRICT.

——	1941.	1942.	1943.	1944.	1945.*	1946.†	1947.
Cane—							
Tons	1,006,149	755,491	790,616	878,187	908,566	445,752	894,482
Pol per cent.	14·76	14·96	14·42	15·35	14·84	13·23	14·31
Fibre per cent.	12·93	13·85	13·64	13·39	13·97	13·47	14·68
C.C.S.	13·57	13·73	13·26	14·20	13·63	11·54	13·01
Purity first expressed juice	87·94	88·01	88·18	89·15	88·17	81·18	88·05
Sugar—							
Tons (94 net titre)	134,603	101,314	102,286	121,713	119,918	50,600	110,920
Cane per ton sugar	7·48	7·46	7·73	7·22	7·58	8·81	8·07
Pol per cent.	98·80	98·86	98·90	99·08	99·09	98·72	99·06
Net titre	97·16	97·39	97·56	97·92	97·95	97·02	96·96
Dilution indicator	24·27	31·15	29·11	26·13	27·79	26·73	25·00
Pol per cent. pol cane	86·64	85·53	85·49	85·90	86·33	81·99	83·86
Mud—							
Tons	31,996	26,669	32,969	31,966	34,716	15,601	30,515
Mud per cent. cane	3·18	3·53	4·17	3·64	3·90	3·69	3·39
Pol per cent.	2·90	2·69	2·19	2·50	3·59	3·20	2·55
Pol per cent. pol cane	0·62	0·63	0·63	0·59	0·94	0·89	0·61
Molasses—							
Gallons	4,567,916	3,641,467	3,541,960	3,837,677	4,139,049	3,204,205	4,506,000
Gallons per ton cane	4·54	4·82	4·48	4·37	4·56	7·14	5·13
Brix	87·82	89·29	88·82	89·19	88·62	88·06	88·58
Apparent purity	36·77	38·39	39·71	38·72	39·15	34·60	38·70
True purity	45·96	46·32	47·38	46·98	47·20	45·04	..
Reducing sugars	12·70	12·06	10·06	11·21	11·08	19·59	13·05
Pol per cent. pol cane	6·49	7·27	7·20	6·47	7·13	11·04	7·85
Final bagasse—							
Tons	264,208	215,800	225,235	243,681	267,213	126,496	257,705
Bagasse per cent. cane	26·31	28·56	28·55	27·71	29·41	29·20	29·22
Pol per cent.	2·14	2·22	2·03	2·14	2·17	2·14	1·94
Dry substance	52·60	51·43	50·51	51·15	50·20	49·41	51·07
Pol per cent. pol cane	3·81	4·24	4·01	3·87	4·39	4·38	3·87
Undetermined loss—							
Pol per cent. pol cane	2·44	2·33	2·67	3·17	1·21	1·70	3·81
Fuels—							
Tons wood	8,573	7,418	15,339	11,044	10,351	9,532	4,421
Tons coal	158	504	1,083	602	411	1,001	513
Tons molasses	..	..	..	..	..	..	..

* In 1945, mud figures exclude Rocky Point and Fuel figures exclude Maryborough.

† In 1946, Mount Bauple is excluded from Mud and Fuel figures and Rocky Point from all except Tons Cane, Tons Sugar, Tons Cane per ton Sugar and Fuel figures.

ALL QUEENSLAND DISTRICTS.

