

ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS FROM NATAL SUGAR FACTORIES, SEASON 1933-34.

By H. H. DODDS and O. W. KARLSON.

In many ways the 1933/34 season continues the general advance shown in recent years. The total output of sugar, 390,473 short tons (354,231 metric tons), is only slightly below the record for 1930, although the rainfall for 1933 was far below normal. The average rainfall for 1933 at 36 stations was 31.77 ins. or 75.8 per cent of that of the preceding four years, and of the total nearly one half fell in the last two months of the year. Up to the end of October the rainfall at the Sugar Experiment Station, Mount Edgecombe, was only 15.63 ins. or 54 per cent of normal for the first ten months of the year.

The percentage of total output represented in our report is somewhat less than that of recent years owing to one factory that has customarily reported not having favoured us on this occasion. However, 15 factories out of 21 reported, representing 90.0 per cent of the total output. Of the remaining six factories only two have complete chemical control.

It is of interest to note in passing that while the factories reporting to us show the total ratio of cane to sugar of 9.306, the other six factories have a ratio of 10.123.

Willet & Gray's estimates for the total world output of sugar, cane and beet, for the season 1933/34 as recorded in the International Sugar Journal for February, 1934, is 24,747,459 tons. According to this estimate the output of South Africa corresponds to 1.58 per cent of the whole.

The average sucrose content of cane for the season in South Africa is 13.88 per cent which is the highest recorded for any year. The purity of juice, 84.92, shows a falling off from the average of recent years no doubt owing to the effects of drought, although the average fibre content of cane is not particularly high. The Java ratio 77.27 was surpassed only once previously, in 1927. As usual the sucrose content of cane and purity of juice were low at the beginning of the harvesting season and did not reach a satisfactory figure until the July period.

This year, owing to the early close of the season due to drought stricken cane being hurried to the mills as rapidly as possible, there was little falling off in quality of cane towards the end of the season, which closed to all intents and purposes with the November period.

The usual losses of sucrose occurred through premature harvesting of cane in May and June; but this season these losses were largely unavoid-

able owing to the necessity mentioned above of harvesting drought stricken cane early to save the life of the cane and roots.

The usual well marked peak of recovery efficiencies is to be noted for the months of July to October.

Although the recovery on mixed juice was well maintained into November because of the continued good quality of cane in that period, there is a marked falling off in overall recovery due to much lower extraction. This lower extraction is largely accounted for by certain factories having relatively high extractions closing down before this period.

Viewing the season as a whole the overall recovery (sucrose in sugar per cent of sucrose in cane), 76.63, shows a further marked increase and is well above that of any previous season, even taking into account the fact that only 90 per cent of the output is included this season, compared with 94 per cent in recent years, and the presumed lower recoveries of the factories not reporting.

The recovery on mixed juice (sucrose in sugar per cent of sucrose in juice), 84.88, is also higher than in any previous season. The extraction (sucrose in juice per cent of sucrose in cane), 90.28, was once exceeded, in 1926, but as explained last year, in those days only 73 per cent of the output was represented in our results, 10 out of 23 factories not reporting.

An overall recovery of 76.63 nevertheless leaves considerable room for further improvement and is much below those of Queensland, Puerto Rico, Java and Mauritius, inserted in the appended tables for comparison.

The losses of sucrose in extraction, that is sucrose lost in bagasse (9.72 per cent of sucrose in the cane) are accounted for by the relatively greater volume of the bagasse due to the higher fibre content of the standard (Uba) variety of cane. The actual sucrose percentage content of the bagasse, 3.71, cannot be considered very high, though not down to the best standards. The remaining sources of loss, principally in filter cake and in molasses, can also be attributed largely to the refractory nature of Uba juices at the filter station and boiling house, due to the nature of the non-sugars, and in spite of the relatively high juice purities attained (84.92 average purity of mixed juice for the season). These losses in recovery of sugar from mixed juice cannot be particularized more closely in this country until more factories record weights of filter cake and of final molasses. The sum total of these losses, however, 13.85 per cent of sucrose in cane, is the lowest yet recorded in this country.

Very little cane of varieties other than Uba has yet been milled, nearly all of the rapidly increasing stocks of new varieties having been used for replanting.

The ratio of cane to sugar, 9.28, is considerably better than for any previous year, by virtue of the high sucrose content of cane and increased recovery.

The highest output for any individual factory is that of No. 5, 50,016 tons, the first time that the 50 thousand mark has been passed in this country. No. 1 factory with 40,481 tons, is the only other factory to exceed 33,000 tons.

The highest sucrose content of cane is shown by factories No. 20, 14.50 per cent, No. 5, 14.44 per cent, and No. 1, 14.40 per cent. All these factories are in the Inanda district.

The lowest sucrose contents are those of the Zululand and the South Coast factories.

The highest extraction (sucrose in juice per cent of sucrose in cane) is as usual attained by factory No. 1; No. 6 factory is second with an extraction of 92.98. This factory is evidently hampered in sugar recovery by the relatively low purity of juice, 82.40, with which it has to contend. The best recovery on mixed juice (sucrose in sugar per cent of sucrose in juice) is attained by factory No. 16, 88.15, turning out sugars of average polarization of 98.26 from a juice of 85.71 purity. No. 5 factory records a recovery of 87.48 of sugars of 98.10 average polarization from a mixed juice of 85.90 purity.

Of those factories turning out a considerable proportion of sugar for direct consumption, factory No. 1 shows 85.81 recovery on mixed juice as sugars of 99.17 average polarization.

In overall recovery (sucrose in sugar per cent of sucrose in cane) factory No. 1 regains the lead by virtue of its high extraction. This overall recovery of 80.84 and that of the same factory in the 1929/30 season, 80.37, are the only occasions when any South African factory has exceeded a recovery of 80. This is the more creditable when the large proportion of high grade sugars (average polarization of all sugars 99.17) made by this factory is taken into account.

The lowest ratio of cane to sugar, 8.51, is shown by factory No. 5; this figure appears to be a record for South Africa. It is closely followed by factory No. 1 with a ratio of 8.52; but on recalculating to a common basis of 96° polarization sugar, No. 1 factory takes the lead with 8.24, No. 5 factory second with 8.33 and No. 20 factory third place with 8.36. These are the three factories showing the highest sucrose content of cane and the highest overall recovery, both essential factors in gaining

a low ratio. No. 20 is one of the smaller factories but by paying special attention to cleanliness of working, an important consideration that is too often neglected in this country, and an ample steam supply, which is another very important factor, gains very good results.

In tons of cane crushed per hour No. 5 factory again takes the lead with an average for the crop of 111.95 thus surpassing the record it made last year. This is a double tandem mill. Another factory recording over 100 tons is No. 1 with an average rate for the season of 102.74 tons cane crushed per hour, on a single train of mills. Having regard to the high fibre content of cane crushed, 15.75 per cent average for the season, and low sucrose content left in the bagasse, only 2.32 per cent, this performance is very good.

Most factories have recorded the residual sulphur dioxide contents of sugar, from which it is evident that special attention has been paid to this matter to remove any possible source of complaint from refiners on this ground. With Uba cane as it exists in this country, it has always been found necessary to use sulphitation, even to make raw sugars, and it is difficult to remove residual sulphur dioxide down to the very small limits legally permitted. It will be of interest to see whether sulphitation cannot be dispensed with in cases where other varieties of cane replace Uba.

To conclude, the study of factory laboratory reports year by year show how technique has been successfully developed and improved to manufacture sugar of various grades from Uba cane under South African conditions.

This improvement is no doubt largely due to greater co-operation between manufacturers and the introduction of more technical staff and improved equipment, due in part to the stress of severe economic conditions. The adoption of uniform methods of chemical control under the aegis of this association has also been a very important factor, making possible accurate comparisons between different factories and leading to a stimulating spirit of healthy emulation.

The adaptation of present methods to dealing with other varieties of cane (mainly the later P.O.J. and Co. numbers) now being extensively planted will be noted with interest. In many respects manufacture will be simplified; but no doubt the new varieties will bring their own problems, some of which perhaps have yet to be realized.

The writers desire to express their appreciation of the information freely given by the factories, that has made this report possible.

Experiment Station,
South African Sugar Association,
Mount Edgecombe.

March, 1934.

COMPARATIVE RESULTS FOR RECENT YEARS.

