ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS FROM NATAL SUGAR FACTORIES, SEASON 1935-36

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In last year's summary two abnormal factors, unusually late rains and the locust plague, were mentioned as having profoundly affected the crop.

For the season now under review we have fortunately largely escaped any further widespread attack by locusts, but the weather has again been very unusual in three respects, each being more or less unfavourable for the sugar cane crop.

The rainfall, although the highest for many years in most districts, was very abnormally distributed. For the first four months it was distributed as usual and the quantity was only slightly below normal. May, however, had a total of 8.72 ins. and June the abnormal total of 16.93ins. The average rainfall for these months is 1.61ins. and 1.00ins. respectively, and since they form the beginning of the four months' cool season when the cane ripens but will not grow, heavy rains are not desired. The June rainfall which came practically all in the three consecutive days from the 11th to the 13th caused extensive floods which caused, however, relatively little direct damage to the cane fields as a whole.

The effect was of course to delay the ripening of the cane, but was not so prolonged as might have been expected and had disappeared in July, the general sucrose average for that month being as much as 13.47 per cent. of cane.

The last four months of the year were abnormally dry, the total rainfall for that period being 8.06ins., or only half the normal rainfall. The result was that the cane held its sucrose very late in the season, the general average for the December period being still 13.67 per cent. of cane.

The very dry conditions of the last four months of the the year were very unfavourable to the growth of the cane, however, and made planting very difficult.

The third factor that no doubt adversely affected the cane was the abnormally low temperatures over the greater part of the year. The mean air temperature for the year was 66.8°, which is the lowest annual mean on record at the Experiment Station, and is 1.6° below normal. The mean temperature for every month excepting July and October was much below normal, and for January, February, May, June, August, November and December was the lowest ever recorded for each of these months. August with a mean temperature of 59.4° was nearly 1° colder than any month ever before recorded here.

Fortunately therewere no ground frosts such as have occurred in some years, and little or no damage to sugar cane from frost is recorded, or from the few local hailstorms that occurred during the year.

The unusually low temperatures, however, no doubt prolonged and intensified the usual effect of the winter season in inhibiting growth of the cane, and made growth less active during the warmer months. On the other hand, the low temperatures most probably served to neutralize the depressing effect of the abnormal late rains on the sucrose development of the cane and promoted after all a sucrose content of cane for the season well up to the average of recent years. The purity of mixed juice for August, 87.10, is a record for any month, and the average mixed juice purity for the season, 86.49, is the highest on record for the country. The reducing sugar ratio in mixed juice, 2.65, is also the lowest ever known in this country, that for August being as low as 2.36, which is comparable with the reducing sugar ratio for countries with a really cold winter, such as Louisiana.

The total world crop of sugar for 1935-36 as estimated by Mikusch ("Facts About Sugar," Jan. 1936, p. 7.) is 25,612,000 metric tons, of which 15,810,000 metric tons or 61.7 per cent. is cane sugar. Of the world total, South Africa with 417,289 tons of 2,000 lbs. or 378,564 metric tons, forms 1.48 per cent., or 2.64 per cent. of the output of cane sugar. Of the total sugar produced in the British Empire, 6,090,000 metric tons, the South African output forms 6.22 per cent.

The leading sugar producing countries within the Empire are:—

	Metric Tons
India	3,400,000
Australia	636,000
United Kingdom	560,000
South Africa	378,564
British West Indies	358,000
Mauritius	285,000

Of the South African output of sugar, 405,213 short tons or 97.1 per cent. of the total are represented in our returns.

This proportion of the output for which data are reported to us has steadily increased since the first of these reports, as shown below:—

Season.	No. of factories reporting.	No. of factories in operation.	Per cent. of total output represented in returns.
1925/26	11	25	60.4
1926/27	13	23	73.3
1927/28	14	21	81.0
1928/29	14	25	83.3
1929/30	16	25	91.0
1930/31	17	23	94.9
1931/32	16	22	94.5
1932/33	16	23	94.4
1933/34	15	23	90.0
1934/35	17	23	96.5
1935/36	17	23	97.1

The 2.9 per cent. of the output not reporting, or 12,076 tons of sugar is produced at six small factories, understood not to have complete chemical control.

The total output of cane for the season was 3,867,536 short tons (3,508,625 metric tons) of cane (estimated) milled and 417,289 short tons (378,564 metric tons) of sugar manufactured. Of this cane 2,240,403 short tons or 57.93 per cent. of the total was grown by planters selling cane to the manufacturer, leaving a balance of 42.07 per cent. of cane grown by the manufacturers themselves.

Contrary to last season, very little cane sent to the mills was found to be below the standard for rejection of 9 per cent. sucrose and 78 purity according to the Fahey Conference Agreement. The quantity for the season was 6,823 tons or 0.17 per cent. of the total.

Of the total cane crushed by mills, only 241,947 tons or 6.26 per cent. consisted of cane varieties other than Uba. This is still a small proportion, most of these canes having been used for replanting, but the proportion now planted is a very considerable one, as the appended returns will show.

The average sucrose content of cane for the season was 13.65 per cent., which is about the average of recent years, omitting the preceding season's disastrously low figure of 11.88 due to locust-stricken cane.

As already mentioned the juice was of unusually high quality compared with other years, both the first crusher juice and the mixed juice showing the highest purities on record, 89.35, and 86.49 respectively; and the reducing sugar ratio was also extraordinarily low.

The fibre content of the cane, on the other hand, 15.92 per cent., was the highest recorded for some years, and the Java Ratio is correspondingly low.

Although the mill extraction, 90.64, shows a slight fall from last year as might be expected from the higher fibre content this is more than compensated for by a recovery on mixed juice of 86.52, the highest on record for this country. This results in an overall recovery of 78.40, 0.81 higher than the previous best, recorded last season.

The ratio of cane to sugar is 9.19, the lowest for any year, on an average polarization of all sugars of 98.42. Calculated to a basis of 96° test sugar the ratio is 8.96, corresponding to a yield on cane of 11.16 per cent. of sugar of 96° test.

These results, obtained as they were with a crop still consisting almost entirely of Uba cane, augur well for the factory efficiencies that may be expected when improved varieties form most of the crop.

The chief sources of loss at present are both in the bagasse due to the high fibre content of the cane, and in the molasses, which is of unduly high purity because of the difficulty in exhausting Uba molasses with its high content of colloids.

In reduced extraction based on a 12.5 per cent. fibre, which compensates for an excessive fibre content of cane, if not for any excessively refractory quality of fibre, we are now not far behind most other countries. No formula yet devised, however, can compensate for the special difficulties met with arising out of the nature of the non-sugars in Uba juices as met with in this country, so that our reduced boiling house recovery and consequently reduced overall recovery are still much below the best standards.

There is as usual a well-marked peak of quality in the cane during the central period of the crushing season, beginning in July, and in this case being prolonged into December because of the unusual drought and cold.

On several occasions in recent years attention has been called in these reports to the loss of sugar entailed by harvesting cane too early in the season. This also applies to the season under review. 143,205 tons of cane were crushed in May, yielding 13,769 tons of sugar, and 401,911 tons of cane in June, yielding 40,631 tons of sugar. If these 545,116 tons of cane had been harvested over the four months August to November having an average ratio of cane to sugar of 8.94 they would have yielded 60,975 tons of sugar, or 6,595 tons more than they actually did, a sheer waste of the latter quantity of sugar through premature harvesting. In some seasons it becomes necessary to harvest drought-stricken cane early before the drought kills it, but that could not have been the case last season. There are of course other reasons that lead to the premature harvesting of cane, that have been discussed at these Congresses from time to time; but the central fact of the annual loss from this cause should be borne in mind by those concerned and kept as small as practicable.

In the individual factory reports we find that the highest sucrose content of cane, 14.37 per cent., was gained at factory No. 20, and the lowest fibre, 15.04 per cent., at factory No. 5; while the highest purity of mixed juice, 88.60, was recorded at factory No. 15, and the lowest reducing sugar ratio at factory No. 8.

The highest extraction, 94.52, is as usual gained by factory No. 1, also the highest reduced extraction 95.70. This is believed to be the highest recorded over a whole season by any South African factory.

The record overall recovery of 83.17 (reduced overall recovery 82.87) is also attained by this factory. Overall recoveries of over 80 are also shown by factories 20 and 6 (the latter also shows the highest reduced overall recovery, 83.24).

The lowest ratio of cane to sugar, both net, 8.23, and recalculated in terms of 96° pol. sugar, 8.06, is gained by factory No. 20. This appears to be the lowest ratio ever recorded over a whole season in South Africa.

It should be borne in mind, however, that factory No. 1, that comes second in this respect, makes a large proportion of white sugar of high polarization, 99.85, which naturally entails more losses in manufacture than a sugar intended for the refinery.

The highest recovery on mixed juice (boiling house recovery) is shown as last year by factory No. 16, and the highest reduced boiling house recovery by factory No. 6.

Closely related to boiling house recovery is the exhaustion of the final molasses, always a difficult problem with our Uba cane. In this respect the lowest apparent purity of final molasses is attained by factory No. 16 with 40.02, nearly 6 below the average. No. 6 factory also shows a purity of final molasses well below the average, and has the lowest virtual gravity purity of molasses, 40.25.

The highest available sucrose per cent. of sucrose in mixed juice is shown by factory No. 15, and the highest recovery efficiency (sucrose in sugar per cent. of available sucrose in mixed juice) is gained by factory No. 6.

The highest Java Ratio for cane, the lowest milling loss, extraction ratio, and primary juice loss are all recorded by factorp No. 1 by virtue of its excellent milling work.

The greatest quantity of cane crushed by any one factory was 504,716 short tons (457,878 metric tons) by factory No. 5, surpassing the record created last season at this factory. No. 5 also has the highest output of sugar of any factory, 58,762 short tons (53,309 metric tons), and the highest crushing rate, 124.47 short tons per hour.

The highest crushing rate for any single tandem factory was 114.18 short tons per hour at factory No. 1. This was the only other factory to exceed 50,000 tons of sugar, 55,659 short tons (50,494 metric tons) being recorded.

Factory No. 20 worked with extraordinarily little interruption, the time spent in crushing throughout the season being no less than 99.21 per cent. of available time.

This report records further progressive improvement in the quality of cane supplied and in the efficiency of manufacture. It is unfortunate that there is no corresponding improvement in the economic conditions governing the Industry.

The writers wish to express their thanks to those who have so fully and cordially co-operated in supplying the varied information required for the compilation of this report.

Experiment Station,
South African Sugar Association,
Mount Edgecombe, Natal,
March, 1936.

APPENDIX

FIELD RETURNS 1934/35 CROP—COMPILED FROM THE UNION DEPARTMENT OF CENSUS STATISTICS FOR SUGAR CANE

(European Planters only).

The Special Census of Sugar Cane Plantations, 1934/35, is of special interest this year because of certain data concerning new variety canes.

The area of non-Uba canes harvested during the 1934/35 season is still very small, amounting to 4,037 acres, yielding 119,297 tons of cane, or 29.55 tons per acre. The general yield for Uba during the same season was 20.63 tons of cane per acre. Every district except Port Shepstone was represented, the greater proportions being supplied by Lower Tugela, 41,670 tons, Lower Umfolozi 27,978 tons, and Inanda 26,281 tons.

These figures by no means represent the area under these canes, since by far the greater part of the cane has been used for replanting.

