1950.

QUEENSLAND

FIFTIETH 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* 1948").

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FIFTIETH 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 Fiftieth Annual Report of the Bureau of Sugar Experiment Stations, covering the period from 1st July, 1949, to 30th June, 1950.

NORMAN J. KING, Director.

10th October, 1950.

Director's Report.

GENERAL.

The growing season for the 1950 crop may be described as one of abnormally high rainfall, combined with a deficiency of sunshine in all areas. The net effect of the conditions varied from district to district. Heavy flooding occurred in parts of the northern areas but no serious damage to crops resulted. The continuation of the wet season beyond its normal period prevented land preparation and planting in all areas, and fields which were planted between rains became waterlogged and gave poor resultant stands. In consequence planting for the 1951 harvest will be delayed until the spring. The climatic conditions of the early summer period and of the following wet season were favourable to the development of very high grub populations in north Queensland, and most areas not protected by benzene hexachloride were seriously damaged in the autumn months. However, the 20,000 acres treated with this insecticide were unaffected by this serious cane pest and as a result the production of these lands was greatly increased. In no instance was there a break-down of the control.

Another effect of the universally prolonged wet season was the heavy arrowing experienced in all centres. This naturally affected late growth in districts where temperatures were favourable to winter development and it also made impracticable the standing over of many crops which were otherwise suitable.

The most serious effect of the late rains was the postponement of early crushing dates. Almost every mill was compelled by lack of cane supply to close down for some weeks or to start much later than originally planned. It is not feasible to extend the season to make up for this lost time since the next wet season and the difficulty of retaining labour after the end of December will force the closure of mills before all cane has been harvested.

The late plantings for the 1951 crop will undoubtedly have an effect on the tonnage produced for that year. In the Mackay area in particular practically no early planting was carried out, and from Townsville north the proportion of early planting was considerably below normal.

The supply position showed some improvement over the previous year particularly in regard to fertilizers and tractors, but the serious steel shortage continued and there was no amelioration of the time lag in obtaining such items as mill machinery, tramlines, agricultural implements, etc.

In the following table are shown the monthly rainfall for the several 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.

ESTIMATE OF THE 1950 CROP.

During May, 1950, a preliminary assessment of the crop was made and the summation of figures received showed that 7,018,376 tons of cane would be available for crushing. It was calculated that this tonnage would yield approximately 988,000 tons of 94 net titre sugar or 954,000 tons of bagged sugar. In view of the late wet season experienced and the lower than usual sugar content of cane crushed it would appear that a figure of 970,000 tons of 94 net titre sugar may be a more reasonable expectation.

TABLE I.—RAINFALLS IN CHIEF CENTRES OF PRODUCTION DURING PERIOD JULY, 1949, TO JUNE, 1950, INCLUSIVE.

(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 Rainfall.
	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	57	9	0	127	11	2	131	9	3	68	9	1	339	12	3	1,229	13	9	1,951	63	18	2,470	13	11	2,794	14	12	1,422	17	11	2,590	25	15	230	8	4	332	14	6	9,838	91	59	11,789	154	77	9,276
Cairns ..	45	9	1	321	15	5	111	10	2	24	4	0	353	10	4	722	13	7	1,576	61	19	2,290	15	10	1,138	18	12	2,633	17	14	1,961	25	11	228	8	4	294	12	3	9,574	95	54	10,120	156	73	8,875
Babinda..	430	10	8	529	12	7	616	8	7	93	4	1	240	3	3	454	6	5	2,362	43	31	2,036	14	11	1,689	13	12	3,832	14	12	4,272	21	20	536	14	10	554	13	8	12,919	89	73	15,281	132	104	16,617
Innisfail..	527	15	12	479	13	7	92	11	7	39	4	1	121	6	2	303	14	3	1,561	63	32	1,978	16	16	1,960	15	13	3,537	16	14	4,585	26	20	568	10	4	533	14	6	13,161	97	73	14,722	160	105	14,378
Tully ..	430	11	8	900	11	11	317	9	7	25	1	1	265	5	4	731	10	8	2,668	47	39	3,269	12	10	2,627	16	13	6,873	19	17	5,325	25	21	571	12	6	635	12	10	19,300	106	77	21,968	153	115	18,071
Ingham ..	6	2	0	99	11	1	128	9	1	140	7	2	99	6	2	165	7	3	637	42	9	2,431	15	11	1,473	18	10	4,587	21	16	1,522	17	9	448	9	4	253	12	6	10,714	92	56	11,351	134	65	7,992
Giru ..	0	0	0	0	0	0	0	0	0	281	5	3	325	4	4	23	1	1	629	10	8	1,262	14	12	960	12	9	3,062	18	16	953	17	11	208	5	3	112	2	1	6,557	68	32	7,186	78	60	4,596
Ayr ..	0	0	0	3	1	0	3	1	0	269	8	1	74	3	1	39	2	1	388	15	3	1,240	16	13	814	14	10	2,517	20	12	640	14	9	180	4	3	63	7	1	5,454	75	48	5,842	90	51	4,154
Proserpine	25	4	0	45	5	0	36	6	0	220	6	3	310	5	4	82	5	1	718	31	8	2,651	15	15	912	17	9	2,822	22	17	1,045	15	12	318	6	5	140	8	2	7,888	83	60	8,606	114	68	7,151
Mackay ..	31	5	0	4	2	0	19	3	0	397	5	4	259	9	4	109	7	3	819	31	11	1,911	18	16	1,585	17	10	2,538	26	20	1,139	19	8	407	11	7	143	9	3	7,723	98	68	8,542	129	79	6,691
Sarina ..	10	2	0	29	2	1	11	1	0	247	4	4	234	6	4	326	6	3	857	21	12	3,295	17	16	957	14	8	3,561	22	18	1,140	15	9	259	8	5	253	4	2	9,465	80	58	10,322	101	70	6,989
Bundaberg	51	6	0	23	5	0	72	6	1	852	12	6	345	13	5	292	6	2	1,635	48	14	614	9	6	1,756	19	13	764	21	9	556	19	6	252	5	4	681	11	4	4,623	84	42	6,258	132	56	4,347
Childers ..	124	8	1	59	4	1	304	6	4	798	15	9	465	11	5	401	4	2	2,151	48	22	336	11	3	1,705	19	10	720	21	11	459	15	5	237	9	3	495	11	5	3,952	86	37	6,103	134	59	4,178
Maryborough	136	9	2	77	7	2	315	7	3	1,543	15	9	399	14	6	381	4	2	2,853	56	24	482	9	5	1,970	21	13	676	25	13	392	20	3	205	7	4	447	11	6	4,172	93	44	7,025	149	68	4,563
Nambour	208	7	4	68	6	1	551	13	5	1,465	13	11	371	12	3	596	9	3	3,259	60	27	864	12	7	3,372	22	14	1,063	17	16	596	21	9	172	7	3	672	7	5	6,739	86	54	9,998	146	81	6,416
Beenleigh	68	6	1	20	2	0	165	6	3	1,091	12	9	355	5	4	281	3	3	1,980	34	20	670	6	5	1,374	13	10	681	16	8	207	12	2	57	4	1	724	9	4	3,713	60	30	5,693	94	50	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.

In all districts a bounteous season was experienced and many mill areas produced crops in excess of previous production records. Fifteen mills have estimated crops in excess of 250,000 tons of cane while five mills will handle over 300,000 tons each.

In addition it is estimated that the three New South Wales mills will crush some 374,000 tons of cane from which some 44,000 tons of bagged sugar would be manufactured. The total estimated yield of 94 net titre sugar may therefore be set down at 1,016,000 tons.

In Table II. below are shown the individual Queensland mill estimates for 1950 as well as the actual crushings for 1949.

TABLE II.

SUGAR CANE HARVESTED, 1949—ESTIMATED, 1950.

Domestic Tonnage.	Actual Crushing.		Mills.	Estimated 1950 Crop.
	Purchased.	Condemned.		
146,541	146,541	..	Mossman	160,000
220,968	220,968	67	Hambledon	232,000
271,430	271,513	..	Mulgrave	295,000
250,275	250,192	..	Babinda	280,000
196,791	196,791	..	Goondi	200,000
252,241	252,241	..	South Johnstone	275,000
172,543	172,543	..	Mourilyan	180,000
267,693	267,693	31	Tully	304,242
326,874	326,874	165	Victoria	330,000
321,573	321,573	64	Macknade	345,000
2,426,929	2,426,929	327	..	2,601,242
109,971	109,971	110	Invicta	128,200
232,863	232,863	14	Pioneer	253,000
236,133	236,133	30	Kalamia	253,000
302,295	302,295	62	Inkerman	336,000
881,262	881,262	216	..	970,200
226,012	226,012	121	Proserpine	260,000
117,651	117,566	23	Cattle Creek	113,200
281,830	282,098	1,236	Racecourse	320,000
261,020	261,031	663	Farleigh	280,000
144,061	143,925	911	North Eton	160,000
254,936	254,570	106	Marion	290,000
290,253	290,561	266	Pleystowe	316,019
234,339	234,339	336	Plane Creek	240,000
1,810,102	1,810,102	3,662	..	1,979,219
100,684	100,684	14	Qunaba	115,000
222,972	222,972	..	Millaquin	240,000
239,421	239,421	11	Bingera	240,000
207,908	207,908	70	Fairymead	250,000
79,754	79,754	62	Gin Gin	100,000
269,450	269,213	..	Isis	245,000
60,637	60,874	12	Maryborough	77,665
46,653	46,649	6	Mount Bauple	52,000
149,399	149,403	3	Moreton	130,000
22,871	22,871	..	Rocky Point	18,000
1,399,749	1,399,749	178	..	1,467,665
6,518,042	6,518,042	4,383	..	7,018,326

6,522,415, including condemned cane crushed.

1949 CROP STATISTICS.

For the second year in succession a record was established for tonnage of cane crushed at the State's 32 factories. The final figure reached 6,518,042 tons of cane, being 84,486 in excess of the 1948 crop. Although higher crushing rates prevailed in general, the season was unduly extended in many cases to enable handling of the large tonnages involved. Crushing began on May 25th at Macknade and Inkerman mills and a week later Babinda, Tully and Victoria started the season's work. By the end of June nine other mills were in operation and the remainder followed during July. At the other end of the season Hambledon Mill was the first to finish on November 18th, but six factories extended operations into January, 1950, the last to complete work being Isis and Racecourse on the 12th and 13th respectively. The longest season was 32·3 weeks at Macknade, but Victoria and Inkerman also experienced crushings in excess of 31 weeks.

The amount of condemned cane delivered to the mill is shown in Table II. as amounting to 4,383 tons. This unusually high tonnage of cane below 7·0 c.c.s. was due, in the main, to the effects of red rot disease at the end of the season in Mackay. As is usual this figure has been deducted before calculating figures of mill performance.

The tonnage of sugar produced during the 1949 season, including 1,031 tons local sales, amounted to 897,267 of 94 net titre. This was below 1948 production by 12,782 tons but was in excess of the 1939 yield. The extra cane crushed was more than offset by the lower quality ratio of 7·23 which is one of the worst figures recorded in the last twenty years. In the past eleven years the ratio has exceeded 7·0 on six occasions, and of the five years when it was below 7·0 the best recorded figure was 6·77 in 1939.

Table III. shows the amount of annual production of sugar for the districts north and south of Townsville over a period of six years. These figures indicate that the decrease in production on 1948 yields occurred mainly in the north. There the drop in production amounted to three per cent. as compared with 0·5 per cent. in the south of Townsville districts.

TABLE III.

SUGAR PRODUCTION (94 NET TITRE), 1944–1949.

——	1944.	1945.	1946.	1947.	1948.	1949.
North of Townsville	259,573	282,034	233,732	255,958	356,969	345,684
South of Townsville	383,967	362,627	278,354	315,700	553,080	551,583
Totals	643,540	644,661	512,086	571,658	†910,049	†897,267

† Includes Local Sales.

Districts.	Plant Cane.		Ratoons.		Stand-over.		Total Acres.
	Acres.	%	Acres.	%	Acres.	%	
Northern	35,520	34·1	68,504	65·7	177	·2	104,201
Burdekin	17,417	62·7	10,239	36·9	110	·4	27,766
Mackay	40,573	46·3	46,644	53·3	355	·4	87,572
Southern	13,146	23·6	33,342	59·8	9,286	16·6	55,774
Whole State	106,656	38·7	158,729	57·7	9,928	3·6	275,313

The acreage harvested for milling was 275,313 and was nearly 10,000 acres in excess of the previous record figure of 1940; it was 17,000 acres above the previous year. All districts, as shown in the following table, increased the percentage of crop obtained from ratoons. This growing awareness of the value of ratoon crops follows the use of more vigorous varieties which are better suited to this practice. Some of the increased acreage harvested is due to the opening of new lands for the settlement of returned soldiers.

In Table IV. will be found the district figures for cane and sugar per acre. In the aggregate the yields are slightly below those of 1948 the cane being 1·21 tons lighter and the sugar 0·26 tons per acre less. The Lower Burdekin area topped the State for unit production with 31·74 tons of cane and 4·67 tons of sugar per acre. These were appreciably below 1948 figures as are also the yields of three other districts. On the other hand the Mackay, Childers-Maryborough and Nambour-Beenleigh districts showed an improvement. The yields of the last-mentioned district were particularly good even though due cognisance is taken of a proportion of standover cane. Actually in the Nambour-Beenleigh area only 821 acres were two-year cane representing 14 per cent. of the area harvested.

TABLE IV.

TOTALS AND AVERAGE YIELDS BY DISTRICTS: 1949.

(Domestic Crushing).

Districts.	Tons of Cane.	Tons Cane per Acre.	Tons 94 N.T. Sugar per Acre.
Mossman–Ingham	2,426,929	23·29	3·31
Lower Burdekin	881,262	31·74	4·67
Prosepine	226,012	18·35	2·63
Mackay	1,584,069	21·05	2·84
Bundaberg–Gin Gin	850,739	24·61	3·09
Childers–Maryborough	376,740	24·41	3·09
Nambour–Beenleigh	172,270	29·87	3·71
	6,518,021	23·67	3·26

The usual production data for cane, sugar and acreage are shown in Table V. The figures show the recovery which has taken place since the war in general production and per acre performance.

TABLE V.

ACRES CULTIVATED AND HARVESTED, YIELDS OF CANE AND SUGAR AND ACRE YIELDS AND QUALITY OF CANE, 1940–1949.

Year.	*Acres Cultivated.	Acres Harvested for Milling.	Total Yields.		Yields per Acre.		Tons Cane per Ton 94 N.T. Sugar.
			Cane.	Sugar.	Cane.	Sugar.	
			Tons.	Tons.	Tons.	Tons.	
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
1948	384,213	258,585	6,433,556	†910,049	24·88	3·52	7·07
1949	395,660	275,313	6,518,021	†897,267	23·67	3·26	7·26
Average 10 years	340,270	242,477	4,748,962	672,848	19·59	2·77	7·06

* Data supplied by Government Statistician. † Includes Local Sales.

The usual molasses disposal table is given below. The total figure shows an increase of one and a-half million gallons over the previous year but the gallonage sold to distilleries decreased appreciably. Fertilizer usage was responsible for a further two and a-quarter million gallons and the amount run to waste increased by 116,000 gallons. An analysis of the figures disclosed that 76 per cent. of the molasses run to waste was in the central district.

TABLE VI.

DETAILS OF DISPOSAL OF MOLASSES FOR 10-YEAR PERIOD, 1940–1949.

(DATA SUPPLIED BY THE GOVERNMENT STATISTICIAN.)

Method of Usage.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.
	Gallons of Molasses :—									
Distilleries	11,531,396	12,882,397	10,457,747	7,345,596	9,136,862	9,380,679	10,691,581	8,256,892	18,233,153	17,595,388
Fertilizer	3,334,372	1,510,650	1,857,300	2,122,220	2,745,617	3,074,755	2,899,167	3,558,155	5,282,501	7,517,311
Stock Feed	5,380,242	3,490,937	3,071,918	3,055,728	4,719,517	4,675,909	6,932,902	5,320,970	5,845,585	5,563,273
Mill Fuel	1,781,425	1,232,338	3,024,370	2,176,926	2,251,737	1,748,299	954,970	1,427,775	1,677,174	1,490,063
*Ferment	..	..	..	..	..	..	..	..	377,939	543,087
Other Purposes ..	228,450	158,821	303,240	441,522	254,358	423,085	241,045	312,930	24,546	183,597
Wasted	47,069	55,237	31,153	97,643	16,660	50,902	63,466	15,035	167,537	283,315
Totals	22,302,954	19,330,380	18,745,728	15,239,635	19,124,751	19,353,629	21,783,131	18,891,757	31,608,435	33,176,034

* Prior to 1948 molasses used for making cleaning ferments was included under "Other Purposes."

TABLE VI.A

MOLASSES DISPOSALS IN VARIOUS DISTRICTS, 1949.

—	Gallons Made During Season.	To Distilleries.	For Fuel.	Ferment.	Feed.	Fertilizer.	Other Purposes.	Wasted.
North	10,432,697	5,137,097	1,474,547	167,970	830,410	3,315,403	178,120	63,460
Burdekin ..	3,997,564	1,874,042	..	122,549	285,019	1,634,192	..	..
Mackay ..	11,389,589	7,692,705	15,516	171,145	2,084,204	392,838	..	215,580
South	7,496,013	2,891,544	..	81,423	2,363,640	1,574,878	5,477	4,475
State ..	33,315,863	17,595,388	1,490,063	543,087	5,563,273	7,517,311	183,597	283,315

SUGAR VALUES, 1949 SEASON.

The Sugar Board has declared the final price for the 1949 season's sugar as follows:—

—	No. 1 Pool.			No. 2 Pool.	Total.
	Home Consumption.	Surplus.	Total.	Excess.	
Tons	464,982	344,743	809,725	86,511	896,236
Per cent.	57·4247	42·5753	100	..	..
Price	£24 6 0	£29 7 6	£26 9 3	..	£26 14 10

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

—	Home Consumption.	Surplus.	Total.
Tons	32,320	8,381	40,701
Per cent.	79·4076	20·5924	100
Price	£24 6 0	£29 7 6	£25 6 11

The total value of the Queensland crop, calculated from the above figures, was approximately £24,000,000, being an advance of £800,000 on the previous year. This was due to the rise in overseas price from £28 2s. 0d. to £29 7s. 6d. per ton. The average overall price was 24s. 11d. higher than in 1948 and this more than offset the lower sugar yield.

The following table summarises production and consumption figures and sugar values for the past ten years. A table of mill peak allocations is also given below to indicate the years in which the various Mill Peak Schedules operated.

Year.	Total Sugar Production at 94 n.t.	Tons Sugar Exported 94 n.t.	Average Australian Price.	Average Export Price.	Average Price No. 1 Pool Sugar.	Average Price all Sugar.	Total Value.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£
1939	891,218	531,033	23 12 6	10 7 6	16 19 7	15 15 3	14,046,500
1940	758,966	383,699	23 1 0	11 5 6	17 11 9	17 2 8	13,003,600
1941	696,927	281,275	22 13 0	10 18 9	18 0 4	18 0 2	12,550,500
1942	605,361	188,080	22 14 6	10 16 3	19 1 0	19 0 6	11,516,000
1943	486,354	75,650	22 10 6	13 2 6	21 1 3	21 1 3	10,244,000
1944	643,475	208,679	22 2 0	15 0 6	19 18 1	19 16 1	12,744,000
1945	644,624	205,453	21 18 0	16 17 9	20 8 2	20 6 1	13,087,000
1946	512,035	72,578	21 18 0	21 10 0	21 16 11	21 16 10	11,184,000
1947	571,503	95,246	24 0 0	29 12 6	24 16 0	24 18 9	14,251,000
1948	909,896	440,814	23 1 0	28 2 0	24 17 0	25 9 11	23,198,000
1949	896,236	431,254	24 6 0	29 7 6	26 9 3	26 14 10	23,967,000

TABLE OF MILL PEAKS AND OF PROPOSED ULTIMATE PEAK BY 1953.

Mill.	1929.	1939.	1949.†	1950.†	Proposed Ultimate 1953 Peak.††
Mossman	14,972	20,000	22,000	22,000	27,000
Hambledon	31,836	36,000	39,600	39,600	44,000
Mulgrave	31,643	36,000	40,100	40,100	44,000
Babinda	31,901	36,000	39,600	39,600	45,000
Goondi	27,034	29,500	32,400	32,400	37,000
South Johnstone	30,979	36,000	39,600	39,600	47,000
Mourilyan	23,630	27,000	29,700	29,700	32,000
Tully	30,930	38,000	42,100	42,100	47,000
Macknade	30,952	34,000	39,900	46,500	49,000
Victoria	32,221	37,500	43,600	49,100	82,000
Invicta	11,736	16,000	18,300	19,100	27,000
Kalamia	26,053	31,000	35,400	35,600	40,000
Pioneer	21,391	26,000	30,100	34,000	36,100
Inkerman	*24,207	31,000	36,800	42,000	46,800
Proserpine	16,650	23,000	26,300	33,000	36,500
Farleigh	16,993	23,000	27,600	32,400	34,800
Racecourse	18,066	24,000	29,000	35,200	36,700
Pleystowe	19,781	24,000	29,200	35,900	37,900
Marian	18,997	24,000	28,600	32,300	34,400
North Eton	9,319	12,000	14,500	15,900	17,600
Cattle Creek	8,791	12,000	13,400	14,100	15,200
Plane Creek	18,233	24,000	28,600	30,800	34,100
Fairymead	15,882	21,000	25,700	28,600	30,200
Qunaba	8,940	10,000	11,200	12,700	13,700
Millaquin	14,443	19,000	24,100	29,600	31,800
Bingera	17,864	23,000	27,800	31,000	33,400
Gin Gin	6,000	6,500	8,000	8,400	11,000
Isis	28,011	27,000	30,000	30,200	31,600
Maryborough	2,862	7,500	9,500	9,500	12,000
Mount Bauple	6,231	6,500	7,200	7,200	8,000
Moreton	11,586	14,000	16,000	16,000	19,000
Bagtoby	280	300	..	..	..
Rocky Point	2,014	2,200	2,700	2,700	3,200
	611,428	737,000	848,600	916,900	1,045,000

* Increased by 2,500 tons in 1938.
† Does not include 3 per cent. for Soldiers' Settlement.
†† Subject to provision for the following being realised:—
(1) 3 per cent. for Soldier Settlement.
(2) New settlement.
(3) Improved settlement for smaller assignment holders.
(4) Mill crushing capacity.

REVIEW OF THE INDUSTRY.

Sugar Agreement.

In the last Annual Report it was stated that during September, 1948, the British Ministry for Food announced the five-year guarantee for sugar producers in this country to cover the years 1948 to 1952; this contract covered all exportable surpluses. In November, 1949, a conference was convened in London at which all sugar-producing countries of the British Commonwealth were represented. In December of the same year agreement was reached between the British Government and the Australian delegation covering future markets and certain aspects of price. It was agreed that in 1950 the Australian export price would be the same as for the Colonies, representing a probable advance on 1949. It was also agreed that from 1953 to 1957 a market would be found for a total exportable surplus of 600,000 tons per annum. Of this amount the United Kingdom undertook to accept 300,000 tons at a guaranteed price although this would be fixed by negotiation from year to year. The other 300,000 tons would be sold on the Canadian and United Kingdom markets at world price plus preference.

Since the 1948 agreement provided for a guaranteed price for all exportable surplus sugar from 1948 to 1952, and the new agreement covered up to 600,000 from 1953 to 1957, Australia is provided with an assured export outlet for up to 600,000 tons for the next eight years. Provision was made to extend the term if found mutually desirable.

This news was welcomed by the industry and it was considered that a determined effort should be made to produce the extra sugar required by 1953. The Central Cane Prices Board accordingly increased the aggregate mill peaks to a proposed ultimate figure of 1,045,000 tons of 94 net titre sugar, this target being conditional upon (1) three per cent. soldier settlement being realised, (2) new settlement, (3) improved settlement for smaller assignment holders and (4) provision of adequate mill crushing capacity.

Most mills in the State have, as a result of this expansion policy, planned extensive additions and improvements to plant to cope with the extra tonnage of cane they will be called upon to treat.

Royal Commission.