COUNTRY	NATAL									
	YEAR	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.
CANE—										
Per cent. Sucrose	12.55	13.23	13.66	13.75	12.95	13.66	13.84	13.48	13.88	
Per cent. Fibre	15.88	16.01	16.27	15.88	15.52	15.82	15.75	15.65	15.78	
JUICES—										
Purity of First Crusher	87.24	87.11	88.30	87.80	88.81	88.66	87.92	87.89	87.46	
Purity of Mixed Juice	84.47	84.65	85.47	84.90	86.04	85.88	85.27	85.30	84.92	
Purity of last Roller Juice	78.20	76.12	80.20	78.50	80.72	80.79	79.99	79.20	78.26	
Purity of Syrup	86.39	86.14	87.20	86.60	87.44	87.60	86.82	86.84	86.57	
Drop in purity Crusher to Mixed Juice	2.77	2.46	2.80	2.90	2.77	2.72	2.65	2.59	2.54	
Drop in purity Crusher to last Mill	9.04	10.99	8.10	9.30	8.09	7.91	7.93	8.69	9.20	
Drop in purity Crusher to Syrup	0.85	0.97	1.10	1.20	1.37	1.08	1.10	1.05	0.89	
Increase in purity Mixed Juice to Syrup	1.92	1.49	1.70	1.90	1.40	1.73	1.55	1.54	1.65	
JAVA RATIO	75.77	75.73	77.78	76.78	77.01	76.36	76.92	76.99	77.27	
BAGASSE—										
Per cent. Sucrose	4.03	3.53	4.06	4.10	4.07	4.20	4.22	3.83	3.71	
Per cent. Moisture	49.38	49.33	49.89	50.01	50.69	50.66	50.09	51.89	51.62	
EXTRACTION—										
Imbibition % Cane	—	—	—	26.34	25.54	26.62	27.86	29.66	30.45	
Sucrose in Juice % Sucrose in Cane	89.30	90.86	89.30	89.47	89.02	89.78	89.40	89.86	90.28	
FILTER CAKE—										
Per cent. Sucrose	5.24	6.46	5.41	5.15	6.15	4.97	4.79	4.50	4.04	
Weight % Cane	5.63	5.10	5.33	4.77	4.33	4.97	5.01	5.41	5.18	
FINAL MOLASSES—										
Clerget purity	44.50	45.30	46.10	45.30	45.11	45.90	45.04	45.06	44.92	
RECOVERY—										
Sucrose % Cane lost in manufacture	3.37	3.38	3.53	3.43	3.38	3.58	3.53	3.36	3.27	
Sucrose in Sugar % Sucrose in Cane	73.28	74.48	74.13	75.06	75.13	74.77	74.39	75.73	76.63	
Sucrose in Sugar % Sucrose in Juice	81.98	81.97	83.01	83.90	84.39	83.80	83.27	84.27	84.88	
YIELD—										
Tons Cane per ton Sugar	10.77	9.92	9.69	9.49	10.06	9.59	9.53	9.61	9.28	
Tons Cane per ton Sugar of 96° Pol.	10.46	9.74	9.48	9.30	9.87	9.40	9.33	9.40	9.03	
LOSSES—										
Sucrose in Bagasse % Sucrose in Cane (A)	10.70	9.14	10.70	10.53	10.99	11.08	10.86	10.14	9.72	
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	13.85	
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	23.57	
SUGAR—										
Average Polarization of all Sugars	98.89	97.74	98.08	98.00	97.87	97.96	98.08	98.14	98.68	

COUNTRY	*JAVA		†MAURITIUS		‡PUERTO RICO		§QUEENSLAND		
	YEAR	1931.	1932.	1931.	1932.	1931.	1932.	1930.	1931.
CANE—									
Per cent. Sucrose	12.60	13.22	12.73	13.06	12.75	12.62	15.97	15.94	
Per cent. Fibre	12.60	12.60	13.70	12.90	13.90	13.65	12.59	12.28	
JUICES—									
Purity of First Crusher	—	—	86.40	86.80	—	—	90.90	89.59	
Purity of Mixed Juice	82.50	84.30	83.20	84.30	—	—	—	—	
Purity of last Roller Juice	—	—	75.20	75.40	—	—	—	—	
Purity of Syrup	—	—	83.90	84.40	84.32	84.15	90.60	89.28	
Drop in purity Crusher to Mixed Juice	—	—	3.20	2.50	—	—	—	—	
Drop in purity Crusher to last Mill	—	—	11.20	11.40	—	—	—	—	
Drop in purity Crusher to Syrup	—	—	2.50	2.40	—	—	0.30	0.31	
Increase in purity Mixed Juice to Syrup	—	—	0.70	0.10	—	—	—	—	
JAVA RATIO	—	—	—	—	—	—	—	—	
BAGASSE—									
Per cent. Sucrose	2.70	2.84	2.97	2.84	2.26	2.36	3.10	3.31	
Per cent. Moisture	44.80	44.90	45.20	44.70	46.11	48.18	51.80	52.56	
EXTRACTION—									
Imbibition % Cane	—	—	—	—	28.89	28.56	—	—	
Sucrose in Juice % Sucrose in Cane	94.60	94.60	93.70	94.50	94.92	94.56	94.49	94.10	
FILTER CAKE—									
Per cent. Sucrose	3.30	3.30	7.90	7.90	—	—	—	—	
Weight % Cane	—	—	2.02	1.90	—	—	—	—	
FINAL MOLASSES—									
Clerget purity	30.60	30.50	39.40	39.50	30.80	30.78	—	48.49	
RECOVERY—									
Sucrose % Cane lost in manufacture	1.92	1.87	2.38	2.20	1.55	1.68	—	—	
Sucrose in Sugar % Sucrose in Cane	84.70	85.83	81.30	84.30	88.87	86.80	86.83	86.37	
Sucrose in Sugar % Sucrose in Juice	89.40	90.63	86.70	89.10	92.21	91.87	91.89	91.79	
YIELD—									
Tons Cane per ton Sugar	9.09	8.96	9.51	—	8.97	8.59	6.84	6.94	
Tons Cane per ton Sugar of 96° Pol.	—	—	9.27	—	8.92	8.52	6.67	6.78	
LOSSES—									
Sucrose in Bagasse % Sucrose in Cane (A)	5.40	5.34	—	—	0.60	0.65	—	—	
Sucrose in Filter Cake % Sucrose in Cane (B)	0.60	0.62	—	—	0.10	0.11	—	—	
Sucrose in Molasses % Sucrose in Cane (C)	7.50	6.53	—	—	0.77	0.84	—	—	
Undetermined Sucrose % Sucrose in Cane (D)	1.80	1.68	—	—	0.08	0.08	—	—	
Sucrose lost in Boiling House % Sucrose in Cane (B)+(C)+(D)	9.90	8.83	—	—	—	—	—	—	
Sucrose in Total Losses % Sucrose in Cane (A)+(B)+(C)+(D)	15.30	8.83	—	—	—	—	—	—	
SUGAR—									
Average Polarization of all Sugars	—	—	98.50	98.60	96.53	96.77	98.50	98.18	

* From the "International Sugar Journal." † "La Revue Agricole," March, 1933.

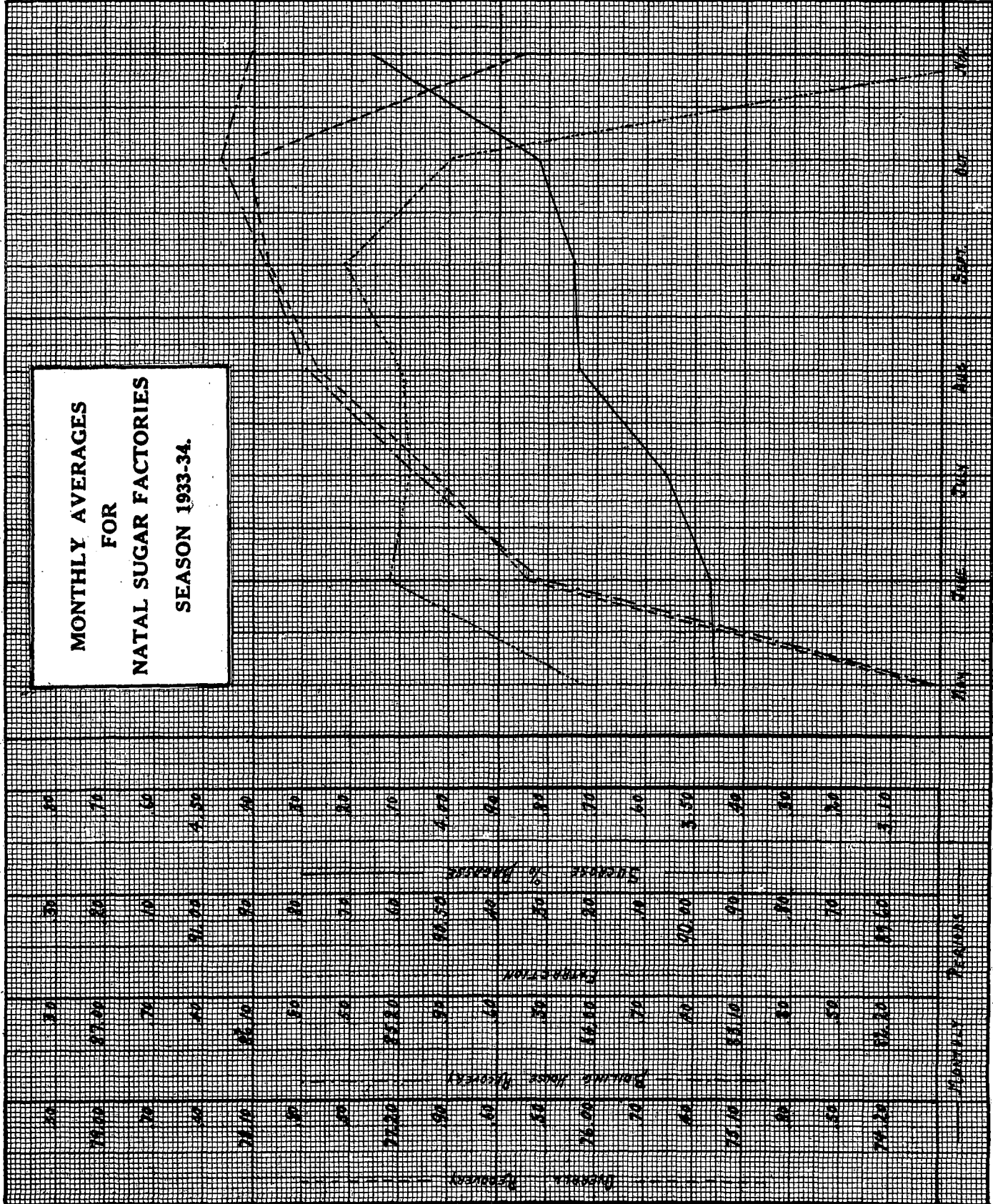
‡ By courtesy of the Sugar Producers' Association of Puerto Rico:

§ From the Annual Reports of the Bureau of Sugar Experiment Stations, Queensland.

Average Manufacturing Results by periods for Natal Sugar Factories Reporting to the Experiment Station, Season 1933-34.

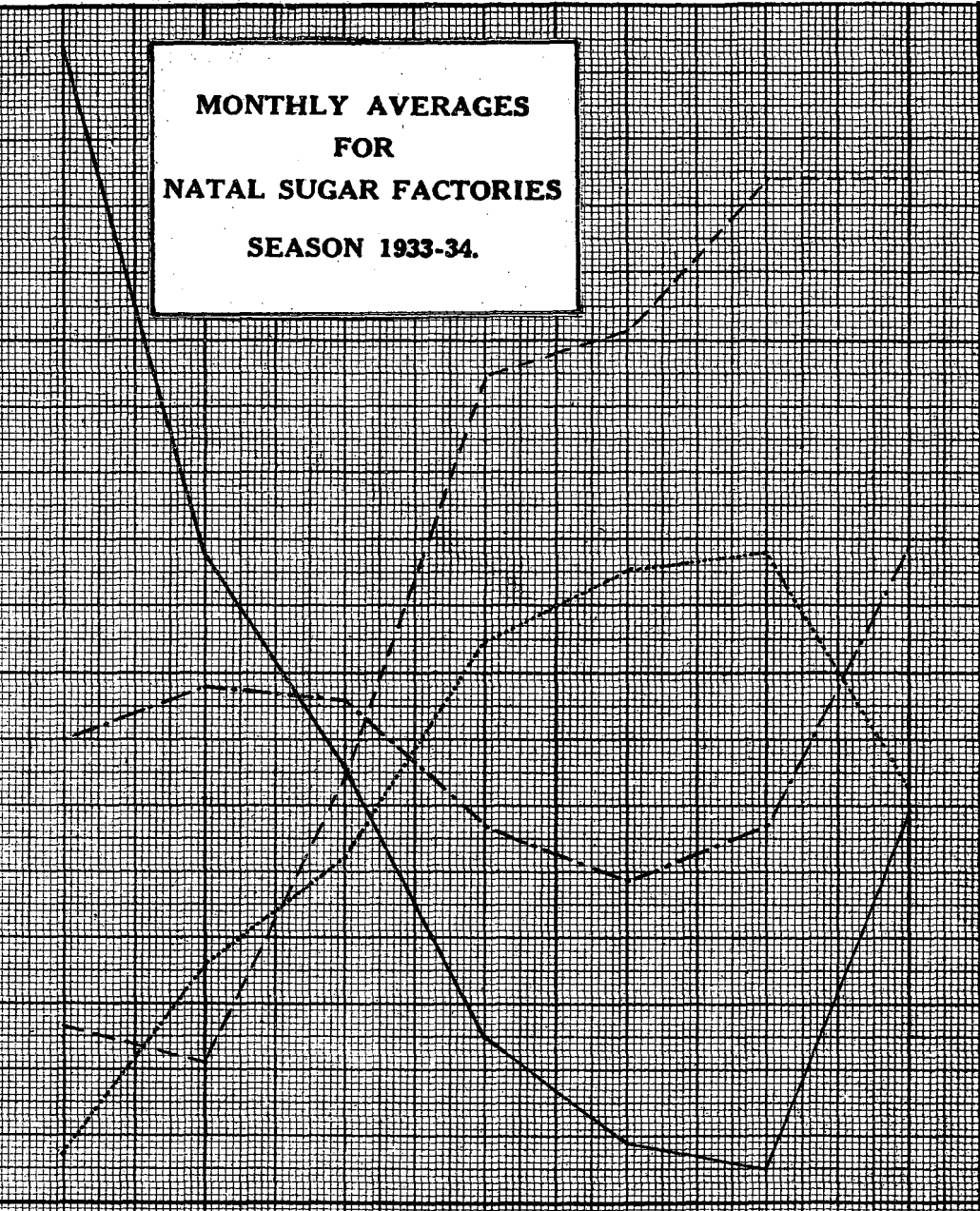
Period ending	JUNE 3rd, 1933.	JULY 1st, 1933.	JULY 29th, 1933.	SEPT. 2nd, 1933.	SEPT. 30th, 1933.	OCT. 28th, 1933.	DEC. 2nd, 1933.	SEASON.
Tons of 2,000 lbs. Cane crushed	This period 265,757	453,150	470,115	592,128	472,261	421,633	267,286	3,260,862 short tons. <i>2,958,189 metric tons.</i>
To date	265,757	732,102	1,202,216	1,794,346	2,266,607	2,688,239	2,992,687	
Tons of 2,000 lbs. Sugar bagged and estimated	This period 25,458	46,826	50,213	66,871	54,347	48,734	29,780	351,071 short tons. <i>318,485 metric tons.</i>
To date	25,458	73,618	123,832	190,702	245,049	293,773	326,679	
Tons Cane per ton Sugar	This period 10.44	9.68	9.36	8.85	8.69	8.65	9.29	9.29
To date	10.44	9.94	9.71	9.41	9.25	9.15	9.16	
Tons Cane per ton of Sugar calculated as sugar of } 96° Pol	This period 10.18	9.43	9.13	8.64	8.48	8.44	9.06	9.03
To date	10.18	9.69	9.47	9.18	9.02	8.93	8.94	
Sucrose per cent. Cane	This period 12.75	13.32	13.64	14.29	14.50	14.56	13.86	13.88
To date	12.75	13.11	13.32	13.64	13.82	13.94	13.93	
Fibre per cent. Cane	This period 15.70	15.78	15.76	15.57	15.49	15.57	15.99	15.78
To date	15.70	15.74	15.74	15.68	15.64	15.63	15.67	
Sucrose per cent. Bagasse	This period 3.46	3.47	3.56	3.74	3.75	3.82	4.16	3.71
To date	3.46	3.29	3.51	3.59	3.62	3.65	3.70	
Moisture per cent. Bagasse	This period 51.89	51.67	51.27	51.91	52.00	52.13	51.78	51.62
To date	51.89	51.70	51.71	50.65	51.82	51.87	51.85	
Imbibition per cent. Cane	This period 31.27	31.26	31.47	31.21	30.85	31.27	28.79	30.45
To date	31.27	31.13	31.26	31.24	31.16	31.18	30.94	
Extraction	This period 90.23	90.62	90.58	90.60	90.71	90.50	88.80	90.28
To date	90.23	90.45	90.51	90.54	90.58	90.54	90.37	
Recovery on Mixed Juice	This period 81.98	84.35	85.10	85.79	86.02	86.30	86.12	84.88
To date	81.98	83.47	84.15	84.72	85.01	85.24	85.35	
Overall Recovery	This period 73.98	76.44	77.08	77.72	78.03	78.11	76.48	76.63
To date	73.98	75.50	76.16	76.70	77.00	77.18	77.11	
Java Ratio	This period 77.76	77.69	77.69	77.18	77.15	76.89	76.85	77.27
To date	77.76	77.82	77.84	77.58	77.46	77.37	77.30	
SO ₂ in Sugar p.p.m.	This period 51.90	39.70	47.49	44.84	47.51	49.03	52.29	46.17
To date	51.90	45.62	46.21	45.92	47.05	46.91	46.83	
Purity of Mixed Juice	This period 83.53	83.42	84.28	85.49	85.63	86.08	86.08	84.92
To date	83.53	83.45	83.73	84.33	84.50	84.83	84.95	
Reducing Sugar Ratio	This period 4.69	4.70	4.33	3.68	3.62	3.38	3.38	4.01
To date	4.69	4.81	4.34	4.30	4.17	4.03	3.97	
Purity of Syrup	This period 84.95	85.17	85.97	87.20	87.43	87.72	87.69	86.57
To date	84.95	84.99	85.37	86.01	86.29	86.53	86.65	
Sucrose in Filter Cake	This period 3.38	3.68	3.89	3.96	3.73	3.67	5.12	4.04
To date	3.38	3.57	3.79	3.78	3.93	3.72	3.82	
Purity of Final Molasses	This period 45.32	44.35	43.44	44.88	45.64	45.59	46.60	44.92
To date	45.32	43.31	43.23	43.81	44.42	44.59	45.14	
Average Polarization of Sugar	This period 98.44	98.54	98.44	98.37	98.33	98.39	98.43	98.68
To date	98.44	98.46	98.48	98.44	98.42	98.42	98.40	

MONTHLY AVERAGES
FOR
NATAL SUGAR FACTORIES
SEASON 1933-34.