Turning to the area recorded as planted with varieties other than Uba as at April, 1935, we find that it amounts to 52,879 acres, or nearly 15 per cent. of the total, the proportion showing an increase from 4.2 per cent. the previous year. Lower Tugela 15,879 acres, 16.5 per cent. of the total area under cane in that division, and Lower Umfolozi 11,753 acres, 20.0 per cent. of the total area under cane in that locality, are the leading districts in this respect. This included both plant cane and ratoon crops; taking plant cane only into consideration

we find that the proportion of new canes is very much greater, showing that relatively little Uba cane is now being planted.

The total area of cane harvested for Europeans, 172,447 acres, is the largest ever harvested in one season, the previous largest being 163,584 acres in the 1932/33 season. The yield of cane 3,594,298 short tons (3,260,744 metric tons) is also the highest on record. The total quantity of cane recorded received by the factories for the season was 3,878,079 short tons (3,518,170 metric tons), the difference of 283,781 short tons presumably being the cane supplied by Native and Indian growers, equivalent to 7.32 per cent. This proportion is rather lower than that estimated from the same sources during recent years.

The yield of cane per acre, 20.84 short tons (18.91 metric tons) shows a further small increase, but the yield of sugar per acre was much lower because of the disastrously low sucrose content of the cane during the 1934/35 season.

The increased yield per acre was due to increases in all districts in the central area between the Umkomaas and Umhlatuzi rivers, producing 62 per cent. of the total output. The outlying districts both to the north and south showed further small decreases in yield per acre, but it was undoubtedly these districts that had to bear the brunt of the locust invasion.

The lead in yield per acre is now taken by the Inanda district with an average yield of 25.90 short tons (23.50 metric tons) per acre, the lowest being the Hlabisa and Port Shepstone districts at the extreme north and south respectively.

In production Lower Tugela with 1,012,784 short tons again takes the lead, with Inanda, 618,853 tons, second, and Umzinto, 611,231 tons, third. Production on the Central North Coast continues to expand at the proportional expense of the Zululand and South Coast areas.

The near future will show some interesting changes in the South African Sugar Industry in view of the revolution in cane varieties that has now begun, and the proposed new changes in commercial relations between the grower and manufacturer.

Experiment Station,
South African Sugar Association,
Mount Edgecombe, Natal,
March, 1936.

FINAL MANUFACTURING RESULTS, NATAL SUGAR FACTORIES, SEASON 1935—36.

FACTORY NUMBER	1	2	4	5	6	8	9	10	11	12	14	15	16	18	19	20	21	SEASON.
Tons of 2,000 lbs. Cane crushed	465,998	124,073	197,998	504,716	248,646	161,800	87,866	276,730	274,109	359,455	259,850	143,319	82,864	141,216	103,098	147,282	145,559	**3,724,579**
Cane crushed—*metric tons*	*422,753*	*112,559*	*179,624*	*457,878*	*225,571*	*146,785*	*79,712*	*251,049*	*248,671*	*326,097*	*235,736*	*130,019*	*75,174*	*128,111*	*93,530*	*133,614*	*132,051*	*3,378,934*
Tons of 2,000 lbs. Sugar bagged and estimated	55,659	12,193	20,751	58,762	26,964	17,597	9,132	27,865	27,327	38,650	27,450	14,944	9,273	15,180	10,054	17,888	15,524	**405,213**
Sugar bagged and estimated—*metric tons*	*50,494*	*11,061*	*18,825*	*53,309*	*24,462*	*15,964*	*8,285*	*25,279*	*24,791*	*35,063*	*24,903*	*13,557*	*8,412*	*13,771*	*9,121*	*16,228*	*14,083*	*367,608*
Tons Cane per ton of Sugar	8.37	10.18	9.54	8.59	9.22	9.19	9.61	9.93	10.03	9.30	9.47	9.59	8.94	9.30	10.25	8.23	9.38	**9.19**
Tons Cane per ton of Sugar calculated as Sugar of 96° Pol.	8.14	9.99	9.25	8.39	9.04	9.19	9.27	9.63	9.70	9.07	9.23	9.39	8.71	9.10	10.01	8.06	9.10	**8.96**
Time Crushing per cent. Available Time	97.14	90.13	94.92	93.08	97.06	87.12	97.75	94.96	96.30	97.22	97.65	92.43	94.43	94.51	87.52	99.21	97.00	**95.09**
Tons of 2,000 lbs. of Cane per hour Actual Crushing	114.18	54.35	50.58	124.47	79.75	49.88	24.08	70.76	87.00	88.52	65.05	40.46	23.53	33.32	26.68	33.82	44.25	**75.59**
Tons of 2,000 lbs. White Sugar made	31,982	—	10,672	—	—	—	8,980	—	12,322	—	—	6,121	—	70	4,708	—	7,243	**82,098**
Tons of 2,000 lbs. Raw Sugar made	23,677	12,193	10,079	58,762	26,964	17,597	152	27,865	15,005	38,650	27,450	8,823	9,273	15,110	5,346	17,888	8,281	**323,115**
Sucrose per cent. Cane	14.18	12.81	13.52	14.33	13.08	13.56	13.78	12.98	13.14	13.46	13.45	13.72	13.92	13.62	13.21	14.37	13.86	**13.65**
Fibre per cent. Cane	15.39	16.39	15.44	15.04	16.51	15.63	16.82	15.25	17.31	15.50	16.03	17.11	15.58	16.55	18.04	15.22	16.76	**15.92**
Java Ratio	78.96	77.54	75.91	78.26	73.39	77.46	75.90	75.39	74.10	74.47	75.50	76.01	77.72	75.55	73.68	78.14	75.08	**76.24**
Milling Loss	5.05	7.98	9.00	9.26	6.08	9.09	8.96	8.69	7.52	9.37	9.16	8.19	10.40	7.06	8.69	6.34	8.10	**8.01**
Extraction Ratio	0.36	0.62	0.66	0.65	0.46	0.67	0.65	0.67	0.57	0.69	0.69	0.60	0.76	0.52	0.66	0.44	0.58	**0.59**
Primary Juice Loss	30.13	52.24	56.19	54.85	38.74	56.62	54.05	56.74	47.39	58.77	57.62	49.41	62.96	43.26	53.93	37.43	48.72	**49.43**
Imbibition per cent. Cane	41.45	27.49	31.67	30.15	37.08	37.69	30.30	28.92	29.41	33.29	29.34	30.51	30.47	34.67	30.47	35.06	35.03	**33.04**
Extraction (Sucrose in Mixed Juice % Sucrose in Cane)	94.52	89.76	89.74	90.29	92.34	89.51	89.07	89.79	90.08	89.22	89.00	89.80	88.38	91.42	88.13	93.28	90.19	**90.64**
Reduced Extraction (based on Fibre of 12.5 per cent.)	95.70	92.54	91.97	92.16	94.47	91.91	92.28	91.89	93.23	91.60	91.77	92.94	91.01	93.82	92.29	94.65	93.04	**92.94**
Sucrose per cent. Bagasse	2.28	3.47	3.93	3.97	2.60	3.83	4.24	3.53	3.51	3.98	3.80	3.65	4.56	3.11	3.87	2.93	3.58	**3.48**
Moisture per cent. Bagasse	51.74	51.96	50.67	52.12	53.74	53.12	47.60	54.88	48.87	52.45	54.05	51.05	50.47	51.85	50.66	50.16	51.23	**51.93**
Sucrose per cent. Cane lost in manufacture	2.38	3.20	3.15	2.88	2.47	3.12	3.43	3.01	3.25	2.88	3.04	3.50	2.90	3.06	3.62	2.47	3.30	**2.94**
Overall Recovery (Sucrose in Sugar % Sucrose in Cane)	83.17	74.97	76.76	79.91	81.11	76.98	75.11	76.82	75.26	78.64	77.38	74.50	79.14	77.44	72.63	82.82	76.17	**78.40**
Reduced Overall Recovery (based on Fibre of 12.5% and Mixed Juice Purity of 85.0°)	82.87	78.53	76.79	79.76	83.24	78.41	73.02	78.18	76.47	79.38	77.83	71.22	79.92	76.32	74.25	80.65	75.46	**78.76**
Recovery on Mixed Juice (Sucrose in Sugar % Sucrose in Mixed Juice	87.99	83.51	85.53	88.50	87.83	86.00	84.33	85.55	83.55	88.50	86.94	82.96	89.55	84.71	82.41	88.79	84.45	**86.52**
Reduced Boiling-House Recovery (based on Mixed Juice Purity of 85.0°)	86.59	84.86	83.50	86.54	88.11	85.31	79.13	85.08	82.02	86.66	84.81	76.63	87.81	81.35	80.45	85.21	81.10	**84.74**
Available Sucrose % Sucrose in Mixed Juice	87.71	85.80	87.71	87.63	86.24	88.08	89.54	86.54	87.34	88.39	88.31	90.96	88.42	87.02	87.90	—	88.26	**87.73**
Recovery Efficiency (Sucrose in Sugar % Available Sucrose in Mixed Juice)	100.32	97.33	97.52	100.99	101.84	97.64	94.18	98.86	95.66	100.12	98.45	91.20	101.28	97.35	93.75	—	95.68	**98.62**
Virtual Gravity Purity of Molasses	43.17	46.18	48.32	43.27	40.25	45.42	54.18	45.81	50.47	43.06	46.26	56.98	40.86	51.38	52.56	45.59	51.71	**46.38**
Sucrose in Bagasse per cent. Sucrose in Cane (A)	5.48	10.24	10.26	9.71	7.66	10.49	10.93	10.21	9.92	10.78	11.00	10.20	11.62	8.58	11.87	6.72	9.80	**9.36**
Sucrose in Filter Cake per cent. Sucrose in Cane (B)	0.54	2.13	2.09	1.09	1.56	1.73	1.43	1.35	1.66	1.51	1.27	1.40	1.13	1.44	2.21	1.31	1.10	**1.34**
Sucrose in Molasses per cent. Sucrose in Cane (C)	6.22	9.75	9.45	—	7.47	8.39	9.22	—	—	7.66	8.98	7.60	—	—	—	—	—	—
Undetermined Sucrose per cent. Sucrose in Cane (D)	4.59	2.91	1.44	9.29	2.20	2.41	3.31	11.62	13.16	1.04	1.37	6.30	8.11	12.26	13.29	9.15	12.93	**10.90**
Sucrose in Boiling House per cent. Sucrose in Cane (B)+(C)+(D)	11.35	14.80	12.98	10.38	11.23	12.53	13.96	12.97	14.82	10.21	11.62	15.20	9.24	13.98	15.50	10.46	14.03	**12.24**
Sucrose in total Losses per cent. Sucrose in Cane (A)+(B)+(C)+(D)	16.83	25.03	23.24	20.09	18.89	23.02	24.89	23.18	24.74	21.36	22.62	25.50	20.86	22.56	27.37	17.18	23.83	**21.60**
FIRST CRUSHER JUICE—																		
Brix	20.15	19.19	20.01	20.26	20.10	19.65	19.90	19.68	19.83	20.10	19.96	20.07	19.96	20.05	20.18	20.44	20.41	**20.03**
Purity (apparent)	89.16	86.08	89.00	90.40	88.70	89.11	91.26	87.50	89.44	89.90	89.25	89.90	89.83	89.89	88.80	90.00	90.45	**89.35**
LAST ROLLER JUICE—																		
Brix	1.92	5.79	3.88	3.58	4.19	5.03	7.90	5.24	5.82	5.03	5.18	4.69	4.70	3.10	5.92	3.04	4.25	**4.33**
Purity (apparent)	74.02	76.20	70.60	79.60	74.70	79.92	83.00	78.50	79.07	78.50	79.40	84.00	80.17	78.96	80.90	81.20	78.59	**78.05**
Purity drop from First Crusher	15.14	9.88	18.40	10.80	14.00	9.19	8.26	9.00	10.37	11.40	9.85	5.90	9.66	10.93	7.90	8.80	11.86	**11.30**