Almost simultaneous with the Government's decision to approve the new mill peaks an announcement was made regarding the appointment of a Royal Commission to enquire into the practicability and expediency of establishing additional sugar mills in Queensland and to plan the proper development of the industry over the next twenty-five years. The plans outlined in the foregoing section provide for the extra sugar required for the export market but it was appreciated that the future of the industry required close examination so that the increasing home consumption market would be cared for. Over the past ten years Australian requirements have increased from 360,000 to 469,000 tons, or an annual increase of nearly 12,000 tons of sugar. Although this increase may be somewhat misleading, owing to the buoyant export market for jams and such products, it is a pointer to the fact that the local market is steadily expanding with increasing population. Within another twenty years it is possible that a further 120,000 tons of sugar will be required and orderly planning is essential to ensure that any future home requirements are met without interfering with any export commitments.

Increased Sugar Prices.

In December, 1947, the Commonwealth Government agreed to an increase of £4 13s. 4d. per ton in the wholesale price of refined sugar and this resulted in the retail price rising from 4d. to 4½d. per lb. Owing to rising costs in the way of freights, coal, jute and wages the industry received only £1 15s. 0d. of the £4 13s. 4d. on the 1948 output and the prospects for the 1949 sugar yield looked even less bright with the continuation of rising costs on every hand.

Accordingly, in July, 1949, the sugar organizations prepared a case for review of the Commonwealth Sugar Agreement including a request for a further increase in the price per ton of refined sugar from £37 6s. 8d. to £41 9s. 4d. This would have the effect of a further ½d. per lb. rise in the retail price. The industry's case was endorsed by the Queensland Government and by September the Federal Cabinet decided in favour of the increase sought. A Bill to approve the amendment passed both Houses of the Commonwealth Parliament and was assented to on October 28th. The new price operated on approximately two-thirds of the 1949-1950 sales year and the raw sugar price resulting from home consumption sales advanced for the 1949 season, to £24 6s. 0d.

This is the highest price received since 1931, and the average export price of £29 7s. 6d. is the highest ever received. The average return for all sugar—home market and export—was £26 14s. 10d., an advance of £1 4s. 11d. on the previous year.

Costs.

On the other side of the ledger must be entered the steeply rising cost of production caused by the upward trend of nearly all requirements in field and mill. The basic wage has increased considerably and this has been accompanied by proportional increases in cane cutting rates and in the wages of mill hands. The effect of wage increases in other industries is reflected in the rising prices of tractors, implements, fuel, repairs, mill machinery and fertilizers. The major portion of the increase in price of refined sugar has been absorbed by higher costs in refining and distribution and little margin remains to offset the spiralling cost of production on farms and in mills. The favourable overseas price is the one factor at present operating which enables the industry to maintain a reasonable economy.

Manpower.

The improvement in the field labour position mentioned last year continued during the period under review. During the height of the season the effective units reached 8,000, of which professional cutters numbered 6,290. Immigrants contributed 768 to the total and farmers and cutters totalled 957 at one stage of the harvest. The position cannot yet be considered as highly satisfactory since labour shortages do exist in certain districts. The expansion of mill capacities will demand a larger labour pool in future years if the mills are to be kept fully supplied with cane.

Labour for field work other than cutting has been short in all districts and mill labour has barely sufficed to maintain continuity of operations. Both sides of the industry have suffered from the number of transients who move from area to area as the season proceeds.

Fertilizer.

The supply position during the year approached more closely to normal than at any time since the outbreak of war. Superphosphate and potash were in good supply and were sufficient to fulfil all needs. Sulphate of ammonia, although not adequate to satisfy all orders was not seriously deficient but organic fertilizers such as meatworks bone and dried blood showed no improvement. The sulphate of ammonia position for 1950 season is much improved and adequate supplies are assured. As from July 1st, 1950, sharp price increases operated, potash rising by £3 10s. 0d. per ton, sulphate of ammonia by £4 0s. 0d. and superphosphate by £2 5s. 0d. The last-mentioned item was due to the abolition of the Commonwealth subsidy on this particular fertilizer. The £500,000 subsidy on sulphate of ammonia continues unchanged.

During the past twelve years fertilizer prices have increased more steeply than many other commodities. Sulphate of ammonia has risen 257 per cent. to £30 17s. 6d., but is subsidised to the extent of £4 per ton; potash has increased by 253 per cent. to £34 8s. 0d. per ton and superphosphate by 183 per cent. to £9 15s. 0d.

WORK OF THE BUREAU.

Certain staff changes occurred during the year but the net result was a numerical gain. Resignations included the Senior Clerk, Mr. D. Linklater, Adviser in Cane Culture, Mr. J. T. Elliott, who purchased a cane farm, one cadet and three typistes. Appointments were made of Mr. C. Horne as Acting Senior Clerk, Messrs. A. G. Claire and K. J. Yore to the mill technology division, Messrs. J. Anderson and A. A. Matthews as field cadets, and one typiste. In addition Mr. J. C. Skinner was awarded an overseas scholarship for the purpose of studying genetics for two years at Manchester University. On the completion of this course Mr. Skinner will be attached to the Plant Breeding Division.

The awarding of the overseas scholarship in genetics is one of the initial steps in a long-range plan to improve the cane-breeding activities of the Bureau. It is felt that more rapid and valuable advances can be made in the varietal field than in most other avenues of research, and in particular in the solution of the early-maturing cane problem. Few of the world's cane breeders have applied the fundamental principles of genetics to sugar cane breeding and it is felt that the time has arrived when this State should devote more attention to this complex problem.

During the year the field activities of the Bureau covered all of the routine investigational work normally performed, as well as certain new studies designed to effect improvements in disease and pest control, soil conditions, fertilizer and lime applications and minor element deficiencies. The work in certain areas was somewhat disorganised by staff movements consequent upon the loss of two Advisers but the replacement officers have carried out the field programme effectively.

Fertilizer trials were harvested at Mossman, Fishery Falls, Moresby, Proserpine, Bundaberg and Yandina. Simultaneously, fertility surveys were conducted on areas of the same soil types to ensure a better understanding of problem areas and to define improved fertilizer practices on those properties. Combined laboratory and field studies on soil acidity, responses to lime applications, and correlations with calcium and magnesium contents of soils suggest that a new approach to this work is desirable. The conception of calcium deficiency as related to plant growth appears to be a more promising line of investigation than the traditional theory of soil acidity which was corrected by relatively heavy lime applications.

Minor element studies were carried out on a block of cane in the Mackay area which exhibited pronounced deficiency of some essential plant food. An excellent response was obtained to a dressing of 55 lb. per acre of copper sulphate thus marking the first clear-cut response to a minor element in the sugar industry of the State. Confirmatory trials are in progress. Several other trials in the high rainfall belt on gravelly and leached soils failed to give any observable responses and it can only be assumed that deficiencies have not yet developed on any of the soils investigated.

The trend towards potash depletion became more marked since last year while the phosphate status of the hundreds of soils examined was hardly changed. This effect is doubtless a result of the high cost of potassic fertilizers, but the trend is a dangerous one in view of the necessity to maintain correct plant food balance. A considered fertilizer recommendation is sent to all growers who submit soil samples but, naturally, the advisory service can go no further than making the recommendation. The implementation of the advice is the responsibility of the grower.

The work on improvement of soil structure by means of sugar containing amendments advanced a step further during the year. The laboratory studies with molasses continued as well as with certain sweet sorghums. The results of a subsequent field trial with the same substances showed a marked and sustained effect on aggregation. The final value of such applications will best be measured on certain intractable soils where poor structure impedes drainage and cultivation.

The progress results with weedicides is discussed in detail elsewhere in this report. Although control is not complete under all soil conditions the experience is in line with that in other countries where it is found that the characteristics of particular soils are the principal factors to be considered in weedicide usage. However, the outstanding results at Bundaberg and to a lesser extent at Meringa are sufficient to indicate that on certain soil types at least the pre-emergence control of weeds and grasses is not only practicable but economically sound.

In the entomological field benzene hexachloride attained still greater success as a crop-protection insecticide. Very heavy greyback grub populations developed in 1949 and it is certain that in the absence of an effective control measure the losses would have been even more disastrous than in 1934. Twenty thousand acres were treated with benzene hexachloride with complete success where the recommended method of application was adhered to. On untreated areas where grub infestations occurred the damage to cane was so heavy as to cause collapse of crops.

The outstanding success of this insecticide has not been accepted by Bureau entomologists as a reason for complacency or as a final answer to the grub problem. Although it was a happy coincidence that the major grub pest should have been so sensitive to B.H.C., the other grubs—Frenchi, Trichosterna and the Childers grub—appear to be more resistant to the normal applications, and research continues on the optimum dosage and method of application. In addition any new insecticidal discovery is tested for its efficiency in controlling any of our pests. At the moment six newer insecticides are undergoing field trials against the various grub species.

It has for years been a subject for conjecture by entomologists and agronomists as to what losses, if any, were caused by soil inhabiting insects of the minor pest class. The serious damage occasioned by the "major" pests suggests that any insect feeding on roots or stubble is causing some crop loss, even if insignificant. The availability of such a good insecticide as B.H.C. makes it practicable to carry out experiments along these lines. Although all soil insects are not sensitive to the insecticide it should be possible to measure with some degree of precision the damage which the susceptible ones are doing to our cane crops.

Pathological investigations during the year were focused principally on ratoon stunting disease although the usual control problems associated with Fiji and downy mildew diseases were not relaxed. In addition an extensive outbreak of yellow spot disease and a build-up of eye spot necessitated certain investigations on these diseases.

Progress with the studies on ratoon stunting disease were necessarily slow, but satisfactory progress was made with control in the field. The legislative action to control planting material has given good results and there is cause for optimism that a clean-up may be achieved without recourse to eliminating the valuable variety Q.28. A large annual programme of investigational plantings includes a ratoon stunting varietal resistance trial, and before long the resistance or susceptibility of all major varieties in the State will be known. In addition a check is kept on the susceptibility of all new seedling varieties of promise. The causative organism is not yet known but all indications point to a virus. The serological tests, although not clear cut, appeared to confirm the virus theory.

The occurrence of yellow spot provided an interesting problem because of its widespread occurrence in many districts. Although not officially recorded in Queensland previously, there is some evidence that this was not a first appearance. Either unusual seasonal conditions obtaining in the first half of this year or the development of a virulent strain of the organism could be the cause of the outbreak.

Perhaps the most pleasing news on the pathology front is the fact that only seven stools of cane affected by downy mildew were located during the twelve months—and these in one two-acre block of old ratoons at Bundaberg. No recurrence of the trouble was noted in the Hambledon area where last year's outbreak caused some concern. It may not be too much to hope that this disease—the worst in the State not many years ago—may now be under complete control. In five districts of Queensland, Mossman, Cairns, Lower Burdekin, Mackay and Bundaberg, downy mildew has caused the removal from approved lists of major varieties or has prevented the addition of new ones, and Cane Pest and Disease Control Boards have expended large sums in its control. Its disappearance from the list of our cane diseases would make less difficult the release of promising but susceptible cane varieties.

Fiji disease, although still on the wane, remains a cause for some concern. Last year's total of 4,449 stools was reduced to 1,679 in the year under review. This result is praiseworthy and reflects credit on the work of inspection gangs. P.O.J. 2878 should virtually disappear from Moreton fields during 1950 and this will be of major assistance in controlling this disease. However, the partial susceptibility of C.P. 29/116 makes a clean-up in that variety a difficult propositon. A recurrence of Fiji disease was noted in Childers during the year where it had not been seen for nearly four years; the reason for this reappearance is thought to be a deserted farm on which volunteer diseased cane existed in the intervening period, and from which the disease spread to an adjacent irrigated farm.

Since the reorganization of the Bureau in 1928 and the creation of the pathology division disease resistance trials of various types have been carried out in several districts in the State. Their successful management has provided a problem of some magnitude because of the fact that they had to be located in isolation from commercial cane fields. The difficulty of finding farmers outside the closely farmed areas with the facilities to plant and care for the trials had to be experienced to be appreciated, and many failures due to neglect and to absence of irrigation in dry years necessitated repetition of work. To overcome these difficulties the Bureau has established a disease resistance sub-station at Moggill, near Brisbane, where all disease resistance trials will be carried out in future. The exception is ratoon stunting disease, which, for the time being will be located in Mackay until more is known of its transmission. There is no canegrowing district in the State in which the diseases Fiji, downy mildew, leaf scald, chlorotic streak, gumming and red rot all occur and it would be neither politic nor practicable to run such a sub-station in proximity to any cane area and thus create the risk of introducing a new disease to that district. It is a fortunate chance, therefore, that all of these trials can be safely carried out near Brisbane without the slightest risk to commercial plantings, while still within a relatively short distance from the Bureau laboratories.

On the Experiment Stations the usual routine connected with seedling raising and selection was carried out and this constituted the major portion of the work. In addtion, the long-range cultural trials dealing with trash conservation, long fallowing, fertilizer plus crop residues, etc., were proceeded with. At the Lower Burdekin Station a start was made with seedling plantings and with a long-term trial to investigate the growing of first and second ratoon crops of a range of varieties. During the current year this new Station will make much larger plantings and will doubtless become an important unit of the Bureau.

The earlier investigations carried out on our stations in relation to legume crops suitable for the various districts have given speedy results. Demand for seed of velvet beans, Reeve's Selection Cowpea and Cristaudo pea far exceeded supply, and the value of these three crops is being appreciated to a greater extent each year. The problem of seed shortage is a serious one despite the high prices offered and it would appear that a considerable improvement will have to eventuate in the seed supplying areas before the sugar industry's requirements are fulfilled.

The Mill Technology staff continued the 1948 investigations on vacuum pans and crystallizers and the results of the low grade massecuite studies will form the subject of a forthcoming Technical Communication. Certain aids to clarification were also the subject of enquiry and one of these, bentonite, will be under trial on a factory scale in the 1950 season.

The large expansion of generating plants in many Queensland mills has resulted in the engineering technologist being requested to design switchboards for suitable control of output. Complete designs and specifications were prepared for three factories. In addition apparatus was assembled for an investigation into the bagasse nuisance which is so troublesome in certain sugar mill towns.

The two outstanding changes in the varietal census of the State were the rise of Q.50 to a crushing of nearly 600,000 tons of cane and the displacement of Badila from its leading position by Trojan. The rapidly changing varietal picture causes some surprising changes almost annually and it is within the realms of possibility that Badila may return to the premier position in a year of different climatic conditions. C.P.29/116 rose to third place with the fall of Q.28. The decline of Co.290 to thirteenth place draws attention to the relatively short life of this once important cane variety. It is just fifteen years since it was first distributed. Queensland-bred varieties now total 59·2 per cent. of the crop and this figure is still rising.

An interesting feature of the cane breeding work is the production of promising canes with high early sugar and containing one-quarter and one-eighth robustum blood. Those with one-quarter robustum are rather hard-rinded but the more diluted crosses are attractive soft types. It would appear that the use of this New Guinea material promises to result in suitable commercial canes for Queensland.

The field staff in the various centres from Nambour to Gordonvale made possible further valuable advances in our knowledge during the year. A better understanding of the fertility status of our soils was one result and the performance of new and old varieties was measured by numerous trials with a view to greater precision in assessing relative values.

PUBLICATIONS BY BUREAU STAFF.

Officers of the Bureau staff made the following contributions to technical sugar literature during the year:—

Brain, L. R. Further Notes on the Werkspoor Crystallizer.

Buzacott, J. H. Varietal Changes in the Cairns District, 1933-1949.

Hughes, C. G. Downy Mildew disease in North Queensland.

Nicklin, J. H. Heavy Conductors.

Vallance, L. G. The Effect of Variations in Rainfall on C.C.S. in High Rainfall Areas.

Venton, C. B. The Boiling of Low Grade Massecuites in the Webre Pan.

Wilson, G. Benzene Hexachloride Distributors.

Wilson, G. The Effect of Soil Applications of Benzene Hexachloride on C.C.S.

In addition the following publications were issued by the Bureau:—

Technical Communication, 1949, No. 2—The Production and Testing of Sugar Cane Seedlings by C. G. Hughes.

Technical Communication, 1949, No. 3—Soils Investigations on the Sugar Cane Producing areas of Bundaberg, by Norman J. King.

Farm Bulletin No. 11—The Treatment of Cane Setts with Mercurial Solutions, by C. G. Hughes.

Report on Soils and Sugar Cane Culture Investigations in Ceylon, Sudan, United Kingdom, British West Indies, British Guiana, Puerto Rico, United States and the Hawaiian Islands, by L. G. Vallance.

Four issues of the Quarterly Bulletin and two issues of the Newsletter were published.

The Bureau levy for the 1948 season was two pence per ton of cane. Receipts and disbursements for the year under review and totals since the inception of the Sugar Funds 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 1948.*"

SUGAR FUND.

STATEMENT OF RECEIPTS AND DISBURSEMENTS FROM 1ST JULY, 1949, TO 30TH JUNE, 1950.

RECEIPTS.	£	s.	d.	DISBURSEMENTS.	£	s.	d.
To Balance 1-7-49	32,310	5	8	By Salaries	24,974	2	8
,, Assessments	54,320	6	0	,, Contingencies	15,644	15	8
,, Endowment	7,000	0	0	,, Bundaberg	3,819	18	3
,, Bundaberg	1,265	0	0	,, Mackay	3,274	3	6
,, Mackay	1,719	10	9	,, Meringa	4,956	1	8
,, Meringa	1,140	6	3	,, Lower Burdekin (Brandon)	9,110	6	7
,, Sundries	338	7	1		61,779	8	4
				,, Balance, 30-6-50	36,314	7	5
	£98,093	15	9		£98,093	15	9

STATEMENT OF RECEIPTS AND DISBURSEMENTS FROM INCEPTION OF FUND, 1ST DECEMBER, 1900, TO 30TH JUNE, 1950.

RECEIPTS.	£	s.	d.	DISBURSEMENTS.	£	s.	d.
To Assessments	480,378	1	3	By Disbursements	807,789	6	6
,, Endowment	274,862	3	0	,, Balance	36,314	7	5
,, Sugar Experiment Stations ..	88,863	9	8				
	£844,103	13	11		£844,103	13	11

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.

Soil Technology and Experiment Stations Report.

(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, 1949, to 30th June, 1950:—

Soils.	No. of Samples.
Farmers' samples	304
Soil aggregation experiments	167
Lime trials	164
Fertilizer and mud trials	89
Fertility surveys	31
Miscellaneous.	
Cane juices	17
Sorghum	14
Waters	12
Other samples	9
Total	798

SOIL INVESTIGATIONS.

Laboratory Work.

During the year 746 soil samples were analysed. Of these 335 were from farmers' properties for which fertilizer recommendations were made. This number included 31 samples taken in the course of a fertility survey in the Maroochy area. Unfortunately, due to calls upon the services of the field staff the carrying out of these surveys had to be severely curtailed. The remainder consisted of samples tested in conjunction with lime and fertilizer trials and the series of investigations which are being carried out in order to determine the effect of such materials as molasses and sorghum residues on the physical condition of cane soils. Fifty-two other samples including irrigation waters, cane juices, etc., were also analysed.

Since the figures obtained from the farm samples constitute a representative picture of the soil fertility trends in the various districts they are summarised in the following table. As mentioned in last year's report there are again indications that potash deficiency is more pronounced than that of phosphate. This is an important point that must be taken into consideration when planning the industry's future fertilizer requirement. The above trend is also borne out by recent fertilizer trials, the results of which indicate that adequate potash fertilization is necessary to ensure maximum sugar recovery per acre.

Soil Fertility trend in various Cane Areas showing Percentage of Soil Samples at each Fertility Level.

District.	Phosphate.			Potash.			Number. Samples.
	Low.	Fair.	Good.	Low.	Fair.	Good.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Babinda-Mossman	33	11	56	33	22	45	54
Innisfail	29	22	49	52	26	22	100
Ayr	..	..	100	..	20	80	5
Mackay	52	22	26	56	22	22	23
Bundaberg	31	14	55	51	22	27	78
Southern	31	20	49	33	28	39	75
Total	31	18	51	45	24	31	335

Fertilizer Trials.

Fertilizer trials were harvested on farmers' properties at Mossman, Fishery Falls, Moresby, Proserpine, Bundaberg and Yandina. Most of these trials showed increased yields due to the application of sulphate of ammonia whilst the responses obtained from phosphate or potash depended upon the nature of the soil type.

Lime Trials.

A considerable amount of analytical work was carried out on soil samples taken from the 42 lime trials harvested last year. It would appear that the magnitude of the response to the application of lime is more closely related to the actual lime and magnesia content of the soil than with the degree of acidity present. In this respect the possibility that many of our highly leached cane soils which have been continuously cultivated for many years are now becoming deficient in these essential plant foods should not be ignored. Accordingly, therefore, a series of trials is being laid down to determine the response to relatively small drill applications of lime as compared with the usual heavy and more expensive broadcast dressings.

Soil Aggregation Studies.

Because of the necessity to keep a close watch on the possible deterioration of cane soils under continuous cultivation laboratory studies were commenced last year to develop suitable methods for the determination of changes in the physical condition of soils. It was found that the measurement of water stable aggregates provided satisfactory data in this respect. As was reported last year it was found that the application of molasses to various soils considerably increased the percentage of structural units or soil crumbs with a consequent beneficial effect on tilth.

Samples of soil from the South Kalkie, Fairymead and Burdekin areas were treated with molasses at the rates of 12, 6 and 3 tons per acre. Within 14 days a very great increase in aggregation had occurred in all samples and the results indicated that in the 12-ton treatment 98, 91 and 60 per cent. of the three soils respectively had been formed into particles greater than ·5 m.m. diameter. However, all the aggregates formed were apparently not permanent and after 28 days these values had dropped to 95, 78 and 35 per cent. This was followed by a further, although much slower decrease and after 112 days the amounts of soil aggregated were 87, 70 and 16 per cent. respectively. These values were still higher than the untreated check samples and it was evident that the treatments had considerably benefited the physical condition of the soil. The 6 and 3 ton applications gave responses of a similar nature, though not as great or as prolonged as that of the 12 ton treatment.

The outstanding feature of the results obtained in the laboratory was the very great and immediate rise in the number of aggregates due to the application of molasses and the subsequent well marked decline which occurred in all treatments. For practical purposes it is probably neither necessary nor desirable that such a rapid reaction should occur, therefore in order to ascertain whether these results would be reproduced under field conditions, a 5 x 5 Latin square trial was set out at the Moggill disease resistance sub-station. In addition to the molasses application a sweet sorghum treatment was also included to ascertain the soil structure building capacity of plant residues from this high sugar yielding crop.

The results to date of this trial which has now been running for 84 days indicate that whilst the molasses had again been responsible for an increased state of aggregation the effect under field conditions was gradual and lasting. It is of considerable interest to note also that the turning in of sorghum residues was very effective in promoting a good physical condition of the soil. The highest state of aggregation (39·1 per cent.) was obtained by an application of sorghum residues at the rate of 35 tons per acre. This was followed by an aggregation of 24·6 per cent. in the treatment receiving 12 tons of molasses per acre. The amount of aggregation present in the various treatments at the different sampling periods are shown in the following table. This trial will be continued in order to assess the degree of permanence of the effect of the different treatments.

MEAN PERCENTAGE OF AGGREGATES GREATER THAN ·5 M.M. DIAMETER AT DIFFERENT SAMPLING PERIODS.

Treatment.	Percentage of Aggregates > r ·5 m.m.				
	Before Treatment.	Days after Treatment.			
		14.	28.	61.	84.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Molasses 12 tons per acre	12·6	*19·5	*17·8	*22·8	*24·6
Molasses 3 tons per acre	13·8	14·1	9·1	14·7	16·5
Sorghum 35 tons per acre	10·8	*16·2	12·1	†30·0	†39·1
Sorghum 13½ tons per acre	11·5	11·4	9·0	*20·5	*21·4
Check	9·6	6·9	5·4	9·7	10·5

* Significantly greater than check at 5 per cent. level.

† Significantly greater than check at 1 per cent. level.

Fig. 1.

Innisfail.—Showing good control of weeds 21 weeks after spraying with 2,4-D. The row on the left was not sprayed.

Fig. 2.

Innisfail.—Showing the control of weeds 20 weeks after the initial spraying. This row received two applications of 2,4-D. The portion of the row in the background was not sprayed.

Fig. 3.