**MONTHLY AVERAGES
FOR
NATAL SUGAR FACTORIES
SEASON 1933-34.**

PURITY OF MASH (TONS)	PURITY % CANE	SUGAR % CANE	TONS CANE PER TON SUGAR
80	70	14.00	7.0
78	68	13.50	7.0
76.00	66.50	13.00	7.0
75	65	12.50	7.0
74	63	12.00	7.0
72	61	11.50	7.0
70	59	11.00	7.0
68	57	10.50	7.0
66	55	10.00	7.0
64	53	9.50	7.0
62	51	9.00	7.0
60	49	8.50	7.0
58	47	8.00	7.0
56	45	7.50	7.0
54	43	7.00	7.0
52	41	6.50	7.0
50	39	6.00	7.0
48	37	5.50	7.0
46	35	5.00	7.0
44	33	4.50	7.0
42	31	4.00	7.0
40	29	3.50	7.0
38	27	3.00	7.0
36	25	2.50	7.0
34	23	2.00	7.0
32	21	1.50	7.0
30	19	1.00	7.0
28	17	0.50	7.0
26	15	0.00	7.0
24	13	0.00	7.0
22	11	0.00	7.0
20	9	0.00	7.0
18	7	0.00	7.0
16	5	0.00	7.0
14	3	0.00	7.0
12	1	0.00	7.0
10	0	0.00	7.0
8	0	0.00	7.0
6	0	0.00	7.0
4	0	0.00	7.0
2	0	0.00	7.0
0	0	0.00	7.0



MONTHLY PERIODS: May June July Aug Sept Oct Nov

FINAL MANUFACTURING RESULTS NATAL SUGAR FACTORIES, SEASON 1933-34.

FACTORY NUMBER	1	2	4	5	6	8	9	10	11	12	14	15	16	18	20	SEASON.
Tons of 2,000 lbs. Cane crushed	344,917	220,158	180,143	425,876	240,110	159,889	62,651	293,827	353,054	304,076	247,241	142,199	76,194	122,689	107,838	3,260,862
Tons of 2,000 lbs. Sugar bagged and estimated	40,481	21,028	19,459	50,016	26,572	16,578	6,435	30,920	32,145	32,680	26,320	14,112	8,546	13,130	12,649	2,958,189
						<small>refined Sugar</small>										metric tons.
Tons Cane per ton of Sugar	8.52	10.46	9.26	8.51	9.04	9.64	9.73	9.50	10.36	9.30	9.39	10.08	8.92	9.34	8.52	318,485
Tons Cane per ton of Sugar calculated as Sugar of 96° Pol.	8.24	10.29	8.96	8.33	8.85	8.95	9.39	9.23	10.03	9.07	9.11	9.88	8.70	9.12	8.36	9.03
Time Crushing per cent. Available Time	94.46	82.42	96.57	96.04	97.49	90.58	96.00	96.98	90.80	91.82	97.47	89.77	89.14	94.16	95.93	91.23
Tons of 2,000 lbs. of Cane per hour Actual Crushing	102.74	54.63	49.07	111.95	81.02	50.41	20.30	70.64	87.90	88.08	67.03	39.24	21.98	30.98	30.89	64.52
																58.53
																metric tons.
Tons of 2,000 lbs. White Sugar made	—	65	—	—	—	243	6,234	—	—	—	—	6,867	—	108	—	—
Tons of 2,000 lbs. Raw Sugar made	—	20,963	—	50,016	26,572	16,335	196	30,901	—	—	26,320	7,145	8,546	12,943	—	—
Sucrose per cent. Cane	14.40	12.74	14.20	14.44	13.77	13.81	13.97	13.35	13.41	14.03	13.90	13.61	14.18	13.89	14.50	13.88
Fibre per cent. Cane	15.75	16.18	15.20	15.27	15.04	15.70	16.48	15.26	16.80	15.61	15.97	16.94	15.33	16.48	15.57	15.78
Java Ratio	78.66	77.90	77.01	77.80	78.12	76.81	75.50	76.02	76.60	76.64	77.25	77.20	77.44	76.00	77.50	77.27
Natal Ratio	—	—	—	—	—	—	—	—	—	—	—	—	—	75.27	—	75.27
Milling Loss	5.29	9.16	10.08	8.27	6.43	8.63	10.41	7.83	9.95	10.33	9.51	7.81	10.97	9.12	8.04	8.80
Extraction Ratio	0.27	0.72	0.71	0.57	0.47	0.62	0.74	0.59	0.74	0.74	0.68	0.57	0.77	0.66	0.55	0.62
Imbibition per cent. Cane	41.02	25.03	31.56	32.52	34.54	35.21	21.30	27.86	29.60	26.36	26.73	25.62	23.16	26.25	33.57	30.45
Sucrose in Juice per cent. Sucrose in Cane	94.21	88.36	89.20	91.23	92.98	90.17	87.71	91.05	87.52	88.51	89.07	90.26	88.15	89.18	91.37	90.28
Sucrose per cent. Bagasse	2.32	4.14	4.22	3.64	2.77	3.65	4.77	3.16	4.48	4.52	3.98	3.58	4.94	4.05	3.58	3.71
Moisture per cent. Bagasse	52.88	49.46	52.20	51.42	53.16	53.03	48.50	55.50	49.33	50.57	53.00	49.81	48.63	50.61	50.95	51.62
Sucrose per cent. Cane lost in manufacture	2.76	3.49	3.48	2.92	2.93	3.09	3.75	2.94	3.84	3.45	3.39	3.89	3.16	3.37	3.02	3.27
Sucrose in Sugar per cent. Sucrose in Cane	80.84	73.15	75.49	79.81	78.75	77.57	73.13	77.95	71.34	75.40	75.62	71.41	77.71	75.73	79.14	76.63
Sucrose in Sugar per cent. Sucrose in Juice	85.81	82.78	84.64	87.48	84.70	86.03	83.37	85.61	81.51	85.19	84.90	79.11	88.15	84.91	86.60	84.88
Available Sugar per cent. Sucrose in Juice	—	84.76	87.63	87.44	83.92	87.81	87.75	85.65	85.10	86.61	85.74	—	—	87.28	89.16	84.90
Boiling House Efficiency	95.44	97.96	96.58	100.05	—	97.97	96.00	—	95.78	98.35	99.02	—	101.12	97.28	—	96.20
Sucrose in Bagasse per cent. Sucrose in Cane (A)	5.79	11.64	10.80	8.77	7.02	9.83	12.29	8.95	12.48	11.49	10.93	9.74	11.85	10.82	8.62	9.72
Sucrose in Filter Cake per cent. Sucrose in Cane (B)	0.60	1.89	2.48	1.13	2.00	1.56	2.71	1.08	—	1.58	1.78	2.18	—	—	1.66	—
Sucrose in Molasses per cent. Sucrose in Cane (C)	9.19	—	9.32	—	9.20	9.78	10.12	—	—	10.60	11.67	11.30	—	—	10.58	—
Undetermined Sucrose per cent. Sucrose in Cane (D)	3.58	13.32	1.91	10.29	3.03	1.26	2.06	12.02	—	0.19	—	7.41	—	—	—	—
Sucrose in Boiling House per cent. Sucrose in Cane (B)+(C)+(D)	13.37	13.53	13.70	11.42	14.22	12.60	13.58	13.10	15.18	13.11	13.45	20.89	10.44	13.45	12.24	13.85
Sucrose in total Losses per cent. Sucrose in Cane (A)+(B)+(C)+(D)	19.16	26.85	24.51	20.19	21.25	22.43	26.87	22.05	27.66	24.60	24.38	30.63	22.29	24.27	20.86	23.57
FIRST CRUSHER JUICE—																
Brix	20.94	19.32	20.78	20.89	20.73	20.43	20.60	20.18	20.00	20.87	20.83	20.49	20.63	20.68	21.16	20.57
Purity (apparent)	87.41	84.61	88.70	88.80	85.00	88.05	89.50	87.00	87.50	87.70	86.37	86.00	88.54	88.40	88.40	87.48
LAST PRE-IMBIBITION JUICE—																
Brix	—	—	—	—	—	20.43	—	—	—	—	—	—	—	20.88	—	20.66
LAST ROLLER JUICE—																
Brix	2.19	7.10	4.01	4.03	4.04	5.46	10.80	4.60	5.87	8.00	5.69	4.96	7.86	6.29	3.95	5.66
Purity (apparent)	71.45	77.70	71.60	79.20	73.30	81.15	82.70	77.00	79.30	79.70	77.40	82.20	80.94	80.85	79.50	78.26
Purity drop from First Crusher	15.96	6.91	17.10	9.60	11.70	6.90	6.80	10.00	8.20	8.00	8.97	3.80	7.60	7.55	8.90	9.20

