

ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS FROM NATAL SUGAR FACTORIES, SEASON 1936-37

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The factory reports reviewed herewith continue to reflect the progress in manufacture, both in quantity and quality of work, that we have had to report over recent years. The total output of sugar for the season, 446,334 tons of 2 000 lbs. (404,910 metric tons) is a new high level for this country but fortunately has not entailed an increased proportion for export at unremunerative prices, there having been a welcome concurrent increase in the quantity of sugar consumed in South Africa. The relative efficiency of production as reflected in the ratio of cane required to produce a unit of sugar, 9.29, is not quite so low as in the previous year when it was 9.19, or even in 1933 when it was 9.28. In both of those seasons however weather conditions favoured a much higher sucrose content per cent cane, which was relatively low during 1936 13.30 per cent. The actual sucrose recovered in sugar per cent of the sucrose originally in the cane (overall recovery), 79.64, is considerably higher for the 1936/7 season than for any previous year.

Weather Influences and Locusts.

As in 1935 there were abnormally late rains, the rainfall for May being no less than 7.30 ins. Also, the mean atmospheric temperatures for the months of June, July and August was 63.5° F., which is 1.3° above normal, with the result that it was not until the latter month that the sucrose content of the cane and purity of the juice reached normal figures.

There was however little or no direct injury to cane from flood, drought or cold. A certain amount of locust-damaged cane was received at the mills in November, but in general the injury from locusts was less than might have been feared from the large swarms of flyers prevalent during the latter part of the year; and with the distribution of the new improved poison bait for locust hoppers, the means of control of the latter is better than ever before.

Seasonal Variations in the Crop.

The tendency to begin the crushing season very early was not so marked as in some years, but the sucrose content of cane in the first part of the season was very low, and it is perhaps worth while noting that 425,325 tons of cane were cut before

the end of June when the ratio of cane to sugar was as high as 10.99 resulting in 38,702 short tons of sugar.

If the same weight of cane had been harvested equally over the months of August, September and October when the average ratio of cane to sugar was 8.67 it would have yielded 49,057 tons of sugar, or 10,355 tons more than it did in June.

The graphs showing the quality of cane by months shows the same general tendency as past years, there being a well marked peak from the months of August to November inclusive when the sucrose content, juice purity, and fibre content were at the optimum. The extraction and recovery figures, however, show a final maximum after the usual seasonal depression in November. This has been noticed in other recent years and is probably due to the fact that the recovery figures of the last one or two months of the season are not comparable with those of the preceding months owing to certain factories closing down before others.

Crop Statistics.

Of the 3,809,973 short tons of cane sent to the factories during the season by European growers or by the manufacturers themselves, 2,047,937 tons or 53.75 per cent were supplied by private European planters, and the balance of 1,762,036 tons or 46.25 per cent by the miller as planter. The cane supplied by Native and Indian growers is estimated to be 371,000 tons or 8.87 per cent of the total.

The increase in the South African output of sugar has not kept pace with the increase in world production of sugar and still less with that produced within the British Empire.

According to Mikusch ("Facts About Sugar," Jan. 1937, p.7) the total world crop for 1936-37 is estimated to be 27,748,000 metric tons, of which 17,517,000 metric tons or 63.1 per cent is cane sugar. Of the world total, South Africa with 404,914 metric tons forms 1.46 per cent or 2.31 per cent of the cane sugar.

The sugar produced in the British Empire is estimated to be 6,701,000 tons of which the South African proportion is 6.04 per cent.

The principal sugar producing countries within the Empire are:—

	Metric tons 1936-37.
India	3,825,000
Australia	721,000
United Kingdom	548,000
British West Indies	407,000
South Africa	404,914
Mauritius	285,000

As in recent years 17 South African factories are included in our returns, which represent 96.2 per cent of the total output of sugar. The balance of 3.8 per cent is produced in six small factories which are believed not to have complete chemical control.

General Factory Performance.

The extraction, sucrose in juice per cent of sucrose in cane, as might be expected from the low fibre content of cane shows an increase over all previous seasons though surpassing 1934 by only a very narrow margin.