MIXED JUICE—																		
Brix	14.45	15.26	14.53	15.66	14.49	14.10	14.65	14.92	14.89	14.30	15.25	15.11	14.92	14.72	15.01	14.88	14.75	**14.84**
Purity (Clerget)	86.35	83.88	86.60	86.90	84.70	85.60	88.30	85.40	86.10	86.80	86.83	88.60	86.86	87.36	86.30	88.20	87.32	**86.49**
Reducing Sugar Ratio	2.51	4.22	2.88	2.36	2.62	1.79	—	3.64	2.39	2.78	3.02	—	2.03	2.71	2.49	1.96	2.17	**2.65**
Purity drop from First Crusher	2.81	2.20	2.40	3.50	4.00	3.51	2.96	2.10	3.34	3.10	2.42	1.30	2.97	2.53	2.50	1.80	3.13	**2.86**
CLARIFIED JUICE—																		
Brix	13.63	15.00	14.93	—	13.76	13.69	14.40	12.50	14.97	12.43	12.69	15.37	12.70	14.74	16.54	14.97	13.62	**13.86**
Purity (apparent)	90.23	85.73	88.20	—	86.60	88.31	89.20	87.00	87.70	88.60	88.30	87.90	88.35	87.39	88.00	89.80	88.62	**88.26**
Reducing Sugar Ratio	0.76	3.34	—	—	2.53	1.62	—	3.21	—	2.51	2.78	—	1.65	—	2.06	1.75	1.58	**2.11**
pH	6.88	7.34	7.22	—	7.28	—	—	7.30	7.00	7.60	7.50	—	7.39	—	—	7.51	6.96	**7.24**
Ash per cent. Brix	—	—	—	—	—	—	—	—	—	2.47	—	—	—	—	3.48	—	—	**2.70**
Parts SO_2 per million of Brix	1,161	1,260	—	—	734	—	—	923	—	839	597	—	—	—	—	—	—	**918**
FILTER CAKE—																		
Per cent. Sucrose	0.79	6.99	5.89	4.74	4.35	4.10	5.00	3.89	4.86	4.51	3.79	5.17	3.41	3.91	6.49	4.54	4.09	**3.69**
Weight per cent. Cane	9.65	3.90	4.80	3.30	4.69	5.73	3.94	4.50	4.50	4.50	4.50	3.71	4.60	5.00	4.50	4.14	3.72	**4.97**
SYRUP—																		
Brix	51.30	50.46	48.30	51.07	49.63	54.95	52.30	56.21	54.13	50.46	51.70	54.33	52.55	57.50	52.52	52.86	51.51	**52.15**
Purity (apparent)	90.05	86.38	87.70	88.40	86.10	88.28	89.30	87.00	87.80	88.70	88.50	88.10	88.84	87.36	88.10	89.90	88.86	**88.28**
Reducing Sugar Ratio	0.82	3.03	2.79	—	2.33	1.55	—	—	2.20	2.27	2.14	—	1.61	—	2.01	1.73	1.58	**1.92**
pH	6.64	7.40	6.96	7.40	6.90	—	—	7.20	7.00	7.50	7.42	—	7.42	—	—	7.44	6.88	**7.15**
Purity drop from First Crusher	—0.89	—0.30	1.30	2.00	2.60	0.83	1.96	0.50	1.64	1.20	0.75	1.80	0.99	2.53	0.70	0.10	1.59	**1.07**
Purity increase from Mixed Juice	3.70	2.50	1.10	1.50	1.40	2.68	1.00	1.60	1.70	1.90	1.67	—0.50	1.98	0.00	1.80	1.70	1.54	**1.79**
Parts SO_2 per million of Brix	—	—	—	616	647	—	—	—	—	—	—	—	—	—	—	—	—	**626**
Ash per cent. Brix	—	—	—	—	—	—	—	—	—	2.33	—	—	—	—	—	—	—	—
FIRST MASSECUITE—																		
Brix	91.46	93.99	91.63	91.89	93.67	92.11	90.40	93.56	93.13	92.58	91.40	89.17	93.00	91.12	91.89	91.30	92.57	**92.13**
Purity (apparent)	90.77	78.02	87.80	83.90	78.20	85.00	88.60	82.10	87.40	81.30	79.00	86.70	82.87	85.89	86.60	85.60	86.48	**84.48**
Purity of Run-off	76.93	60.97	69.40	67.30	55.90	66.37	69.20	60.70	70.34	59.30	60.60	71.20	61.88	67.09	68.20	67.70	68.82	**66.26**
Cubic feet per ton of Sugar (all Massecuites and Jelly)	55.60	53.26	—	—	52.56	—	54.20	56.17	—	52.33	59.80	—	50.15	—	—	—	—	**54.79**
SECOND MASSECUITE—																		
Brix	94.40	94.43	95.48	93.01	95.38	92.50	93.20	95.20	93.67	94.95	91.20	92.00	96.64	93.62	93.81	94.90	93.64	**93.96**
Purity (apparent)	81.09	66.70	73.40	70.90	68.30	73.06	77.80	66.80	74.80	67.50	68.90	73.90	68.32	73.10	68.80	72.50	72.99	**71.99**
Purity of Run-off	61.46	44.09	51.20	52.90	46.80	53.42	54.90	46.10	52.90	46.80	50.60	57.10	45.85	52.58	49.50	51.10	55.68	**51.93**
THIRD MASSECUITE—																		
Brix	96.21	—	96.34	—	96.07	—	93.10	—	93.94	—	—	91.92	97.29	94.17	—	—	93.46	**95.03**
Purity (apparent)	68.47	—	63.30	—	62.60	—	67.90	—	62.60	—	—	67.50	58.79	66.52	—	—	64.44	**65.06**
Purity of Run-off	49.26	—	43.80	—	43.00	—	45.70	—	42.72	—	—	53.30	41.22	47.20	—	—	47.11	**46.22**
JELLY—																		
Brix	—	—	92.22	92.67	93.26	90.53	—	93.01	91.59	91.83	89.20	88.70	—	—	93.41	92.40	—	**91.84**
Purity (apparent)	—	—	52.10	52.90	44.80	54.61	—	46.40	46.50	47.10	51.40	55.50	—	—	49.60	51.50	—	**49.88**
FINAL MOLASSES—																		
Brix	81.91	89.68	85.68	88.12	83.93	88.16	—	86.78	86.34	86.58	82.80	83.39	89.73	—	83.72	87.40	80.15	**85.47**
Purity (apparent)	48.88	44.09	45.00	45.80	43.00	48.15	45.50	44.50	43.83	45.30	47.71	51.30	40.02	46.97	46.08	45.10	47.11	**46.00**
Weight per cent. Cane at 85.0° Brix	2.16	3.34	3.35	—	3.70	2.73	3.60	—	—	2.68	2.98	—	—	—	—	—	—	**2.89**
POLARISATION OF SUGARS—																		
White	99.85	—	99.60	—	—	—	99.48	—	99.75	—	—	99.48	—	99.80	99.72	—	99.76	**99.72**
Raw	97.27	97.70	98.42	98.34	97.87	96.00	—	99.02	98.61	98.45	98.54	97.15	98.48	98.18	97.15	97.98	98.36	**98.10**
Average of all Sugars	98.75	97.70	98.99	98.34	97.87	96.00	99.48	99.02	99.23	98.45	98.54	98.04	98.48	98.09	98.35	97.98	98.98	**98.42**
SO_2 in parts per million	27.40	33.50	49.40	74.00	65.00	—	—	59.00	60.34	63.00	49.00	—	67.60	—	28.89	69.00	27.65	**53.70**
FACTORY NUMBER	**1**	**2**	**4**	**5**	**6**	**8**	**9**	**10**	**11**	**12**	**14**	**15**	**16**	**18**	**19**	**20**	**21**	**SEASON**

COMPARATIVE RESULTS FOR RECENT YEARS.

COUNTRY	NATAL							
YEAR	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.
CANE—								
Per cent. Sucrose	12.55	13.23	13.66	13.75	12.95	13.66	13.84	13.48
Per cent. Fibre	15.88	16.01	16.27	15.88	15.52	15.82	15.75	15.65
JUICES—								
Purity of First Crusher	87.24	87.11	88.30	87.80	88.81	88.66	87.92	87.89
Purity of Mixed Juice	84.47	84.65	85.47	84.90	86.04	85.88	85.27	85.30
Purity of last Roller Juice	78.20	76.12	80.20	78.50	80.72	80.79	79.99	79.20
Purity of Syrup	86.39	86.14	87.20	86.60	87.44	87.60	86.82	86.84
Drop in purity Crusher to Mixed Juice	2.77	2.46	2.80	2.90	2.77	2.72	2.65	2.59
Drop in purity Crusher to last Roller	9.04	10.99	8.10	9.30	8.09	7.91	7.93	8.69
Drop in purity Crusher to Syrup	0.85	0.97	1.10	1.20	1.37	1.08	1.10	1.05
Increase in purity Mixed Juice to Syrup	1.92	1.49	1.70	1.90	1.40	1.73	1.55	1.54
Reducing Sugar Ratio of Mixed Juice	—	—	—	3.86	3.35	3.33	3.35	3.09
JAVA RATIO	75.77	75.73	77.78	76.78	77.01	76.36	76.92	76.99
BAGASSE—								
Per cent. Sucrose	4.03	3.53	4.06	4.10	4.07	4.20	4.22	3.83
Per cent. Moisture	49.38	49.33	49.89	50.01	50.69	50.66	50.09	51.89
EXTRACTION—								
Imbibition % Cane	—	—	—	26.34	25.54	26.62	27.86	29.66
Sucrose in Mixed Juice % Sucrose in Cane	89.30	90.86	89.30	89.47	89.02	89.78	89.40	89.86
Reduced Extraction (based on 12.5% Fibre)	91.90	93.15	92.13	92.03	91.46	92.23	91.90	92.19
Primary Juice loss	56.68	47.95	55.07	55.78	59.77	54.38	56.70	54.65
FILTER CAKE—								
Per cent. Sucrose	5.24	6.46	5.41	5.15	6.15	4.97	4.79	4.50
Weight % Cane	5.63	5.10	5.33	4.77	4.33	4.97	5.01	5.41
FINAL MOLASSES—								
Purity	44.50	45.30	46.10	45.30	45.11	45.90	45.04	45.06
RECOVERY—								
Sucrose % Cane lost in manufacture	3.37	3.38	3.53	3.43	3.38	3.58	3.53	3.36
Sucrose in Sugar % Sucrose in Cane	73.28	74.48	74.13	75.06	75.13	74.77	74.39	75.73
Reduced Overall Recovery (12.5% Fibre, 85° pur. Mixed Juice)	76.02	76.62	75.89	77.36	75.93	76.19	76.18	77.34
Sucrose in Sugar % Sucrose in Mixed Juice	81.98	81.97	83.01	83.90	84.39	83.80	83.27	84.27
Reduced Boiling House Recovery (based on 85° pur. Mxd. Juice)	82.72	82.25	82.37	84.06	83.02	82.61	82.90	83.89
Virtual Gravity Purity of Molasses	49.50	50.14	49.98	47.51	49.03	49.63	49.21	47.72
YIELD—								
Tons Cane per ton Sugar	10.77	9.92	9.69	9.49	10.06	9.59	9.53	9.61
Tons Cane per ton Sugar of 96° Pol.	10.46	9.74	9.48	9.30	9.87	9.40	9.33	9.40
LOSSES—								
Sucrose in Bagasse % Sucrose in Cane (A)	10.70	9.14	10.70	10.53	10.99	11.08	10.86	10.14
Sucrose in Filter Cake % Sucrose in Cane (B)	2.44	2.49	2.11	—	—	—	—	—
Sucrose in Molasses % Sucrose in Cane (C)	—	—	—	—	—	—	—	—
Undetermined Sucrose % Sucrose in Cane (D)	—	—	—	—	—	—	—	—
Sucrose lost in Boiling House % Sucrose in Cane (B)+(C)+(D)	16.06	16.38	15.17	14.41	13.88	14.15	14.56	14.13
Sucrose in Total Losses % Sucrose in Cane (A)+(B)+(C)+(D)	26.77	25.52	25.87	24.94	24.87	25.23	25.42	24.27
SUGAR—								
Average Polarization of all Sugars	98.89	97.74	98.08	98.00	97.87	97.96	98.08	98.14