MIXED JUICE—																	
Brix	15.15	15.11	15.35	15.68	15.60	14.88	16.50	15.95	15.06	16.08	16.53	16.27	16.37	16.08	15.48	15.74	
Purity (Clerget)	85.13	83.37	86.60	85.90	82.40	85.35	86.90	84.60	84.30	85.20	84.56	85.20	85.71	86.43	86.80	84.92	
Reducing Sugar Ratio	3.43	4.32	4.02	3.21	5.79	2.79	—	4.01	3.87	4.49	4.41	—	3.81	3.60	3.35	4.01	
Parts SO ₂ per million of Brix in Sulphited Juice	—	—	—	2,650	—	—	2,730	2,951	—	3,438	2,773	—	311	—	—	—	
Purity drop from First Crusher.. .. .	2.28	1.24	2.10	2.90	2.60	2.84	2.60	2.40	3.20	2.50	1.71	0.80	2.83	1.97	1.60	2.54	
CLARIFIED JUICE—																	
Brix	13.48	15.15	15.55	—	15.02	14.25	16.70	12.72	15.54	14.32	14.90	17.12	15.17	15.67	15.84	15.10	
Purity (apparent)	89.49	84.74	87.80	—	83.70	87.44	87.90	86.90	86.10	86.30	85.85	83.80	86.72	87.33	87.90	86.57	
Reducing Sugar Ratio	1.65	3.80	—	—	5.49	2.71	—	—	3.70	—	4.28	—	—	—	3.08	3.63	
pH	6.90	—	7.12	—	7.28	—	—	7.40	—	7.50	7.85	—	—	—	7.36	—	
Calcium Salts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Per cent. Ash	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Parts SO ₂ per million of Brix	—	—	—	—	778	—	—	618	—	569	280	—	—	—	—	—	
FILTER CAKE—																	
Per cent. Sucrose	0.83	6.44	6.36	4.57	5.45	4.15	8.40	3.21	7.39	4.88	5.39	6.37	4.36	6.13	5.42	4.04	
Weight per cent. Cane	10.48	3.75	5.53	3.56	5.06	5.20	3.99	4.50	—	4.54	4.58	—	—	—	4.43	5.19	
SYRUP—																	
Brix	58.48	49.69	51.45	53.20	51.10	56.31	56.10	60.56	53.37	51.64	55.52	50.82	52.63	49.01	53.50	53.56	
Purity (apparent)	89.24	84.73	87.50	86.90	83.40	87.43	88.20	86.80	85.90	86.30	86.14	84.10	87.48	86.59	87.90	86.57	
Reducing Sugar Ratio	1.69	3.44	3.83	—	5.04	2.44	—	3.51	3.44	4.08	3.47	—	3.52	—	2.83	3.39	
pH	6.61	—	6.94	—	7.04	—	—	7.20	—	7.64	7.37	—	—	—	7.25	—	
Purity drop from First Crusher.. .. .	1.83	0.12	1.20	1.90	1.60	0.63	1.30	0.20	1.60	1.40	0.23	1.90	1.06	1.81	0.50	0.89	
Purity increase from Mixed Juice	4.11	1.36	0.90	1.00	1.00	2.21	1.30	2.20	1.60	1.10	0.29	0.30	1.77	0.16	1.10	1.65	
Parts SO ₂ per million of Brix	—	—	—	—	569	—	—	—	—	—	—	—	—	—	—	—	
Per cent. Ash	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
FIRST MASSECUITE—																	
Brix	91.66	93.60	92.43	91.96	94.06	91.55	91.50	93.57	92.51	92.46	91.09	91.07	92.87	90.34	91.40	92.14	
Purity (apparent)	88.76	78.28	87.60	84.20	77.80	84.74	85.30	81.90	84.70	80.60	79.70	83.40	84.56	87.06	85.90	83.63	
Purity of Run-off	74.20	—	67.00	67.10	49.60	65.68	65.10	61.50	—	46.80	59.98	68.00	62.03	67.11	67.70	63.21	
Cubic feet per ton of Sugar	34.30	46.00	41.70	—	47.45	—	49.70	51.57	—	53.56	50.86	—	51.50	—	—	46.52	
SECOND MASSECUITE—																	
Brix	94.28	93.58	95.90	93.52	95.67	92.64	93.80	95.70	92.80	94.66	92.14	93.02	95.95	92.64	94.60	94.06	
Purity (apparent)	80.19	62.48	72.30	69.70	65.00	73.46	75.20	68.50	71.80	67.40	69.89	70.70	67.20	73.43	71.80	70.60	
Purity of Run-off	60.25	—	49.10	51.90	37.73	53.82	50.30	46.40	—	45.90	48.82	50.80	44.79	52.88	49.80	49.42	
Cubic feet per ton of Sugar	16.10	31.55	31.50	—	47.45	—	49.70	38.78	—	53.56	50.86	—	51.50	—	—	41.22	
THIRD MASSECUITE—																	
Brix	96.42	—	96.33	94.40	—	—	94.40	—	93.06	—	—	92.55	96.38	93.08	—	94.58	
Purity (apparent)	67.20	—	63.30	53.10	—	—	65.10	—	61.50	—	—	62.20	57.84	63.62	—	61.74	
Purity of Run-off	48.41	—	44.20	44.10	—	—	41.70	—	—	—	—	49.10	40.20	47.31	—	45.00	
Cubic feet per ton of Sugar	11.50	—	31.50	—	—	—	49.70	—	—	—	—	—	51.50	—	—	36.05	
JELLY—																	
Brix	94.84	—	91.64	—	95.96	90.74	—	93.47	90.42	92.17	89.86	88.15	—	—	91.70	91.90	
Purity (apparent)	53.16	—	49.80	—	44.20	54.56	—	47.10	51.00	67.50	50.91	47.90	—	—	50.00	51.61	
Purity of Run-off	46.82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46.82	
FINAL MOLASSES—																	
Brix	82.58	83.48	86.91	—	82.14	88.25	—	87.59	—	85.38	85.73	84.49	89.02	—	88.50	85.64	
Purity (apparent)	47.89	44.77	45.60	44.10	42.20	48.71	—	45.30	44.00	43.80	47.00	43.90	40.85	47.31	44.10	44.92	
85° Brix per cent. Cane	3.35	3.85	3.48	—	3.53	3.26	—	—	—	3.99	—	—	—	—	—	3.54	
POLARISATION OF SUGARS—																	
White	99.85	—	99.60	—	98.12	—	—	98.77	—	98.45	—	—	—	—	—	—	
Raw	97.09	—	98.87	—	97.87	—	—	99.07	—	98.44	—	—	98.18	—	—	—	
Low Grade	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Average of all Sugars	99.17	97.54	99.26	98.10	98.01	96.00	99.47	98.86	99.18	98.45	98.73	97.82	98.26	98.29	97.85	98.68	
SO ₂ in parts per million	39.00	17.00	—	68.00	56	—	27	53	48	38	32	—	49.00	—	50	46.00	
Ash per cent.	—	—	—	—	—	—	—	—	—	—	0.19	—	—	—	—	—	

Mr. DODDS continued:—

I would like to call your attention to the following tables. First, Comparative Results in recent years, showing that all the figures on the whole have steadily increased. If you look under "Recovery" in the latter part of the page you see that the overall recovery, that is sucrose in sugar per cent sucrose in cane has gradually increased from 73 in 1925 to the present record of 76.6, and the same with Yield, tons of cane per ton of sugar; all that is affected by the sucrose content of the cane which naturally varies with the climatic conditions of the season, but you see on the whole there has been a marked decrease in the tons of cane required to make a ton of sugar from 10.77 in 1925 to 9.28 in 1933. The total losses are being reduced corresponding to the increased recovery. As I mentioned in the report, we still have a long way to go and the figures for Java, Mauritius, Puerto Rico, and Queensland are appended. Their sucrose content with the exception of Queensland is not as high as ours even with Uba cane, consequently we will probably increase our superiority considerably when we get on to new varieties of higher sucrose content. It is to be hoped though that under those conditions the losses in fibre will be correspondingly reduced. I have no doubt that after a few years working largely with other varieties we shall find the figures compare favourably with most other countries.