——	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Cane—							
Tons	4,793,589	4,350,642	3,397,424	4,398,196	4,551,982	3,714,475	4,150,987
Pol per cent.	15·75	15·51	15·80	16·15	15·51	15·33	15·34
Fibre per cent.	11·26	11·71	12·02	11·90	12·21	11·44	12·28
C.C.S.	14·64	14·43	14·72	15·07	14·41	13·89	14·18
Purity first expressed juice	89·55	89·80	89·93	90·35	89·70	86·23	89·26
Sugar—							
Tons (94 net titre)	697,345	605,680	486,447	643,540	644,661	512,086	571,658
Cane per ton sugar	6·87	7·18	6·98	6·83	7·06	7·25	7·26
Pol per cent.	98·65	98·71	98·76	98·88	98·86	98·80	98·81
Net titre	97·10	97·31	97·30	97·70	97·67	97·36	97·50
Dilution indicator	31·70	32·16	31·67	27·34	27·75	27·66	30.00
Pol per cent. pol cane	87·86	86·53	86·17	86·57	86·17	83·67	85·11
Mud—							
Tons	133,073	127,727	103,667	130,590	130,779	112,417	113,434
Mud per cent. cane	3·34	3·60	3·63	3·57	3·56	3·75	3·31
Pol per cent.	2·66	2·72	2·70	2·78	2·93	2·68	2·51
Pol per cent. pol cane	0·56	0·63	0·56	0·60	0·67	0·66	0·54
Molasses—							
Gallons	16,269,701	14,727,001	12,053,510	15,486,707	16,456,376	18,330,731	16,349,000
Gallons per ton cane	4·08	4·15	4·22	4·23	4·46	6·07	4·78
Brix	87·50	86·85	87·34	87·10	87·67	87·58	87·91
Apparent purity	35·68	36·45	37·22	37·28	38·05	34·84	36·35
True purity	46·91	46·97	47·10	47·43	48·09	46·26	..
Reducing sugars	14·65	14·19	13·84	13·77	13·73	21·18	15·17
Pol per cent. pol cane	5·28	5·51	5·65	5·55	6·30	7·85	6·45
Final bagasse—							
Tons	944,258	874,553	727,051	944,066	938,936	747,209	860,928
Bagasse per cent. cane	23·71	24·67	25·43	24·97	25·46	24·86	25·16
Pol per cent.	2·80	2·62	2·67	2·75	2·54	2·87	2·36
Dry substance	50·45	50·46	50·57	50·80	51·13	49·86	51·49
Pol per cent. pol cane	4·15	4·13	4·21	4·13	4·17	4·62	3·85
Undetermined loss—							
Pol per cent. pol cane	2·15	3·20	3·41	3·15	2·69	3·20	4·05
Fuels—							
Tons wood	23,465	22,787	33,034	28,819	28,731	35,145	16,798
Tons coal	408	741	1,642	1,244	925	1,638	800
Tons molasses	7,527	17,032	13,425	13,296	11,250	6,315	9,057

Tons of Cane, Tons Sugar, and Tons Cane per ton Sugar include all mills. All other figures exclude C.S.R. Mills only, except—

(1) In 1945, Mud figures exclude Rocky Point and Fuel figures exclude Maryborough.

(2) In 1946, Mount Bauple is excluded from Mud and Fuel figures and Rocky Point from all except Tons Cane, Sugar, Tons Cane per ton Sugar and Fuel figures.

(3) All years Fuel figures exclude Pioneer and Isis.

TABLE XI.—SUGAR PRODUCED 1947, COMPARED IN DISTRICTS WITH AGGREGATE PEAK ALLOCATIONS.

District.	Tons 94 n.t. Sugar.			Production Per Cent. Peak.
	Produced.	Peak.	Excess of Peak Over Production.	
Northern	255,941	330,000	74,059	77·56
Central	204,668	270,000	65,332	75·80
Southern	110,858	137,000	26,142	80·91
Totals	571,467	737,000	165,533	77·54

TABLE XII.—TONS OF CANE PER TON 94 N.T. SUGAR (WEIGHTED AVERAGE).

Seasons.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Tons cane per ton 94 n.t. sugar	6·90	7·31	6·97	6·92	6·94	6·73	6·87	6·77	6·82	6·87	7·18	6·98	6·83	7·06	7·25	7·26

TABLE XIII.—FIGURES FOR 1947 SEASON. (TOTALS AND ARITHMETIC AVERAGES).