COUNTRY	NATAL.			QUEENSLAND.[1]		MAURUITIUS.[2]		INDIA.[3]
YEAR	1933.	1934.	1935.	1933.	1934.	1933.	1934.	1934
CANE—								
Per cent. Sucrose	13.88	11.88	13.65	14.85	15.57	13.19	12.79	11.21
Per cent. Fibre	15.78	15.24	15.92	12.00	12.23	12.90	13.40	15.50
JUICES—								
Purity of First Crusher	87.46	86.03	89.35	89.40	89.95	87.30	86.90	81.25
Purity of Mixed Juice	84.92	84.02	86.49	—	—	84.40	83.80	79.21
Purity of last Roller Juice	78.26	76.71	78.05	78.08	78.94	75.60	75.30	—
Purity of Syrup	86.57	85.53	88.28	89.41	89.48	85.00	84.20	—
Drop in purity Crusher to Mixed Juice	2.54	2.01	2.86	—	—	2.90	3.10	2.04
Drop in purity Crusher to last Roller	9.20	9.32	11.30	11.32	11.01	11.70	11.60	—
Drop in purity Crusher to Syrup	0.89	0.50	1.07	+0.01	0.47	2.30	2.70	—
Increase in purity Mixed Juice to Syrup	1.65	1.51	1.79	—	—	0.60	0.40	—
Reducing Sugar Ratio of Mixed Juice	4.01	4.21	2.65	—	—	4.00	3.70	—
JAVA RATIO	77.27	78.66	76.24	83.05	82.78	79.94	78.71	—
BAGASSE—								
Per cent. Sucrose	3.71	3.05	3.48	3.04	3.19	2.83	2.84	3.23
Per cent. Moisture	51.62	52.11	51.93	51.50	50.75	44.70	44.70	—
EXTRACTION—								
Imbibition % Cane	30.45	30.25	33.04	—	—	—	—	17.44
Sucrose in Mixed Juice % Sucrose in Cane	90.28	91.07	90.64	94.49	94.46	94.50	94.20	90.65
Reduced Extraction (based on 12.5% Fibre)	92.59	92.90	92.94	94.23	94.32	94.69	94.65	92.72
Primary Juice loss	51.88	49.67	49.43	40.41	39.76	37.14	37.48	50.97
FILTER CAKE—								
Per cent. Sucrose	4.04	3.65	3.69	—	—	7.70	7.70	—
Weight % Cane	5.18	5.07	5.01	—	—	1.80	1.87	—
FINAL MOLASSES—								
Purity	44.92	42.58	46.00	38.55	39.20	40.00	39.70	34.59
True Purity (from true dry substance and clerget sucrose)	—	—	—	47.92	48.07	—	—	—
RECOVERY—								
Sucrose % Cane lost in manufacture	3.27	2.52	2.94	1.97	1.97	2.17	2.20	2.57
Sucrose in Sugar % Sucrose in Cane	76.63	77.59	78.40	86.76	87.37	83.60	82.20	77.05
Reduced Overall Recovery (12.5% Fibre, 85° pur. Mixed Juice)	78.67	80.14	78.76	—	—	84.12	83.51	83.35
Sucrose in Sugar % Sucrose in Mixed Juice	84.88	85.20	86.52	91.88	92.49	88.30	87.10	84.96
Reduced Boiling House Recovery (based on 85° pur. Mxd. Juice)	84.97	86.27	84.74	—	—	88.84	88.25	89.89
Virtual Gravity Purity of Molasses	45.99	43.79	46.38	—	—	38.75	40.02	36.43
YIELD—								
Tons Cane per ton Sugar	9.28	10.67	9.19	7.57	7.21	8.94	9.37	11.50
Tons Cane per ton Sugar of 96° Pol.	9.03	10.40	8.96	7.36	7.01	8.70	9.13	11.11
LOSSES—								
Sucrose in Bagasse % Sucrose in Cane (A)	9.72	8.93	9.36	5.51	5.54	5.50	5.80	9.35
Sucrose in Filter Cake % Sucrose in Cane (B)	—	—	1.37	0.46	0.50	1.39	1.43	—
Sucrose in Molasses % Sucrose in Cane (C)	—	—	—	5.72	5.17	—	—	—
Undetermined Sucrose % Sucrose in Cane (D)	—	—	10.87	1.55	1.42	9.51	10.57	—
Sucrose lost in Boiling House % Sucrose in Cane (B)+(C)+(D)	13.65	13.48	12.24	7.73	7.09	10.90	12.00	13.60
Sucrose in Total Losses % Sucrose in Cane (A)+(B)+(C)+(D)	23.37	22.41	21.60	13.24	12.63	16.40	17.80	22.95
SUGAR—								
Average Polarization of all Sugars	98.68	98.45	98.42	98.71	98.74	98.60	98.50	99.37

[1] From the Annual Reports of the Bureau of Sugar Experiment Stations, Queensland. [2] From the "International Sugar Journal."
[3] From the Sugar Technologists' Association of India, Year Book, 1931-1935.

Average Manufacturing Results by periods for Natal Sugar Factories Reporting to the Experiment Station, Season 1935-36.

Period ending		JUNE 1st, 1935.	JUNE 29th, 1935.	AUGUST 3rd, 1935.	AUGUST 31st, 1935.	SEPT. 28th, 1935.	NOV. 2nd, 1935.	NOV. 30th, 1935.	JAN. 4th, 1936.	SEASON.
Tons of 2,000 lbs. Cane crushed	This period	143,205	401,911	675,770	527,007	543,237	649,997	469,691	187,525	
	To date	143,205	557,286	1,243,986	1,770,993	2,314,230	2,964,227	3,433,918	3,636,713	3,724,579 short tons. 3,378,934 *metric tons.*
Tons of 2,000 lbs. Sugar bagged and estimated	This period	13,749	40,631	72,488	58,349	61,172	72,274	52,996	20,625	
	To date	13,749	55,678	128,994	187,343	248,515	320,789	337,785	396,081	405,213 short tons. 367,608 *metric tons.*
Tons Cane per ton Sugar	This period	10.42	9.89	9.32	9.03	8.88	8.99	8.87	9.09	
	To date	10.42	10.01	9.64	9.45	9.31	9.24	9.19	9.18	**9.19**
Tons Cane per ton of Sugar calculated as sugar of 96° Pol	This period	10.15	9.65	9.09	8.80	8.67	8.77	8.65	8.86	
	To date	10.15	9.76	9.40	9.21	9.08	9.01	8.96	8.96	**8.96**
Sucrose per cent. Cane	This period	12.59	12.91	13.47	13.78	13.96	13.91	14.02	13.67	
	To date	12.59	12.84	13.17	13.35	13.50	13.59	13.65	13.65	**13.65**
Fibre per cent. Cane	This period	16.13	16.04	16.17	15.76	15.70	15.76	15.65	15.66	
	To date	16.13	16.06	16.23	16.09	16.00	15.95	15.91	15.90	**15.92**
Sucrose per cent. Bagasse	This period	3.54	3.38	3.43	3.41	3.45	3.37	3.60	3.53	
	To date	3.54	3.41	3.42	3.42	3.42	3.41	3.47	3.47	**3.48**
Imbibition per cent. Cane	This period	32.75	32.71	33.81	33.40	33.34	33.06	32.20	32.17	
	To date	32.75	32.75	33.36	33.38	33.37	33.30	33.15	33.10	**33.04**
Extraction	This period	89.44	90.12	90.58	91.11	91.12	90.77	90.75	90.73	
	To date	89.44	89.99	90.35	90.54	90.68	90.70	90.71	90.70	**90.64**
Recovery on Mixed Juice	This period	84.02	85.48	86.51	86.92	87.00	86.66	87.24	87.31	
	To date	84.02	85.09	85.77	86.12	86.33	86.41	86.53	86.59	**86.52**
Overall Recovery	This period	75.15	77.03	78.35	79.19	79.26	78.66	79.18	79.21	
	To date	75.15	76.57	77.49	77.98	78.29	78.37	78.49	78.54	**78.40**
Java Ratio	This period	76.87	76.37	76.03	76.73	76.04	76.19	75.85	76.06	
	To date	76.87	76.51	76.25	76.39	76.31	76.29	76.22	76.26	**76.24**
SO_2 in Sugar p.p.m.	This period	35.89	58.99	54.16	53.92	52.03	52.01	54.32	59.11	
	To date	35.89	58.00	56.20	55.12	54.06	53.63	53.62	53.73	**53.70**
Purity of Mixed Juice	This period	85.92	86.17	86.65	87.10	86.75	86.25	86.35	85.14	
	To date	85.92	86.12	86.42	86.63	86.66	86.56	86.53	86.44	**86.49**
Reducing Sugar Ratio	This period	3.02	2.78	2.62	2.36	2.47	2.66	2.62	3.18	
	To date	3.02	2.84	2.78	2.64	2.59	2.60	2.62	2.65	**2.65**
Purity of Syrup	This period	87.50	87.88	88.33	88.78	88.54	88.17	88.17	87.35	
	To date	87.50	87.76	88.09	88.32	88.34	88.39	88.27	88.20	**88.28**
Sucrose in Filter Cake	This period	4.04	3.36	3.46	3.58	3.56	3.52	3.43	2.86	
	To date	4.04	3.55	3.50	3.52	3.53	3.53	3.52	3.48	**3.69**
Purity of Final Molasses	This period	40.60	45.91	46.15	46.14	46.18	46.04	45.83	45.16	
	To date	40.60	4.543	45.71	45.79	45.70	45.78	45.76	45.74	**46.00**
Average Polarization of Sugar	This period	98.53	98.40	98.39	98.49	98.32	98.41	98.42	98.44	
	To date	98.53	98.42	98.41	98.45	98.41	98.41	98.41	98.40	**98.42**

Apparent discrepancies between period and to-date figures are due to some Factories not reporting each period.