Power spray mounted on tractor with boom in position for spraying. When used for pre-emergence weed control this outfit covers about 6 acres per hour.

WEEDICIDES.

During the spring of 1949 an extensive series of trials to investigate the efficiency of 2,4-Dichlorophenoxy acetic acid (2,4-D) as a pre-emergence spray under Queensland conditions, in conjunction with contact weedicides, was put down.

Results of Pre-emergence Tests.

At Meringa, Innisfail and Bundaberg very good results were obtained from the pre-emergence sprays. The results obtained on the Meringa Experiment Station indicated that one application of 2,4-D applied at the rate of 4 lb. per acre early in September gave sufficient control of weeds and grasses for all practical purposes until the end of January, at which date the cane was nearly out of hand and no other treatment was necessary. The control given by the use of only 2½ lb. of 2,4-D per acre was not quite satisfactory.

At Innisfail plots were treated with 2,4-D at the rate of 4 lb. per acre. This application gave a satisfactory control (Figure 1) of weeds and grasses from late September until February, covering a period of 21 weeks without any other treatment being required.

Other plots in this area (Figure 2) were given a second spraying in November, consisting of a further 4 lb. of 2,4-D per acre plus diesel oil and sodium pentachlorphenate. However, from the indications of the plots which received only the initial spray in September it would appear that the second spraying was not necessary. In these trials it was also shown that 2,4-D prevented the emergence of Sensitive Weed and Rattlepod. However, it did not prevent the germination and growth of Mauritius Bean.

The same series of trials was put down at Mackay with disappointing results. The failure was due to two reasons. Firstly, the land was infested with nut grass over which the 2,4-D exercised no pre-emergence control. Secondly, the soil cracked very badly and grasses and weeds grew from out of these cracks. Furthermore, the fact that it was not possible to cultivate the soil after the spray had been applied led to a depression in growth of the cane, since cultivation is essential on this type of soil.

As in North Queensland good results were obtained with the use of 2,4-D as a pre-emergence spray on Bundaberg Experiment Station. On one particular block complete control of weeds and grass during spring and summer was obtained by an application of 2½ lb. of 2,4-D per acre on 21st September followed by a similar application in December. Two other blocks were sprayed with 2,4-D at 4 lb. per acre on 23rd November and 16th December. These required no further treatment since complete control of weeds and grass was obtained until the cane was out of hand in February. Although single applications of 2½ lb. per acre were also tried the results were not so satisfactory as the 4 lb. treatment.

These results must be regarded as very encouraging since the trials were subject to a considerable amount of rain in January and February. In North Queensland also the heavy rains experienced during these two months seemed to have little or no effect on the effectiveness of 2,4-D. However, at Bundaberg it was noticed that where pools of water lay in the inter-row space for some time weeds and grasses subsequently germinated and grew.

In the Maroochy area trials were also set out on both plant and ratoon cane. However, as at Mackay, the trials were failures because the cracking of these somewhat heavy soils allowed the germination of weeds and grasses.

Contact Spray Trials.

In addition to the pre-emergence work a considerable amount of investigation was carried out with contact sprays. These sprays consisted of weed killing chemicals which, unlike the pre-emergence spray, are applied directly to the growing weeds and grasses. Several different types were used. The sprays first tried contained either diesel or tar oil as a base together with sodium pentachlorphenate. To this was added a quantity of 2,4-D which in addition to its own contact weed killing power also provided a pre-emergence effect. The results obtained so far have not been greatly successful. Although these sprays will kill weeds and grasses if used in sufficient quantity there are two factors to be considered. Firstly, the cane will also be killed or severely damaged by such heavy concentrations and secondly the cost of material per acre is in most cases uneconomic. However, the present indications are that an economic application of the diesel oil based spray can be made without injuring the cane *provided* the weeds and grass seedlings are sprayed when very young.

A spray which seems to be showing more promise than either the diesel or tar oil is one in which creosote is used as a base. Sodium pentachlorphenate and 2,4-D are also added. Here again good results can be obtained without very much risk to the cane if the spray is used in the early stages of weed and grass growth. However, further information regarding the most efficient and economical rates of application of these contact sprays has yet to be obtained and trials to this end are being laid down.

NORTHERN SUGAR EXPERIMENT STATION.

(Mr. G. Bates, Senior Adviser, Officer in Charge.)

METEOROLOGICAL AND CROP GROWTH REPORT.

Weather conditions during the latter portion of 1949 were rather more favourable than the corresponding period in 1948. Good rain fell in August, 1.45 inches being registered, while November and December yielded 2.25 and 4.88 inches respectively. Although the total rainfall for August-December inclusive was under average the rain fell at the right time and growing conditions for the young cane were good.

The wet season commenced in the second week in January, 15.69 inches being recorded on 14 wet days. February yielded 11.93 inches over 14 wet days. Flood rains did not fall until March when 27·58 inches fell, but damage to cane crops was not serious. The wet season, however, was late, April yielding 12·87 inches over 23 wet days. This late rain put back the autumn planting, causing a rush of planting in late May and June in an endeavour to have land planted prior to commencement of harvest operations.

The following tables show the rainfall records taken at the Northern Sugar Experiment Station over the past 25 years together with an abstract of other meteorological observations.

Year.	Rainfall in Inches.	Year.	Rainfall in Inches.
1925	76·98	1938	55·86
1926	59·12	1939	118·08
1927	90·16	1940	84·58
1928	66·33	1941	84·65
1929	102·28	1942	60·14
1930	107·61	1943	47·31
1931	98·82	1944	60·73
1932	76·31	1945	117·60
1933	96·06	1946	55·18
1934	91·44	1947	43·67
1935	59·91	1948	70·13
1936	88·81	1949	83·12
1937	46·33	1950 (6 months)	72·54

Average for 25 years = 77·65.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT NORTHERN SUGAR EXPERIMENT STATION, GORDONVALE, FROM 1ST JULY, 1949, TO 30TH JUNE, 1950.

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.			
1949.											
July	0·2	7	82·0	73·0	78·3	65·0	40·0	55·3	23·0	68·2	79
August	1·45	13	88·0	78·0	80·75	65·0	46·0	58·6	22·15	70·03	85
September	0·85	10	89·0	75·0	84·0	69·0	55·0	61·7	22·3	74·7	72
October	0·33	4	94·0	87·0	92·0	74·0	58·0	67·1	24·9	81·6	72
November	2·25	11	97·0	84·0	92·2	74·0	56·0	67·6	24·6	82·5	71
December	4·88	13	94·0	85·0	90·8	76·0	66·0	70·8	20·0	82·1	79
1950.											
January	15·69	14	97·0	82·0	91·1	75·0	66·0	68·5	22·5	81·53	83
February	11·93	14	97·0	86·0	90·8	76·0	68·0	72·6	18·2	82·0	83
March	27·58	15	96·0	78·0	90·0	77·0	68·0	72·5	17·5	80·5	82
April	12·87	23	92·0	75·0	84·2	75·0	60·0	69·3	14·9	76·1	87
May	2·18	7	89·0	75·0	84·0	70·0	50·0	61·2	22·8	73·4	81
June	2·29	6	87·0	68·0	78·7	73·0	45·0	58·8	19·9	68·0	82

Greyback beetles emerged in very large numbers in the Mulgrave and Babinda areas, commencing on the 14th November, 1949. Very excessive damage to the 1950 crop by this pest has resulted in these areas. The Mulgrave Mill area is fortunate in having over 6,000 acres of cane protected by benzene hexachloride; 2,000 acres of grub damage in that area alone has developed in untreated fields. In Hambledon, greyback damage is much less prominent. Babinda Mill area has suffered a considerable increase in the extent of grub damage in cane in the northern end not treated with B.H.C.

Frenchi grub damage is severe in sections at Hambledon, and also from Mt. Sophia to Deeral where several large fields of young ratoon cane and one of plant were destroyed during December, 1949, and had to be ploughed out. There were heavy emergences of these beetles in mid-November in restricted localities at Highleigh and Mt. Sophia but the present cycle of these beetles suggests that more general flights are to be anticipated in 1950.

All cane on the Experiment Station was treated with 10 per cent. B.H.C., and as a result no grub damage has occurred this year.

Work of the Station.

Field Day was held at Meringa on 19th May under ideal weather conditions, and was well attended by 280 growers and other visitors connected with the sugar industry. Visitors were conducted on a tour of the Station in groups, with Bureau staff acting as guides. An excellent display of tractors, together with spray apparatus, caused considerable interest.

Seedling selection in the 1949 crop was carried out in the seedling block and resulted in the selection of 136 seedlings which were subsequently planted in 40-sett plots. From the eighty 40-sett plots of the previous year, fourteen varieties were selected for planting in a yield observation trial whilst an additional five varieties from the ratoon 40-sett plots on D.7 were planted in a yield observation trial on rich soil on E.2, using Trojan and Badila as standards. From the first ratoon yield observation trial of "G" seedlings, five were selected and planted in a randomised block on A.5 whilst others were planted out for further observation on a better soil type.

Heavy arrowing occurred throughout most parts of the district and a record number of crosses was made. Full details of the cross pollination and relative work appears in the report on cane breeding.

Disease Trials.—The leaf scald trial was again planted at Pine Creek, but was a failure due to the poor growth of cane and consequent lack of spread of leaf scald. The downy mildew trial was transferred to Bundaberg.

A chlorotic streak varietal resistance trial was planted at Babinda during 1949 whilst a randomised trial to determine losses due to chlorotic streak was also planted at Babinda early in 1950.

Frost Resistance Trial.—A frost resistance trial was planted at Kairi Regional Experiment Station on the Atherton Tableland to determine resistance of breeding lines to frost and also included in the trial was a number of seedlings selected as possible fodder canes.

Legumes.—Further plantings were made in November, 1949, of various cowpea type legumes, both Queensland bred and importations from Costa Rica. The following varieties were tested with Cristaudo and Reeve's selection (Q.1582) as standards—Q.1568, Q.1565 (Queensland bred varieties), Chinegra (No. 0189), Chinito (No. 0190), Garbancito (No. 0151). Blue Mildew Resistant (No. 0154) and Azul Grande (No. 0153) the latter five being importations from Costa Rica. All were planted on poorly drained soil to test wilt resistance. Q.1568 was the only variety to compare with the standards. It resembles the well known giant cowpea type of growth and is resistant to wilt. It produced a very good crop and arrangements have been made for the propagation of this variety.

The imported varieties were a complete failure on this soil type and under these conditions. They failed not only to produce the crop and cover of the standards, but were also affected by wilt. The other two Queensland varieties (Q.1565 and Q.4313) were more successful but did not compare favourably with Q.1568 and the standards.

A small planting of Mung Bean (a variety of legume being planted to some extent during the last year or so) was made, but cover was inferior on the dry soil type, although better on the wetter soils.

Pre-emergence Sprays.—Preliminary experiments have been carried out with hormone type sprays and results indicate that these sprays have a very definite future in the cane areas. Four trials were set out on the Experiment Station—

(*a*) 2 lb. and 4 lb. per acre 2,4-D used on 3 months old plant cane and

(*b*) A similar trial on ratoon cane.

Results indicate that under certain conditions 4 lb. per acre gave better control than 2 lb. on both the plant and ratoon cane.

A further trial was carried out to determine whether or not spraying with 4 lb. 2,4-D per acre prevented the germination of cane, by spraying the same day as planting, 24 hours later and also 48 hours after planting. Results show that under the conditions prevailing at the time of the experiment the 2,4-D had no effect on the germination of the variety Q.50. Preliminary experiments were also carried out with a combined spray containing creosote plus sodium pentachlorphenate plus 2,4-D. These experiments, which showed considerable promise, are to be continued.

Experiments Harvested during the 1949 *Season.*—Five seedling trials were harvested during the year. These consisted of a plant trial in the form of a Latin Square on Division A.3; a 1st ratoon randomised block on Division A.2; two plant yield observation trials (one on Division A.6 and one on Division E.3) and a 1st ratoon yield observation trial on Division A.4.

In the plant Latin square, F.304, F.335, F.343 and 41MQ779 were compared with Trojan and the trial was harvested in September at the age of 12½ months. 41MQ779 with 7.89 tons of sugar per acre exceeded all other varieties at the 1 per cent. level of significance in both cane and sugar per acre. F.304 was next with 6.03 tons sugar, then Trojan with 5.91, F.335 with 5.77 and F.343 with 5.63 tons of sugar per acre respectively. The satisfactory performance of 41MQ779 which so greatly exceeded Trojan indicates a possible future for this cane, though the sparse top late in the season allowed much Blue Top to grow in these plots. F.335 and F.304 were favoured by the cane cutter owing to evenness of stalks, good stooling and softness in cutting. These two varieties with F.343 suffered in the dry spell following the planting when many young shoots died off, causing a rather patchy stand which unfortunately is also showing out in the 1st ratoons. The varieties 41MQ779, F.304, F.335 and F.343 are now being propagated on farms throughout the district and the three "F" canes have also been planted on better land on the Station for further observation.

In the 1st ratoon randomised block on Division A.2, Trojan, E.209, E.230, E.247, E.269 and E.275 were compared. This trial was harvested in September at the age of 11½ months. The standard Trojan with 6.04 tons sugar was the leading variety and significantly exceeded E.209, E.230 and E.247 at the 5 per cent. level. E.275 was a very close second with 5.92 tons sugar per acre. There was no significant difference between the performance of E.275 and Trojan in either cane or sugar per acre. E.269 was next with 5.36 tons of sugar per acre and it is interesting to note that Trojan and E.275 were not significantly better than this variety. The remaining varieties, E.209, F.230, and E.247 yielded 5.14, 5.04 and 5.39 tons sugar per acre respectively. E.247 lodged badly, but all the other canes were reasonably upright, though E.269 was leaning badly in patches an E.275 tended to sprawl in one plot. All varieties gave better coverage than Trojan.

A plant yield observation trial on Division A.6, in which 28 "H" varieties were compared with Trojan, was harvested at the age of 12 months. The variety H.232 with 35·2 tons at 17·06 c.c.s. was the leading cane yielding 6 tons sugar per acre. Another promising cane was H.265 with 5·99 tons sugar per acre while H.312 and H.231 with 5·37 and 5·23 tons sugar per acre respectively also gave good returns. The heaviest Trojan plot yielded 32.72 tons cane per acre with 18 c.c.s. giving 5.89 tons sugar per acre and the lightest plot produced 20.89 tons per acre with 18.8 c.c.s. giving 3.93 tons sugar per acre. The variety most impressive in the plant crop was H.231. This cane is an early maturer with good growth habits. It is an excellent germinator and after harvesting, the ratoons came away strongly. It yielded a little over threequarters of a ton of sugar per acre more than the nearest Trojan plot.

As is often the case in seedling trials, many of the heavy yielders had low sugar and bad growth habits. The ratoons are being carefully watched to determine whether these canes live up to the promise shown in the plant crop.

The plant yield observation trial on Division E.3 was harvested at the end of July at the age of 12 months. Eight "G" varieties and Q.54 were compared with Trojan and Badila. Trojan showed its superiority in this trial with 7.57 tons sugar per acre followed by G.243 with 5.96 tons, a Badila plot with 5·87 tons, G.218 with 5·84 tons, Q.54 with 5.67 tons and G.244 with 5.66 tons per acre respectively. G.243 and G.244 produced a very heavy tonnage of cane which lodged badly. The soil on this block is good and all canes in this trial were considered suitable for this type of land.

The 1st ratoon yield observation trial on Division A.4 was harvested in October at the age of 12½ months. In this trial 32 "G" varieties were compared with Trojan. After the plant crop was harvested, all varieties with the exception of G.261, G.271, G.274 and G.282 came away well. The five best varieties which were considered worthy of further trial gave the following results:—

G. 262 with 4·71 tons of sugar per acre as compared with 4·69 for the adjacent Trojan plot
G. 270 with 5·57 tons of sugar per acre as compared with 5·63 for the adjacent Trojan plot
G. 273 with 5·51 tons of sugar per acre as compared with 5·63 for the adjacent Trojan plot
G. 323 with 4·18 tons of sugar per acre as compared with 6·31 for the adjacent Trojan plot
G. 362 with 5·15 tons of sugar per acre as compared with 5·26 and 4·78 for the adjacent Trojan plots

These varieties were therefore planted out in a randomised block trial on Division A.5 with Trojan as the standard. G.262 was the only cane to outyield Trojan in sugar per acre. G.270 and G.273 have good growth habits and compared favourably with Trojan although the former is very hard. Other varieties also considered worthy of further trial were G.208, G.324 and G.331 and these were planted out on better land on Division D.5.

Laboratory Work.

Cane (maturity tests and station samples)	806
Cane (farm trials)	321
Cane (farmers' samples)	24
	1,151

Crop Summary.

Cane sent to mill	575 tons
Cane used for plants, samples, &c.	30 tons
	605 tons
Total area harvested	20·68 acres
Tons cane per acre harvested	29·25

Class of Cane.

Plant	45·35 per cent.
Ratoon	54·65 per cent.

LOWER BURDEKIN EXPERIMENT STATION, AYR.

(Mr. G. A. Christie, Senior Adviser, Officer in Charge.)

CROP GROWTH REPORT.

The late winter, spring and early summer periods of 1949 were dry over most of the Lower Burdekin area. Heavy monsoonal rains fell early in January and continued with only short breaks until the middle of April. The preparation of land throughout the district was interfered with by this wet weather and planting was considerably delayed. The Burdekin River was in flood for a long period and at one stage the river broke its banks, causing some damage to isolated farms by depositing sand and bringing about the lodging of crops. However, the damage was not as serious as in the 1946 or 1940 floods, although several of the weaker points in the bank which broke in both previous floods failed to hold the flow on this occasion also.

Fortunately no gale winds occurred during the rains but some heavy crops on saturated soils lodged with the moderate winds that were experienced.

Land preparation could not be commenced until the end of April and the heavy growth of grass and weeds made planting conditions particularly difficult. Mercurial dipping was carried out extensively, particularly in the Inkerman area, the results of which have been very successful.

No meteorological equipment has yet been installed at the Station but the following rainfall figures are available from the post office at Ayr.

RAINFALL RECORDS TAKEN AT AYR POST OFFICE, FROM 1ST JULY, 1949, TO 30TH JUNE, 1950.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Total.
Inches	·05	..	..	2·69	·74	·39	12·4	8·14	25·17	6·40	1·80	6·3	58·41
Wet days	1	..	..	8	3	2	16	14	20	14	4	7	89

WORK OF THE STATION.

Most of the cultivable area of the station has now been cleared of timber. Preparation of the land for planting was commenced early in March, but due to wet weather had to be discontinued until May, after which month it was possible to resume ploughing and the land turned up in very good condition. A certain amount of levelling and grading was found to be necessary for efficient irrigation.

Planting was almost completed in the latter half of June and a long term ratooning trial has already been set out covering 5¼ acres. The object of this trial is to determine the practicability of growing first and second ratoon crops in the Burdekin area and to compare the economic results with that of growing plant cane only. The behaviour of three varieties namely, Badila, Trojan and S.J.16 is being investigated in this trial.

The first batch of seedlings was transplanted into pots and was ready to go into the field at the end of June. The fuzz was germinated at Meringa and transported by rail to the Station in seed boxes. The total number of seedlings transplanted was 3,308 representing progeny from 28 crosses.

CENTRAL SUGAR EXPERIMENT STATION.

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

METEOROLOGICAL AND CROP GROWTH REPORT.

The outstanding features of the 1949 season in the Mackay district were the record crop harvested and the complete failure of winter rainfall. No useful falls were experienced until the middle of October. This was in marked contrast to the corresponding period in 1948 when good rain occurred in June and July. The cold weather continued during July and frost was recorded on five nights. The continuation of dry weather into August made cutting and carting conditions ideal, but rain was needed for the young plant and ratoon cane, while the germination of cane setts was slow. During these two months, despite the winds and dry weather, the cane remained in good condition. Similar weather continued throughout September but by this time the cane showed the effects of the severe conditions in most mill areas. Relief rain was required particularly as the young cane was not progressing and the ratoons were suffering. Although dead cane was evident on some of the Experiment Station blocks the cane on the remainder maintained its condition.

Excellent rainfall and growth conditions were experienced during October and cane made rapid recovery and progress. This altered the crop position for the district and ensured the success of the young plant and ratoon cane; furthermore many setts germinated following the rain and improved the appearance of those blocks with a large number of blank spaces. In contrast to its beneficial effects agriculturally, it caused five mills in the area to cease crushing for a short period. November storms enabled the fields of young plant and ratoon cane to make good progress during the month, but a continuation of these was required to maintain this progress. However, this did not eventuate and hot dry days and strong winds affected the cane during the first three weeks of December. Relief was afforded with rain at the end of this month, which continued right through until the end of April. Total rainfall for the six months, July to December, 1949, was 9·76 inches.

The situation altered considerably in January when the heaviest monthly total rainfall since 1932 was recorded. Registrations in some areas of the district were above 30 inches, with Koumala recording 38 inches. All station crops made excellent progress during this period but some of the low lying blocks in the district suffered from the effects of water-logging due to local flooding. Excellent growing conditions continued throughout February when crops made prolific growth and compared favourably with the 1949 crop at this period of the year.

A cyclone destroyed the township of Carmila in the early morning hours of the 11th March and many neighbouring cane areas suffered severe damage. Strong winds were experienced in the Mackay area with slight damage to buildings; many cane crops were flattened but most of these had recovered by the end of the month. However, the bend which remained in the cane will affect loading during the harvesting period of the 1950 season. The rainfall for March was the heaviest since 1936 and it completely upset any plans for early planting. Many of the fallow blocks on low lying areas were lagoons for the greater part of the month. All crops made prolific growth under the excellent conditions, which continued during April when the rainfall experienced was the heaviest since 1941. Generally the cultivation of land in the Mackay area was delayed until the end of the month as wet patches occurring in the paddocks hampered this work.

Cane varieties in the area were flagging and these arrowed in May. One bleak wintry day was experienced on the 25th May; the rest of the days were warm and, following a short period of fine weather, canegrowers commenced cultivating in preparation for planting, but further rain towards the end of the month again prevented farm operations. Two cold days occurred on the 9th and 10th June. Rain in the first half of June interrupted farm operations and mill crushing. Generally the district crops are good but most varieties, although erect, show the effects of the wind in March.

The rainfall for the first six months of the year 1950 totalled 75·72 inches, being more than double the 34·41 inches recorded for the first six months of 1949. The total rainfall for the period under review was 85·48 inches recorded on 116 days. This was 38·53 inches more than the previous twelve monthly period, which recorded 46·95 inches on 95 days.

The severe seasonal test imposed on the record 1949 crop by heavy early frosting and the almost complete absence of winter rain was reflected in poor c.c.s. and cane quality towards the end of the long crushing season, when dead cane was present on many blocks. This should be remembered when assessing the performance of the variety Q.50, which was one of the varieties concerned. It was severely affected by red rot during the last few weeks of the long season when there was a marked drop in c.c.s. from mid-November following the October-November rainfall. Before mid-November it was an outstanding variety in tonnage

and sugar content. This variety, comprised approximately one-third of the 1949 season's crop and has given excellent returns especially on areas considered unfit for cane growing with the older varieties. It is expected that it will constitute a large proportion of the 1950 season's crop. A heavy tonnage of Q.28 was also harvested during 1949, both Q.28 and Q.50 once again demonstrating their value as varieties for the Mackay district.

It was estimated that approximately 5,000 tons were lost by grub damage to the 1949 crop. The beetle flight which occurred in November and December was early and heavy. The application of benzene hexachloride is now definitely established as a standard farm practice for the control of wireworms and also to prevent damage by the grub of the greyback cane beetle on those farms which are in the grub-infested areas; approximately 1,500 acres of the 1950 crop were treated for grubs. Generally the "frenchi" grub infestation was light but there were odd severe cases. Reports on rat damage show that apparently this was larger than usual, while wallaby damage was negligible.

The following meteorological observations were made at the Station during the year.

The rainfall records (also given below) were, prior to 1935, 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	1937	56·60
1921	95·89	1938	52·18
1922	34·47	1939	56·14
1923	25·23	1940	84·97
1924	53·37	1941	71·38
1925	54·80	1942	77·92
1926	34·60	1943	60·11
1927	83·87	1944	53·16
1928	72·28	1945	46·76
1929	64·03	1946	53·74
1930	55·81	1947	53·39
1931	30·01	1948	41·80
1932	48·48	1949	44·17
1933	71·94	1950 (6 months)	75·72
1934	37·57	**Average for 30 years**	**57.15**
1935	45·15	**Average at Te Kowai 15 years**	**59.66**
1936	97·37		

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE CENTRAL SUGAR EXPERIMENT STATION, MACKAY, DURING PERIOD 1ST JULY, 1949, TO 30TH JUNE, 1950.