The boiling house recovery, sucrose in sugar per cent of sucrose in juice, also shows a new high level, 87.44. This is not associated with a particularly high purity of mixed juice, last year's average of 85.43 having been exceeded in several seasons, but the losses of sucrose in filter cake, 1.14 per cent, and in undetermined losses (including molasses), 10.30 per cent, have been further reduced, although still by no means down to the best standards in other countries.

The resulting overall recovery, 79.64 as already stated is a new high level for this country, and has steadily risen from 74.39 in 1931.

Individual Factory Performances.

To turn to individual factory reports, we find that the two highest sucrose contents of cane are both in the Inanda district, 13.94 per cent at factory No. 1 and 13.88 at factory No. 20. The lowest fibre content of cane 13.81 per cent is recorded at factory No. 4, and the highest purity of mixed juice, 87.70 and the lowest reducing sugar ratio 2.06 at factory No. 15. The highest Java ratio 79.31, is shown at factory No. 20.

No. 1 factory creates yet another South African record for extraction, 94.62, corresponding to a re-

duced extraction on a 12.5 per cent fibre basis of 95.78. This factory also gains the record overall recovery for South Africa of 83.68 (reduced overall recovery on basis of 12.5 per cent fibre and 85.0 mixed juice purity, 84.25) and the lowest loss in manufacture of sucrose per cent cane, 2.27, and the lowest ratio of cane to sugar, 8.49 on actual polarization and 8.23 calculated to a polarization of 96° while making sugars of an average polarization of 98.98. Factory No. 20 takes the second place in this important respect with an actual ratio of cane to sugar of 8.55. No. 1 factory gains the lowest milling loss 4.87, primary juice loss, 29.51 and extraction ratio, 0.35.

The largest quantity of cane crushed, 505,236 short tons (458,350 metric tons) and largest output of sugar, 56,680 short tons (51,420 metric tons) was again recorded by factory No. 5. This throughput of cane is the highest recorded for a single season in any South African factory. This factory also shows the highest crushing rate over the season ever attained by a South African factory, 124.99 short tons per hour. Factory No. 1 comes second in throughput of cane, 453,201 short tons (411,143 metric tons) and output of sugar 53,404 short tons (48,448 metric tons) and has the record high crushing rate for any single train of mills in this country of 114.76 tons of cane per hour while dealing with 42.32 per cent imbibition.

The only other factory to exceed sugar output of more than 31,000 short tons is factory No. 12 with 46,315 short tons (42,017 metric tons). No. 16 factory again takes the lead in boiling house recovery (sucrose in sugar per cent of sucrose in mixed juice) of 91.16 as well as the highest reduced boiling house recovery, 90.36, by virtue of a final molasses of purity reduced to 36.57. Since the purity of final molasses assumed in our modification of the S-i-m formula is 45, this factory gains a recovery efficiency (sucrose in sugar per cent available sucrose in mixed juice) of 104.28.

Conclusion.

This report records further substantial improvement in factory efficiency, and with a rapid change to varieties of improved quality in progress, and prices stabilized for the next five years, together with the increasing domestic consumption of sugar already mentioned, the outlook for the industry is at present very favourable.

APPENDIX

FIELD RETURNS 1935/36 CROP—COMPILED FROM THE UNION DEPARTMENT OF
CENSUS STATISTICS FOR SUGAR CANE
(European Planters only).

Change in varieties under cultivation.

The revolution that is taking place in the variety of canes under cultivation is further shown in these returns. It will be seen that although the proportion of Non-Uba canes as first ratoons in April last was only 21 per cent, the proportion as plant cane had risen to nearly 80 per cent and was as high as 90 per cent in the Lower Umfolosi division at that time. This points to a remarkable change having taken place between the plant cane and the first ratoon crop mentioned. The indications are that if the present tendency continues, there will be very little Uba under cultivation within a few years time.