AREA OF CANE HARVESTED AND YIELDS BY DISTRICTS (EUROPEAN PLANTERS ONLY).

COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	ACREAGE HARVESTED.									PER CENT. OF TOTAL AREA								
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.
Port Shepstone	2,116	2,087	2,705	3,109	3,697	3,212	4,182	3,128	4,158	2.0	1.9	2.1	2.3	2.6	2.3	2.6	1.9	2.4
Umzinto	17,367	18,162	24,351	24,848	20,153	23,443	28,716	27,595	29,536	16.3	16.2	18.8	18.4	13.9	16.8	17.6	17.1	17.1
Durban and Pinetown	4,691	5,245	5,442	5,467	6,158	5,979	7,312	6,004	7,933	4.4	4.7	4.2	4.1	4.2	4.3	4.5	3.7	4.6
Total South of Umgeni River	24,174	25,494	32,498	33,424	30,008	32,634	40,210	36,727	41,627	22.6	22.8	25.1	24.8	20.7	23.4	24.6	22.7	24.1
Ratio to 1926 (= 100)	100	105.5	134.4	138.3	124.1	135.0	166.3	151.9	172.2	—	—	—	—	—	—	—	—	—
Inanda	19,646	20,284	19,060	20,280	18,831	19,608	22,635	22,126	23,892	18.4	18.1	14.7	15.0	13.0	14.0	13.8	13.7	13.8
Lower Tugela	24,857	24,620	32,616	32,890	39,492	35,608	41,066	42,634	46,848	23.3	22.0	25.1	24.4	27.3	25.5	25.1	26.4	27.2
Total for North Coast between Umgeni and Tugela Rivers	44,503	44,904	51,676	53,170	58,323	55,216	63,701	64,760	70,740	41.7	40.1	39.8	39.4	40.3	39.5	38.9	40.1	41.0
Ratio to 1926 (= 100)	100	100.9	116.1	119.5	131.0	124.1	143.1	145.5	159.0	—	—	—	—	—	—	—	—	—
Total for Natal South of the Tugela (excluding Zululand)	68,677	70,398	84,174	86,594	88,331	87,850	103,911	101,487	112,367	64.3	62.9	64.9	64.2	61.0	62.9	63.5	62.8	65.1
Ratio to 1926 (= 100)	100	102.5	122.6	126.1	128.6	127.9	151.3	147.8	163.6	—	—	—	—	—	—	—	—	—
Mtunzini	14,846	15,432	17,008	16,915	19,269	18,352	20,523	19,201	21,211	13.9	13.8	13.1	12.5	13.3	13.1	12.5	11.9	12.3
Eshowe	2,332	2,812	4,036	3,602	7,232	5,787	6,343	6,875	7,249	2.2	2.5	3.1	2.7	5.0	4.1	3.9	4.2	4.2
Lower Umfolozi	20,948	20,226	21,083	24,034	24,373	23,696	28,208	29,360	27,301	19.6	18.1	16.2	17.8	16.8	17.0	17.2	18.2	15.8
Hlabisa	—	3,041	3,483	3,712	5,669	4,089	4,599	4,654	4,319	—	2.7	2.7	2.8	3.9	2.9	2.8	2.9	2.6
Total North of the Tugela (Zululand)	38,126	41,511	45,612	48,263	56,543	51,864	59,673	60,090	60,080	35.7	37.1	35.1	35.8	39.0	37.1	36.5	37.2	34.9
Ratio to 1926 (= 100)	100	108.9	119.6	126.6	148.3	136.0	156.5	157.6	157.6	—	—	—	—	—	—	—	—	—
GRAND TOTAL FOR NATAL (including Zululand)	106,803	111,909	129,786	134,857	144,874	139,774	163,584	161,577	172,447	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio to 1926 (= 100)	100.0	104.8	121.5	126.3	135.6	130.9	153.2	151.3	161.5	—	—	—	—	—	—	—	—	—

AREA OF CANE HARVESTED AND YIELDS BY DISTRICTS (EUROPEAN PLANTERS ONLY).—(Continued).

COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	YIELD OF CANE IN TONS.								
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.
PORT SHEPSTONE	37,421	34,891	48,662	54,068	68,770	60,231	81,823	64,018	67,974
UMZINTO	308,038	319,105	470,723	498,795	449,410	486,803	638,701	598,308	611,231
DURBAN AND PINETOWN	102,218	102,218	123,231	135,604	164,849	136,979	159,020	138,096	185,118
Total South of Umgeni River	445,814	456,214	642,616	688,467	683,029	684,013	879,544	800,422	864,323
Ratio to 1926 (= 100)	100.0	102.3	144.1	154.4	153.2	153.4	197.3	179.54	193.9
INANDA	328,554	340,501	351,677	415,176	414,466	375,763	455,816	504,540	618,853
LOWER TUGELA	499,583	468,315	654,828	684,601	873,467	648,693	754,022	829,067	1,012,784
Total for North Coast between Umgeni and Tugela Rivers	828,137	808,816	1,006,505	1,099,777	1,287,933	1,024,456	1,209,838	1,333,607	1,631,637
Ratio to 1926 (= 100)	100.0	97.6	121.5	132.8	155.5	123.7	146.1	161.00	197.0
Total for Natal South of the Tugela (excluding Zululand)	1,273,951	1,265,030	1,649,121	1,788,244	1,970,962	1,708,469	2,089,382	2,134,029	2,495,960
Ratio to 1926 (= 100)	100.0	99.3	129.4	139.3	154.7	134.1	164.0	167.51	195.9
MTUNZINI	332,465	326,502	354,523	349,925	434,124	331,561	360,130	353,287	414,821
ESHOWE	52,578	57,882	91,866	74,203	146,256	109,525	105,836	120,099	130,104
LOWER UMFOLOZI	523,629	456,517	484,622	519,332	580,925	426,516	525,498	582,636	489,547
HLABISA	--	51,470	64,768	66,184	110,840	59,657	74,379	80,552	63,866
Total North of the Tugela (Zululand)	908,672	892,371	995,779	1,009,644	1,272,145	927,259	1,065,813	1,136,574	1,098,338
Ratio to 1926 (= 100)	100.0	98.2	109.6	111.1	140.0	102.0	117.3	125.08	120.9
GRAND TOTAL FOR NATAL (including Zululand)	2,182,623	2,157,401	2,644,900	2,797,888	3,243,107	2,635,728	3,155,195	3,270,603	3,594,298
Ratio to 1926 (= 100)	100.0	98.8	121.1	128.2	148.6	120.8	144.6	149.85	164.7

AREA OF CANE HARVESTED AND YIELDS BY DISTRICTS (EUROPEAN PLANTERS ONLY).—(Continued).

COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

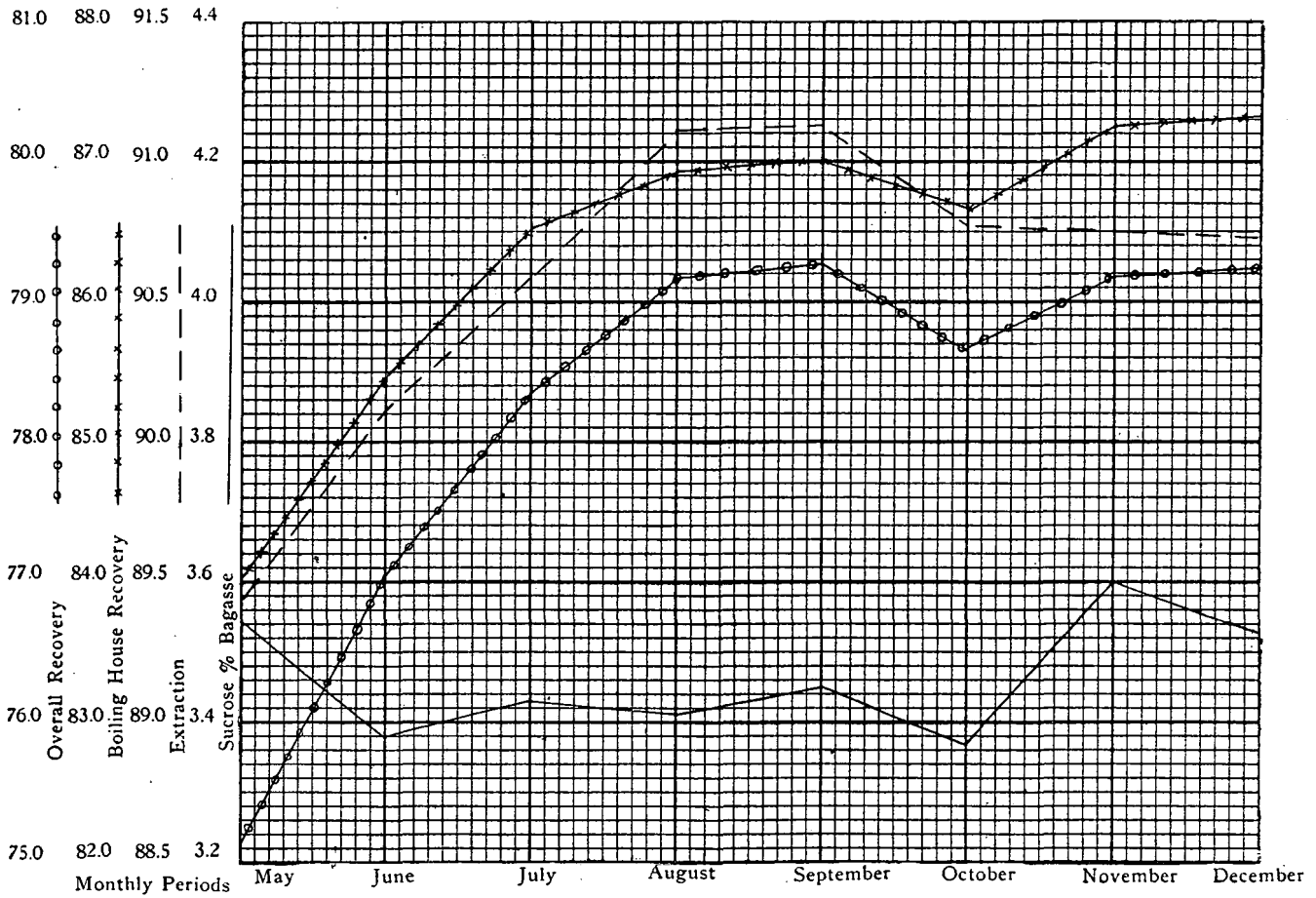
DISTRICT.	PER CENT. OF TOTAL TONNAGE.								
	1926.	**1927.**	**1928.**	**1929.**	**1930.**	**1931.**	**1932.**	**1933.**	**1934.**
PORT SHEPSTONE	1.7	1.6	1.8	1.9	2.1	2.3	2.6	2.0	1.9
UMZINTO	14.1	14.8	17.8	17.8	13.9	18.5	20.2	18.3	17.0
DURBAN AND PINETOWN	4.6	4.7	4.7	4.8	5.1	5.2	5.0	4.2	5.1
Total South of Umgeni River	20.4	21.1	24.3	24.6	21.1	26.0	27.9	24.5	24.0
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	—	—
INANDA	15.1	15.8	13.3	14.8	12.8	14.3	14.4	15.4	17.2
LOWER TUGELA	22.8	21.7	24.8	24.5	26.9	24.6	23.9	25.3	28.2
Total for North Coast between Umgeni and Tugela Rivers	37.9	37.5	38.1	39.3	39.7	38.9	38.3	40.8	45.4
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	—	—
Total for Natal South of the Tugela (excluding Zululand)	58.3	58.6	62.4	63.9	60.8	64.8	66.2	65.2	69.4
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	—	—
MTUNZINI	15.1	15.1	13.4	12.5	13.4	12.6	11.4	10.8	11.6
ESHOWE	2. 4	2. 7	3. 5	2. 7	4. 5	4. 2	3. 4	3.7	3.6
LOWER UMFOLOZI	24.0	21.2	18.3	18.6	17.9	16.2	16.7	17.8	13.6
HLABISA	—	2. 4	2. 5	2. 4	3. 4	2. 3	2. 4	2.5	1.8
Total North of the Tugela (Zululand)	41.6	41.4	37.6	36.1	39.2	35.2	33.8	34.8	30.6
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	—	—
GRAND TOTAL FOR NATAL (including Zululand)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	—	—

AREA OF CANE HARVESTED AND YIELDS BY DISTRICTS (EUROPEAN PLANTERS ONLY).—(Continued).