Month.	Rainfall (Inches).	Wet Days.	Average Rainfall (Inches).	Shade Temperature.					
				Maximum.			Minimum.		
				High.	Low.	Mean.	High.	Low.	Mean.
1949.									
July	0·25	3	1·36	84·5	67	73·7	60·5	34·5	46·6
August	..	..	0·97	79·5	71	75·1	62	39	49·8
September	0·20	4	1·52	88	74·5	79·4	69·5	44·5	55·3
October	4·52	6	1·82	89	78	84·5	73·5	54·5	65·5
November	2·13	9	2·93	96	80	86·6	71·5	48	64·0
December	2·66	8	6·53	93·5	84	87·9	78	60·5	68·1
1950.									
January	21·25	14	13·36	92	79	86·4	74	60	68·9
February	11·60	15	12·27	89	83·5	85·8	76	67·5	71·7
March	26·23	25	10·99	90·5	80·5	84·0	76	64	71·4
April	12·80	17	5·29	86·5	73·5	80·0	72·5	54	65·8
May	2·28	9	3·01	87	63	78·4	68	47·5	56·6
June	1·56	6	2·45	80	62	72·1	65·5	39·5	51·9
Totals and Averages	85·48	116	62·50	..	..	..	..	..	..

WORK OF THE STATION.

Experiments Harvested during 1949 *Season.*—Five varietal trials were harvested during the 1949 season, being a plant randomised block trial including Co.301, C.P.29/116, Pindar, Q.47, Q.49 and Q.50; a plant randomised block trial including "F" seedlings, Q.28 and Q.50; a yield observation trial on plant cane with "H" seedlings, B.331 and Q.50; a first ratoon randomised block trial including "E" seedlings and Q.28, and a yield observation trial with first ratoon "G" seedlings and Q.28. In addition to these, three Q.28 "ratoon stunting" disease trials, a long-range trial to measure the effect of various crop rotations on soil fertility, a second ratoon filter mud plus fertilizer trial and a second ratoon fertilizer placement trial were harvested.

The germination of the six varieties in the plant randomised trial was slow; progress was poor until the end of December, 1948, and generally the stooling was variable. The varieties made progress from January to April and maintained condition during the dry period June to September. Pindar was ahead in the monthly maturity tests for the latter period, but Q.50 gave the best c.c.s. in October. At harvest Q.50 gave the best results with 4·09 tons of sugar per acre. Q.50 and Pindar exceeded C.P.29/116, Q.49, Q.47 at the 5 per cent. level of significance with Q.50 exceeding the latter two Q. varieties at the 1 per cent. level. The yields of the other varieties in tons of sugar per acre were: Pindar (3·94), Co.301 (3·50), C.P.29/116 (3·30), Q.49 (3·21) and Q.47 (2·90).

The second plant randomised trial contained "F" seedlings (124, 135, 160, 184, 186), Q.28 and Q.50. The dry spring affected the germination and to some extent the development of the crop. However, this cane made good progress from January to April and maintained its condition until it was harvested in October, 1949. At harvest Q.50 gave the best results with 5.30 tons of sugar per acre thus exceeding F.160, Q.28, F.184, F.135 at the 5 per cent. level of significance, and F.184 and F.135 at the 1 per cent. level. The yields of the other varieties in tons of sugar per acre were: F.124(4·55), F.186 (4·14), F.160 (3·66), Q.28 (3·59), F.184 (3·34), F.135 (3·05).

The yield observation trial on plant cane included 26 "H" seedlings, B.331 and Q.50 as the standard variety. By February, 1949, it was obvious that the trial results would be unreliable owing to poor germination and variable growth. The trial has been repeated as a number of the varieties had better early sugar than the standard and were worthy of further investigation.

One variety, E.129, was outstanding in the first ratoon randomised trial with "E" seedlings (119, 122, 124, 129, 135) and Q.28. At harvest E.129 gave the best results with 3·82 tons of sugar per acre, thus exceeding all other varieties at the 5 per cent. level of significance and all except E.135 at the 1 per cent. level. The yields of the other varieties in tons of sugar per acre were: E.135 (3·14), Q.28 (3·04), E.124 (2·96), E.119 (2·73) and E.122 (2·33). The seedling E.129 gave a total yield of sugar per acre for the plant and ratoon crops of 9·3 tons compared with 7·8 tons for the standard Q.28.

The yield observation trial on ratoon cane included 20 "G" seedlings with Q.28 as the standard variety. Final selections were made in June, when the seedlings, G·101, G·104, G·105, G.112, G.176, G.177 were selected for further trial with Q.50 as the standard.

The second ratoon crop of the filter mud plus fertilizer trial was harvested. The results based on tons of sugar per acre for the three crops showed that (*a*) there was very little difference in gain between 1½ cwt. per acre of fertilizer applied to each crop and the application prior to planting of 20 tons and 40 tons per acre of mud; (*b*) the difference between the mud applications was negligible; (*c*) there was a better response to 3 cwt. per acre of fertilizer per crop, which, considering all factors appears the most economical proposition; (*d*) the best results were obtained when the fertilizer and mud were combined; (*e*) the effects of 20 tons of mud per acre before planting plus an annual application of 3 cwt. per acre of fertilizer were as beneficial as the application of 40 tons of mud plus the fertilizer treatment.

Further interesting information concerning losses from "ratoon stunting disease" was obtained from the trials on Q.28 ratoon cane. The losses in the ratoon crops for each trial were 18·2 and 20·3 tons of cane per acre respectively, the total losses from both plant and ratoon being 25·2 and 24·6 tons of cane per acre. These results emphasise the seriousness of this disease.

The fertilizer placement trial was designed to measure the relative effects of surface and subsurface placement of fertilizer. There were no signficant differences at harvest.

The plant crop of the long range trial was harvested and sections three and four were planted with grass and perennial legumes respectively, section one being ratooned. The first cycle of this trial will be completed in 1951.

Landsdowne Road Seedling Plots.—First year selections from the previous year's seedlings were planted out in 40 sett plots on a farm at Alexandra. The new site now gives two seedling sub-stations on alluvial soil.

Plant Introductions.—New varieties introduced from quarantine during the year were Co.331, P.O.J.2961, 34 S.N.248, 38 S.N.4305, 40 S.N.1133, 40 S.N.5819, 41 S.N.2261 and 41 S.N.3339.

Weedicide Trials.—Three pre-emergence spraying trials were set out using an ordinary knapsack type spray. The solutions applied contained 2, 4-D at the rate of 2½ lb. and 4 lb. per acre. The results were disappointing and the failure was due to two causes. Firstly the land was badly infested with nut grass over which the 2, 4-D exercised no pre-emergence control. Secondly this type of soil cracked very badly and grasses and weeds grew out of these cracks. Cultivation is essential on this type of soil and future trials which already have been planned will combine cultivation and spraying.

Legumes.—A small amount of the seed of Guar and *Canavalia bonariensis* was planted for observation on two soil types. These were inferior to Reeve's Selection and Cristaudo Pea as green manure crops, but a larger area of C. bonariensis is required for observation purposes. The perennial legumes Centro, Puero and Stylo were planted in the long range trial. Some of the Reeve's Selection planted in early October 1949 was destroyed by a fusarium wilt in January 1950.

Experiments Initiated During the Year.—These included a varietal trial with B.174, E.119, E.129, E.135, Q.47 and Q.50, a trash trial, a randomised variety trial with six "G" Seedlings and Q.50, and a yield observation trial with 26 "I" Seedlings, N.Co.310, D.225 and Q.50. The yield observation trial with 26 "H" Seedlings, B.331 and Q.50 was repeated. In addition "ratoon stunting disease" trials were planted in isolation and a further area prepared for similar trials.

Field Day.—The 1950 Field Day was held at the Mackay Sugar Experiment Station on 23rd May. Approximately 400 persons attended and visitors were conducted on a tour of the Station in parties of twelve or fifteen by members of the Bureau staff, who acted as guides. A display of implements and tractors was provided by Mackay agencies and manufacturers.

Mackay District Sugar Court.—Bureau officers were in attendance on the Bureau exhibit in the Sugar Court at the Mackay District Agricultural Show.

LABORATORY WORK.

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

Station maturity analyses	942
Station trials	195
Farm trials	200
Maturity testing for farmers	302
Farm varietal trials maturity analyses	90
Show canes	37
	1,766

Summary of Crops Harvested on Station.

Cane sent to mill	694·86 tons
Cane used for plants	27·5 tons
Total area harvested	29·9 acres
Average tons per acre	24·16 tons
Class of cane—	
Plant	341·75 tons
Area	14 acres
Average per acre	24·48 tons
First ratoon	276·57 tons
Area	11·1 acres
Average per acre	24·91 tons
Second ratoon	104·04 tons
Area	4·8 acres
Average per acre	21·67 tons

SOUTHERN SUGAR EXPERIMENT STATION.

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

METEOROLOGICAL AND CROP GROWTH REPORT.

Frosts with dry weather in July followed by continued dry weather in August and early September tended to produce harsh spring conditions. However, light rains during September brought some relief and by mid-October when good rain fell the spring planted cane was well established. Better than average rainfall recorded in October materially assisted crop growth, and for the balance of the period under review good well-spaced rain occurred and kept soil moisture at reasonable levels. The total rainfall for the twelve months, 59·31 inches recorded on 124 wet days, was 16·87 inches above the yearly average of 42·44 inches.

Crop growth improved with the good rains of mid-October and was well maintained until the cane began to arrow. Arrowing was profuse and widespread and appeared first in C.P.29/116 in April. Although arrowing may possibly affect crop yields, the crops were so well grown when arrowing occurred that district yields should be the highest recorded.

During the late spring and early summer months damage by grubs of *P. furfuracea* was more evident that in previous years and most of the areas affected were treated with carbon disulphide.

Rainfall Records, 1914–1950.

Year.	Rainfall Inches.	Year.	Rainfall Inches.
1914–15	31·99	1932–33	36·81
1915–16	28·54	1933–34	71·45
1916–17	58·08	1934–35	40·01
1917–18	49·85	1935–36	44·24
1918–19	24·24	1936–37	31·65
1919–20	28·20	1937–38	44·40
1920–21	45·16	1938–39	41·01
1921–22	44·97	1939–40	41·69
1922–23	37·14	1940–41	43·26
1923–24	34·16	1941–42	33·52
1924–25	50·96	1942–43	40·75
1925–26	37·62	1943–44	45·22
1926–27	68·18	1944–45	28·14
1927–28	74·69	1945–46	26·10
1928–29	31·16	1946–47	44·52
1929–30	43·16	1947–48	57·76
1930–31	47·19	1948–49	40·18
1931–32	22·88	1949–50	59·31

Average for 36 years .. .. 42·44

Abstract of Meteorological Observations made at the Southern Experiment Station, Bundaberg, from 1st July, 1949, to 30th June, 1950.

Month.	Rainfall (Inches.)	Wet Days.	Shade Temperatures.						Mean Diurnal Range.	Mean Per Cent. Relative Humidity at 9 a.m.
			Maximum.			Minimum.				
			High.	Low.	Mean.	High.	Low.	Mean.		
1949.										
July, ...	·42	4	74	60	70·9	56	34	44·7	26·2	..
August	·14	4	80	67	74·2	57	38	47·3	26·9	..
September ..	1·06	4	82	72	77·5	70	43	52·9	24·7	..
October	7·31	12	85	76	82·25	73	57	65·0	17·25	73·4
November	4·17	8	88	78	82·0	75	49	64·5	17·5	65·0
December	2·19		89	80	84·4	76	60	66·4	18·0	64·3
1950.										
January	5·58	8	89	80	85·5	75	66	70·7	14·8	74·0
February	16·88	18	90	76	83·2	77	64	71·8	11·4	82·7
March	8·30	26	85	78	81·4	75	62	67·2	14·2	83·1
April	4·38	19	82	75	78·4	68	50	60·1	18·3	80·0
May	2·57	4	80	61	75·3	65	46	55·0	20·3	75·6
June	6·31	10	73	61	69·0	65	40	51·4	17·6	81·7
Totals ..	59·31	124	..	..	..	..	..	..	..	..

WORK OF THE STATION.

Field day was held on 15th June and the attendance of growers and persons interested in the sugar industry was satisfactory despite the fact that rain fell for most of the day. Bureau officers, acting as guides, conducted all visitors on a tour of the station.

Plant Distribution.—A distribution of Q.50 was made to growers in the Bingera, Fairymead, Gin Gin, Millaquin and Qunaba areas during the spring of 1949. In all 351 applications were received and 305 tons of cane distributed.

New varieties introduced from quarantine during the year were P.O.J.2961, 38 S.N.248, 38 S.N.4305, 40 S.N.1133, 40 S.N.5819, 41 S.N.3261, 41 S.N.3339 and Co.331.

Experiments Harvested During 1949 Season.—Most of the experiments harvested during the year were of the usual type associated with seedling production, selection and testing.

The first ratoon randomised trial with ten "D" seedlings (9, 11, 14, 15, 41, 44, 60, 62, 65 and 73) did not reveal any seedling of commercial promise and all have been discarded.

The first ratoon crop of the third cycle of the rotational trial was harvested from Block B.4. This long-range experiment was first planted in autumn, 1938. The design has been fully described in previous annual reports and the following brief description of the layout will suffice:—

The trial consists of three rotational treatments—

(1) Eighteen months fallow with legumes followed by a plant and one ratoon crop of cane;

(2) Six months fallow with legumes followed by plant, first and second ratoon crops; and

(3) Similar to (2), but in the replanting of the trial at the end of the crop cycle the original variety is replaced by a fresh variety.

Yields from the plant and first ratoon crop in this cycle were (1) 79·45 tons per acre; (2) 79·82 tons per acre and (3) 70·57 tons per acre. Section 1 has been ploughed out and is now under fallow while second ratoons will be harvested from sections 2 and 3 during the spring of 1950.

The first ratoon crop harvested from the fifth rotation of the permanent trash trial on Block E.3a again did not indicate any increase in yields from trash conservation on this red volcanic soil type under southern climatic conditions. Aggregate yields to date amount to 304·6 tons for the trash plots and 303·8 tons for the no-trash plots or 30·46 and 30·38 tons per acre per crop average.

The first ratoon crop harvested from the rotary filter mud plus fertilizer trial on Block E.3b yielded an average of 34·7 tons of cane per acre, with an average yield of 51·66 tons of cane per acre for the two crops harvested. When the plant crop of this trial was harvested in 1948, the yield figures indicated that neither the application of mud nor the fertilizer dressings brought about an increase in tons of cane or sugar per acre. This was not unexpected since these red soils often do not require fertilizer for the plant crop, particularly when the preceding crops have been adequately fertilized. However, when the first ratoon crop was harvested there was again no clear cut response to fertilizer or mud. Nevertheless there were indications that the dressing of 2 cwt. of fertilizer and the 50 ton application of filter mud were beginning to have some beneficial effect. This trial will now be ratooned in order to ascertain whether these trends have become more marked.

Eight "H" seedlings and two "F" seedlings were selected from the plant yield observation trial in Block E.4 and the ratoon yield observation trial in Block F, respectively, and replanted in an 11 x 4 randomised trial in Block B.1. Of the eight "H" seedlings selected, four had the parentage P.O.J. 2878 x Co.290, two Co.281 x P.O.J. 2878, one Co.281 x C.P.29/116 and one P.O.J.2725 x Co.290. Parentage of the "F" seedlings was P.O.J.2878 x Co.290 and Co.419 x P.O.J.2940. The randomised trial with the ten "F" seedlings on Block A.2 did not reveal any seedling of outstanding promise.

Water Supply.—The station irrigation water supply did not cause any concern, supplies being sufficient for seedling requirements. The position appears to be satisfactory for the next seedling programme.

New Experiments Initiated During the Year.—A randomised block trial with eight "H" seedlings and two "F" seedlings was established. Full scale trials with 2,4-D were set out for pre-emergence control of weeds.

Legumes.—Four strains of velvet beans—C.P.I.2041, C.P.I.2043, C.P.I.2271 and C.P.I.2272—were tested in a replicated trial with four strains (Black Mauritius, Jubilack, Marbilee and Somerset) which perform well in the district. C.P.I.2043, C.P.I.2271 and C.P.I.2272 yielded similar amounts of green matter per acre to the four strains against which they were tried while the yield of C.P.I.2041 was lower. Guar bean, *Cyamopsis tetragonoloba*, and a red bean, *Canavalia bonariensis*, were also tested but their growth habit and cover are unsuitable for southern conditions.

Weedicides.—Full scale field trials using 2,4-D as a pre-emergence spray were established on Block B.3 and Block E.3a. Application of the weedicide was made with the power spray equipment attached to the tractor. Generally, the pre-emergence application of 2,4-D satisfactorily controlled germination of weeds and grass.

Contact weedicides tried for controlling weeds and grass which germinated subsequent to the pre-emergence application of 2,4-D consisted of (1) emulsified diesel oil base with a combination of 2,4-D and sodium pentachlorphenate and (2) creosote base with a combination of 2,4-D and sodium pentachlorphenate. Either of these contact sprays killed quite readily when applied to young grass and weeds but the weedicide with the creosote base is simpler to handle and appears to be faster in action than the other. Further trials will be carried out during the coming summer months.

Further information regarding these weedicide trials is given elsewhere in this Annual Report.

LABORATORY WORK.

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

Station and trial cane samples	995
Farmers' cane samples	371
Irrigation waters	11

SUMMARY OF CROPS GROWN ON STATION.

Varieties harvested 1949 season—	Tons.	
P.O.J.2878	139·76	
Q.49	50·9	
C.P.29/116	55·44	
Seedlings	327·39	
Total	573·49	
Plant cane harvested	208·51	
First ratoon cane harvested	364·98	
Total	573·49	
Total cane harvested for mill	573·49	
Used for samples and plants on station	11·0	
Total crop	584·49	
Total acreage harvested	20·08	acres
Average tonnage per acre	29·11	tons

REPORT ON THE WORK OF THE FIELD STAFF.

(By W. R. STERN, Assistant Agronomist.)

In addition to the field experimental programme, advisory work and regular inspections were carried out by the field staff. The programme for the present season was discussed at a meeting of the field staff held in April, concurrently with the conference of the Queensland Society of Sugar Cane Technologists.

GROWTH OF THE 1950 CROP.

General.—In all districts the late winter and early spring were particularly dry and it was not until rains fell in October that the cane made any headway. From October onwards rain was regular and adequate for the growth of the crop and by the end of the year the cane was out of hand.

The wet season this year was prolonged, thus delaying harvesting and planting. In some cases, general and local flooding hampered operations while strong winds caused many crops to lodge. The cane ratooned slowly at first but with the onset of the rains in October growth was prolific. Once again the cane is arrowing heavily and practically all varieties have either arrowed or are flagging.

Germinations.—The earlier plantings this year germinated well in all districts, but the later plantings which were caused by inaccessibility of the fields due to excess rain have given somewhat irregular strikes. This is due mainly to the prolonged wet weather, and the slower germinations to cooler temperatures. The use of mercurial dips became more widespread and excellent results were obtained where these were used.

In the central district, B.H.C. was effective in wireworm control and has ensured germinations. A series of germination trials in the Burdekin district indicated that spring planted cane yields better planting material than the older autumn plant.

Arrowing.—By mid autumn practically all varieties had arrowed in all districts. Early arrowing was noted particularly in Eros and Q.44 in the northern district, and C.P. 29/116 in the southern districts. Q.50, Q.55 and Pindar were shy arrowers in the southern districts. The effect of this early arrowing may be a reduction in the estimate of cane to be harvested.

Ratooning.—The ratoons for the 1950 crop made little headway until the onset of the October rains, when strong and vigorous growth developed. In the southern districts Q.49 showed a reluctance to ratoon if harvested early. This was characterised by uneven and weak ratooning of stools and was not confined to dry areas. It was more noticeable when following a heavy or standover crop.

Following are detailed notes on the 1950 crop in various districts.

Northern District (North of Townsville).

The bulk of the planting was completed before the commencement of the 1949 crushing. The young plant and ratoon cane received more rain than usual during the critical second three months of growth and it was out of hand before the wet season. The distribution of rain was much more even than in the previous year, particularly in the last quarter of 1949. The wet season was prolonged, and with squally conditions in April and May fairly extensive lodging occurred in all varieties, particularly on river flat country and grub damaged areas.

Lower Burdekin District.

July to late November was fairly dry but the wet season extended from January to the middle of April. Rain during this period was heavy and continuous and interfered with planting operations and the standing cane received little or no attention.

The Burdekin River broke its banks and though damage was not as severe as in the 1942 or 1946 floods, the river remained in flood for a long period. In some cases the river changed its course particularly in the Ana-branch and damage was caused on some individual farms by deposition of silt and lodging of crops.

Central District.

This season was unlike the previous two. It commenced with a dry period from July to early October but from then on excellent growing conditions prevailed for the 1950 crop. Good summer storms occurred and until the end of the year the total precipitation was 9.31 inches which compared with 9·27 inches over the same period the previous year.

From January until the end of March it rained consistently and a total of 48·06 inches was registered over a period of 53 wet days compared with 30·24 inches over 47 wet days for the same period the previous year. Flooding occurred in the Pioneer River and local creeks but this was not serious and no erosion problems were created. A cyclone about the middle of March caused some damage to the standing cane but with subsequent conditions which were favourable to the growth of the crop much of the cane recovered.

There was a marked decline in c.c.s. during the latter part of the 1949 crushing season. This was due to the interaction of a number of factors, but can be attributed chiefly to the percentage of dead sticks resulting from the earlier dry weather, and the development of red rot and rind disease in the crop after the October-November rains.

Southern District.

The winter of 1949 was mild and with the exception of the Maryborough-Bauple area the July-August period was particularly dry. But excellent growing conditions developed from mid-October onward and the rainfall was fairly well distributed until practically the end of June. This produced heavy cropping, but further growth was forestalled by the early arrowing of the major canes of the district.

The Moreton area suffered badly from flooding during the crop year. The first flooding took place in early September and the second in late October. Damage was caused to young plant and ratoon cane and some trials were lost as a result of these floods.

GREEN MANURE CROPS.

High prices and the difficulty of obtaining seed supply of the more desirable types of green manure crops forced growers to plant those varieties which are wilt susceptible. The velvet beans became increasingly popular and the acreage planted will multiply as further supplies of seed become available. In the northern and central districts good crops were obtained with Reeve's Selection and Cristaudo Pea while Poona Pea plantings succumbed to wilt early in the season.

In the Bundaberg districts velvet beans have proved themselves eminently suited to local conditions and further supplies are being built up in the Isis area. In the Maryborough area also velvet beans were in strong demand. Due to the heavy wet season all green manure crops failed in the Moreton District.

VARIETY TRIALS.

The work on varieties comprised the planting of variety trials, propagation of new stock and the harvesting of plant, first ratoon and second ratoon trials in all districts. Details of these trials appear in the January and April issues of the Cane Growers' Quarterly Bulletin, and only the salient points are discussed here.

In the *Cairns district* Q.50 proved outstanding both in yield and in c.c.s. It was superior to Q.45 and Q.47, though Q.45 weighed surprisingly heavy. In a trial at Mossman on grey clay loam, Q.50 was superior to both Eros and Comus while seedlings D.225 and D.271 in the same trial did not show promise. These two latter showed better growth at Highleigh on red brown loam but still did not measure up to the standard cane.

In a trial including Trojan, Eros and Q.54, Trojan and Eros were significantly superior to Q.54; though the stalks of this latter cane are attractive, it is a shy stooler and an unsatisfactory ratooner. In this trial there was no significant difference between Trojan and Eros.

In the *Lower Burdekin* no decisive results were obtained with B.331 while B.212 was inferior to the standard varieties. Pindar and Trojan were ahead at all stages and Trojan made considerable late growth. In a trial including Q.28, Q.50, Q.45, Eros, and E.K.28, the yield in the first ratoon crop was not appreciably below that of the plant crop, except in E.K.28. Despite the satisfactory yields obtained with Q.50 and Q.45 it is unlikely that these canes will ever be grown there as their physical characters are not favoured by the growers of this district. Trojan, S.J.16 and Comus are gaining increasing favour while E.K.28 is being discarded.