——	Northern.	Central.	Southern.	All Districts.
Tons cane crushed	1,876,137	1,380,368	894,482	4,150,987
Tons 94 n.t. sugar	255,941	204,668	110,858	571,467
Net titre	97·06	97·60	97·18	97·50
Tons cane per ton sugar	7·36	6·84	8·24	7·44
C.C.S. of cane	13·37	15·37	12·93	14·13
Coefficient of work	97·53	95·35	94·30	95·44
Coefficient of work E.S.G.	91·57	90·51	90·00	90·56
Crushing rate	77·63	61·39	48·05	60·55
Lost time per cent.	9·63	7·53	12·82	9·76
Fibre, per cent. cane	10·65	12·61	14·09	12·72
Pol per cent. cane	14·82	16·46	14·20	15·30
First expressed juice—				
Brix	19·83	22·08	20·19	20·95
Purity	88·57	90·41	86·83	88·81
Clarified juice—				
Brix	15·42	15·68	14·59	15·22
Purity	88·20	88·40	86·29	87·59
Syrup—				
Brix	69·14	70·36	67·67	69·10
Purity	88·21	88·34	86·41	87·61
Last expressed juice—				
Purity	74·61	76·95	74·38	75·57
Clarified juice per cent. cane	104·31	113·58	107·25	109·08
Dilution per cent. first expressed juice	28·64	42·08	38·88	37·70
Final bagasse—				
Per cent. pol	2·45	2·67	2·09	2·43
Dry substance	51·00	52·07	51·09	51·51
Pol extraction	96·35	95·77	95·65	95·86
Reduced extraction	95·58	95·81	96·24	95·90
Final molasses—				
Gallons per ton cane	4·47	5·19	5·32	4·78
Brix	88·60	88·03	87·01	87·37
Apparent purity	32·75	38·26	39·37	37·41
True purity	46·62	47·69	48·44	47·67
Reducing sugars	17·46	14·55	13·47	14·98
Final mud—				
Tons per cent. cane	2·80	3·61	3·39	3·31
Pol per cent. mud	3·55	2·22	3·53	2·96
Sugar—				
Pol	98·470	98·909	98·728	98·753
Reducing sugars	·472	·306	·203	·304
Ash	·182	·201	·270	·223
Moisture	·356	·250	·290	·287
Dilution indicator	30·00	29·00	30·00	29·00
Pol balance—				
Sugar (recovery)	85·77	84·76	82·89	84·37
Bagasse	3·65	4·23	3·81	3·96
Molasses	5·52	6·99	7·42	6·80
Mud	·64	·42	·61	·53
Undetermined loss	4·42	3·60	5·27	4·34
Boiling house efficiency	93·87	92·42	92·17	92·66
Boiling house efficiency E.S.G.	93·49	92·12	91·87	92·34
Fuels (calculated as equivalent bagasse per cent. cane)—				
Wood	1·167	1·487	3·785	2·238
Coal	·005	·025	·141	·062
Molasses	·913	·019	·000	·226
Total added	2·085	1·531	3·926	2·526
Bagasse	22·988	28·068	30·388	27·684
Total fuel	25·073	29·599	34·314	30·210
Crop days	1,848·5	1,249·3	1,191·5	4,289·3

TABLE XIV.—AVERAGE PERFORMANCE FOR QUEENSLAND FACTORIES, EXCLUDING COLONIAL SUGAR REFINING CO'S. FACTORIES. (ARITHMETIC AVERAGES.)