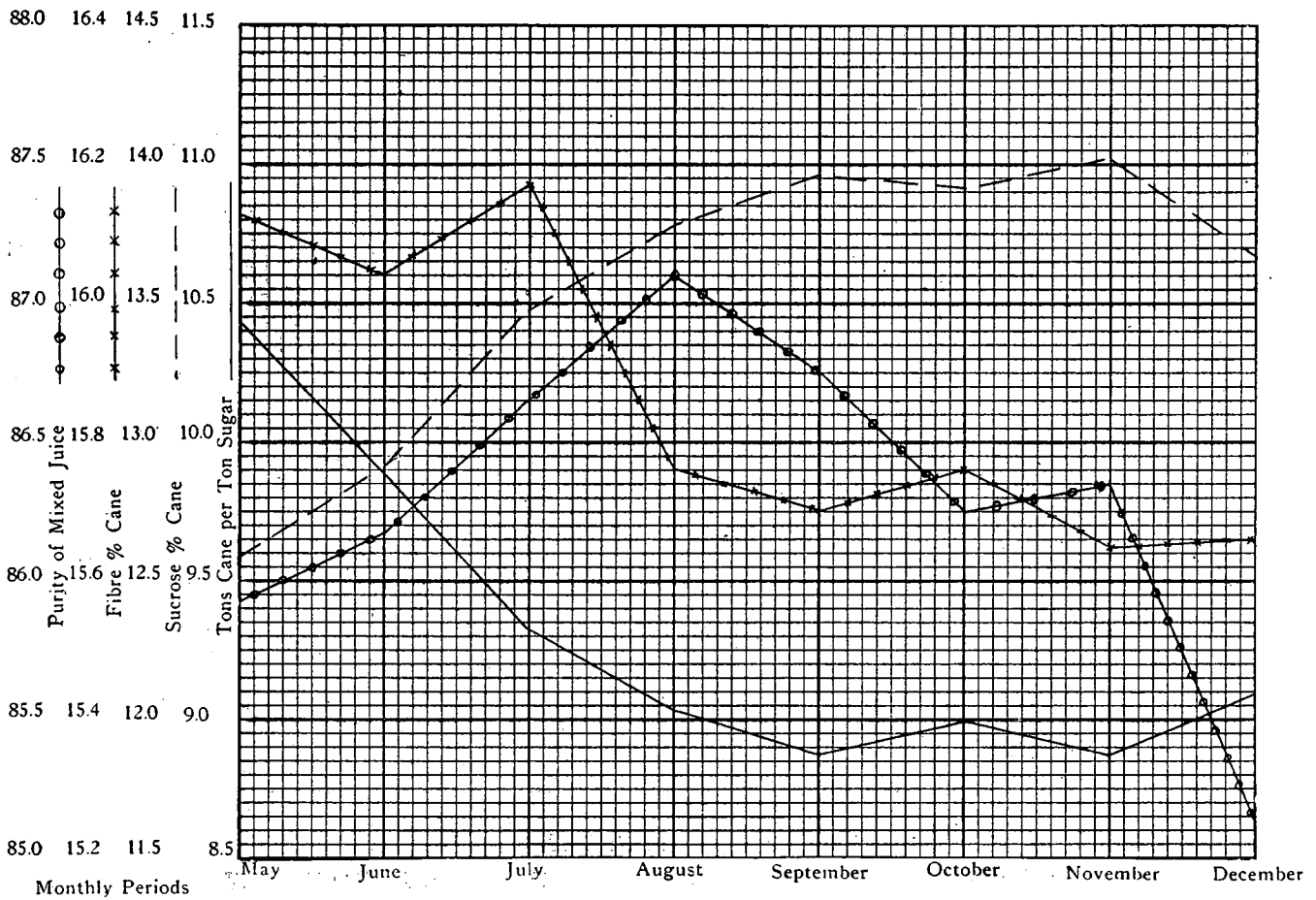
COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	TONS CANE PER ACRE.									AVERAGE AREA (IN ACRES) UNDER CANE, PER FARM.	PERCENTAGE OF NON-UBA CANES UNDER CULTIVATION.	
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1934.	1933.	1934.
PORT SHEPSTONE	17.68	16.72	19.98	17.40	18.60	18.80	19.57	20.47	16.34	421	0.3	4.4
UMZINTO	17.74	17.57	19.33	20.10	22.30	20.80	22.24	21.68	20.69	1,080	2.4	10.3
DURBAN AND PINETOWN	21.39	19.49	22.64	24.80	26.77	22.90	21.75	23.00	23.34	636	2.1	12.1
Total South of Umgeni River	18.44	17.89	19.77	20.60	22.76	21.00	21.87	21.79	20.76	846	2.2	10.0
Ratio to 1926 (= 100)	100.0	97.00	107.20	111.70	123.40	114.10	118.60	118.17	112.58	—	—	—
INANDA	16.72	16.79	18.45	20.50	22.01	19.20	20.14	22.80	25.90	1,020	5.1	14.3
LOWER TUGELA	20.10	19.02	20.08	20.80	22.12	18.20	18.36	19.45	21.62	560	4.2	16.5
Total for North Coast between Umgeni and Tugela Rivers	18.61	18.01	19.48	20.68	22.08	18.60	18.99	20.59	23.07	659	4.5	15.8
Ratio to 1926 (= 100)	100.00	96.80	104.70	111.10	118.10	100.00	102.00	110.64	123.97	—	—	—
Total for Natal South of the Tugela (excluding Zululand)	18.55	17.97	19.59	20.65	22.31	19.40	20.11	21.03	22.21	718	3.6	13.6
Ratio to 1926 (= 100)	100.00	96.90	105.60	111.30	120.30	104.60	108.40	113.37	119.73	—	—	—
MTUNZINI	22.39	21.16	20.84	20.70	22.53	18.10	17.55	18.40	19.56	408	3.4	16.4
ESHOWE	22.55	20.88	22.76	20.60	20.22	18.90	16.69	17.47	17.95	255	2.1	8.7
LOWER UMFOLOZI	25.00	22.57	22.99	21.60	23.83	18.00	18.63	19.84	17.93	416	7.2	20.0
HLABISA	—	16.93	18.58	17.80	19.55	14.60	16.17	17.31	14.79	239	4.4	17.2
Total North of the Tugela (Zululand)	23.83	21.50	21.83	20.92	22.50	17.90	17.86	18.91	18.28	365	5.1	17.2
Ratio to 1926 (= 100)	100.00	90.20	91.60	87.80	94.40	75.20	74.95	79.35	76.71	—	—	—
GRAND TOTAL FOR NATAL (including Zululand)	20.44	19.28	20.38	20.75	22.39	18.90	19.29	20.24	20.84	535	4.2	14.9
Ratio to 1926 (= 100)	100.00	94.30	99.70	101.50	109.50	92.60	94.40	99.02	101.96	—	—	—
Average Rainfall of all Districts (inches)	—	—	—	43.77	38.51	29.56	50.85	31.77	46.50	—	—	—

MONTHLY AVERAGES FOR NATAL SUGAR FACTORIES
SEASON 1935-36.

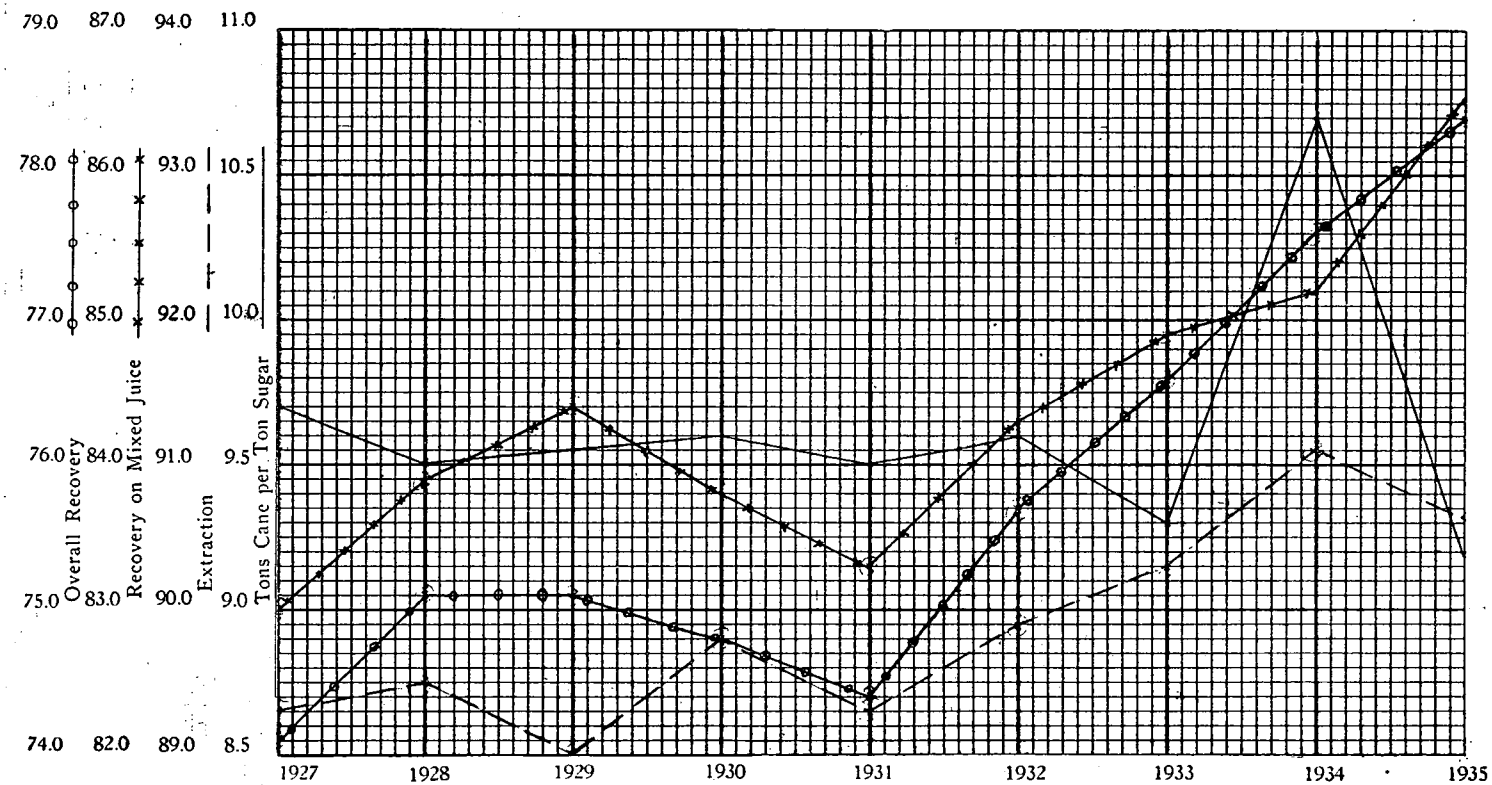


MONTHLY AVERAGES FOR NATAL SUGAR FACTORIES
SEASON 1935-36.