In the *Central districts,* a variety trial including Badila, Trojan, Pindar, Q.45, Q.47 and Q.49 was planted on rich alluvial loam in order to test the potentiality of such varieties as Q.47 and Q.49 which to date have not proved themselves in this area. C.P. 29/116 has shown promise under adverse conditions; in a trial which included the varieties Q.50, Co.290, Q.28 and B.174 its yield was significantly greater than that of the other varieties. This cane may be suited to the poorer class soils of the district.

In *Southern Queensland* several trials were planted this year to include the varieties Q.50, Q.55, Vesta, Akbar, Eros, Pindar, four F. Seedlings—F.14, F.18, F.25, F.26—Q.47 and C.P.29-116. In a first ratoon trial at Bundaberg C.P.29-116 outyielded Co.301, Q.50, A.130 and Q.28 but there was no significant difference in sugar per acre between C.P.29.116, Q.50 and Co.301. None of three seedlings, viz., D.73, D.9, D.62, in a trial proved of outstanding quality or character.

On Bingera Plantation, in a 14 months crop, Q.47 significantly exceeded Trojan, Q.44 and P.O.J.2878 in both yield and sugar per acre, while Atlas, Q.49 and Trojan significantly exceeded Q.44 and P.O.J.2878. In this trial Q.47 produced higher than average sugar early in the season, and should prove a valuable cane for this district.

In a trial of standover canes on the Maroochy River, Vesta was superior to Q.47, Q.49, Akbar, and P.O.J.2878. The plant crop was harvested at two years of age and the ratoon crop at one year, but in the final analysis Vesta exceeded Q.47, the next best cane, by almost two tons of sugar per acre.

Cane Breeding.

(By J. H. Buzacott, Senior Plant Breeder.)

Good rains fell in the Cairns district during December, 1948, and January and February 1949 followed by very heavy rain in March and further good falls until mid-April. In consequence it is not surprising that the arrowing season was exceptionally good and unusually early. The first crosses were established on the 17th May and by the end of the month seventy-one crosses were in progress.

Loethers, an old variety in the parental line of many good P.O.J. canes, arrowed for the first time in the history of Meringa and arrows were used in a number of crosses, whilst S.J.16, also for the first time at Meringa, produced a few arrows which were used in one cross. The variety Clark's Seedling flowered sparsely at Gordonvale and was used in the breeding programme, whilst B.208 which has only flowered once in the past ten years, also produced two arrows at Pine Creek although they were unsuitable for use when found. Oramboo produced a number of arrows at Meringa this year and was used to the full extent of its availability.

Some difficulty was experienced with arrows dying in solution during the first two weeks of crossing. The main offenders were Q.50, Eros, P.O.J.2725, P.O.J.2875 and P.O.J.2878 and the trouble was probably caused by the exceptionally warm conditions experienced at that particular period. With the advent of cooler weather no further trouble occurred. Fortunately, in most instances, only some of the arrows in each cross died and the remainder matured normally, so that few complete crosses were lost. Strangely enough Co.290 performed much better than usual and few deaths of this variety occurred.

Experiments were carried out using dark boxes to enclose stools of cane for the purpose of controlling the amount of daylight and thereby attempting to produce arrows in varieties which normally either flower sparsely or not at all. These experiments were initiated some two months prior to the normal flowering period. Elongation and flagging occurred on all stools boxed but the arrows failed to emerge. This was believed to be due to the restriction on growth caused by the boxes, only one side of which was opened to admit daylight during certain daylight hours.

Particular attention was again paid to the attempted production of early maturing varieties and further nobilizations of promising quarter-wild hybrids were made. In addition more purely noble crosses were carried out than last year, these being produced mainly for the Burdekin Experiment Station, since that district still utilises noble varieties to a large degree. Several promising early maturing Co.270 x P.O.J.2878 seedlings were also used extensively as parents in order to produce seedlings containing Co.270 blood from varieties which when crossed with Co.270 do not fertilize it.

The total number of crosses made during the year was 219, being the largest number yet achieved in one season. However, since consideration must be given to the requirements of four stations and three sub-stations the demand for a greater variety of crosses is stronger than ever before. A full list of the crosses made appears in Table VIII.

An innovation this year was the storage of portion of the fuzz in "Pliofilm" bags. These bags are transparent, waterproof, airtight and easily sealed by heat. The tins used in the past for fuzz storage required cleaning and repainting each year before use. Considerable labour is saved by the use of "Pliofilm," while storage is made easier and freight reduced.

Fuzz was sown at Meringa and Bundaberg during 1949. Early in 1950 the fuzz planting was carried out at Mackay and a further sowing was made at Meringa to provide seedlings for planting out at the Burdekin Station later in the year. At all stations some trouble was experienced with poor growth of the young seedlings. The cause is not definitely known and it is hoped that similar trouble will not develop during 1950. Both Meringa and Bundaberg will be planting solely fresh seed during 1950 whilst Mackay will also plant a proportion of fresh seed. A disappointing feature of the seedling raising of 1949 was the germination failure of all Pindar crosses and of all S.J.2 crosses in which S.J.2 was used as a female. Pindar has been used during 1950 with a further series of males in an endeavour to obtain seedlings from this promising variety.

At Meringa, 7,815 seedlings, which constituted 53 families, were planted out in the field during November, 1949. At Babinda 1934 setts representing 967 seedlings (32 families) were planted during late August. These seedlings made good growth and selections were made and planted out at the end of June, 1950. At Mackay many seedling deaths occurred on the benches and a good deal of repotting was necessary. However, at the Experiment Station, 7,674 seedlings representing 79 families were planted in the field during August. Q.50 was substituted for Q.28 as a standard in the Mackay seedlings in 1949. A total of 5,904 seedlings (40 families) was field planted at the Bundaberg Experiment Station during October.

In addition a family sett planting of original seedlings taken from the Bundaberg Experiment Station and which comprised 83 seedlings representative of twenty-one families was made at the Beerwah Isolation Plot.

The seedlings of the previous year yielded 136 selections at Meringa, 29 of which were taken from ratoons and the remainder from plant seedlings. Included among these were three breeding canes of the cross I.210 x I.203, the parents of both of which are H.Q.426 and C.278. There were also four varieties of the parentage Co.270 x P.O.J.2878 which were selected mainly as breeding canes but with commercial possibilities. At Babinda 24 selections were made from the 1948 plantings. All these came from the plant crop, none of the ratoon seedlings being deemed worthy of selection. At Mackay Experiment Station 41 selections were made, whilst at Lansdowne Road sub-station 31 seedlings were selected of which only one came from the first ratoon seedlings. Seventy-two selections were made at Bundaberg, all from a plant crop, since original seedlings are not ratooned at that centre. At all stations and sub-stations the selections were planted out in 40-sett plots.

From the 40-sett plots at Meringa, in 1949, fourteen varieties were selected during June and planted in a yield-observation trial. At least two of these varieties have shown good results in the plant crop but selections will not be made until the first ratoons in 1951. At Babinda seven varieties were selected from the 40-sett plots and planted in a yield-observation trial during August. Five of these were of the parentage Q.27 x Badila, which was one of the few crosses which produced a good sugar content at the Babinda seedling sub-station. Twenty-six varieties were selected at Mackay and planted during August in a yield-observation trial. These included two selections which were made at Lansdowne Road sub-station where the major selection will be performed in the ratoon crop. Selections from 40-sett plots were made and planted out at Bundaberg during August, giving a yield-observation trial of 31 varieties. Approximately half of these were of the parentage P.O.J.2878 x Co.290, which indicates the suitability of this cross to Bundaberg conditions.

The "H" series seedlings harvested at Meringa during 1949 as a plant crop showed no particularly outstanding yields but there was a number of varieties which gave a high early sugar content. Of these at least two or three should be selected in 1950 from the ratoon crop provided the ratoon yields are satisfactory. A further yield-observation trial of five "H" varieties was planted on rich soil at Meringa during 1949. These varieties made exceptionally good growth and two have given a very promising performance in the plant crop. Selection from this trial will be deferred until the ratoon crop. Of five "H" varieties in an observation trial at Babinda only two, H.404 and H.411 were deemed worthy of further trial and these were planted out for further observation. Their performance in this later planting indicated that only H.411 was worth future consideration. The "H" seedlings at Mackay planted during 1948 gave a very poor germination and on this account the yield-observation trial was repeated with the same varieties during 1949. Although the yield-observation trial at Bundaberg was affected by drought during the latter part of 1948 a number of the varieties yielded well and eight of them were selected and planted out in a randomised block on the Experiment Station and also in a yield-observation trial on a district farm.

The ratoon yield-observation trial of "G" seedlings at Meringa produced a number of high-yielding varieties with a good sugar content. Finally, two early-maturing types and three heavy-yielding canes were chosen and planted in a randomised block. In addition four other varieties were planted out on a richer soil type for further observation. The canes in the randomised trial made particularly good growth and the results of this planting are awaited with interest. An additional yield-observation trial of "G" seedlings which was planted in 1948 on better land showed no varieties which were superior to Trojan in the plant crop. It seems unlikely that any in this trial will be selected from the ratoon crop in 1950. At Mackay the ratoon yield-observation trial of "G" seedlings made good progress and six of them were selected for planting in a randomised block. The best figures were shown by G.105, which considerably outyielded the standard in both tonnage and sugar content.

The "F" seedlings at Meringa have all been discarded owing to inferior performance when compared with modern standards. At Mackay the five "F" seedlings which were planted in a randomised trial during 1948 met with dry conditions and the germination in some varieties was poor. At harvest the standard Q.50 outyielded all other varieties in the plot. Whether any of these "F" seedlings will be propagated further will depend on the yield of the ratoon crop. At Bundaberg the randomised trial of ten "F" seedlings planted during 1948 also met with dry weather. Several of the varieties outyielded the standard Q.49 in sugar per acre and the ratoons will be watched with interest. The ratoon yield-observation trial of "F" seedlings also yielded well and several performed better than standard.

At Meringa the Latin Square trial of "E" varieties ratooned well after harvest, although none of them outyielded the standard Trojan. E.275 produced a comparable yield and is now being propagated on a limited scale. The ratoon randomised trial of "E" seedlings at Mackay suffered considerably from dry weather and bad red rot developed in some of them. Three of the varieties which yielded well were planted in a further trial.

"D" seedlings are now only represented at Bundaberg. In the ratoon randomised trial there, two varieties outyielded the standard but one of these is susceptible to red rot and the other sprawls badly. Accordingly it seems that none has a commercial future. Of the "B" seedlings, Mackay is still carrying out trials with B.174 which may be useful as a special purpose cane.

No entirely new varieties were introduced to the industry during the year but a considerable extension in plantings occurred with varieties such as Trojan, Pindar and Q.50 in those areas to which they have been introduced recently.

FROST RESISTANCE TRIALS.

Two frost resistance trials which were planted in the Mackay district during 1948 were frosted severely during 1949. Varieties which showed fairly good or good resistance to damage were Co.301, C.P.29-116, Eros, H.Q.426, Q.28, Q.42, Q.47, Q.49, Q.50 and Trojan in addition to several "E" and "F" series seedlings from the Mackay Experiment Station. The resistance of B.174 and two "F" series seedlings was poor whilst the family planting of P.O.J.2875 x G.257 also showed poor frost resistant qualities. A further frost resistance trial was planted at the Kairi Regional Experiment Station during 1949. This trial included Badila, Comus, Eros, H.Q.426, Pindar, Q.44, Q.50 and Trojan as commercial canes; the Turkmenistan blood varieties C.P.38-907, C.P.39-424, C.P.39-778, G.254, G.256, and G.257; family resistance groups of the parentage G.254 x Comus, P.O.J.2878 x Eros and Trojan x Eros; and finally a group of clones being tested for fodder purposes and having the parentage E.256 x Uba Marot, Oramboo x F.363, Oramboo x I.202, P.O.J. 2725 x Co.290 and Q.44 x F.363.

VARIETAL STATISTICS.

Table IX. shows the varietal composition of the 1949 crop throughout the State. It presents the tonnage crushed and the percentage of each variety grown in the four main cane-growing districts and in the whole of Queensland respectively. The 1949 crop exceeded that crushed in 1948 by some 84,500 tons. The crushing in the Mackay district exceeded the 1948 figure by about 150,000 tons and this was the largest district contribution to the State increase. The other districts all showed increases with the exception of North of Townsville where the crop was some 78,000 tons lighter.

The greatest change in the varietal position was caused by the meteoric rise of the variety Q.50. In the Annual Report for last year it was predicted that Q.50 would at least occupy sixth place in the 1949 crushing. Actually it rose to fifth position with very nearly 600,000 tons of cane.

Trojan wrested the position of premier variety from Badila for the first time, and indeed it is the first time for very many years that Badila has not led the field. Actually the relative percentage of Trojan and Badila crushed North of Townsville was approximately the same as last year, but a big rise in Trojan crushings occurred in the Burdekin district and a considerable extension also occurred in Mackay. Q.28 was displaced for third place by C.P.29/116, due mainly to the fact that Q.50 has been largely substituted for Q.28 in the Mackay district. With the extension of Q.50 and Pindar in the southern areas, C.P.29/116 may be displaced to some degree during the next two years. P.O.J.2878 suffered a slight further decline and now represents under five per cent. of the total. Comus and Q.44 remained more or less stable but E.K.28 fell from seventh position to tenth and the amount crushed represented only two-thirds of that crushed in 1948. It seems that E.K.28 is one other noble variety that is now on the way out after being a major variety for many years in the Burdekin district. Q.49 showed a considerably increased crushing which raised it from twelfth to ninth position whilst Co.290 declined from ninth to thirteenth place. This Indian variety seems now to be gradually passing out of favour. Clark's seedling showed a marked fall from tenth position to fifteenth. This occurred mainly in the districts North of Townsville. Of the remaining varieties, those which have risen are notably Q.47, which from twenty-second position reached eighteenth place, Vesta from thirty-fourth to twenty-eighth, and Co.301 from thirty-seventh to thirtieth. Varieties on the down grade are S.J.4 which descended from sixteenth place to twenty-first, due mainly to its restriction in the Mossman district, B.208, of which the 1949 tonnage was only half that of 1948, and Q.48, D.1135 and Q.10 which will soon disappear from the lists. Several varieties which were shown in the 1948 crushings did in fact fail to obtain listing in 1949 and these included Q.2, Q.20, Q.52 and Akbar.

The figures shown in Table VII. and the accompanying graph which present the composition of the 1949 crop on the basis of countries of origin do not differ markedly from those presented in 1948. Queensland-bred canes have, however, shown a still further gain of almost six per cent. of the total, chiefly at the expense of U.S.A. and Java varieties. A further decline of 1·8 per cent. was shown in New Guinea varieties represented almost entirely by Badila. With further extensions of Q.50 and Pindar there is little doubt that a further rapid rise in the percentage of Queensland-bred varieties will take place during the next few years. That this should be so, in spite of the regular importation of new varieties from overseas, is a fact of which the industry might well be proud.

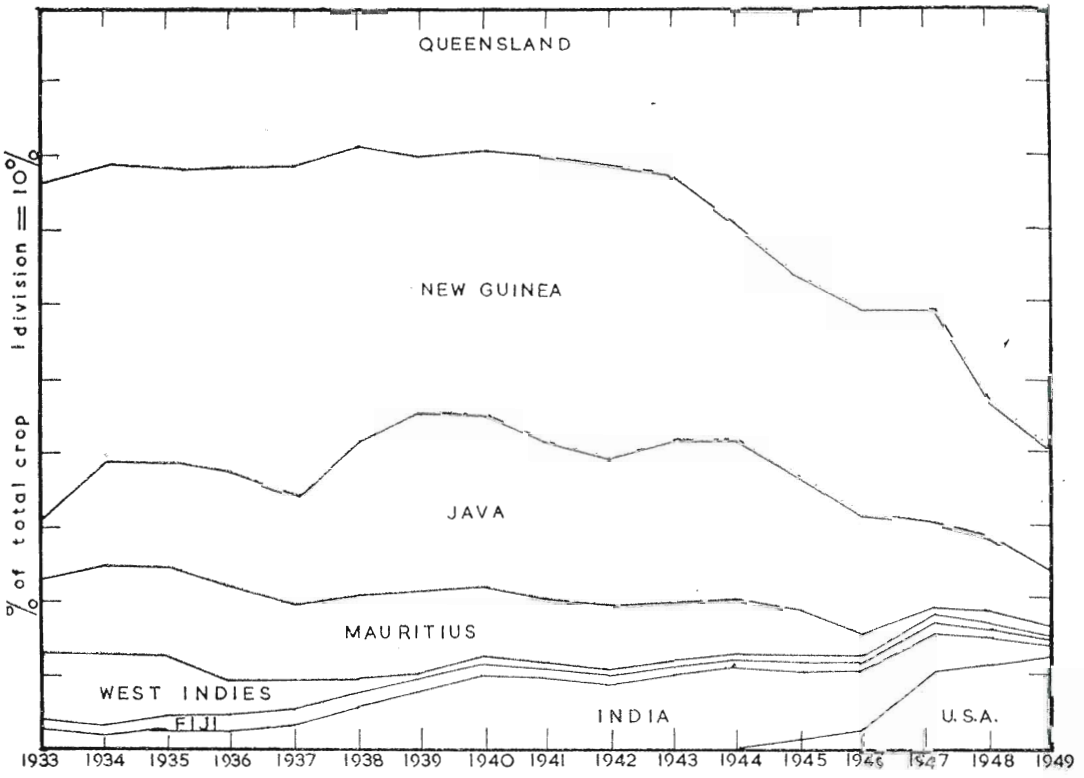

Fig. 4.
Showing the composition of the crop on the basis of country of origin from 1933 to 1949.

TABLE VII.—COMPOSITION OF 1948 CROP ON BASIS OF COUNTRIES OF ORIGIN.

Country of Origin.	Tonnage Harvested.	Per Cent. of Crop.
Queensland	3855,845	59·2
New Guinea	1,103,609	16·9
U.S.A.	809,213	12·3
Java	502,046	7·7
India	128,447	2·0
Mauritius	86,903	1·3
West Indies	25,987	·4
Fiji	14,892	·2
	6,518,942	100·0

TABLE VIII.—LIST OF CROSSES MADE DURING 1950 SEASON.

A.130 ..	..	x Comus, Eros, J.B.3, Q.1098
Atlas ..	..	x Comus
Badila..	..	x Korpi, Oramboo, G.362, G.270, G.323, Eros, Q.32, C.279, Loethers, P.O.J.2878, J.201 Comus
Cato ..	..	x Comus, F.363
Co.270	..	x Comus, E.257, J.B.3, P.O.J.2878, Q.31, Q.34, Q.36, Q.1098, E.257
Co.290	..	x P.O.J.2878
Cato ..	..	x Comus, F.363
C.P.29–320	..	x Comus
C.P.34–120	..	x Eros
C.P.36–13	..	x D.1135
C.P.36–105	..	x Eros
D.209 ..	..	x H.Q.409, P.O.J.2878, Q.31
D.285 ..	..	x Comus, C.P.29–116, E.282, Eros, Korpi, Oramboo, P.O.J.2878, Q.27
D.1135	..	x C.P.36–13
Eros ..	..	x A.130, Korpi, P.O.J.2878, Badila
G.257 ..	..	x P.O.J.2878
G.270 ..	..	x Oramboo
G.323 ..	..	x Comus, Loethers, Oramboo, Q.27, Q.31, Trojan, Badila
G.362 ..	..	x Q.27, Comus, Badila
H.265	..	x Comus, J.B.3, P.O.J.2878, Q.33, Q.1098
H.312	..	x Comus, Oramboo
H.Q.426	..	x Comus, G.270, G.362, J.201, Q.27
I.207 ..	..	x Comus
J.333 ..	..	x Badila, Comus, J.B.3, Q.31, Q.34
J.334 ..	..	x Badila, Black Innis, Comus, E.281, Q.31, Q.34, Q.39, Q.1098
J.336 ..	..	x Badila, Comus, E.281, Q.31, Q.34, Q.39, Q.1098
Korpi ..	..	x Badila, C.278, C.279, Comus, Eros, J.B.3, P.O.J.2878, Q.27, Q.31, Q.41
Loethers	..	x Badila
39M.Q.832	..	x Comus, J.B.3, P.O.J.2878, Q.34
Mahona	..	x G.270, G.323
N.Co.310	..	x P.O.J.2878
Oramboo	..	x Badila, C.279, D.285, G.270, G.323, P.O.J.2878, Q.27, Q.31, Q.32
Orion ..	..	x G.323, Q.31
Pindar	..	x Comus, J.B.3, Q.32, Q.34
P.O.J.2364	..	x E.281
P.O.J.2725	..	x Co.281, Co.290, Comus, E.281, Eros. P.O.J.2878, Q.33
P.O.J.2875	..	x Co.290, Co.301, Comus, C.P.29–116, E.281, Eros, G.257, 31–2484
P.O.J.2878	..	x Badila, Co.281, Co.290, Comus, Eros, G.257, G.270, Korpi, Oramboo, Q.27, Q.31, Q.1098
P.O.J.2883	..	x Badila, Co.281, Co.290, Co.301, Comus, Q.34, 31–2484
Q.13 ..	..	x Comus, G.270, G.323
Q.27 ..	..	x Comus, G.270, G.323, G.362, Korpi, Oramboo, P.O.J.2878, Q.31, Q.32, Q.39
Q.42 ..	..	x Comus, P.O.J.2878, Q.1098
Q.44 ..	..	x Badila, C.279, Comus, G.270, Loethers, Oramboo, P.O.J.2878, Q.27, Q.31, Q.32
Q.50 ..	..	x Badila, Comus, C.P.29–116, E.281, Eros, F.363, G.270, Oramboo, P.O.J.2878, Q.27, Q.32 Q.34, Q.36
S.J.16	..	x Comus
Trojan	..	x Badila, Comus, Eros, G.270, G.323, Korpi, Loethers, M.G.24, Oramboo, P.O.J.2878, Q.27 Q.31, Q.32, Q.39, Q.41

TABLE IX.—VARIETAL COMPOSITION AND DISTRIBUTION IN THE FOUR MAIN DISTRICTS AND THE STATE AS A WHOLE: 1949 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. Trojan	991,842	39·9	130,988	15·9	45,680	2·5	1,296	·1	1,169,806	17·95
2. Badila	745,767	30·0	339,869	41·3	17,626	1·0	..	..	1,103,262	16·93
3. C.P.29/116	..	..	..	..	..	..	800,213	57·2	800,213	12·28
4. Q.28	..	..	52	..	610,021	33·7	68,191	4·9	678,264	10·44
5. Q.50	197	..	..	..	597,943	33·0	41	..	598,181	9·18
6. P.O.J.2878	8,731	·4	5,982	·7	120,857	6·7	182,962	13·1	318,532	4·89
7. Conus	73,740	3·0	63,067	7·7	88,902	4·9	..	..	225,709	3·46
8. Q.44	178,338	7·2	35	..	23	..	122	..	178,518	2·74
9. Q.49	..	..	..	..	..	..	166,961	11·9	166,961	2·56
10. E.K.28	..	..	85,826	10·4	70,910	3·9	..	..	156,736	2·40
11. Eros	151,303	6·1	204	..	150	..	..	..	151,657	2·33
12. S.J.16	..	..	136,712	16·6	..	..	..	..	136,712	2·10
13. Co.290	..	..	..	..	79,943	4·4	42,910	3·1	122,853	1·88
14. Pindar	118,656	4·8	252	..	..	..	..	..	118,908	1·82
15. H.Q.426	82,811	3·3	13,340	1·6	18,090	1·0	..	..	114,240	1·75
16. M.1900S.	..	..	..	..	82,069	4·5	4,829	·3	86,989	1·33
17. Cato	63,460	2·6	..	..	..	..	..	..	63,460	·97
18. Q.47	..	..	..	..	..	..	52,083	3·7	52,083	·80
19. Q.45	..	..	..	..	45,819	2·5	..	..	45,819	·70
20. Q.42	..	..	..	..	..	..	40,076	2·9	40,076	·61
21. S.J.4	33,400	1·3	3,516	·4	..	..	..	..	36,916	·57
22. P.O.J.2725	1,083	..	..	..	20,906	1·2	1,970	·1	23,960	·37
23. S.J.2	162	..	18,796	2·3	4,638	·3	..	..	23,596	·36
24. B.208	..	..	23,291	2·8	..	..	..	..	23,291	·36
25. Pompey	14,892	·6	..	..	..	..	..	..	14,892	·23
26. Orion	12,783	·5	..	..	..	..	..	..	12,783	·20
27. Q.25	..	..	..	..	..	..	10,857	·8	10,857	·17
28. Vesta	..	..	..	..	..	..	6,982	·5	6,982	·11
29. Q.813	37	..	..	..	4,390	·2	1,730	·1	6,157	·09
30. Co.301	..	..	..	..	..	..	5,594	·4	5,594	·09
31. Atlas	..	..	..	..	..	..	5,093	4	5,093	·08
32. Q.48	..	..	..	..	..	..	4,376	3	4,376	·07
33. P.O.J.2714	..	..	1,430	·2	846	..	48	..	2,324	·04
34. P.O.J.213	..	..	..	..	..	..	1,495	1	1,495	·02
35. D.1135	923	..	..	..	556	..	..	..	1,479	·02
36. Q.10	1,099	..	..	..	..	..	..	..	1,099	·02
37. H.Q.409	836	..	..	..	..	..	..	..	836	·01
38. Q.51	..	..	..	..	..	..	391	..	391	·01
39. B.147	317	..	..	..	..	..	..	..	317	..
40. Oramboo	..	..	..	..	..	..	288	..	288	..
41. Q.54	257	..	..	..	..	..	..	..	257	..
42. Q.2	126	..	..	..	..	..	..	..	126	..
43. Akbar	..	..	..	..	..	..	97	..	97	..
44. Others	3,788	..	288	..	712	..	1,144	..	5,948	..
Totals	2,484,543	38·12	823,648	12·64	1,810,081	27·77	1,399,749	21·47	6,518,042	100·00

Report of the Division of Entomology and Pathology.