It is hardly possible yet to make a valid comparison of yields, but the records show that the 14,781 acres of non-Uba varieties harvested during the year ending April, 1936 yielded 26.78 tons of cane per acre, while the 161,111 acres of Uba harvested during the same period gave 19.49 tons of cane per acre. However, the non-Uba canes were nearly all plant cane, whilst the Uba consisted approximately equally of plant cane, first ratoon, second ratoons, and combined later ratoons.

The superiority of the new canes is most marked in the Zululand districts, as experiments have consistently shown, and it may be that Zululand will now regain the lead in yield of cane compared with the rest of Natal.

Local Crop Statistics.

The area of cane harvested for Europeans in 1935, 175,892 tons, is a new record for any one

season, but the resulting cane, 3,535,484 tons is lower than in 1934, the yield of cane per acre having diminished to 20.10 tons. The total quantity of cane received by the factories in the 1935/36 season was 3,867,536 tons. If we assume the difference of 332,052 tons to represent Native and Indian owned cane, we have a proportion of 8.58 per cent of the latter which is perhaps not far out, though of course various other small sources of discrepancy may account for part of the difference.

Lower Tugela division as usual takes the lead with 1,033,633 tons of cane, with Inanda 672,954 tons second and Umzinto 553,401 tons third.

The proportion of the total yield supplied by the Zululand districts remains almost the same as last year, 30.5 per cent. North Coast production, 48.3 per cent continues to expand in both the Inanda and Lower Tugela divisions at the expense of the South Coast, 21.2 per cent.

In yield of cane per acre the Inanda division again takes the lead with 26.76 tons. This is a complete reversal of the position seven years ago when Inanda was the lowest of the nine divisions and has steadily increased since then. Lower Tugela occupies the second place with 20.83 tons of cane per acre and Durban (including the coast between Umgeni and Umkomaas rivers) third with 20.27 tons. Every district in Zululand shows a further slight fall, the average for that area being now 18.00 tons per acre.

However for reasons already mentioned an improvement of the yields in Zululand in particular may be anticipated.

FINAL MANUFACTURING RESULTS, NATAL SUGAR FACTORIES, SEASON 1936-37.