The next table shows how the conditions during the different monthly periods affect the general recovery and efficiency figures of the factory, and that is shown graphically in the graphs on the last two pages, showing the variations. Then we have the big sheet where we deal with individual factories in some detail, in greater detail than is practicable with our present staff in the monthly report. That needs to be studied in detail and requires no further comment at present.

PRESIDENT: Last year Mr. Dodds called this a hardy annual. From what I can see of it the thing is getting harder and still more hard every year. Certain factories are piling up these figures. It is going to be very difficult for some of us to catch up. 80% overall recovery in 1926 was thought impossible, but we have got it. Factory No. 1 has got it. I open the paper now for discussion.

Mr. MOBERLY: There are two points I want to bring up. One is a small one, and the other perhaps a bit more interesting. Just as a preliminary, I would like to suggest that these rainfall figures, instead of being taken from the end of the year, could with very little extra trouble be taken from some period in the middle of the year between the dry and wet seasons, which would give us a complete rain cycle, at the same time corresponding very much more closely to our crop year. At present, as is pointed out here, the figures are

thrown out very much by the drought over the last two months, which really belong to the next season, and which do not affect in any way the cane that was cut this year. It is quite easy to go back over previous year and re-adapt the figures, so that you have got something which would correspond more closely.

The other point arises in connection with the very low purities of the canes at the beginning of the season, especially at certain factories, and as you know there was a very large amount of cane which fell below the rejection point specified in the Fahey agreement. Something over 50,000 tons was actually tested below that point. Usually we have been unable to tell what the real value of that cane is, because it has been entirely swamped by the very large amount of good cane. We have only had very small percentages at any one mill. This year, over a period of a few months, we had really large percentages. We had one factory with 10% of cane below that limit, and another factory actually 20% of its cane below that limit. I tried to see whether I could work anything out one these figures. We got complete tests of all the cane below the rejection point and its weights. I was able to separate the accepted and rejected cane into two portions, and then, by crediting the accepted cane with the best recovery that the particular mill had usually achieved with that purity, giving them every advantage, and putting the balance of the sugar made on to the other cane, I found that even with a very generous allowance of recovery for the accepted cane, the sugar which might be credited to this other cane did not fall very much below what the S.J.M. formula said it should be; or, in terms of the F.C.A. Scale, it would have been very fairly paid for if it had received the 3% penalty, which is the maximum penalty below that of rejection. That 3% over the whole of this 50,000 would have meant that the amount would have been paid for more or less in proportion to the sugar which might be credited to it, and in doing that I made a very liberal allowance for the accepted portion. I thought that point would be of interest to the meeting, because it is the first time that we have been able to get any sort of idea as to the recovery value of this cane.

PRESIDENT: Was the amount actually paid for the cane so much less than that?

Mr. MOBERLY: Yes. Unfortunately, I have not got the figures, and of course it varied between one company and another. But it certainly fell below that figure. I daresay other people may have views to express on that. Unfortunately I did not bring my figures with me. The point did not occur to me as an interesting one until I happened to glance through this report. But I have got the figures all worked out to show what may be credited to this cane.

Mr. DODDS: There is, of course, no difficulty, in re-calculating out the average annual rainfall figures, say from the end of June or the end of March, or any other period which might be found most instructive, instead of the calendar year.

I am sorry to say that there is an omission from this report of a certain feature that we have had in the past few years. We generally introduce into this report, although it has nothing to do with the actual work of the factories, the tonnage of cane and proportion of total output from different areas, and a comparison of yields of cane per acre from the different areas which is interesting especially when correlated with the rainfall and other local circumstances. But this year we have not been able to do this, because we depend on getting the necessary data from the Census Department. These census returns have not yet been received, according to the Department because of delay in supply of figures on the part of the planter. If they come out in time before the publication of these proceedings in a printed form, they will be inserted later.

Mr. VIGER: Mr. Moberly says he has calculated the value of this bad cane. I am afraid that the S.J.M. formula cannot apply, because of the non sugars which may be affected. There are certain non-sugars which are undoubtedly affected.

Mr. MOBERLY: There is a little misunderstanding. I did not calculate the yield of these poor canes on S.J.M. formula. What I did was to separate out two different types of cane and get the analysis of each shown separately, and then credit to the accepted cane the amount of sugar corresponding to the best recovery which that particular mill normally got at that purity. In most cases it gave a purity to that mill very similar to what it had had in recent years, and I assumed that that mill, if it had this cane alone, would have the same recoveries as before. I then worked out the S.J.M. formula, by way of a check, and the formula certainly gave a higher figure than the figure found the other way, due to the fact, as Mr. Viger said, that that formula does not apply so well at the lower purities.

Mr. BECHARD: I do not know whether Mr. Moberly took into consideration the fact that the general rate of improvement is better year by year, and very often month by month. For instance, as shown by Mr. Dodds in his report, factory 16, has a recovery on mixed juice of 88.15. We generally agree that factory 16 works under ideal conditions. It is certainly not affected by the drought to the same extent as we were. If the work at that factory had been duplicated elsewhere perhaps it would have had a different result. I do not know what factory 16 does, but the probability is that their work is good all round. But the point I really want to bring up is this matter of purity and yield.

We all know, the rejection point is fixed. Certain penalties are imposed. We know that lighter purities are accounted for by several factors. You may have a drought cane that is not matured, or cane that has been allowed to decay in the field. Various canes react differently to different circumstances. For instance, mature cane will work more easily on the whole than cane that has never been properly matured. Probably cane that has been allowed to deteriorate in the field is one of the worst things we have to handle. I do not see how we are going to apply any particular value to this cane unless the factor of depreciation is to be considered. Apart from the personal element, I do not see why cane could not be graded in the same way as every other agricultural product. It is practically impossible to say by chemical analysis or otherwise "What is the value of an orange?" because appearance and everything else counts. And the same thing applies to sugar. We have to reach a standard somewhere. We have cane of high purity that works very badly. That happens year after year. As a matter of fact after 90 and 91 purity, we generally have very poor results in comparison with its purity, or what its purity ought to give us.

Mr. BOOTH: I must thank Mr. Bechard for putting in a different way advocacy for my suggestion, that we should try out other processes. My experience at certain times of the year, and under certain conditions, is that the S.J.M. formula is not much use in calculating the yield from cane.

Mr. BIJOUX: With regard to the purity of the juice in relation to season, you must have noticed that the amount of molasses produced for the first two months of last season was something tremendous, more than I have ever seen. We generally reckon about $3\frac{1}{2}$ gallons per ton of cane; this season we had 5 to $5\frac{1}{2}$.

Mr. HAYES: I think the point that Mr. Moberly made has been altogether missed in the subsequent discussion. During the last year the amount of cane below rejection point was such a high proportion of the total crushed that there has been no need whatever to use the S.J.M. formula. The S.J.M. formula was simply applied as a check, but more as a check on the formula itself than on the quantities worked out. Even allowing the factories concerned a record recovery, and a very good record, there is no justification for allowing more than 88%. And with this allowance during a week in which 20% of the cane crop was rejected you cannot very well presuppose recoveries of 100 and over! The sugar has to come from somewhere, and the quantities, as Mr. Moberly states, have been so great that even conceding the factories concerned a recovery which is more than they ever hoped for, there is still a very considerable margin left over which has to be accounted for in some way. Cane of low purity may affect the recovery from

cane of good purity to a certain extent, but not to such an extent that it will neutralize all the manufacturing possibilities of that cane.

Mr. BECHARD: Speaking for myself. I did not miss Mr. Moberly's point. I made the further point that purity, when taken into conjunction with reducing sugar will probably mean a different thing altogether. Calculating back to the S.J.M. formula at the beginning of the season, we have sugar approximately twice what we are used to at other times for the same periods of the previous year. If these figures are taken into account, then it becomes quite apparent that some of the cane was actually better than it showed. This is the point I was trying to make. Some lower purity canes are actually better than we give them credit for. On the other hand, some high purity canes have got less value than we give them credit for. The same applies on the whole range of purities. There are certain canes that are really bad, from which we cannot make sugar. If we could throw those away we would be better off. Some types of cane we did get, that, had it been possible for us to throw it out of the factory, we would have done so.

Mr. DODDS: I think it is now commonly understood that the rejection point in the Fahey Agreement was fixed unduly high, and that the cane immediately below rejection point has considerable commercial value. But it is very difficult to assess that commercial value to the satisfaction of everyone.