By R. W. Mungomery, Officer in Charge.

The most important items of direct concern to this Division during the period under review were the extensive and heavy infestations of the greyback grub pest in North Queensland, and the widespread occurrence of yellow spot disease throughout much of the same territory. Fortunately individual lossses caused by the latter were not great; nevertheless in some areas the severity of the infection was such as to cause considerable apprehension regarding the potentialities of this disease. Apart from this outbreak which was indeed spectacular, the disease position continued to show marked improvement in most of the cane areas. Consequently there was no necessity to invoke any further restrictive legislation against diseases or pests, but in order to maintain this improvement it became more a matter of a general tightening of existing control measures. As a result, the incidence of some diseases such as Fiji disease, was showing a steep downward tendency in South Queensland, whilst others such as downy mildew were on the point of being eliminated from all commercial plantings in Queensland.

Losses through grubs, on the other hand, were much more serious and were due, for the most part, to heavy infestations spilling over into areas which previously had suffered only very light damage. Because of this encroachment on to what are normally regarded as being marginal areas of infestation, it is estimated that some mill areas suffered losses of nearly 20,000 tons of cane. But for the widespread use of benzene hexachloride the year might well have been a most ruinous one for many of the northern growers. As it was, overall losses were not of the magnitude of those in previous outbreak years, but the damage sustained in contrast with the undamaged treated fields did serve to show up the effects of grub attack in correct perspective. In consequence there was a greatly-increased demand for B.H.C. The extent of this continued upward trend in the use of B.H.C. has been difficult to gauge and trouble was being experienced in forecasting requirements a year or so in advance. This question of probable demand is of direct concern to the manufacturers, since it involves making provision ahead for the manufacture and processing of adequate supplies. To date the 1950 orders show an advance of over one third on those of the 1949 season, when approximately 20,000 acres were treated against grub attack.

The twelfth Conference of Cane Pest and Disease Control Boards, which was held in Ayr on 16th May, 1950, was attended by a number of delegates from Central and North Queensland, but unfortunately South Queensland Boards were not represented. Considerable discussion centred around the unsatisfactory transport of rat baits, and as a result it was decided to make further representations to the Commissioner for Railways. On the subject of cane grub control, the question of subsidies on benzene hexachloride was ventilated, and it was agreed that this was a question for decision by the individual boards concerned, though it was felt that the position had already arisen when the continuation of subsidy payments would be impossible without an undesirable increase in levies. This conference was the first in which the discussion of various diseases formed part of the proceedings, and the status of leaf scald, Fiji, and ratoon stunting diseases in different districts was outlined with the object of improving existing methods of control.

One noteworthy feature in connection with the pathological section was the acquisition of a 10-acre block of land at Moggill—some ten miles from the Bureau's Brisbane laboratories—which will be utilised for disease resistance trials. The small disease plot at the Domain had reached the stage where it was unable to cope with the expanded disease programme, and in addition the eradication of a number of diseases in certain districts had rendered imperative the transference of such disease resistance trials from the vicinity of commercial plantings to some central isolated plot. Accordingly, two trials were established at Moggill during the past year, and this project is to be expanded as rapidly as possible so as to accommodate all future disease resistance trials. The property has the advantage of a satisfactory irrigation supply, and since the central grouping will permit of better cultivation and closer attention than was possible when several small, isolated, disease plots were involved, the change-over should result in increased efficiency and greater positiveness and reliability in the results obtained.

The position regarding more important pests and diseases, as well as the details of investigational work carried out in connection with each one, are discussed at greater length under the following separate headings:—

GREYBACK CANE BEETLE (*Dermolepida albohirtum* Waterh.)

Emergence of the greyback beetle in most of the northern cane areas commenced in mid-November, 1949, and these pests continued to appear in very large numbers throughout December, the upward population trend having been maintained since 1947. Damage to the 1950 crop would have exceeded that of the disastrous year of 1934 had not benzene hexachloride come into use as a control agent on a wide scale, although wet weather which continued well into the early winter months helped to lessen the severity of the crop damage to some extent.

A general increase in grub infestation was noticeable in the Mossman area, notably at Whyanbeel, Miallo and Rocky Point, whilst lighter damage was sustained at Cassowary and Mowbray.

In the Hambledon area damage was not generally serious, with the exception of Greenhill Plantation which became heavily infested. There, for the first time, extensive areas of plant cane were treated with B.H.C. and small untreated check strips were severely damaged. Some damage was also prominent in the Freshwater section.

In the Mulgrave area there was a considerable extension of grub infestation when compared with that recorded in past years. The protection afforded to 5,600 acres by the application of B.H.C. and the residual toxicity in a further 1,000 acres from previous B.H.C. treatments prevented losses which, no doubt, would have exceeded any previously sustained. Despite this extensive use of the insecticide in the recognised "grubby" areas, it was estimated that crops on 2,000 acres of untreated cane land suffered through the depredations of grubs. This damage was evident throughout most of the Mulgrave fields and extended into the northern portion of the Babinda mill area.

Insofar as the Innisfail district is concerned, damage was moderate in the Goondi and Mourilyan areas, but South Johnstone suffered an extension of severe grub infestation into every section of the area. The Mena Creek and Japoonvale portions were the worst hit and it was estimated that the losses there were comparable with those sustained in the Mulgrave area. The Tully and Herbert districts encountered light and patchy infestations; however, at least some of the damage there was masked by the regular rains. Grub damage was also recorded in parts of the Burdekin and Mackay districts, but in both these areas B.H.C. is steadily rising in popularity as an effective control.

Benzene Hexachloride in Greyback Grub Control.

B.H.C. is now supplied as a 20 per cent. dust at a saving of approximately one third the cost of double the quantity of the previously used 10 per cent. dust. As a consequence the demand by canegrowers has swung almost entirely to the 20 per cent. product for the heavier single applications that are capable of affording complete protection throughout the normal cycle of three crops. The 10 per cent. dust is favoured only for light retreatments of ratoons which as plant crops may not have received adequate dressings to provide sufficient residual toxicity in the succeeding ratoons. This change in field practice has been supported by results from field experiments, which so far have shown no significant differences between treatments involving equivalent amounts of the two dusts.

Trials which were initiated to determine whether there is any difference in the efficacy of B.H.C. when applied as a single dressing to the plant crop or when applications of the same amount are divided between the plant and first ratoon crops reached the first ratoon stage this year. The yields to date have given no indication of significant differences between the two methods of treatment. Accordingly the single treatment to the plant crop is still being recommended.

The standard rate of application to plant crops, namely 75 lb. of 20 per cent. dust per acre, has consistently given effective protection, and the reasons for B.H.C. failures in the few instances recorded were due either to insufficient care in application or to too light a dressing. Sometimes it was found that the insecticide had been applied to the surface of the ground or on top of the stool itself, and no attempt had subsequently been made to work it into the soil. In other cases it had been applied too late after the beetle flight.

During the past season some plantings were reported to have failed due to the fact that the total quantity of B.H.C. required for grub control had been mixed with fertilizer and applied at planting time in direct contact with the setts. A number of trials were laid out to test the value of mixing B.H.C. with fertilizer but in these instances care was taken to ensure that the mixture did not come in direct contact with the setts. Under such circumstances good germinations were secured.

Results to date indicate that greyback grubs can be controlled by this method of application, and that this treatment is more effective when the mixture is placed about 1 inch above the setts rather than when placed below. However, there was nothing to show that this method is in any way superior to the standard practice of applying the insecticide in the half-open drill after the setts have germinated and stooled adequately.

Tests with Miscellaneous Insecticides.

Small scale field trials involving the use of the following insecticides were set out in areas infected by greyback grubs:—Chlordane, Toxaphene, Aldrin, Dieldrin, E.605 and B.H.C. as an emulsion, as a dispersible powder, and as the standard 10 and 20 per cent. dusts. Unfortunately one of the most comprehensive of these trials was so raided by bandicoots in their search for grubs that no reliable information could be obtained from it. However, some of these insecticides showed promise elsewhere, and trials with the more important ones will be repeated in the coming year.

FRENCH'S CANE BEETLE (*Lepidiota frenchi* Blkb.)

Heavy flights of this beetle occurred in restricted portions of the Highleigh and Mt. Sophia areas in mid-November, 1949, but the present cycle of these pests in the Mulgrave district suggests that more general flights are to be expected this summer. Reports of dense populations of small grubs in parts of Mowbray, Mossman, indicate that emergences there must also have been substantial.

Frenchi grub damage was severe in sections of the Hambledon mill area and also from Mt. Sophia to Deeral, where several large fields of young ratoons and one field of plant cane were destroyed during December 1949, and had to be ploughed out. In the Mackay area the infestation was generally light, but odd cases of severe damage occurred.

Control of the pest in its early instars was demonstrated in the northern section of the Babinda mill area by the standard application in the half-open drill of 150 lb. of 10 per cent. B.H.C. per acre. Dressings at the rate of 50 lb. and 100 lb. per acre were incompletely but proportionally successful, while a 200 lb. treatment gave no better protection than the 150 lb. dressing. This was established in a 5 x 5 Latin square trial in which the infestation was so severe that four out of five untreated check plots yielded no commercial crop. The yields from the various treatments were as follows:—

lb. 10 per cent. B.H.C. per acre	0	50	100	150	200
Tons cane per acre	2·45	13·28	17·76	22·04	22·02

Necessary difference for significance = 4.02 at 5 per cent. level.
= 5.64 at 1 per cent. level.

A number of trials which were laid down in Mossman and Mulgrave aimed at securing additional information on the control of the third-stage grubs, but these did not become infested. Previous trials in which the application was made in the half-open drill indicated that by this method satisfactory control commenced at dosages between 300 lb. and 400 lb. of 10 per cent. B.H.C. per acre. Present investigations aim at reducing these amounts by placing the insecticide in a more concentrated and narrower band in a more efficient position.

MISCELLANEOUS SCARABAEID PESTS.

The two southern species *Lepidiota trichosterna* Lea and *Pseudoholophylla furfuracea* Burm., again proved the most serious pests of the Bundaberg and Isis districts, and infestations were heavier than in 1949.

In Bundaberg, grubs of both species were particularly active during the spring and early summer months. Populations of *L. trichosterna*, though patchy and scattered, appear to have steadily increased in the South Kalkie and Burnett Heads areas. With the assistance of inspectors from the local Cane Pest and Disease Control Board growers in the Bundaberg district fumigated approximately eight acres with carbon disulphide.

In the Isis district damage from grubs of *P. furfuracea* also showed a slight increase, though confined to isolated patches.

B.H.C. investigational work against both pests was continued, but to date no important results have been forthcoming from the trials established in those areas.

Infestations by the Dynastid, *Metanastes vulgivagus* Olliff, during the 1949 spring were more widespread and severe than usual. This pest was responsible for considerable losses in young plant cane on five farms near the Mourilyan township, though chlorotic streak disease was an associated factor, whilst similar but more localized damage was recorded in a low-lying, badly drained field in the Bundaberg district.

Fig. 5.

Illustrating successful control of frenchi grub pest with B.H.C. Plot in background treated with 150 lb. of 10 per cent. dust per acre. The treated plot in foreground is grub-damaged and was subsequently overgrown with weeds.

Fig. 6.

Commercial usage of B.H.C. in the Mulgrave area showing successful control achieved against grubs of "greyback" beetle. Right treated—left untreated.

ARMYWORMS.

An outbreak of armyworms, *Cirphis unipuncta* Haw., occurred throughout the cane areas from Ingham to Babinda in the spring of 1949, but the affected cane quickly recovered with little, if any, crop loss. This was followed in the summer months by very heavy infestations of *Spodoptera exempta* Walk. in the Mossman, Mulgrave and Innisfail areas. These caterpillars were successfully prevented from invading new areas by putting down a band of 10 per cent. B.H.C.dust some six to nine inches wide on top of the soil around the infested area. The quantity used was half a pound per linear chain. The effect on the caterpillars was so rapid that none succeeded in crossing the band, which soon became aligned with thousands of dead specimens. A successful alternative control was found in the use of a ·13 per cent. D.D.T. spray at the rate of 25 gallons per acre. Growers, however, have been warned to use these insecticides with caution, and only when warranted by the severity of the outbreak, since they may inflict serious mortality on the many parasites that normally keep these pests depressed at unimportant levels.

WIREWORMS.

In the central districts approximately 9,000 acres were treated at planting time with B.H.C.-fertilizer mixtures against wireworms, *Lacon variabilis* Cand., and this pest has now ceased to be of major concern there in securing satisfactory strikes. In the Ingham, Mossman, Hambledon and Mulgrave areas a further 5,000 acres received this protective treatment, but in at least some of these areas there is reason to suspect that other species may have been involved in damaging the germinating setts. Some of these latter occurrences have been in fields normally infected by white grubs, so it is possible that in making provision against grub attack, the wireworm population there will automatically become depressed at a sufficiently low level to prevent large scale damage in the future.

MISCELLANEOUS INSECT PESTS.

The mound-building ant, *Aphaenogaster pythia* Forel., was present on a number of farms in the Tully area, where its tunnelling activities around the base of the cane stools were responsible for a reduction in yields of affected crops. Small field trials using 50 lb. and 100 lb. of 10 per cent. B.H.C. dust per acre applied (*a*) as a dressing in a half-open drill and (*b*) in the drill with fertilizer, did not give encouraging results and further trials with other insecticides will be set out as soon as opportunity permits. Similarly no results have been forthcoming to date from a B.H.C. trial laid out against earth-pearls, *Margarodes* sp., in the Pialba district.

Damage by the weevil borer, *Rhabdoscelus obscurus* Boisd., was extremely rare, and this state of affairs has continued ever since pre-harvest burning became standard practice in Queensland.

ANIMAL PESTS.

Rats.—Assessed on the basis of rat-bitten cane, rat populations in canefields showed a definite increase since the previous year. Although not in plague proportions, infestations were generally distributed throughout the cane area of the north, whereas last year noticeable infestation was confined to the customary, favoured localities along river banks and in similar environments.

Baiting with either packeted, thallium-coated, wheat baits or with yellow phosphorus paste on bread was carried out by most Boards wherever damage was detected, and the overall losses were not unduly great.

Wallabies and pigs proved of minor importance. The onset of spring rains a few weeks earlier than in the previous year provided abundant natural feed and the inroads of these pests were thereby curtailed. Because of the continued scarcity of wire netting, shooting and the payment for scalps were relied on to keep them under control and in the case of wallabies, beagle hounds were utilized on an increased scale.

Fox populations increased considerably in South Queensland and damage to cane in isolated cases assumed more serious proportions. In the Sharon area crop losses in the variety C.P.29/116 on one farm were estimated at two tons per acre, whilst a propagation plot of Pindar in the Tegege area was singled out for attack.

RATOON STUNTING DISEASE.

Surveys made by the Mackay Cane Pest and Disease Control Board and observations by Bureau officers indicate that there is every prospect of controlling ratoon stunting disease in the Mackay district without the loss of the variety Q.28. As mentioned in this report last year this disease does not spread readily in the field and it would appear at present that the rigid control of planting material, as provided by Proclamation 20 under the Sugar Experiment Stations Acts, will be all that is required for the control of the disease. It remains to be seen whether such control measures will be necessary in the other districts where the disease has occurred.

The first ratoon crops of the yield trials planted in 1947 using both healthy and diseased Q.28 from various sources were harvested during the 1949 season and showed the expected heavy losses. The results of the plant crop published last year demonstrated that there were considerable differences in yield in this crop between diseased and healthy plantings; the differences were sometimes substantial but at other times were not at all obvious. In the ratoon crops, however, the differences were spectacular in all trials. A summary of the harvest results of five separate trials is given in the table below.

SUMMARY OF YIELDS FROM FIVE TRIALS; TONS OF CANE PER ACRE.

Trial No.	Planting Material.	Plant Crop.	Ratoon Crop.	Total of Two Crops.	Total Loss Due to Disease.
1	Healthy Q.28	28·6	27·6	56·2	..
	Diseased Q.28	17·9	9·6	27·5	28·7
2	Healthy Q.28	36·0	20·5	56·5	..
	Diseased Q.28	27·7	7·5	35·2	21·3
3	Healthy Q.28	30·2	17·0	47·2	..
	Diseased Q.28	23·9	10·0	33·9	13·3
4	Healthy Q.28	40·1	29·6	69·7	..
	Diseased Q.28	33·1	11·4	44·5	25·2
5	Healthy Q.28	37·3	30·3	67·6	..
	Diseased Q.28	33·0	10·0	43·0	24·6

It can be seen that in the plant crops the diseased cane produced a reasonable tonnage, although it was from 4·3 to 10·7 tons per acre (11·5-37 per cent.) below the healthy cane. In the ratoon crops losses varied from 7·0 to 20·3 tons per acre (41-67 per cent.), while the losses from the two crops ranged from 13·3 to 28·7 tons per acre, i.e. from about 28 per cent. to just over 50 per cent. of the total crop. The real losses in trials No. 2 and 3 are not shown by these figures because a large amount of disease was spread into healthy plots by means of the cutter planter, and consequently the ratoon yields of these plots were much reduced. The story of the losses does not end with the first ratoon crop for it was obvious that the healthy crops would have gone on to produce a profitable second ratoon while the diseased could not be ratooned.

The research programme in connection with ratoon stunting has been continued actively during the year. Results have already been obtained in some instances but usually they await the observations which will be made on the ratoons within the next few months. Serological tests in which rabbits were injected with diseased and healthy juice from the variety Q.28, and the serum subsequently tested for the production of antibodies, indicated a positive reaction. However, more definite reactions will have to be obtained before the method could be used for the identification of the disease in cane juice. Inoculation of the young stalks of several varieties of maize and sorghum with juice from diseased Q.28 using a hypodermic syringe failed to have any effect. The maize was kept under observation until it had matured and died. The sorghum was allowed to head and was then cut and ratooned, but there was no difference between plants in the inoculated and non-inoculated plots. Attempts to hasten identification of the disease by ratooning cane before the normal season were not successful; it was found that the diseased and the healthy plots grew at the same slow rate until the late spring, at which time the differences had become apparent in the plots cut at the normal time.

The experiments laid down in spring 1949 and which are expected to yield results during the course of the next few months, include a wide range of inoculation and other trials. The inoculation tests include leaf, stem and stubble and further pressure inoculations as well as inoculations made with extracts from grasses, soils, diseased cane refuse, diseased Q.28 leaves and poorly grown crops of varieties other than Q.28 from many parts of the State. A large varietal resistance trial has been planted, the use of hot water as a possible curative agent studied further and the effect of ageing and antiseptics on the infectivity of diseased juice investigated. Transmission studies and attempts to isolate a causal agent have been continued.

FIJI DISEASE.

The general decrease in the amount of Fiji disease reported last year continued in the Bundaberg and Moreton districts; at Rocky Point the 92 diseased stools rogued were approximately the same is in 1948-1949, but the seven stools found in a field of P.O.J.2878 in the Isis area represented a fresh report after a lapse of nearly four years, during which time the previously reported diseased fields had been ploughed out. Repeated inspections of the present diseased field and the surrounding cane have shown that the outbreak is not extensive, and the ploughing out of the field after harvest should prevent the continuation of the disease in that particular locality.

The Bundaberg Cane Pest and Disease Control Board rogued 394 stools affected with Fiji disease; 248 of these stools were taken from Bingera Plantation, where the excellent irrigated crops and large proportion of standover cane render control somewhat more difficult than on farms of the district. In the Moreton Mill area 1186 stools were rogued from 3932 acres inspected. The number of diseased stools found was only one-third the number of the previous year and one-tenth of the number found in the peak year 1944-45, but it will still be necessary to continue the policy of enforced ploughouts or harvests of diseased fields. There is no doubt that the varietal position at present, in which C.P.29/116 and other comparatively resistant varieties have replaced P.O.J.2878, has helped considerably in bringing the disease under control.

At Maryborough, not a single stool affected with Fiji disease was found and the field where a diseased stool was rogued last year was ploughed out. The importance of this clean report from Maryborough is only realized when it is recalled that Fiji disease caused more damage in the Maryborough district than anywhere else in Queensland, and at one stage about fifteen years ago, plant crops were being ploughed out because they were not worth harvesting on account of the disease.

YELLOW SPOT.

The most interesting pathological item of the year was an extensive outbreak of yellow spot (*Cercospora kopkei* Krug.) in North Queensland in the late summer months (Figure 9). The disease had not been recorded positively in Queensland before this, but there is no doubt that it must have been present in a mild form. The first reports of the disease were from Mossman, where numerous fields of Trojan growing in sheltered positions were found to be infected in March. Within the next few weeks it was found in the Hambledon, Mulgrave, Babinda, Innisfail and Tully areas and during the winter months it was obvious that the disease was causing losses in tonnage. In the worst fields 80 per cent. or more of the photosynthetic area of the leaves was put out of action, leaves died prematurely and growth ceased entirely in April, instead of continuing through the winter. It is impossible to determine the actual tonnages lost because of the absence of control, non-diseased blocks, but Trojan, which was the variety chiefly affected, is known to grow well during a moist winter such as the one just past. This cessation of growth in autumn did not give a correspondingly high sugar content. The destruction of leaf tissue led to loss of cover and even heavy crops became very weedy, so adding to harvesting difficulties and causing cultivation troubles later.

Eros was another variety affected; P.O.J.2878 appears to be almost as susceptible but is not widely grown, and Comus is also somewhat susceptible. S.J.4 gets a few spots but Badila, Pindar, Q.44 and Q.50 show barely a trace even in fields adjacent to diseased Trojan.

At this stage it is impossible to decide whether a new, more virulent strain of the causal organism has suddenly arisen or whether this widespread outbreak is an expression of the prolonged and very humid wet season, which gave an unusually large number of wet days during the early half of the year. The behaviour of the disease during the 1951 wet season will be closely watched.

EYE SPOT.

Eye-spot disease (*Helminthosporium sacchari* (v. Breda de Haan) Butl.) can usually be found in most seasons in South Queensland but it is normally inconspicuous and does not cause any loss in tonnage. During the winter of 1950, however, it was apparent that the succession of damp days during the cooler months had resulted in the disease becoming very obvious and in some cases causing appreciable losses. At Bingera, in the Bundaberg area, the susceptible variety Atlas (see Figure 8) was so badly affected that most of the leaf area of the crop was destroyed by the extensive runners and growth ceased several months earlier than would be expected for a healthy crop. P.O.J.2878 and Vesta were also affected, but to a lesser extent. In the Mackay district, very severe eye spot was seen in a block of Trojan. This is the first record in Queensland of the disease in this variety. In addition to the spots and runners there were losses due to the top-rot stage of the disease.