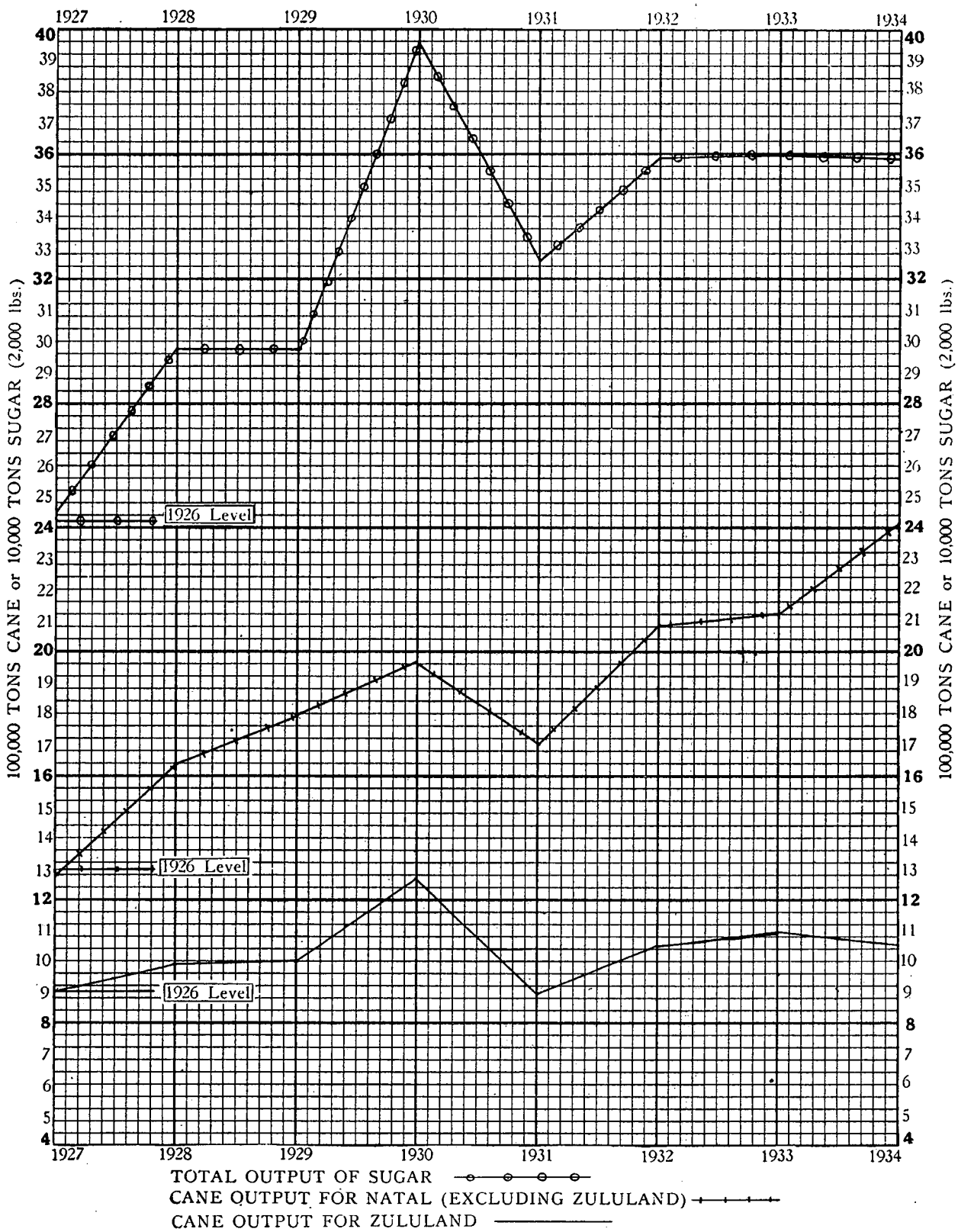


EXTRACTION AND RECOVERY FIGURES

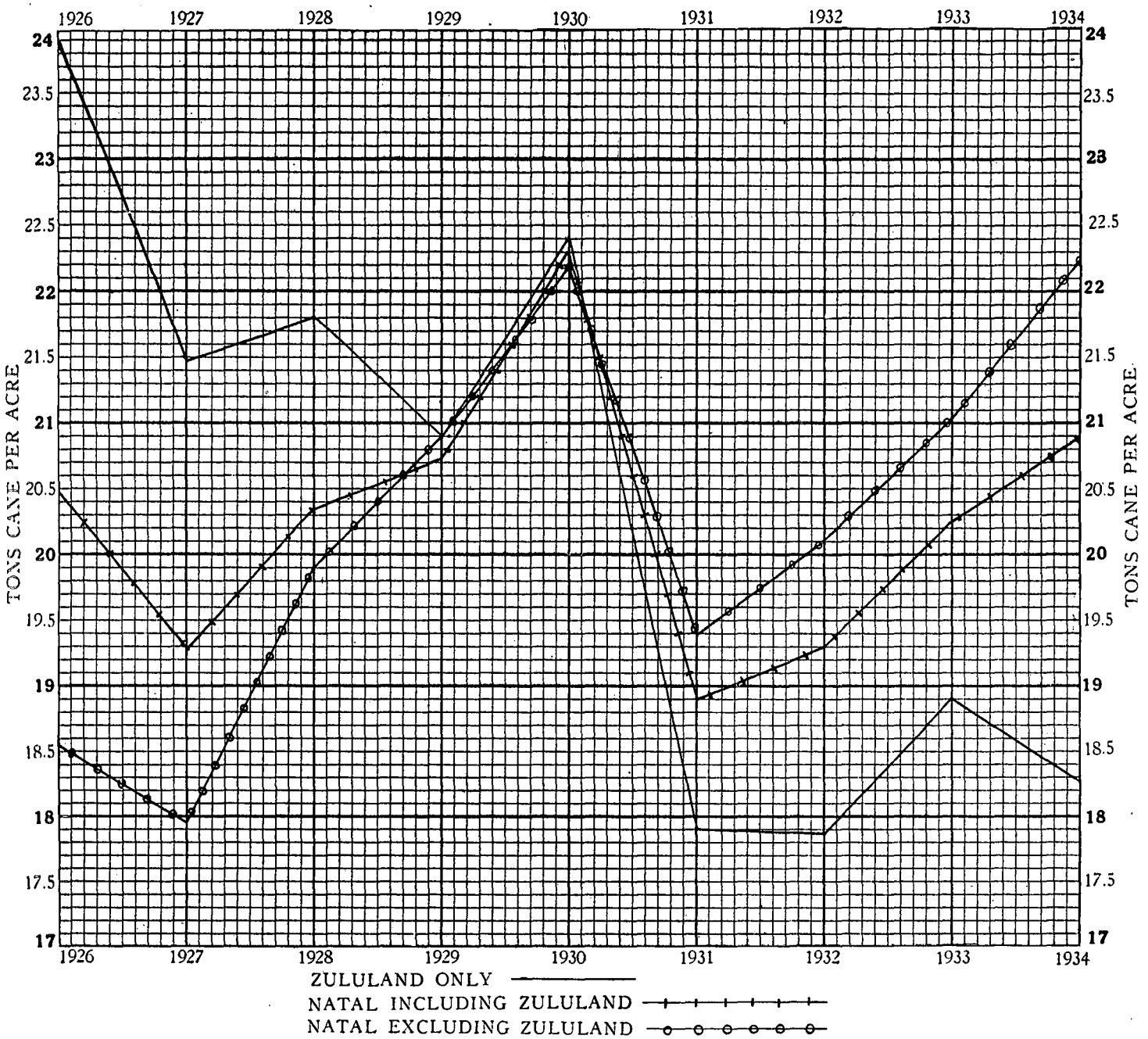
1927 to 1935.



TOTAL OUTPUT OF SUGAR FROM NATAL, 1926-1934.
ALSO CANE OUTPUT FROM ZULULAND AND FROM REST OF NATAL RESPECTIVELY



YIELD OF CANE IN TONS PER ACRE OVER RECENT YEARS
(EUROPEAN PLANTERS)



The PRESIDENT: Gentlemen, the Reports are open for discussion, and I invite any remarks or questions you feel inclined to make.

Mr. RAULT: I would like to give your our experience in the past season. Although it is in a limited sphere of the coastal belt, yet you may find in certain ways our figures are not quite in agreement with the average figures that are given in the paper. They are quoted, all the same, to add some knowledge of the effect of weather on the crop. We seem to be able to say that the growth of cane may be affected by rainfall, and such other conditions like temperature. But when we come to the sucrose content of the cane it is extremely difficult to find always a direct relation between rainfall and sucrose. For example, taking our rainfall of the present season previous to starting the crop. We find that we had just as much rain at the beginning of this season as we had last year, and yet we started this season with sucrose in cane of about 1.7 I think higher than last year. So we could not find any explanation for it, apart, possibly, for some small degree less in temperature. It is very hard to explain that high sucrose by that one degree drop. Further, the excessive rains we had—floods—usually are supposed to bring down sucrose in cane. Well, we did not find that the heavy rainfall affected our sucrose very much, and after a week sucrose in cane started going up again to round about July and August, when to our surprise, from August, September, October, when usually sucrose in cane gets up into a peak with the drought, we found this year that we were stabilised at a fairly high figure, but nothing to what we should have expected by going through the experience of previous years, when every time sucrose goes up. And yet these months were, as you say, months of drought, which ought to have raised our sucrose content very much higher.

Now there is another paragraph in your very valuable report, in which you speak of the results to be obtained by the new varieties. Well, we may give you here our results. They deal with a certain heavy weight of soft canes, especially when we came to the last three weeks of the sason. We then crushed from 30% to 50% of the new varieties, but looking at our figures we are not able to see any difference from the results that we obtained when we were crushing soft cane in very small quantities with Uba canes nearly 90%. I might explain myself better. At the start of the season, right to about September, we were crushing 2 or 3 or say 10% of new varieties. At the latter end we crushed 30 to 50%. Going by what we thought, we ought to have a peak in extraction, in recovery and other figures. Yet we did not find any better results. Possibly we don't know how to work this cane, but we never changed our process. I am just giving you what we actually found.