The question of purity of juice was mentioned last year by Mr. Buchanan, who pointed out that factories which had to work with juice of purity much below average, had figures which were scarcely comparable with those of factories that were more favourably situated in that respect. On looking through the annual report this year, we find there are only two factories whose average of purity with mixed juice for the season is considerably below normal. In one case at least I have given that factory credit in the text. It might be possible, and no doubt is done by the Java people, who seem to have devised a formula for every

possible set of circumstances, to apply some calculation intended to take that factor into account. We did not do this in our figures, because of the fact that, taking the season as a whole, it is only at a few factories that the purity of the juice varies much from the general average.

PRESIDENT: There is just one point I should like to mention. I should have mentioned it yesterday. We are of opinion that the term "boiling house recovery" should actually be taken from the syrup, not right from the mixed juice. I should like to make the suggestion that the incoming control committee send out a questionnaire to all the factories, asking whether it is possible to be done in each factory. If it is possible to be done, I think we should do it.

Mr. DODDS: Do you mean that all the factories should determine the sugar in syrup?

PRESIDENT: Yes. For boiling house recovery, if it is possible.

Mr. FOWLIE: I would hesitate to say very much about this subject of factories because I am not a technical man on the factory side, but this subject of the value of rejected cane is of such vital importance to the planter, that I would like to suggest that it appears to be high time that some investigation was set afoot to get figures representing its real value in the factory. We may never have a season like last, but we do have a certain amount of rejected cane almost every season, and it now seems to be the undoubted fact that that cane has value, and I certainly think that before the revision of the Fahey Agreement is due that we should know a bit more than we seem to do about the value of that cane.

PRESIDENT: I would like to thank Mr. Dodds and Mr. Karlson for the paper. There has been a tremendous amount of work put in, and the figures obtained are very interesting indeed. I would like you to signify your approval in the usual manner. (Applause.)

APPENDIX.

Since writing the above report the sugar cane census returns of European-owned plantations for the 1932-33 season have been received, enabling us to make the usual analysis of sugar cane returns and yield per acre from different districts.

Weather conditions in 1932 showed a great improvement over those of 1931, and the rainfall was above the average at most stations, due mainly to abundant rains over the first five months of the year, especially in the Mtunzini, Eshowe, and Lower

Umfolozzi districts. The total rainfall for 1932 at the Experiment Station at Mount Edgecombe was 41.36ins. and the average for 38 stations along the coast from Umzumbi to Hluhluwe was 51.15ins.

The 1932-33 crop was, however, affected by the disastrous 1931 season, and yields of cane per acre showed only moderate improvement, and indeed a further slight fall in the Zululand section.

There was a considerable increase in all districts in the area harvested, maintaining the general

advance in recent years. The tendency remarked last year may again be noted for the South Coast section to increase its relative proportion of acreage harvested, mainly in the Umzinto area, at the expense of every North Coast district, where the increase in area harvested was relatively less. This trend is even more noticeable in terms of cane harvested and the South Coast now supplies 27.9 per cent of the total crop, North Coast up to the Tugela river 38.3 per cent, and Zululand 33.8 per cent. The largest crops for individual districts are Lower Tugela, 754,022 tons, corresponding to 23.9 per cent of the total, and Umzinto 638,701 tons, or 20.2 per cent of the total.

An increased crop is shown in every district excepting Eshowe, where there was a slight decrease.

In yield of cane per acre the lead is now taken by the Umzinto district with 22.24 tons, followed by another small South Coast district, Durban and Pinetown, with 21.75 tons. The best yield among North Coast districts is shown by Inanda with 20.14 tons per acre.

The lowest yields are recorded in the Hlabisa district of Zululand (Mtubatuba, Hluhluwe, etc.), with 16.17 tons per acre, and Eshowe with 16.69 tons. These districts were very severely affected by the drought in 1931.

A slight increase in yield over the previous year

is recorded in nearly every district south of the Tugela, and a slight decrease in Zululand, as a whole, although the northern coastal districts of Zululand, Lower Umfolozi and Hlabisa, show considerable increases in yield per acre.

How far these comparisons of yield per acre may be affected by different average ages of cane at harvesting in different districts still remains to be determined, if possible. In the great majority of cases the cane cut represents approximately a two-year crop, but there are exceptions, probably more numerous in alluvial valley lands, such as form a relatively large proportion of the Lower Umfolozi district, for example.

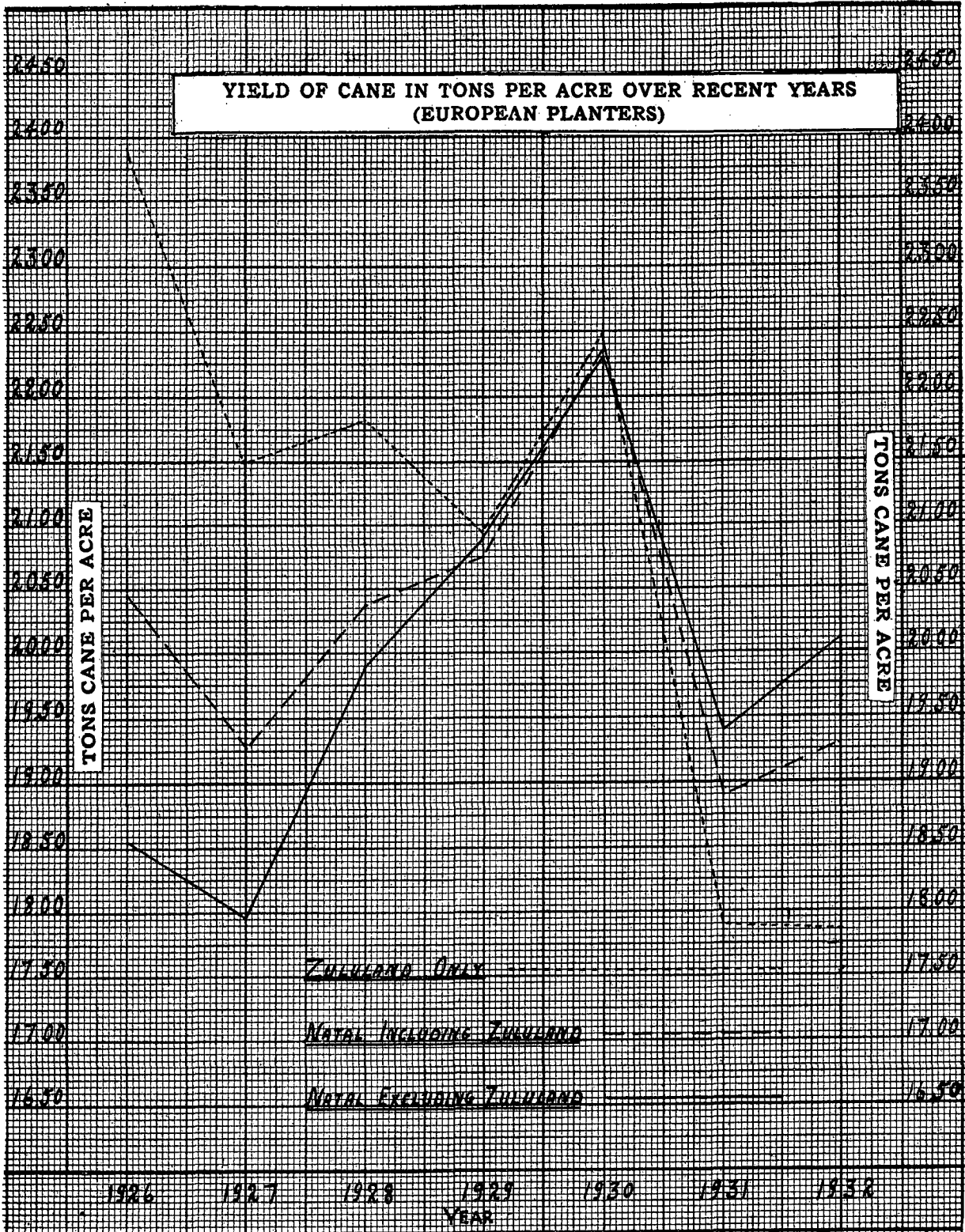
The total quantity of cane received for milling as recorded by the factories for the 1932-33 season is 3,490,000 tons and the total quantity of cane harvested by European planters for milling as recorded by the Department of Census is 3,155,200 tons; this leaves a difference of 334,800 tons or 9.59 per cent of the total, presumably owned by natives and Indian planters. It would be of interest if the latter returns were obtained directly by the Census Department, so that the crops and yields of cane per acre by districts could be calculated for comparison with those of European planters.

South African Sugar Association,
Mount Edgecombe.
April, 1934.