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	453,201	229,506	212,836	505,236	289,490	154,782	95,996	289,925	271,622	435,385	272,818	143,237	84,135	152,633	97,183	145,497	156,050	3,989,532
Cane crushed—metric tons	411,143	203,203	193,085	458,350	262,625	140,418	87,087	263,020	246,415	394,981	247,500	129,944	76,327	133,469	88,164	131,995	141,568	3,619,299
Tons of 2,000 lbs. Sugar bagged and estimated	53,404	21,175	22,775	56,680	30,684	16,983	10,109	30,397	27,626	46,315	28,625	15,023	9,346	16,345	10,050	17,016	16,725	429,278
Sugar bagged and estimated—metric tons	43,443	19,210	20,661	51,420	27,336	15,407	9,171	27,576	25,062	42,017	25,969	13,629	8,479	14,328	9,117	15,437	15,173	389,440
Tons Cane per ton of Sugar	8.49	10.84	9.34	8.91	9.43	9.11	9.48	9.55	9.83	9.40	9.53	9.53	9.00	9.34	9.67	8.55	9.33	9.29
Tons Cane per ton of Sugar calculated as Sugar of 96° Pol.	8.23	10.40	9.06	8.72	9.25	9.11	9.15	9.29	9.53	9.16	9.29	9.30	8.75	9.10	9.43	8.36	9.07	9.06
Time Crushing per cent. Available Time	97.45	86.40	93.47	92.68	97.66	91.21	96.50	93.71	95.50	95.32	97.16	97.44	95.82	96.86	90.10	91.91	97.66	94.66
Tons of 2,000 lbs. of Cane per hour Actual Crushing	114.76	62.78	56.43	124.99	86.46	47.96	24.60	76.14	86.83	95.96	67.00	39.88	24.38	34.00	28.34	34.05	45.37	77.87
Tons of 2,000 lbs. White Sugar made	34,059	—	13,821	—	—	—	9,340	37	12,566	—	—	2,516	—	35	5,147	—	4,393	81,914
Tons of 2,000 lbs. Raw Sugar made	19,345	21,175	8,954	56,680	30,684	16,983	769	30,360	15,060	46,315	28,625	12,507	9,346	16,310	4,903	17,016	12,332	347,364
Sucrose per cent. Cane	13.94	11.79	13.35	13.75	12.76	13.45	13.41	12.88	13.25	13.20	13.06	13.71	13.67	12.89	13.18	13.88	13.77	13.30
Fibre per cent. Cane	15.42	14.96	13.81	14.84	15.11	14.84	16.18	14.16	15.77	14.61	15.13	15.73	14.49	15.57	15.74	14.43	15.72	15.01
Java Ratio	79.25	79.02	77.30	78.75	73.68	77.79	77.10	77.17	77.15	76.54	76.37	76.51	79.29	76.28	76.76	79.31	77.58	77.44
Milling Loss	4.87	7.74	8.87	8.76	6.67	8.49	7.05	7.41	8.95	9.68	9.04	8.39	11.35	6.33	8.88	6.12	8.00	7.92
Extraction Ratio	0.35	0.65	0.66	0.64	0.52	0.63	0.53	0.58	0.68	0.73	0.69	0.61	0.83	0.49	0.67	0.44	0.58	0.60
Primary Juice Loss	29.51	55.14	57.23	54.23	44.33	53.88	44.03	49.41	56.94	62.54	58.73	51.48	70.99	41.48	56.80	37.71	49.00	50.71
Imbibition per cent. Cane	42.32	24.53	31.28	33.46	28.84	36.21	31.00	30.28	33.37	30.14	28.10	33.64	28.61	38.29	19.80	32.38	36.40	32.40
Extraction (Sucrose in Mixed Juice % Sucrose in Cane)	94.62	90.30	90.83	90.55	92.11	90.61	91.50	91.85	89.34	89.30	89.53	90.39	87.97	92.35	89.39	93.64	90.86	91.08
Reduced Extraction (based on Fibre of 12.5 per cent.)	95.78	92.12	91.82	92.25	93.67	92.30	93.71	92.94	91.87	91.07	91.61	92.65	89.86	94.07	91.89	94.61	93.00	92.78
Sucrose per cent. Bagasse	2.16	3.34	3.88	3.71	2.75	3.50	3.39	2.99	3.89	4.04	3.73	3.53	4.96	2.71	3.94	2.79	3.57	3.40