DOWNY MILDEW.

Inspections made during the year indicate that the outbreak of downy mildew disease (*Sclerospora sacchari* T. Miy.) at Hambledon in North Queensland has been brought under control. Not a single diseased stool has been found there since autumn, 1949, and all blocks in which the disease was found were ploughed out after harvest towards the end of 1949. It is, of course, too early to say that the disease has been eliminated in that district but there are grounds for a cautious optimism.

In the Bundaberg district where 74 diseased stools were rogued in 1948-49, only seven stools were found. These were confined to a single two-acre block of third ratoon P.O.J.2878, which will be ploughed out after the present harvest. This may mark the end of downy mildew in the district although there are still growing some fields which are now apparently disease-free but which had some disease earlier.

The downy mildew resistance trial carried out in an isolated area in the Bundaberg district was quite successful, and a satisfactory amount of disease developed in the susceptible varieties. Advanced seedlings from the various Experiment Stations formed the bulk of the trial but several named varieties were also included, either for test or as standards. The amount of disease in these named canes is set out below:—

Variety.	Number Diseased Stalks.	Percentage Diseased Stalks.	Variety.	Number Diseased Stalks.	Percentage Diseased Stalks.
Co.270	0	0	P.O.J.2878	126	37
Co.290	19	6·4	Q.50	9	4·8
Co.301	0	0	Q.55	16	10
Eros	78	64·5	Trojan	55	32
N.Co.310	2	1	41M.Q.105	27	18
Pindar	9	6	41M.Q.779	57	28
P.O.J.2727	22	18			

Although at present susceptibility to downy mildew disease will generally not lead to the discarding of a promising variety, any cane showing as much as, or more susceptibility than P.O.J.2878 would have to be watched carefully if grown in any area where downy mildew has occurred within recent years.

THE TREATMENT OF CANE SETTS WITH MERCURIALS.

The results of demonstration plots in the 1949 planting season showed once more the undoubted value of a dip in mercurial solution as a means of controlling pineapple disease (*Ceratostomella paradoxa*) in the Lower Burdekin district. Farmers there have been quick to appreciate what this means in lowering the cost of production and during the 1950 planting season approximately 160 farmers, representing 40 per cent. of the area, dipped their plants. In the Giru area, which is between the Burdekin proper and Townsville, ten farmers dipped, but the disease has never been as serious there as in the other mill areas. The late ending of the wet season in 1950 forced farmers to plant during the winter months and there is no doubt that had the dipping technique not been available the Burdekin area would have suffered severely from germination failures. As it is there have been some failures, even where the plants were dipped, but the cause has always been obvious and could often have been avoided; it cannot be expected that the mercurial treatment will overcome, for instance, the disadvantages of poor plants and poor ground preparation.

In South Queensland, trials during 1949 had convinced the management of the Fairymead Plantation that dipping was a payable proposition and all plants put in this year were dipped. The Fairymead dipping arrangements are on a much larger scale than would be necessary on a private farm (see Figure 7). The plant is equipped with a mobile crane and a 6,000 gallon tank, and is capable of handling 550 bags of plants per day.

The dipping devices of the Burdekin farmers vary from hand baskets, mostly used for small plantings or for treating supplies, to units capable of handling a double-row planter box full of plants at the one dipping. Most farmers are satisfied to discard their cutter-planters and use the drop-planter with the dipped setts but one farmer at least has been experimenting with sprays mounted on the chute of the cutter-planter. The solution is sprayed finely on to the sett as it goes down the chute but is largely recovered through the perforated base of the chute and is recirculated. The chief difficulty is in getting a good cover of mercurial on the top end of the sett because when once cut the sett drops rapidly. The reversion of many farmers to the drop-planter has led to a good deal of critical analysis of the costs and methods of planting, quite apart from the dipping process and at the moment it would appear that the rapidly-loaded drop-planter, using the minimum weight of dipped setts is the cheapest method of getting the crop planted. The method of cutting the setts has received some consideration and already circular saws, mounted either singly or in a bank, are in use as a means of reducing the cost of the cut setts.

RED ROT.

Although red rot (*Physalospora tucumanensis* Speg.) was not widespread in the 1949 crop, sufficient did show in the Mackay district and at Bundaberg to emphasize the susceptibility of the variety Q.50 to the disease. Losses by some individual farmers were quite heavy and fields of this cane should be harvested by the middle of the crushing season at the latest. Vesta standover crops at Moreton showed some red rot.

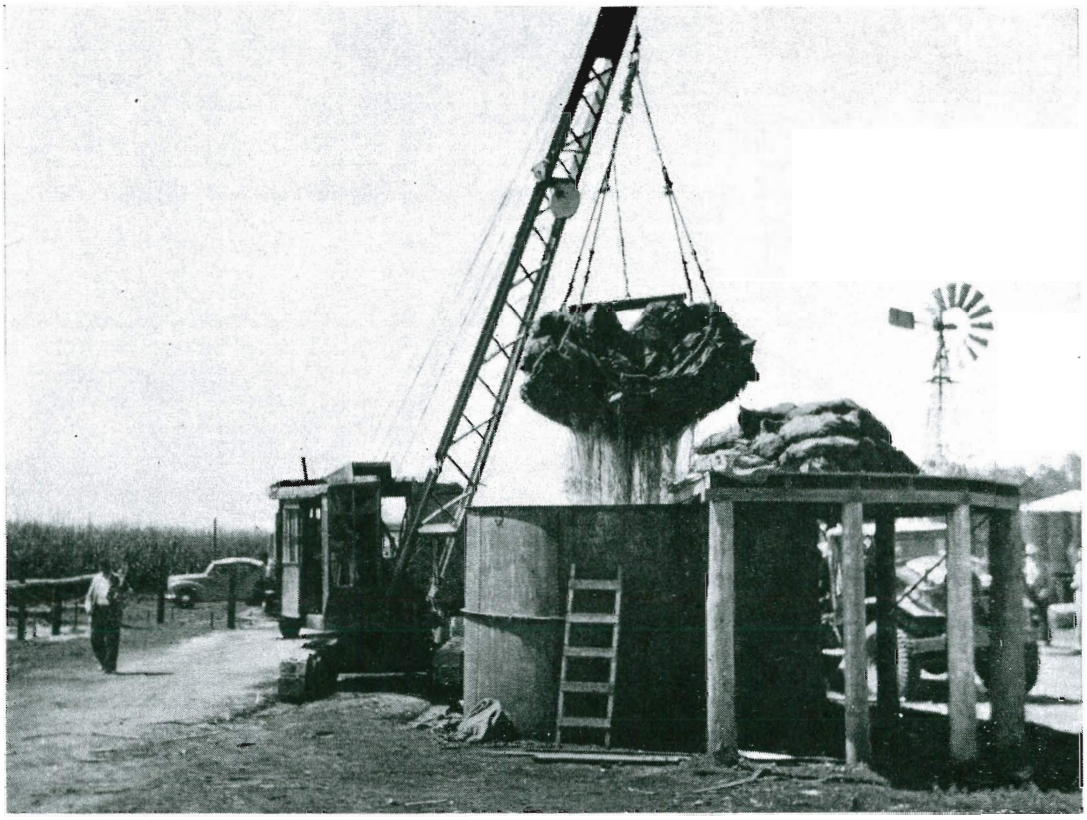

Fig. 7.
A large plant-dipping installation on Fairymead plantation. This outfit is capable of treating 550 bags of plants per day.

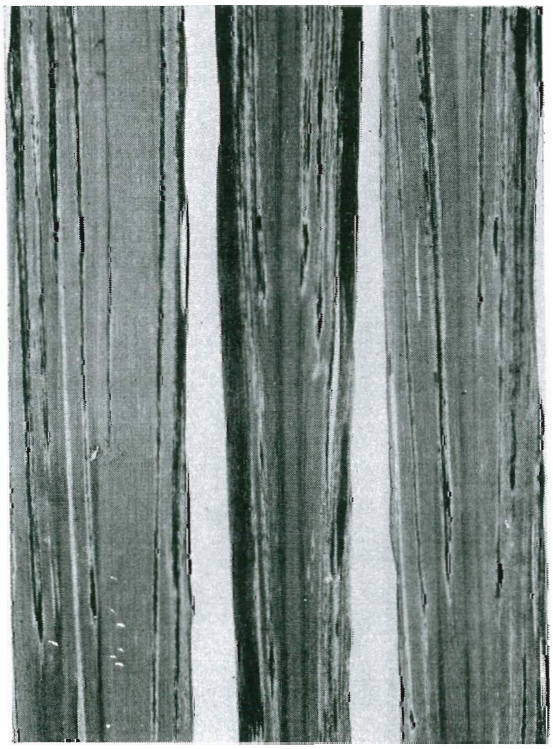

Fig. 8.
Eye spot disease on the leaves of the variety Atlas at Bundaberg.

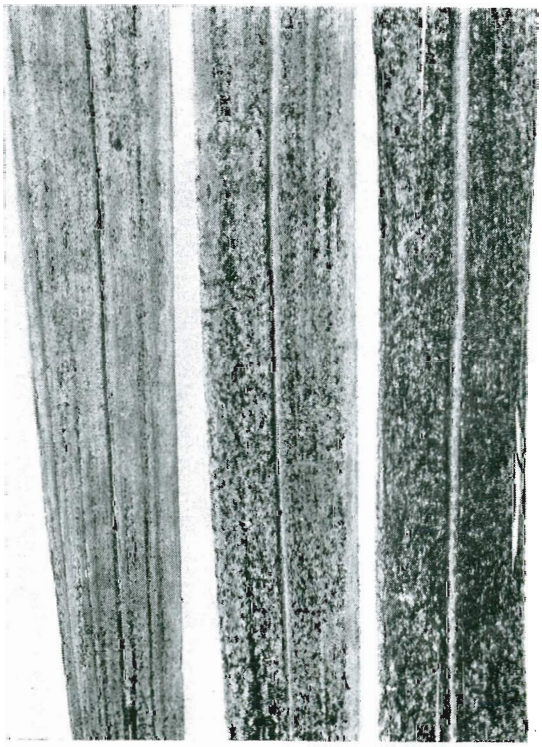

Fig. 9.
Yellow spot disease on leaves of Trojan at Gordonvale.

Investigations in the laboratory have been continued and it is evident that there are a number of strains of the red-rot fungus present in Queensland. The differences observed were essentially cultural and the strains have not yet been tested as to possible variations in virulence. The perfect stage of the fungus has been obtained from cultures of nine strains in the laboratory, but despite extensive research, the perithecia have not been found in the field.

MISCELLANEOUS.

Gumming disease (*Xanthamonas vasculorum*) was not reported in Queensland cane fields during the 1948-49 season, but the disease was not on that account thought to have been eradicated and in this report last year a warning was sounded concerning the possibility of the disease still being present in the Mossman area. The experience of the 1949-1950 season has shown that the warning was justified for the disease was found during harvest in three blocks of S.J.4 in the quarantined part of the mill area. The blocks in question have now been ploughed out but it still cannot be certain that the disease has disappeared altogether, and the reintroduction of susceptible varieties such as H.Q.426 and S.J.4 will not yet be advisable in the once-diseased localities.

In the Mulgrave mill area, where gumming disease forced out the popular H.Q.426 and S.J.4 some 14 years ago, the demand for these varieties has still persisted. A short while ago the early maturing H.Q.426 was reintroduced and after it had remained free from the disease when grown in formerly diseased parts of the area, it was placed on the approved variety list in January, 1950. Some ten tons of the even more susceptible S.J.4 have now been planted in the area. It will be of general interest to compare the growth and yields of this cane with the newer seedlings which have become popular since the growing of S.J.4 was banned.

The gumming resistance trial planted at Moggill (*q.v.*) encountered such excellent growing conditions during late summer, autumn and winter that, despite inoculation with the bacteria during the growing period, the disease made so little headway that no conclusions could be drawn. Even the infection rows of H.Q.426 and the test plot of S.J.4 did not show any death due to gumming.

Although there is normally little relationship between the production of the more severe symptoms of gumming and those of leaf scald, it may not be mere coincidence that the leaf-scald resistance trial at Pine Creek near Cairns in North Queensland was also a failure. It came away well and grew normally but very little disease developed. The only conclusion warranted was that 41M.Q.105, a promising new seedling from Macknade, North Queensland, is quite susceptible to the disease.

Although the cause of the so-called "droopy top" disease, which causes growth failure on certain types of soil in South Queensland, remains unknown, there are indications that a somewhat similar condition in Q.50 at Mt. Pelion in the Mackay district may be prevented by the addition of copper to the soil. An exploratory trial on the ratoons in a block which had shown the disease, gave a marked response to 55 lb. of copper sulphate per acre. There was an estimated difference of 20 tons per acre between a plot to which copper sulphate had been added and the neighbouring check plot. Iron, manganese and zinc did not give any improvement in the crop, although plots to which molybdenum was applied gave variable yields. However, the trial, although each plot was replicated, was a preliminary one only and further tests are being arranged.

Future work in the pathology section of this Division will be helped considerably by the acquisition of the plot at Moggill mentioned above. It is only ten miles from the Brisbane Head Office and with city water, a northerly aspect, fair to good soil and excellent shelter from most winds should be very suitable for sugar cane. The plot was taken over in spring, 1949, and two disease resistance trials as well as material for various investigations were planted immediately. This present spring another gumming and a second Fiji trial will be planted in addition to a leaf-scald resistance trial and, on the shallow soil above the creek flat, a red-rot trial. It is planned to plant a downy mildew trial in 1951.

The practice of providing cultures for the inoculation of leguminous crops used in normal rotation was continued. Eighty-five growers took advantage of this service and during the year sufficient inoculum was despatched to provide for the treatment of 712 bushels of cowpea, 21 bushels of Mauritius bean, 3 bushels of soybeans, 1,640 lb. of Gambia pea (*Crotalaria goreensis*) and 90 lb. of lucerne.

In the Quarantine House, the three Tucuman canes, 3950, 4535 and 4624, and the two Indian varieties Co. 475 and Co. 617, which had not completed their requisite period of quarantine in the previous year, were further grown for the full period of the 1949-50 season. In addition, the following importations were made from overseas:—P.O.J.3016, P.O.J.2967, P.O.J.2364, C.P.36/183 and F.108 from U.S.A. and F.108, F.110, P.O.J.2801 and P.O.J.2967 from Taiwan. The three last-named Taiwan importations failed to grow, but the remainder all made satisfactory growth with no evidence of any disease or pest, and they will accordingly be distributed in September, 1950, to the four Experiment Stations for further propagation.

There was a steep rise in requests for varieties to be despatched from Queensland, and the following were forwarded:—Badila, E.K.28, P.O.J.2878, Eros, Trojan, H.Q.426, Q.44 and Q.50 to Ceylon; Q.42, Q.47, Q.49 and Q.50 to Argentine; Q.49, Trojan, Pindar and Eros to South Africa; Eros, 39 M.Q.832, H.Q.409, P.O.J. 2875, S.J.2, J.B.3, Q.27, Q33, Q.34 and G.269 to the United States of America; Trojan, C.P.29/116, Q.47 and Q.50 to Taiwan; Co.290, Co.301, China, C.P.29/320, C.P.34/79, C.P.34/120, C.P.36/13, C.P.36/105, Q.47 and Q.50 to New South Wales and P.O.J.2878, E.K.28, Trojan, Comus, Pindar, H.Q.426, Badila, S.J.2, S.J.4, S.J.16, Q.20 and Q.50 to the Ord River in Western Australia.

Report of the Division of Mill Technology.

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

ROUTINE OPERATIONS.

Throughout the 1949 season the Mutual Control Scheme operated successfully on a revised procedure. The 24 mills contributing to the Scheme supplied the complete set of control figures weekly, and these were circulated also on a weekly basis. In accordance with an earlier decision the recording of plant data was separated from the Mutual Control Scheme, and after some delay in printing the first edition of the new publication, the Plant Data Record was published based on returns for the 1948 season. At the same time the first Supplement also applying to the 1948 season was published. The second Supplement and the Mutual Control Synopsis for 1949 are due for release shortly. It is pleasing to record that two more mill companies have signified their willingness to participate in the Mutual Control Scheme, and three more have agreed to contribute Plant Data returns.

The standardisation of laboratory apparatus was continued throughout the year. Tests were made on 253 brix spindles, 215 flasks, 18 pipettes, 52 polariscope tubes, one graduated cylinder, one thermometer and one set of weights. In addition six new polariscopes were tested and certified, while six others were overhauled and adjusted. It is interesting to note that two of the new polariscopes were rejected on the score of inaccuracy. One other of the new polariscopes was the first of Italian manufacture to be introduced into the industry; it was found to be of excellent quality. Two new models of pH meter were examined and tested, and one glass electrode was calibrated. Several batches of standard buffer solution were issued, and check analyses were carried out on several samples of sugar and molasses. The general quality of apparatus available to the industry has improved considerably during the past year. A complete line of certified volumetric glassware is now procurable at reasonable prices, quartz wedge compensated saccharimeters are back on the market, several excellent models of pH meter, both battery operated and mains operated, have been introduced, and the range and quality of most laboratory apparatus has improved.

As usual the members of the mill technology staff were actively associated with the Conference of the Queensland Society of Sugar Cane Technologists held at Cairns in April, 1950. Papers were contributed to the Proceedings as mentioned elsewhere in this report.

Continued pressure of business has limited the attention devoted to the News Letter. Only two issues were published during the year, but more regular publication of this valuable pamphlet will be resumed at the earliest opportunity.

SEASONAL INVESTIGATIONS.

During the 1949 season, as in 1948, the two main subjects studied were vacuum pans and crystallizers. Tests were made on the performance of the Webre pans at Farleigh and Plane Creek Mills, and the operation of the Werkspoor crystallizer at the latter factory was studied. The results of these tests were published in the two papers by Messrs. Venton and Brain referred to above. As anticipated, sufficient information has been secured during the past two seasons to publish a "Technical Communication" on the treatment of low grade massecuite. This Technical Communication is now in course of preparation and should shortly be ready for printing.

Other seasonal activities included an investigation of the influence of low purity magma on factory work and the use of soda ash as an aid in the clarification of sugar juice. Tests were carried out on the sugar dryer at Moreton Mill and the boilers at Plane Creek Mill, while a general survey of operations at Mulgrave mill was conducted. All mills were visited at least once by a mill technologist during the season.

SLACK SEASON WORK.

Viscosimeters.—The new viscosimeter of Bureau design was checked against the standard Hoeppler instrument which is now in working order again. It was then used in an investigation into the flow properties of molasses and massecuites. In preliminary tests it was established that commercial glucose syrup displays the properties of a Newtonian fluid and is very satisfactory for use in the calibration of viscosimeters provided that its surface is sealed from the atmosphere with a light immiscible fluid such as kerosene.

The molasses samples tested displayed only a slight degree of plasticity but the massecuites exhibited this property to a marked degree. Further work on this subject is proceeding.

The opportunity occurred to test a "Technico" viscosimeter of the torsion wire type. This instrument was found to be highly satisfactory as an industrial class of instrument for testing the viscosity of molasses but it is considered unsuitable for massecuites.

Scale.—Several samples of scale from juice heaters were analysed, with inconclusive results. The problem of scale formation has received considerable publicity and attention in recent years and several methods and devices for the elimination or prevention of scale are under observation.

Bentonite.—A sample of Australian bentonite was examined with a view to its use as a clarifying agent, but the initial laboratory tests yielded unsatisfactory results and the project was abandoned. Recently a trial shipment of Wyoming bentonite has been imported and is to be used on clarification tests at Fairymead mill. The laboratory examination of this material is proceeding.

Sugar Deterioration.—Following the decision of the Mill Research Programme Committee that an investigation be carried out during the 1950 season into the deterioration of raw sugar, some preliminary work was undertaken in collecting samples of sugar and studying sugar storage sheds.

ENGINEERING TECHNOLOGY.

Electrification.—The trend towards full electrification of all auxiliary power drives continues and further orders for generating plant have been placed by the industry to meet the increase in electrical demand anticipated. All such generating plant has been specified to comply with the standard voltage and frequency used by Regional Boards in the sugar-growing areas. This adoption of what might be called the Queensland standard system facilitates the use of Regional Board power for the slack season and crushing week-ends and most factories are finding that, at such times, public supply is a more economical proposition than private generation. When crushing is in progress, however, conditions are reversed, and sugar factories can then produce electricity at a lower cost than the fuel cost per unit of Regional power plants using coal, crude oil or wood.

The Bureau has always kept in mind the economic possibilities of generating surplus electricity in sugar factories but such possibilities could be put on a more definite basis if the State Electricity Commission were able to advise regarding the quantity of electricity which the Regional Boards in the different sugar areas could absorb, and the maximum price per unit which each Board would be willing to pay.

This matter of surplus electricity could have a considerable effect on the design of a new sugar factory and definite information regarding the surplus which could be absorbed by the Regional Board in the area concerned should be available before planning the boiler plant, power plant and type of drive for the crushing tandem. The possibilities of surplus electricity should also be considered by any existing factory which was planning to increase its rate by the installation of a second tandem.

Visits.—The Engineer Technologist paid short visits to the majority of factories during the year and several extended visits on request for the purpose of special discussion. The latter were mainly devoted to obtaining information on which to base switchboard designs suitable for controlling the output of recently-ordered generating plants. Three switchboard designs and specifications were subsequently submitted to and adopted by the factories concerned.

A week was spent at one factory on boiler station investigations.

Bagasse Nuisance.—A number of factories sought information with a view to reducing the bagasse nuisance which, probably because of the higher boiler outputs required, tended to be more pronounced than in past years. Suitable apparatus for flue gas sampling is now being assembled and it is proposed to carry out tests at four or five factories during the 1950 crushing season. With the information obtained the Bureau should be able to make recommendations as to the most economical way of dealing with the nuisance.

FACTORY OPERATIONS 1949 SEASON.

Although the quantity of cane harvested in the 1949 season constituted a record, the sugar production was nearly 3,000 tons below that of 1948. It is hardly necessary, therefore, to point out that the quality of the cane in 1949 was inferior to that of 1948, but the contrast in the quality ratios is surprising—7·07 in 1948 and 7·26 in 1949. The former is very favourable by Queensland standards, the latter is one of the highest recorded in the last ten years or more. This amply supports the claim made several times of recent years that the ratio of cane to sugar no longer provides an indication of milling efficiency. Nevertheless, it will be shown later that other figures point to some decline in the performance of the factories.

The main production data are set out in Table X, showing the details for the separate districts as well as the State. It will be noted that production was high in all districts, but in both the central and southern areas the c.c.s. of the cane was below recent levels, and the average for the State was the lowest for many years.

The figures for the northern district were generally very similar to those of 1948. The 1949 crop was a little smaller, the standard of quality of the cane a little lower and various other small consequential differences may be noted.

In the central district cane quality slumped badly and the yield of molasses from the large crop totalled over 15 million gallons. It is pleasing to note that this high yield of molasses had a comparatively low average purity. In the south, also, the c.c.s. of the cane was low, but the purity of the juice did not fall far below normal levels and the yield of molasses was moderate. The State production of molasses must constitute a record.

Turning to the performances of the mills, in regard to which data are set out in Tables XIII. and XIV., it will be noted that the average crushing rates rose once again. The State average of 68·74 was some 2·4 tons per hour above that of 1948 for which the average calculated on the same basis was 66·33 tons per hour. In view of this it is perhaps not surprising that the figures for extraction show a slight decline. For some years now crushing rates have risen from season to season and at the same time, until 1949, there was actually a general improvement in the milling performance figures. It is not to be expected that such a combination can be maintained indefinitely, and it may be that the results of the 1949 season show the first adverse effects of excessive crushing rate. Of course, milling results respond to so many variables that it will be some time before the accuracy of the above suggestion can be established.