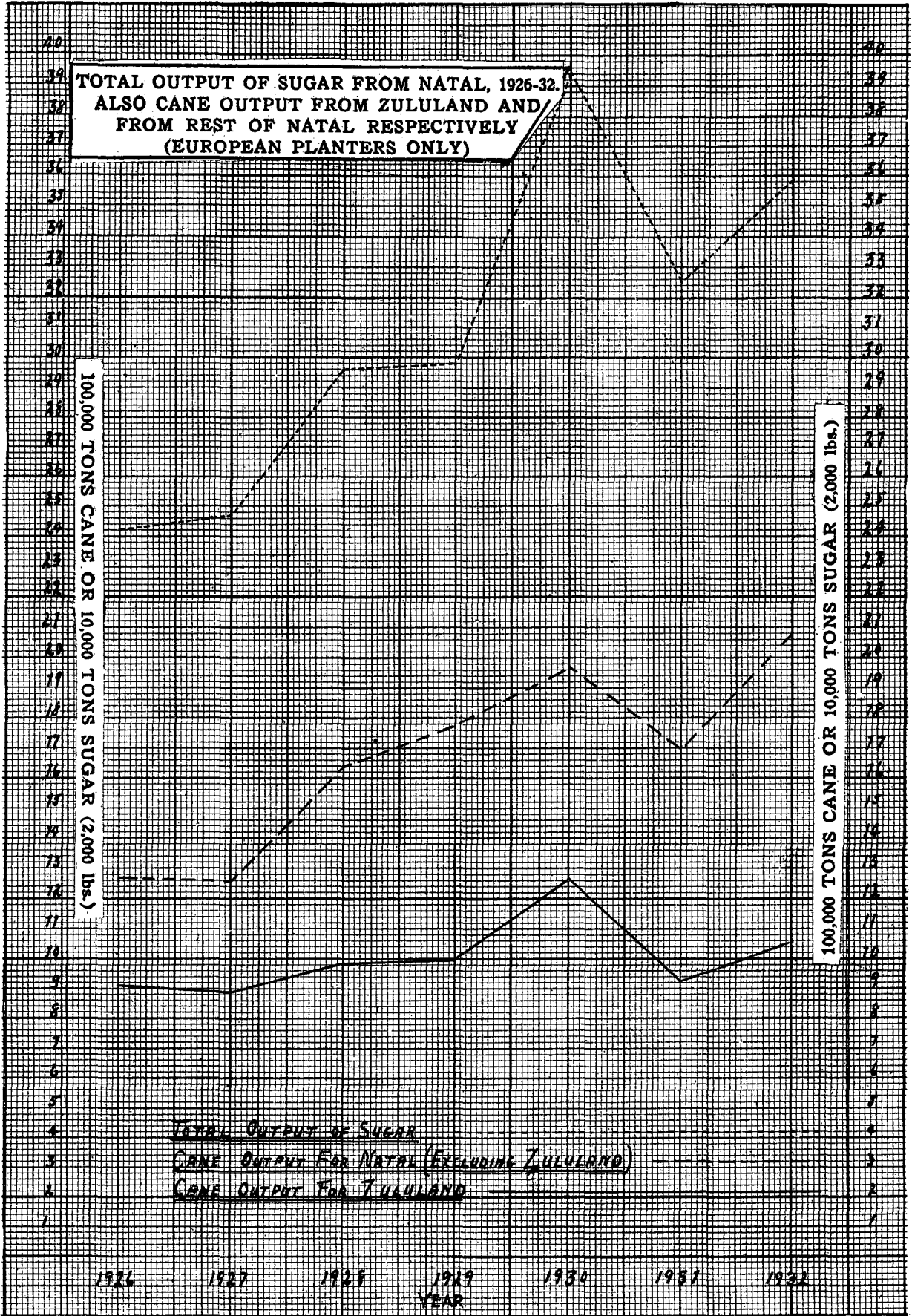
YIELD OF CANE AND SUGAR FOR RECENT YEARS
(NATAL)

SEASON	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.
ACREAGE REAPED	92,965	109,362	114,279	128,734	141,224	135,807	169,803	165,280	180,923	—
CANE HARVESTED—SHORT TONS	1,729,344.0	2,638,000.0	2,335,406.0	2,482,000.0	2,878,149.0	2,818,000.0	3,801,886.0	3,123,792.0	3,490,000.0	3,260,862.0
Metric tons	1,568,826.3	2,393,140.8	2,118,633.6	2,251,620.7	2,610,999.2	2,556,433.2	3,448,994.9	2,833,841.6	3,166,058.2	2,958,189.0
SHORT TONS CANE PER ACRE	18.66	24.12	20.44	19.28	20.38	20.75	22.39	18.90	19.29	—
Metric tons Cane per acre	16.93	21.88	18.54	17.49	18.49	18.82	20.31	17.10	17.4850	—
SHORT TONS SUGAR PRODUCED	161,250.0	239,851.0	242,662.0	247,273.0	296,000.0	298,635.0	393,009.0	325,899.0	358,905.0	351,071.0
Metric tons Sugar produced	146,283.0	217,588.0	220,138.1	224,321.1	268,525.3	270,957.7	356,529.9	295,649.1	325,591.4	318,485.0
SHORT TONS CANE PER TON OF SUGAR ..	10.73	11.00	9.62	10.03	9.72	9.44	9.67	9.58	9.72	9.29
SHORT TONS SUGAR PER ACRE REAPED ..	1.740	2.190	2.120	1.920	2.100	2.200	2.310	1.970	2.191 1.984	—
Metric tons Sugar per acre reaped	1.590	1.990	1.923	1.742	1.905	1.996	2.096	1.780	1.995 1.800	—
SHORT TONS SUGAR PER ACRE PER ANNUM	0.870	1.100	1.106	0.960	1.050	1.100	1.160	0.990	1.097 0.992	—
Metric tons Sugar per acre per annum ..	0.790	0.998	0.962	0.871	0.953	0.998	1.052	0.890	0.995 0.900	—
RAINFALL IN INCHES (Mount Edgecombe)	29.93	43.80	25.42	42.46	27.56	43.83	30.03	28.01	41.36	27.14

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



**TOTAL OUTPUT OF SUGAR FROM NATAL, 1926-32.
 ALSO CANE OUTPUT FROM ZULULAND AND
 FROM REST OF NATAL RESPECTIVELY
 (EUROPEAN PLANTERS ONLY)**



TOTAL OUTPUT OF SUGAR
 CANE OUTPUT FOR NATAL (EXCLUDING ZULULAND)
 CANE OUTPUT FOR ZULULAND

1926 1927 1928 1929 1930 1931 1932
 YEAR

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.							TONS CANE PER ACRE.						
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1926.	1927.	1928.	1929.	1930.	1931.	1932.
PORT SHEPSTONE	1.7	1.6	1.8	1.9	2.1	2.3	2.6	17.68	16.72	19.98	17.40	18.60	18.80	19.57
UMZINTO	14.1	14.8	17.8	17.8	13.9	18.5	20.2	17.74	17.57	19.33	20.10	22.30	20.80	22.24
DURBAN AND PINETOWN	4.6	4.7	4.7	4.8	5.1	5.2	5.0	21.39	19.49	22.64	24.80	26.77	22.90	21.75
Total South of Umgeni River	20.4	21.1	24.3	24.6	21.1	26.0	27.9	18.44	17.89	19.77	20.60	22.76	21.00	21.87
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	100.0	97.00	107.20	111.70	123.40	114.10	118.60
INANDA	15.1	15.8	13.3	14.8	12.8	14.3	14.4	16.72	16.79	18.45	20.50	22.01	19.20	20.14
LOWER TUGELA	22.8	21.7	24.8	24.5	26.9	24.6	23.9	20.10	19.02	20.08	20.80	22.12	18.20	18.36
Total for North Coast between Umgeni and Tugela River:	37.9	37.5	38.1	39.3	39.7	38.9	38.3	18.61	18.01	19.48	20.68	22.08	18.60	18.99
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	100.00	96.80	104.70	111.10	118.10	100.00	102.00
Total for Natal South of the Tugela (excluding Zululand)	58.3	58.6	62.4	63.9	60.8	64.8	66.2	18.55	17.97	19.59	20.65	22.31	19.40	20.11
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	100.00	96.90	105.60	111.30	120.30	104.60	108.40
MTUNZINI	15.1	15.1	13.4	12.5	13.4	12.6	11.4	22.39	21.16	20.84	20.70	22.53	18.10	17.55
ESHOWE	2.4	2.7	3.5	2.7	4.5	4.2	3.4	22.55	20.88	22.76	20.60	20.22	18.90	16.69
LOWER UMFOLOZI	24.0	21.2	18.3	18.6	17.9	16.2	16.7	25.00	22.57	22.99	21.60	23.83	18.00	18.63
HLABISA	—	2.4	2.5	2.4	3.4	2.3	2.4	—	16.93	18.58	17.80	19.55	14.60	16.17
Total North of the Tugela (Zululand)	41.6	41.4	37.6	36.1	39.2	35.2	33.8	23.83	21.50	21.83	20.92	22.50	17.90	17.86
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	100.00	90.20	91.60	87.80	94.40	75.20	74.95
GRAND TOTAL FOR NATAL (including Zululand)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	20.44	19.28	20.38	20.75	22.39	18.90	19.29
Ratio to 1926 (= 100)	—	—	—	—	—	—	—	100.00	94.30	99.70	101.50	109.50	92.60	94.40