Moisture per cent. Bagasse	52.71	52.01	50.62	52.87	54.89	54.37	47.90	55.55	51.56	53.15	54.04	53.52	50.18	53.33	50.84	50.98	50.88	52.76
Sucrose per cent. Cane lost in manufacture	2.27	2.78	2.75	2.74	2.38	2.92	2.93	2.54	3.18	2.72	2.73	3.39	2.70	2.35	3.00	2.40	3.18	2.71
Overall Recovery (Sucrose in Sugar % Sucrose in Cane)	83.68	76.45	79.40	80.09	81.33	78.29	78.19	80.25	76.00	79.40	79.09	75.23	80.19	81.78	77.24	82.74	76.87	79.64
Reduced Overall Recovery (based on Fibre of 12.5% and Mixed Juice Purity of 85.0°)	84.25	79.66	79.50	81.16	82.75	79.57	78.04	81.02	78.25	80.86	80.59	73.11	81.20	83.22	77.78	81.61	77.60	80.73
Recovery on Mixed Juice (Sucrose in Sugar % Sucrose in Mixed Juice)	88.44	84.67	87.42	88.45	88.29	86.39	85.46	87.37	85.06	88.91	88.34	83.24	91.16	88.55	86.41	88.36	84.61	87.44
Reduced Boiling-House Recovery (based on Mixed Juice Purity of 85.0°)	87.96	86.47	86.58	87.98	88.34	86.21	83.28	87.17	85.18	88.79	87.97	78.91	90.36	88.47	84.64	86.26	83.44	87.01
Available Sucrose % Sucrose in Mixed Juice	87.25	84.66	86.83	87.70	87.30	87.58	87.79	86.48	86.15	86.44	86.81	—	87.42	88.57	88.14	—	86.65	86.97
Recovery Efficiency (Sucrose in Sugar % Available Sucrose in Mixed Juice)	101.36	100.00	100.67	100.85	98.88	98.64	97.80	101.03	98.73	102.86	101.76	—	104.28	99.98	98.04	—	97.65	100.53
Sucrose in Bagasse per cent. Sucrose in Cane (A)	5.38	9.70	9.17	9.45	7.89	9.39	8.50	8.15	10.66	10.70	10.47	9.61	12.03	7.65	10.61	6.36	9.14	8.92
Sucrose in Filter Cake per cent. Sucrose in Cane (B)	0.46	1.70	1.14	0.88	1.29	1.83	1.74	1.47	—	1.14	1.13	1.28	1.01	—	—	1.34	1.12	1.14
Sucrose in Molasses per cent. Sucrose in Cane (C)	7.02	8.75	9.31	—	8.38	9.16	8.65	—	—	8.02	8.67	—	—	—	—	—	—	—
Undetermined Sucrose per cent. Sucrose in Cane (D)	3.46	3.24	0.98	9.46	1.11	1.33	2.92	10.13	13.34	0.55	0.64	13.88	6.77	10.57	12.15	9.56	12.87	10.30
Sucrose lost in Boiling House per cent. Sucrose in Cane (B)+(C)+(D)	10.94	13.69*	11.43	10.34*	10.78	12.32	13.31	11.60	13.34	9.71*	10.44	15.16	7.78	10.57	12.15	10.90	13.99	11.44
Sucrose in total Losses per cent. Sucrose in Cane (A)+(B)+(C)+(D)	16.32	23.55	20.60	19.91	18.67	21.71	21.81	19.75	24.00	20.60	20.91	24.77	19.81	18.22	22.76	17.26	23.13	20.86
FIRST EXPRESSED JUICE—																		
Brix	19.92	17.50	19.44	19.61	19.66	19.84	19.41	19.07	19.58	19.54	19.35	19.94	19.40	19.32	19.32	19.75	20.06	19.47
Purity (apparent)	88.29	85.26	88.80	89.00	88.10	87.14	89.50	87.50	87.69	88.20	88.40	89.90	88.87	87.47	88.90	88.60	88.49	88.18
LAST EXPRESSED JUICE—																		
Brix	2.05	6.44	4.12	3.22	4.36	4.25	3.90	3.64	6.41	5.30	5.69	5.06	5.84	2.11	6.69	3.03	5.11	4.33
Purity (apparent)	74.26	77.50	63.90	78.60	71.10	79.29	79.50	73.90	78.50	79.20	79.10	80.60	81.05	71.92	82.50	81.20	78.87	76.87
Purity drop from First Crusher	14.03	7.76	19.90	10.40	17.00	7.85	10.00	13.60	9.19	9.00	9.30	9.30	7.82	15.55	6.40	7.40	9.62	11.31