	Northern District.		Central District.		Southern District.		All Queensland Districts.	
	1946.	1947.	1946.	1947.	1946.	1947.	1946.	1947.
Pol in cane	16·65	14·82	15·17	16·46	13·22	14·20	14·91	15·30
Fibre in cane	10·51	10·65	11·37	12·61	13·49	14·09	11·83	12·72
Purities—								
First expressed juice	89·96	88·57	85·07	90·41	80·25	86·83	84·71	88·81
Clarified juice	89·65	88·20	83·43	88·40	79·18	86·29	83·57	87·59
Syrup	89·30	88·21	83·58	88·34	79·30	86·44	83·58	87·61
Gallons molasses per ton cane	4·67	4·47	6·57	5·19	8·05	5·32	6·59	4·78
Apparent purity molasses	36·36	32·75	34·53	38·26	35·35	39·37	35·20	37·41
Overall recovery	85·32	85·77	82·63	84·76	80·69	82·89	82·57	84·37
Overall recovery E.S.G.	84·97	85·43	82·33	84·42	80·34	82·62	82·24	84·04
Recovery on mixed juice	88·96	89·02	87·13	88·41	84·52	86·65	86·67	88·00
Recovery on mixed juice E.S.G.	88·60	88·66	86·81	88·29	84·15	86·39	86·31	87·73
Boiling house efficiency	93·10	93·87	93·72	92·42	93·18	92·17	93·42	92·66
Boiling house efficiency E.S.G.	92·72	93·49	93·37	92·12	92·81	91·87	93·05	92·34
Pol extraction	95·91	96·35	94·83	95·77	95·60	95·65	95·31	95·86
Reduced extraction	95·01	95·58	94·26	95·81	96·03	96·24	94·93	95·90
C.C.S. in cane	15·50	13·37	13·63	15·37	11·45	12·93	13·39	14·13
Coefficient of work	96·16	97·53	96·74	95·35	97·83	94·30	96·84	95·44
Coefficient of work E.S.G.	91·27	91·57	91·75	90·51	92·93	90·00	91·89	90.56

TABLE XV.—CANE MILLED AND SUGAR YIELD, SEASON 1947.

Mills.	Tons Cane Crushed.	Tons 94 n.t. Sugar Made.	Tons Cane per Ton 94 n.t. Sugar.	
			1947.	1946.
Mossman	138,444	17,526	7·899	6·898
Hambledon	133,754	18,445	7·252	7·014
Mulgrave	185,514	24,112	7·694	7·459
Babinda	252,987	33,520	7·547	6·679
Goondi	174,871	23,321	7·498	6·680
South Johnstone	216,254	29,798	7·257	6·375
Mourilyan	147,825	20,099	7·355	6·663
Tully	221,675	30,344	7·305	6·290
Macknade	204,962	29,076	6·873	6·465
Victoria	199,851	29,700	6·901	6·548
Local sales	..	17	..	..
Northern District, Totals and averages	1,876,137	255,958	7·330	6·640
Invicta	66,133	10,053	6·578	6·432
Pioneer	193,701	29,675	6·527	6·828
Kalamia	209,124	33,564	6·231	6·848
Inkerman	265,254	39,034	6·795	7·351
Proserpine	69,344	10,042	6·905	7·751
Cattle Creek	43,977	6,242	7·045	8·096
Racecourse	101,313	14,147	7·161	8·190
Farleigh	104,335	14,445	7·223	7·666
North Eton	51,198	7,495	6·831	8·768
Marian	82,265	12,058	6·822	7·718
Pleystowe	112,888	16,396	6·885	7·592
Plane Creek	80,836	11,517	7·019	8·387
Local sales	..	112	..	..
Central District, Totals and averages	1,380,368	204,780	6·744	7·538
Qunaba	70,724	7,903	8·949	*
Millaquin	144,374	17,597	8·204	8·603
Bingera	153,692	19,545	7·863	8·281
Fairymead	159,378	19,150	8·323	9·042
Gin Gin	39,550	4,766	8·298	10·524
Isis	111,351	14,572	7·641	9·549
Maryborough	44,894	5,808	7·730	8·319
Mount Bauple	30,386	3,660	8·302	8·989
Moreton	124,740	16,215	7·693	8·688
Rocky Point	15,393	1,642	9·375	9·890
Local sales	..	62	..	..
Southern District, totals and averages	894,482	110,920	8·069	8·809
Totals and averages, all Districts	4,150,987	571,658	7·264	7·254

* Mill did not crush in 1946.

TABLE XVI.—AVERAGE CRUSHING RATES (TONS CANE PER HOUR) (ARITHMETIC AVERAGES).