Now the question of molasses also is rather interesting. You have mentioned that we are not able to bring down th purity of exhaust molasses, and this, of course, is a high loss. Well, this year we had rather a high purity of molasses. That was accounted for by the low reducing sugar sucrose content of our juices. But yet, in spite of our purity showing higher our losses were not higher at all, in fact our losses of sucrose in molasses was the lowest of any season, and our recovery was accordingly slightly better than what we had before. It is just to mention the point that we should not attach always too much importance on that figure by itself. Purity of molasses is linked up with other figures, such as purity of juice, from which we start with your glucrose ratio, for example.

Mr. MOBERLY: I have been very interested in this report, but I really have not had time to digest very much of it. What I wanted to speak about now was to make a few comments on Mr. Rault's observations. He speaks about his experience with these canes this year, especially towards the latter end of the season, when quite appreciable quantities of these canes are crushed. He reports that no appreciable improvement has been noted. But shortly afterwards he said that the procedure had not been altered. So I think we must bear that in mind in judging these questions. During recent years, and for a great number of years now, the whole tone of this Industry has been set by Uba, and I think that during these years the the Industry has built up a very creditable technique for dealing with this cane, particularly, and it is not very easy, at short notice, to change over. Experience and the general manipulation will give us greater knowledge with regard to the new canes, and we will build up our technique. We have to learn a good deal about the settings of the mills. It will have to be done. It won't necessarily be the same exactly as is done in other countries with similar canes, because we know canes do undoubtedly vary in certain characteristics in the countries in which they are grown. We don't know entirely to what extent; but we have got to learn that. We have also got to learn afresh the treatment of the juice from cane. What the Natal Estates have got to learn will be entirely different from what the rest of the factories have got to learn, because they have got these very different processes, and the whole treatment of one variety is different from the treatment of another.

My point in making these remarks is that it would not be fair to judge the possibilities, or probabilities of these canes entirely on the experience gained by Natal Estates last year. This is very valuable information that they have given us, but the lesson to be drawn from it is one we have got to be careful about. The lesson to be drawn from it is that we have yet a lot to learn, both in the factory and in the mill in the manipulation of these new canes.

We have got to look for it along very different paths to which we have been used in the case of Uba.

Mr. CAMPBELL: I do not wish you to take it from Mr. Rault, or our figures last year, or this crushing season, that we did not see any difference between Uba and sweet canes. First, may I just say to Mr. Moberly we are unique in one respect, that when the sweet cane comes along, we are able, by touching a button, to increase the revs. on the crusher and slow down the mills in proportion to the fibre content, as it were, in the cane.

Now there is another factor which Mr. Rault has not dealt with, and it is this—that towards the latter end of the season we were very much up against it in the quadruple. Though we all expected to see a higher recovery and better extraction when we were crushing—I think in one week—up to about 50% of sweet canes, we were very much surprised to see from our figures that apparently there was no diffrence. Mr. Moberly says that we have got a devil of a lot to learn in the manipulation of this sweet cane. Well I agree in this, that undoubtedly nearly all the mills in the country will have to, might I say re-alter, or re-design their crushing. And at the same time the mill engineer will have to throttle or manipulate his mills, and his rollers at a much slower speed, because it is a totally different proposition, the crushing of Uba and the crushing of sweet cane.

This coming season, certain factories are going to run probably a month on sweet canes to give some data to the Industry. But I do want some planters here not to go away with the idea that the figures that we have had at the Natal Estates definitely show that there is not much difference, or any at all, between crushing the sweet cane and Uba. The point is this, that there are other factors. One known factor that we had was that we were up against it in the quadruple, for the simple reason the weather at that time was particularly hot and the evaporator was up against it. I don't want any planters to go away with the idea that the figures discussed by Mr. Rault show that the Natal Estates have found very little difference, if any difference at all, between the sweet cane and the Uba cane. But I do not think any engineer when running a plant would tell you straightaway that he would get through his mills more sweet cane than Uba. I know one factory was practically hung up for a week trying to crush sweet cane. He could not get the cane through the rollers. So engineers have got a devil of a lot to learn about manipulation. I don't want anyone to run away with the idea that we think there is no difference between sweet cane and Uba. We feel there is a lot of difference, but we have got to learn how to work them.

Mr. COIGNET: May I draw attention to the fact that in certain factories they have had a whole lot of trouble because they have passed the sweet canes through without altering the mills at all, just following the regular routine. The cane goes through and is simply skinned or scratched without being properly crushed.

Mr. LADLAU: I would like to ask Mr. Dodds where he got his figures from. He quoted the percentages of soft cane to Uba cane, and seemed to be quite definite as to the quantities of each under cultivation at the present time.

Mr. DODDS: I got the figures from the Government census returns, and they refer to April of last year so they are a little out of date. They are the most recent figures available. They refer, as I have mentioned, to European planters only.

Mr. MOBERLY: One question I would like to ask now. I think it is in order. With regard to the 1934 season, from comparisons we can now make if we look through the series of years, we find the extraordinary fact that 1934 showed an abnormally low purity due to no known cause. There was really a remarkable recovery that year. The same recovery has not been obtained this year, although the recovery this year is certainly very creditable to the Industry. It seems to me that there was some distracting element in 1934. Whether it was due to the conditions, and not the cane giving false figures I don't know. It puzzles me. I am continually being called upon to explain a thing which I cannot explain. If Mr. Dodds could give any guidance I think it would be of great interest to us all here.

Mr. DODDS: First of all, in answer to Mr. Rault's interesting remarks, I would like to say I quite agree that the relation between rainfall and quality of cane is a very complex one, about which we know relatitvely little as yet. But I think it quite reasonable to suppose that on the whole rainfall has a lot to do with it, and I certainly find that where we have a dry and late spring the sucrose content of the cane and the purity are likely to remain high relatively late in the season, whereas if we have early rains, you will find that the sucrose content soon begins to go down. Undoubtedly we have a lot to learn about this, and it is dealt with in more detail in a paper to be presented later in this Congress by Mr. Beater. But I think it is quite fair to assume that, other things being equal, rainfall is likely to have some effect on sucrose content. No doubt there are compensating factors such as temperature and other influences of which we know very little.

With regard to the results obtained from cane varieties, as far as the evidence goes at present, there is perhaps no very obvious improvement in milling and factory practice from using these new canes, apart, perhaps, from their lower fibre content. But I think we are only at the beginning of this matter, and I feel confident that these new canes

will eventually be made to show their good qualities in the factory in this country as they have done elsewhere. That, I think, is the experience of nearly all countries where Uba has been grown to any extent in comparison with these newer canes. When I was in Lorenco Marques a few months ago I saw Mr. Olivier, the General Manager of the Incomati Estates. He kindly gave me some very interesting figures. Their factory, during the last few years, has made a complete change over from Uba to Co. 290. Their soil and other conditions are not very unlike some of ours and, I should say, somewhat approximate to those existing on the Umhlatuzi Flats. Most of the cane is grown under irrigation, but by no means all of it. They show in their returns, not only is there a vast improvement in cane yield, which has been more than doubled over recent years (so that they are now planting, and have for the last three years planted, nothing but Co. 290 cane) but they find also great improvement in the factory and the ratio of cane to sugar over the past seven years, covering the period of this change, has decreased from 11.1 to 9.58. Their extraction has increased from 89 to 91.5. They have had no change in plant but are still using old crushing plant that was designed originally for Uba cane, and one would expect in the ordinary course of events that the extraction, given equal quality of cane, would have decreased during that time, owing to wear and tear on the plant and reduced efficiency. The greatest improvement has taken place in the boiling-house recovery, which has increased during that period from 73 to 85, and that brings an increase in over-all recovery from 65 to 78. No other change has taken place beyond the extension of the irrigation system, and the change over from Uba to Co. 290 cane. Like ourselves, they have had minor difficulties with the juice in the early stages, mainly through lack of experience, perhaps in handling it in the factory or in cutting it at the best possible time in the field, and I feel sure that our experience will be the same as theirs.

In the case o f molasses, I quite agree with what Mr. Rault said, and, I should perhaps have stressed more in our paper, that not only the composition of the molasses, but the relative quantity should be taken into account. Unfortunately we have very little information about the quantity of molasses. Very few factories weigh it, and many of them do not even measure it with any degree of accuracy, consequently it is not possible for us to trace the losses of sucsose in molasses and thereby allocate the losses in the factory as closely as we would like. This information would be most useful if we could get it, but I do not see how we can until the quantity of molasses is more accurately recorded.

Concerning the question raised by Mr. Moberly about the relatively low purity of juice in 1934, the only reason I can see is that a good deal of one-year old cane was cut because of attacks by locusts. It was cut at one year instead of two, and that seems to have had some effect on the working qualities of the juice. Mr. Campbell said that the juice was very easily worked in the factory, although its analysis did not show any striking difference between that and previous years. But there were probably some important difference in the nature or proportion of those obscure components of the juice which undoubtedly affect our factory processes to a very great extent, but of which we have very little real knowledge as yet.

Mr. VIGER: I want to mention the ash contents of juices obtained from Uba and the new variety canes. The juices of new variety canes have a higher soluble ash than Uba. Mr. Dodds mentioned in his report that the recovery was one of the highest on record. The ash percentage Brix of the Mixed Juice was also very low for last season, this may explain the higher recovery. A lower amount of ash generally means a smaller amount of Final Molasses, hence a lower loss of Sucrose in the Molasses, consequently a higher recovery. Mr. Rault said that last year when the mill crushed a higher proportion of new variety canes, he did not obtain a better recovery. I believe it is the higher soluble ash which prevented the factory from getting a higher recovery when new variety cane was crushed. I do not think that any change in the usual process of juice clarification can correct the composition of the ash and produce a better recovery.

Mr. DODDS: That also is a very important factor. Comparatively little is known at present about it. Mr. Viger has, I believe, done more work on it than any of the rest of us, but still we are very much in the dark concerning the factors that affect the quantity of ash in the cane, and its composition and affect on recovery. It may be that we will be able to modify these factors in the direction we desire by the application of fertiliser over the field, or it may be that it will be necessary to use more chemicals such as phosphates to assist in clarification. All that is a matter for experiment, which some of the factories like Darnall, I am glad to say, have already undertaken.

Mr. BECHARD: Mr. Dodds, replying to Mr. Moberly just now, mentioned the fact that in 1935 less plant cane was cut after one year than in 1934. I don't know where Mr. Dodds gets his information from. I believe that last year there were far more one-year-old canes cut than previous years. On the other hand, glancing through the figures, it looks as if everything boils down to the question of sugar.

Mr. DODDS: There are no actual statistics, of course, for the age of cane cut last year compared with 1934. We can only go on the general statements of planters that large quantities of cane were cut out of turn in 1934 because of being attacked by

locusts late in the season, and they were rightly afraid to leave it over to the following season. There was, for another reason, perhaps, that Mr. Bechard hints at, a good deal of one-year-old cane cut last year also. I should have thought that the proportion cut in 1934 was the higher, nevertheless. The total quantity of cane put through the mills was unexpectedly high in 1934, and the sucrose content was extraordinarily low. That was partly accounted for, no doubt, by its quality having been affected by locusts, but no doubt it is also largely accounted for by its relative immaturity.

The PRESIDENT. I think we are all very much indebted to Mr. Dodds and Mr. Christianson for the very able and valuable report which has been read, and they deserve our very best thanks. I would also like to thank the various speakers who have taken part in the discussion for the very interesting points they have brought up.