MIXED JUICE—

Brix	14.34	14.15	14.17	14.80	15.01	14.30	14.53	14.58	14.36	14.56	14.98	14.68	14.64	13.65	16.04	14.83	14.40	14.57
Purity (Clerget)	85.52	83.34	85.80	85.50	84.95	85.17	86.70(A)	85.20	84.89	85.13	85.39	87.70A	86.07	85.09	86.50	87.00A	85.91	85.43
Reducing Sugar Ratio	2.60	4.35	3.02	—	2.43	2.14	4.17	3.73	2.60	3.60	3.10	2.06	2.50	3.16	3.04	2.48	3.03	3.04
Purity drop from First Crusher.. .. .	2.77	1.92	3.00	3.50	3.15	1.97	2.80	2.30	2.80	3.07	3.01	2.20	2.80	2.38	2.40	1.60	2.58	2.75

CLARIFIED JUICE—

Brix	13.07	13.78	14.04	—	14.42	13.67	14.60	12.29	14.42	12.68	12.83	14.89	12.26	13.56	17.16	14.99	12.85	13.60
Purity (apparent)	90.63	86.00	87.50	—	87.10	87.34	89.30	86.80	86.24	87.30	87.10	87.60	87.56	86.27	88.20	88.60	87.24	87.61
Reducing Sugar Ratio	1.11	3.30	—	—	2.37	1.96	—	3.32	—	2.88	2.93	1.96	2.41	—	2.56	2.21	2.32	2.43
pH	6.95	7.33	7.33	7.40	7.43	—	6.80	7.40	7.02	7.40	7.41	—	7.42	—	—	7.47	6.90	7.27
Ash per cent. Brix	2.38	3.77	—	—	—	—	—	—	—	2.86	3.33	—	—	—	3.40	—	—	3.13
Parts SO ₂ per million of Brix	—	—	—	—	784	—	—	930	—	1.095	907	—	—	—	—	—	—	949

FILTER CAKE—

Per cent. Sucrose	0.60	5.56	3.62	3.83	4.48	4.28	5.50	4.20	3.25	3.41	3.86	5.25	3.36	2.67	6.59	4.37	3.58	3.20
Weight per cent. Cane	10.37	3.62	4.20	3.15	3.66	5.76	4.21	4.50	—	4.40	3.82	3.35	4.10	—	—	4.24	4.29	4.71

SYRUP—

Brix	55.53	49.86	58.85	55.12	49.35	54.47	52.10	57.32	52.32	52.33	53.88	53.21	50.46	55.20	53.36	52.49	51.07	53.66
Purity (apparent)	90.28	85.94	87.60	86.90	86.40	87.11	88.60	86.90	86.74	87.70	87.00	88.10	87.92	86.28	88.30	88.70	87.65	87.53
Reducing Sugar Ratio	1.25	2.82	2.81	—	2.14	1.90	—	2.97	2.44	2.63	2.46	1.71	2.02	—	2.61	2.21	2.31	2.29
pH	6.69	7.20	7.18	7.30	6.99	—	—	7.30	6.95	7.40	7.25	—	—	—	—	7.47	6.82	7.14
Purity drop from First Crusher.. .. .	-1.99	-0.68	1.20	2.10	1.70	0.03	0.90	0.60	0.95	0.50	1.40	1.80	0.95	1.19	0.60	-0.10	0.84	0.65
Purity increase from Mixed Juice	4.76	2.60	1.80	1.40	1.45	1.94	1.90	1.70	1.85	2.57	1.61	0.40	1.85	1.19	1.80	1.70	1.74	2.10
Parts SO ₂ per million of Brix	—	—	—	—	634	—	—	—	—	—	—	—	—	—	—	—	—	—
Ash per cent. Brix	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

FIRST MASSECUITE—

Brix	90.95	93.67	92.41	91.99	93.04	93.16	90.80	94.16	93.98	93.09	93.00	89.90	93.75	91.81	92.12	91.80	93.14	91.50
Purity (apparent)	90.85	76.47	86.90	83.70	79.50	84.53	88.00	82.00	85.91	80.80	77.70	85.30	83.41	82.19	86.70	84.10	83.31	83.60
Purity of Run-off	77.52	57.07	67.30	66.60	55.80	64.09	69.10	59.40	66.89	58.20	57.50	68.20	60.60	62.13	66.80	64.50	64.55	64.30
Cubic feet per ton of Sugar (all Massecuites and Jelly)	54.42	53.52	—	—	50.84	—	59.65	53.63	—	53.30	58.42	—	47.17	—	61.56	—	—	54.29

SECOND MASSECUITE—

Brix	94.92	94.02	96.66	93.81	96.30	93.26	93.00	96.51	94.95	96.74	94.30	92.07	98.04	94.10	95.42	95.40	94.57	95.03
Purity (apparent)	80.25	64.97	71.10	70.00	67.90	72.16	76.20	66.30	72.85	66.90	65.50	72.70	65.10	71.67	66.00	70.60	71.30	70.48
Purity of Run-off	59.51	41.39	48.40	51.80	46.00	52.50	52.80	42.80	49.61	45.40	45.80	55.20	39.68	51.69	45.50	47.50	54.19	49.47