Although the true purity of final molasses in 1949 was slightly below that of 1948, the figure recorded for the northern district, 48·04, is particularly disappointing. Recent investigations have verified the theoretical deduction that the northern district enjoys the most favourable conditions for the exhaustion of final molasses. Unfortunately, the mills in that area have been deluded for years by flatteringly low apparent purities, and only recently have any steps been taken in the north to exert the necessary degree of effort in the treatment of low-grade massecuites. Meanwhile, in other districts, the general expansion in capacity is, in many cases, keeping pace with developments in low-grade massecuite treatment, and no significant downward trend in final molasses purities is to be expected until considerably more equipment has been installed.

The average analytical figures for the sugar produced are quite typical, but it is noted that the average pol of sugars in the central district was 98·953, indicating that an appreciable proportion of the sugar must have tested over 99 pol. The low pol of the northern district sugars, and the high content of reducing sugars would appear to indicate a slight degree of deterioration.

The pol balance figures for the various districts offer the possibility of considerable speculation. The low overall recovery and high undetermined losses in the northern district might be due simply to the vagaries of the formula used in the calculation of pol in cane. When account is taken of true purities, the molasses loss appears to be underestimated but the introduction of sucrose figures into a pol balance may easily prove misleading. For the State as a whole the pol balance is not so favourable as in 1948—the overall recovery is lower, the individual losses (except undetermined loss) higher. Boiling house efficiency figures were slightly improved in 1949.

The performance figures of Table XIV. show that, in most respects, the central and southern mills recorded slightly improved figures in 1949, and the co-efficients of work in these areas were distinctly better than in 1948. The northern mills, however, slumped in practically every respect. It is, unfortunately, quite impossible to determine to what extent this was due merely to the limitations of the chemical control system.

A study of the figures presented in this report leads to the tentative conclusion that the Queensland industry has reached the limit of capacity consistent with existing equipment and normal standards of performance. As more equipment is installed capacities will rise further, but the spectacular increases of recent seasons are not likely to be maintained in the future. Meanwhile the accent is still strongly upon production, and technical efficiency is a secondary consideration for the time being.

TABLE X.

PRODUCTION DATA FOR THE QUEENSLAND SUGAR INDUSTRY FOR THE SEASONS 1943 TO 1949, INCLUSIVE.
(TOTALS AND WEIGHTED AVERAGES.)

NORTHERN DISTRICT.*

	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Cane—							
Tons	1,430,006	1,819,552	1,943,613	1,551,959	1,876,137	2,478,083	2,426,929
Pol per cent.	16·10	15·69	15·56	16·68	14·81	15·55	15·50
Fibre per cent.	10·62	10·39	10·51	10·57	10·62	10·55	10·58
C.C.S.	14·99	14·64	14·47	15·54	13·66	14·39	14·36
Purity first expressed juice	89·95	90·38	89·75	90·08	88·60	89·24	89·17
Sugar—							
Tons (94 net titre)	206,634	259,573	281,998	233,732	255,958	356,969	345,684
Cane per ton sugar	6·92	7·01	6·89	6·64	7·33	6·94	7·02
Pol per cent.	98·58	98·67	98·59	98·70	98·48	98·60	98·42
Net titre	97·14	97·42	97·26	97·45	96·91	97·24	96·99
Dilution indicator	32·31	28·50	31·44	28·90	33·00	30·00	30·00
Pol per cent. pol cane	86·07	86·49	86·72	85·65	84·89	86·60	84·59
Mud—							
Tons	23,045	32,285	31,614	26,009	33,152	37,485	42,450
Mud per cent. cane	2·58	2·98	2·93	3·04	2·85	2·67	3·12
Pol per cent.	4·08	4·75	4·57	3·80	3·41	3·93	3·59
Pol per cent. pol cane	0·65	0·90	0·86	0·69	0·66	0·67	0·72
Molasses—							
Gallons	3,738,134	4,174,420	4,415,061	3,979,612	5,065,600	6,087,150	6,142,636
Gallons per ton cane	4.19	3·86	4·09	4·66	4·36	4·33	4·51
Brix	84·91	84·71	87·14	85·92	86·74	86·40	86·57
Apparent purity	35·01	35·83	35·32	36·18	32·41	33·01	34·15
True purity	47·73	48·25	47·80	48·92	..	46·47	47·78
Reducing sugars	16·35	14·72	16·56	14·88	17·50	18·28	17·96
Pol per cent. pol cane	4·99	4·81	5·28	5·52	5·35	5·23	5·68
Final Bagasse—							
Tons	197,909	235,132	234,022	194,494	258,536	308,282	308,622
Bagasse per cent. cane	22·01	21·72	21·68	22·75	22·34	21·93	22·68
Pol per cent.	2·83	2·79	2·72	3·03	2·45	2·86	3·12
Dry substance	51·77	51·45	51·62	50·40	51·04	51·70	50·70
Pol per cent. pol cane	3·90	3·87	3·79	4·13	3·68	4·04	4·75
Undetermined loss—							
Pol per cent. pol cane	4·39	3·93	3·35	4·01	5·42	3·46	4·26
Fuels—							
Tons wood	6,936	6,353	11,143	10,291	7,389	5,378	5,702
Tons coal	..	..	..	..	16·00	..	..
Tons molasses	12,539	12,144	9,951	5,232	9,057	10,691	8,436

* 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.†

	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Cane—							
Tons	1,176,802	1,700,451	1,699,803	1,716,764	1,380,368	2,572,089	2,691,364
Pol per cent.	16·58	16·87	15·83	15·21	16·44	15·98	15·41
Fibre per cent.	11·95	12·07	12·34	11·34	12·16	12·67	12·10
C.C.S.	15·56	15·81	14·79	13·69	15·36	14·76	14·11
Purity first expressed juice	91·19	90·98	90·48	85·64	90·59	88·85	87·59
Sugar—							
Tons (94 net titre)	177,527	262,254	242,673	227,754	204,780	373,003	375,654
Cane per ton sugar	6·63	6·48	7·00	7·54	6·74	6·90	7·16
Pol per cent.	98·80	98·91	98·93	98·87	98·91	98·83	98·96
Net titre	97·52	97·77	97·80	97·63	97·57	97·62	97·91
Dilution indicator	29·35	26·95	24·58	27·16	30·00	28·00	33·00
Pol per cent pol cane	86·65	86·94	85·75	82·96	85·94	86·46	86·27
Mud—							
Tons	47,653	66,339	64,449	70,807	49,767	83,008	86,934
Mud per cent. cane	4·05	3·91	3·79	4·12	3·61	3·23	3·23
Pol per cent.	1·80	1·85	1·78	2·15	1·88	2·27	2·67
Pol per cent. pol cane	0·44	0·43	0·43	0·58	0·41	0·46	0·56
Molasses—							
Gallons	4,773,416	7,474,610	7,902,266	11,146,914	6,777,400	13,828,230	15,387,153
Gallons per ton cane	4·06	4·40	4·65	6·69	4·91	5·38	5·72
Brix	88·15	87·36	87·46	88·02	88·32	88·83	88·73
Apparent purity	37·11	37·36	38·99	34·44	37·69	35·40	34·11
True purity	46·40	47·20	48·71	45·68	..	46·56	45·40
Reducing sugars	14·68	14·34	13·54	23·81	14·57	17·30	19·97
Pol per cent. pol cane	5·24	5·55	6·54	8·44	6·51	7·05	7·37
Final bagasse—							
Tons	303,907	435,253	437,701	426,219	344,687	657,839	697,490
Bagasse per cent. cane	25·82	25·60	25·75	24·82	24·97	25·58	25·91
Pol per cent.	2·93	2·91	2·67	3·03	2·62	2·58	2·67
Dry substance	49·42	50·22	51·43	49·71	52·14	52·99	50·99
Pol per cent. pol cane	4·56	4·42	4·34	4·94	3·97	4·12	4·49
Undetermined loss—							
Pol per cent. pol cane	3·11	2·66	2·94	3·08	3·17	1·91	1·31
Fuels—							
Tons wood	10,759	11,422	7,240	15,322	4,988	9,315	8,576
Tons coal	559	642	514	637	271	244	743
Tons molasses	886	1,152	1,299	1,083	..	40	98

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

TABLE X.—*continued.*

SOUTHERN DISTRICT.

——	1943.	1944.	1945.*	1946.†	1947.	1948.	1949.
Cane—							
Tons	790,616	878,187	908,566	445,752	894,482	1,383,384	1,399,749
Pol per cent.	14·42	15·35	14·84	13·23	14·31	14·58	14·07
Fibre per cent.	13·64	13·39	13·97	13·47	14·68	14·23	14·80
C.C.S.	13·26	14·20	13·63	11·54	13·01	13·28	12·83
Purity first expressed juice	88·18	89·15	88·17	81·18	88·05	86·95	87·10
Sugar—							
Tons (94 net titre)	102,286	121,713	119,918	50,600	110,920	180,077	175,929
Cane per ton sugar	7·73	7·22	7·58	8·81	8·07	7·68	7·96
Pol per cent.	98·90	99·08	99·09	98·72	99·06	99·10	98·90
Net titre	97·56	97·92	97·95	97·02	96·96	97·96	97·08
Dilution indicator	29·11	26·13	27·79	26·73	25·00	28·00	33·00
Pol per cent. pol cane	85·49	85·90	86·33	81·99	83·86	85·04	85·34
Mud—							
Tons	32,969	31,966	34,716	15,601	30,515	40,951	42,597
Mud per cent. cane	4·17	3·64	3·90	3·69	3·39	3·10	3·09
Pol per cent.	2·19	2·50	3·59	3·20	2·55	3·10	2·99
Pol per cent. pol cane	0·63	0·59	0·94	0·89	0·61	0·65	0·66
Molasses—							
Gallons	3,541,960	3,837,677	4,139,049	3,204,205	4,506,000	7,242,457	6,825,754
Gallons per ton cane	4·48	4·37	4·56	7·14	5·13	5·25	4·88
Brix	88·82	89·19	88·62	88·06	88·58	89·47	89·16
Apparent purity	39·71	38·72	39·15	34·60	38·70	37·40	38·48
True purity	47·38	46·98	47·20	45·04	..	46·39	46·80
Reducing sugars	10·06	11·21	11·08	19·59	13·05	15·35	13·95
Pol per cent. pol cane	7·20	6·47	7·13	11·04	7·85	7·93	7·85
Final bagasse—							
Tons	225,235	243,681	267,213	126,496	257,705	397,317	416,113
Bagasse per cent. cane	28·55	27·71	29·41	29·20	29·22	29·02	30·22
Pol per cent.	2·03	2·14	2·17	2·14	1·94	2·02	1·95
Dry substance	50·51	51·15	50·20	49·41	51·07	51·98	52·01
Pol per cent. pol cane	4·01	3·87	4·39	4·38	3·87	4·01	4·20
Undetermined loss—							
Pol per cent. pol cane	2·67	3·17	1·21	1·70	3·81	2·37	1·95
Fuels—							
Tons wood	15,339	11,044	10,351	9,532	4,421	5,925	5,558
Tons coal	1,083	602	411	1,001	513	77	88
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.

——	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Cane—							
Tons	3,397,424	4,398,190	4,551,982	3,714,475	4,150,987	6,433,556	6,518,042
Pol per cent.	15·80	16·15	15·51	15·33	15·34	15·51	15·09
Fibre per cent.	12·02	11·90	12·21	11·44	12·28	12·51	12·41
C.C.S.	14·72	15·07	14·41	13·89	14·18	14·28	13·85
Purity first expressed juice	89·93	90·35	89·70	86·23	89·26	88·47	87·86
Sugar—							
Tons (94 net titre)	486,447	643,540	644,661	512,086	571,658	910,049	897,267
Cane per ton sugar	6·98	6·83	7·06	7·25	7·26	7·07	7·26
Pol per cent.	98·76	98·88	98·86	98·80	98·81	98·83	98·81
Net titre	97·30	97·70	97·67	97·36	97·50	97·60	97·75
Dilution indicator	31·67	27·34	27·75	27·66	30·00	29·00	31·00
Pol per cent. pol cane	86·17	86·57	86·17	83·67	85·11	86·16	85·62
Mud—							
Tons	103,667	130,590	130,779	112,417	113,434	161,444	171,981
Mud per cent. cane	3·63	3·57	3·56	3·75	3·31	3·02	3·17
Pol per cent.	2·70	2·78	2·93	2·68	2·51	2·86	2·97
Pol per cent. pol cane	0·56	0·60	0·67	0·66	0·54	0·56	0·62
Molasses—							
Gallons	12,053,510	15,486,707	16,456,376	18,330,731	16,349,000	27,157,837	28,355,543
Gallons per ton cane	4·22	4·23	4·46	6·07	4·78	5·07	5·22
Brix	87·34	87·10	87·67	87·58	87·91	88·46	88·36
Apparent purity	37·22	37·28	38·05	34·84	36·35	35·40	35·17
True purity	47·10	47·43	48·09	46·26	..	46·49	46·22
Reducing sugars	13·84	13·77	13·73	21·18	15·17	16·95	17·84
Pol per cent. pol cane	5·65	5·55	6·30	7·85	6·45	6·78	7·05
Final bagasse—							
Tons	727,051	914,066	938,936	747,209	860,928	1,363,438	1,422,225
Bagasse per cent. cane	25·43	24·97	25·46	24·96	25·16	25·50	26·20
Pol per cent.	2·67	2·75	2·54	2·87	2·36	2·48	2·56
Dry substance	50·57	50·80	51·13	49·86	51·49	52·41	51·25
Pol per cent. pol cane	4·21	4·13	4·17	4·62	3·85	4·07	4·49
Undetermined loss—							
Pol per cent. pol cane	3·41	3·15	2·69	3·20	4·65	2·43	2·22
Fuels—							
Tons wood	33,034	28,819	28,734	35,145	16,798	29,618	19,836
Tons coal	1,642	1,244	925	1,638	800	321	1,159
Tons molasses	13,425	13,296	11,250	6,315	9,057	10,731	8,534

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 Inkerman.

TABLE XI.

SUGAR PRODUCED IN 1949, COMPARED, IN DISTRICTS, WITH PEAK ALLOCATIONS.

District.	Tons 94 net titre Sugar,			Production in Per Cent. Peak.
	Produced.†	Peak.	Excess of Production Over Peak.	
Northern	345,684	368,600	—22,916	93·78
Central	375,654	317,800	57,854	118·20
South	175,929	162,200	13,729	108·46
All Districts	897,267	848,600	48,667	105·73

† Includes Local Sales.

TABLE XII.

TONS CANE PER TON NET TITRE SUGAR, 1940–1949 (WEIGHTED AVERAGES).

Season.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Tons cane per ton sugar	6·82	6·87	7·18	6·98	6·83	7·06	7·25	7·26	7·07	7·26

TABLE XIII.

FIGURES FOR 1949 SEASON. (TOTALS AND ARITHMETIC AVERAGES.)

——	Northern.	Central.	Southern.	All Districts.
Tons cane crushed	2,426,929	2,691,343	1,399,749	6,518,042
Tons 94 n.t. sugar made	345,684	375,654	175,929	897,267
Net titre of sugar	97·01	97·83	97·08	97·39
Tons cane per ton sugar	7·08	7·17	8·16	7·45
C.C.S. of cane	14·47	14·17	12·89	13·78
Coefficient of work	95·81	99·06	97·14	97·70
Coefficient of work E.S.G.	90·79	93·88	92·28	92·66
Crushing rate	81·81	72·47	55·06	68·74
Lost time per cent	6·97	6·11	8·89	7·23
Fibre per cent cane	10·62	12·14	14·73	12·74
Pol per cent. cane	15·60	15·46	14·12	15·01
First expressed juice—				
Brix	20·67	21·29	20·23	20·80
Purity	89·31	87·64	87·30	87·86
Purity—				
Clarified juice	88·78	85·83	86·52	86·79
Syrup	88·93	85·68	86·79	86·86
Clarified juice per cent. cane	102·00	107·00	106·00	106·00
Dilution per cent. 1st expressed juice	26·64	33·64	37·35	33·57
Final Bagasse—				
Pol	3·13	2·69	2·17	2·61
Dry substance	51·10	51·26	51·95	51·46
Pol extraction	95·22	95·59	95·36	95·43
Reduced extraction	94·27	95·43	96·19	95·43
Final molasses—				
Gallons per ton cane	4·56	5·72	4·89	5·24
Brix	86·02	88·65	87·69	87·74
Apparent purity	34·58	34·28	38·47	35·74
True purity	48·04	45·67	46·44	46·22
Reducing sugars	18·02	19·76	14·12	17·44
Final mud—				
Tons per cent. cane	3·13	3·11	3·26	3·16
Pol per cent. mud	3·87	2·88	3·33	3·25
Sugar—				
Pol	98·433	98·953	98·687	98·746
Reducing sugars	·553	·311	·237	·336
Ash	·174	·163	·280	·207
Moisture	·361	·244	·354	·309
Dilution indicator	30·00	33·00	35·00	32·00
Pol balance—				
Sugar (recovery)	84·60	86·28	84·42	85·29
Bagasse loss	4·78	4·41	4·64	4·57
Molasses loss	5·70	7·46	7·78	7·18
Mud loss	·72	·54	·73	·64
Undetermined loss	4·20	1·31	2·43	2·32
Boiling house efficiency	93·32	95·67	94·09	94·64
Boiling house efficiency E.S.G.	92·87	95·36	93·77	94·27
Fuels (calculated as equivalent bagasse per cent. cane)—				
Wood	·73	·90	1·63	1·12
Coal	..	·15	·02	·07
Molasses	1·10	·01	·00	·27
Total added fuel	1·83	1·06	1·65	1·46
Bagasse	23·24	27·40	32·14	28·11
Total fuel	25·07	28·46	33·79	29·57
Crop days	1,830·3	2,147·6	1,614·6	5,592·5

TABLE XIV.

AVERAGE PERFORMANCE FOR QUEENSLAND MILLS, EXCLUDING C.S.R. COY.'S. MILLS. (ARITHMETIC AVERAGES).

	Northern.		Central.		Southern.		All Districts.	
	1948.	1949.	1948.	1949.	1948.	1949.	1948.	1949.
Cane—								
Pol	15·58	15·60	15·99	15·46	14·72	14·12	15·48	15·01
Fibre	10·55	10·62	12·73	12·14	14·32	14·73	12·78	12·74
Purities—								
First expressed juice	89·28	89·31	88·77	87·64	87·16	87·11	88·35	87·84
Clarified juice	88·88	88·78	86·70	85·83	86·65	86·52	87·29	86·79
Syrup	88·86	88·93	86·90	85·68	86·87	86·79	87·36	86·86
Gallons Molasses per ton cane	4·38	4·56	5·47	5·84	5·16	4·89	5·13	5·24
Apparent purity molasses	33·30	34·58	35·67	34·28	37·68	38·47	35·81	35·74
Overall recovery	86·31	84·60	86·42	86·28	84·66	84·42	85·91	85·29
Overall recovery E.S.G.	85·95	84·19	86·13	86·00	83·80	84·14	85·31	84·97
Recovery on mixed juice	89·96	88·84	90·13	90·25	88·01	88·58	89·38	89·36
Recovery on mixed juice E.S.G.	89·57	88·41	89·83	89·96	87·73	88·21	89·07	89·04
Boiling house efficiency	94·50	93·32	94·94	95·67	93·62	94·09	94·40	94·64
Boiling house efficiency E.S.G.	94·10	92·87	94·62	95·36	93·32	93·77	94·07	94·27
Pol extraction	95·96	95·22	95·88	95·59	95·40	95·36	95·72	95·43
Reduced extraction	95·09	94·27	95·93	95·43	96·07	96·19	95·78	95·43
C.C.S. in cane	14·42	14·47	14·77	14·17	13·60	12·89	14·30	13·78
Coefficient of work	97·97	95·81	98·12	99·06	96·55	97·14	97·56	97·70
Coefficient of work E.S.G.	92·96	90·79	93·20	93·88	91·66	92·28	92·63	92·66

TABLE XV.

CANE MILLED AND SUGAR YIELDED, 1949.

Mills.	Tons Cane Crushed.	Tons 96 n.t. Sugar Made.	Tons Cane per Ton 96 n.t. Sugar.	
			1949.	1948.
Mossman	146,541	22,032	6·651	7·134
Hambledon	220,968	33,972	6·504	6·754
Mulgrave	271,513	37,187	7·301	7·101
Babinda	250,192	32,538	7·689	7·198
Goondi	193,791	26,108	7·538	7·206
South Johnstone	252,241	34,383	7·336	7·064
Mourilyan	172,543	23,748	7·266	7·073
Tully	267,693	37,050	7·244	6·923
Victoria	326,874	48,709	6·688	6·719
Mackade	321,573	48,964	6·568	6·582
Local sales	..	857	..	..
Northern District, Totals and Averages	2,426,929	345,634	7·021	6·942
Invicta	199,971	16,562	6·640	6·528
Pioneer	232,863	34,617	6·727	6·554
Kalamia	236,133	35,663	6·624	6·492
Inkerman	302,295	42,960	7·037	6·864
Proserpine	226,042	32,458	6·965	7·055
Cattle Creek	117,566	16,315	7·206	7·052
Racecourse	282,998	37,788	7·475	7·053
Farleigh	261,031	34,938	7·471	6·952
North Eton	143,925	19,290	7·461	7·187
Marian	253,570	34,995	7·486	6·995
Pleystowe	290,569	39,939	7·443	7·162
Plane Creek	234,389	31,960	7·332	7·069
Local sales	..	108	..	..
Central District, Totals and Averages	2,591,354	375,654	7·164	6·996
Qunaba	166,684	19,224	8·237	8·087
Millaquin	222,972	28,239	7·896	7·476
Bingera	239,421	31,012	7·726	7·562
Fairymead	207,908	26,097	7·967	7·860
Gin Gin	79,754	9,266	8·605	8·052
Isis	269,213	34,040	7·909	7·596
Maryborough	66,874	7,849	7·756	7·340
Mount Bauple	46,549	5,727	8·145	8·024
Moreton	149,463	19,013	7·858	7·655
Rocky Point	22,871	2,396	9·545	9·894
Local sales	..	66	..	..
Southern District, Totals and Averages	1,369,749	175,929	7·956	7·682
All Districts, Totals and Averages	6,518,032	897,267	7·264	7·059

TABLE XVI.

AVERAGE CRUSHING RATES, 1940–1949, EXCLUDING C.S.R. COY.'S MILLS AND ROCKY POINT.

(Arithmetic Averages.)

—	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Tons Cane per Hour	61·67	63·32	55·93	55·45	57·33	59·32	59·48	60·55	66·33	68·74

TOTAL CROP DAYS, 1940–1949.

—	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.	1949.
Total Crop Days ..	4,558	4,034	4,432	4,270	4,749	4,872	3,740	4,289	5,708	5,593

TABLE XVII.

ANALYSIS OF GROSS TIME FOR SEASON 1949.

(Excluding C.S.R. Coy.'s Mills.)

—	Total Hours.	Per Cent. Gross Total Hours.	Per Cent. Available Hours.
Crushing Time	78,248·7	67·91	93·02
Lost Time—			
Manufacture	3,293·1	2·86	3·91
Cane Supply	2,582·7	2·24	3·07
Total Available Time	84,124·5	73·01	100·00
Unmeditated and Week-end Stops	31,105·2	26·99	..
Gross Total Hours	115,229·7	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.						
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	26·816
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
1948	·672	..	1·535	2·207	23·063	25·270
1949	·726	..	1·102	1·828	23·242	25·070
CENTRAL DISTRICT.						
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
1948	1·617	·037	·002	1·656	28·497	30·153
1949	·899	·153	·005	1·057	27·397	28·454
SOUTHERN DISTRICT.						
1940	2·535	·031	·005	2·571	29·341	31·912
1941	2·659	·045	..	2·704	28·612	31·316
.. ..	3·197	·183	..	3·380	30·325	33·705
.. ..	5·385	·380	..	5·765	29·358	35·123
.. ..	4·306	·151	..	4·457	29·326	33·783
.. ..	3·565	·059	..	3·624	30·550	34·174
.. ..	5·693	·697	..	6·390	29·341	35·731
.. ..	3·785	·141	..	3·926	30·388	34·314
1948	1·977	·009	·012	1·998	31·010	33·008
1949	1·633	·016	..	1·649	32·138	33·787
ALL QUEENSLAND DISTRICTS.						
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
1948	1·519	·018	·374	1·911	28·098	30·009
1949	1·122	·067	·266	1·455	28·106	29·561

* Equivalent bagasse = bagasse with net calorific value of 3.300 B.Th.U. per lb.

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