Season.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Crushing rate ..	60·80	61·53	61·67	63·32	55·93	55·45	57·33	59·32	59·48	60·55

TOTAL CROP DAYS.

Season.	1938.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.
Total crop days ..	4,822	5,163	4,558	4,034	4,432	4,270	4,749	4,872	3,740	4,289

TABLE XVII.—ANALYSIS OF GROSS TIME FOR SEASON 1947 (EXCLUDING C.S.R. MILLS).

——	Total Hours.	Per cent. of Gross Total Time.	Per cent. of Available Time.
Crushing time	54,986·2	64·27	90·94
Lost time—			
Manufacture	1,993·5	2·33	3·30
Cane supply	3,483·2	4·07	5·76
Total	60,462·9	70·67	100·00
Premeditated and week-end stoppages	25,089·7	29·33	..
	85,552·4	100·00	..

TABLE XVIII.—FUEL CALCULATED AS EQUIVALENT BAGASSE* PER 100 CANE. (ARITHMETIC AVERAGES.)

Year.	Wood.	Coal, &c.	Molasses.	Total Added.	Bagasse.	Total.
NORTHERN DISTRICT.						
1938	·368	..	1·664	2·032	23·155	25·187
1939	·557	..	1·807	2·364	21·892	24·256
1940	1·226	..	1·217	2·443	21·982	24·425
1941	1·230	..	·768	1·998	21·390	23·388
1942	1·243	..	2·276	3·519	21·637	25·156
1943	1·410	..	2·224	3·634	23·182	26·316
1944	1·063	..	1·770	2·833	22·633	25·466
1945	1·830	..	1·552	3·382	23·021	26·403
1946	2·287	..	1·088	3·375	22·858	26·233
1947	1·167	·005	·913	2·085	22·988	25·073
CENTRAL DISTRICT.						
1938	1·504	·329	·542	2·375	25·317	27·692
1939	·993	·058	·646	1·697	24·743	26·440
1940	1·138	·019	·220	1·377	24·801	26·178
1941	1·106	·047	·295	1·448	24·837	26·285
1942	1·224	·046	·217	1·487	26·254	27·741
1943	2·589	·189	·198	2·976	26·163	29·139
1944	1·995	·131	·180	2·306	27·061	29·367
1945	1·372	·092	·326	1·790	28·144	29·934
1946	2·730	·132	·132	2·994	25·183	28·177
1947	1·487	·025	·019	1·531	28·068	29·599
SOUTHERN DISTRICT.						
1938	4·586	·017	·012	4·615	29·855	34·470
1939	2·714	·010	..	2·724	30·011	32·735
1940	2·535	·031	·005	2·571	29·341	31·912
1941	2·659	·045	..	2·704	28·612	31·316
1942	3·197	·183	..	3·380	30·325	33·705
1943	5·385	·380	..	5·765	29·358	35·123
1944	4·306	·151	..	4·457	29·326	33·783
1945	3·565	·059	..	3·624	30·550	34·174
1946	5·693	·697	..	6·390	29·341	35·731
1947	3·785	·141	..	3·926	30·388	34·314
ALL QUEENSLAND DISTRICTS.						
1938	2·341	·137	·621	3·099	26·432	29·531
1939	1·508	·027	·692	2·227	25·956	28·183
1940	1·662	·018	·382	2·062	25·759	27·821
1941	1·695	·035	·302	2·032	25·369	27·401
1942	1·939	·084	·633	2·656	26·612	29·268
1943	3·313	·212	·613	4·138	26·598	30·736
1944	2·603	·107	·497	3·207	26·814	30·021
1945	2·218	·058	·524	2·800	27·781	30·581
1946	3·516	·270	·341	4·127	25·842	29·969
1947	2.238	·062	·226	2·526	27·684	30·210

* Equivalent bagasse = bagasse with net calorific value of 3,300 B.Th.U. per lb.

By Authority: A. H. TUCKER, Government Printer, Brisbane.