THIRD MASSECUITE—

Brix	97.13	—	97.62	—	96.37	—	93.50	—	95.24	—	—	92.18	98.57	—	—	—	94.81	96.04
Purity (apparent)	67.85	—	60.60	—	62.60	—	62.80	—	62.44	—	—	67.60	54.87	—	—	—	63.60	63.88
Purity of Run-off	47.27	—	41.90	—	42.20	—	41.70	—	40.44	—	—	52.80	36.12	—	—	—	47.91	44.40

JELLY—

Brix	—	—	94.19	90.92	93.76	92.01	—	94.51	94.18	92.58	91.50	90.13	—	90.74	94.28	93.50	—	92.60
Purity (apparent)	—	—	49.00	53.60	45.80	52.35	—	42.90	49.41	45.70	46.50	52.80	—	52.83	45.90	47.50	—	48.64

FINAL MOLASSES—

Brix	85.33	91.21	88.06	84.22	86.55	89.39	89.00	89.96	87.97	88.53	84.88	86.03	91.64	—	85.90	90.60	78.97	86.81
Purity	47.03A	41.39	42.60	45.50	42.30	46.05A	41.70A	41.40	41.84	44.00	44.60	50.00A	36.57	42.90A	43.10A	40.00A	47.26A	43.89
Weight per cent. Cane at 85.0° Brix	2.46	2.88	3.42	—	2.94	3.09	3.12	—	—	2.83	2.88	—	—	—	—	—	—	2.87

POLARISATION OF SUGARS—

White	99.85	—	99.60	—	—	—	—	—	99.70	—	—	—	—	99.80	99.65	—	99.72	99.75
Raw	97.45	97.69	98.24	98.14	97.92	96.00	—	98.70	98.40	98.56	98.49	—	98.71	98.47	97.34	98.19	98.34	98.13
Average of all Sugars	98.98	97.69	99.06	98.14	97.92	96.00	99.47	98.70	98.99	98.56	98.49	98.40	98.71	98.47	98.47	98.19	98.79	98.43
SO ₂ in parts per million	19.90	26.30	39.56	77.00	63.60	—	43.00	59.00	53.76	81.00	70.00	—	89.10	—	30.91	82.00	—	57.26

FACTORY NUMBER 1 2 4 5 6 8 9 10 11 12 14 15 16 18 19 20 21 SEASON

* Other losses reported.

A.—Apparent purity.

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
Reduced 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
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		HAWAII. ²		FORMOSA. ³		
	YEAR	1933.	1934.	1935.	1936.	1934.	1935.	1934.	1935.	1934.	1935.
CANE—											
Per cent. Sucrose	13.88	11.88	13.65	13.30	15.57	15.84	12.80	12.29	14.20	13.73	
Per cent. Fibre	15.78	15.24	15.92	15.01	12.23	12.39	12.62	12.54	11.55	11.45	
JUICES—											
Purity of First Crusher	87.46	86.03	89.35	88.18	89.95	89.83	86.98	86.21	87.72	86.90	
Purity of Mixed Juice	84.92	84.02	86.49	85.43	—	—	84.29	83.41	85.79	84.77	
Purity of last Roller Juice	78.26	76.71	78.05	76.87	78.94	79.80	68.59	67.77	74.14	73.48	
Purity of Syrup	86.57	85.53	88.28	87.53	89.48	89.57	85.64	84.62	86.67	86.25	
Drop in purity Crusher to Mixed Juice	2.54	2.01	2.86	2.75	—	—	2.69	2.80	1.93	2.13	
Drop in purity Crusher to last Roller	9.20	9.32	11.30	11.31	11.01	10.03	18.39	18.44	13.58	13.42	
Drop in purity Crusher to Syrup	0.89	0.50	1.07	0.65	0.47	0.26	1.34	1.59	1.05	0.65	
Increase in purity Mixed Juice to Syrup	1.65	1.51	1.79	2.10	—	—	1.35	1.21	0.88	1.48	
Reducing Sugar Ratio of Mixed Juice	4.01	4.21	2.65	3.04	—	—	—	—	4.55	5.06	
JAVA RATIO											
	77.27	78.66	76.24	77.44	82.78	82.59	81.33	81.77	83.74	83.57	
BAGASSE—											
Per cent. Sucrose	3.71	3.05	3.48	3.40	3.19	3.21	1.41	1.36	1.73	1.76	
Per cent. Moisture	51.62	52.11	51.93	52.76	50.75	50.92	41.47	40.92	38.89	38.91	
EXTRACTION—											
Imbibition % Cane	30.45	30.25	33.04	32.40	—	—	35.07	31.83	25.74	25.45	
Sucrose in Mixed Juice % Sucrose in Cane	90.28	91.07	90.64	91.08	94.46	94.43	97.53	97.57	97.53	97.46	
Reduced Extraction (based on 12.5% Fibre)	92.59	92.90	92.94	92.78	94.32	94.37	97.56	97.58	97.30	97.19	
Primary Juice loss	51.88	49.67	49.43	50.71	39.76	39.39	17.10	16.95	18.92	19.64	
FILTER CAKE—											
Per cent. Sucrose	4.04	3.65	3.69	3.20	—	—	0.83	1.08	2.65	2.14	
Weight % Cane	5.18	5.07	5.01	4.71	—	—	3.68	3.68	1.46	1.46	
FINAL MOLASSES—											
Purity	44.92	42.58	46.00	43.89	39.20	38.33	34.64	34.24	29.63	29.42	
True Purity (from true dry substance and clerget sucrose)	—	—	—	—	48.07	48.55	—	—	—	—	
RECOVERY—											
Sucrose % Cane lost in manufacture	3.27	2.52	2.94	2.71	1.97	1.93	1.29	1.30	1.17	1.19	
Sucrose in Sugar % Sucrose in Cane	76.63	77.59	78.40	79.64	87.37	87.80	89.92	89.43	91.78	91.34	
Reduced Overall Recovery (12.5% Fibre, 85° pur. Mixed Juice)	78.67	80.14	78.76	80.73	—	—	90.32	90.32	91.18	91.20	
Sucrose in Sugar % Sucrose in Mixed Juice	84.88	85.20	86.52	87.44	92.49	92.98	92.17	91.62	94.10	93.72	
Reduced Boiling House Recovery (based on 85° pur. Mxd. Juice)	84.97	86.27	84.74	87.01	—	—	92.58	92.56	93.71	93.84	
YIELD—											
Tons Cane per ton Sugar	9.28	10.67	9.19	9.29	7.21	7.26	8.40	8.81	7.67	7.93	
Tons Cane per ton Sugar of 96° Pol.	9.03	10.40	8.96	9.06	7.01	7.06	8.27	8.68	7.59	7.86	
LOSSES—											
Sucrose in Bagasse % Sucrose in Cane (A)	9.72	8.93	9.36	8.92	5.54	5.57	2.44	2.39	2.47	2.53	
Sucrose in Filter Cake % Sucrose in Cane (B)	—	—	1.37	1.14	0.50	0.60	0.24	0.31	0.27	0.23	
Sucrose in Molasses % Sucrose in Cane (C)	—	—	—	—	5.17	5.33	6.75	7.07	5.24	5.44	
Undetermined Sucrose % Sucrose in Cane (D)	—	—	10.87	10.30	1.42	0.70	0.65	0.80	0.36	0.66	
Sucrose lost in Boiling House % Sucrose in Cane (B)+(C)+(D)	13.65	13.48	12.24	11.44	7.09	6.63	7.64	8.18	5.87	6.33	
Sucrose in Total Losses % Sucrose in Cane (A)+(B)+(C)+(D)	23.37	22.41	21.60	20.36	12.63	12.20	10.08	10.57	8.22	8.66	
SUGAR—											
Average Polarization of all Sugars	98.68	98.45	98.42	98.43	98.74	98.72	97.46	97.44	97.04	96.84	

¹ From the Annual Reports of the Bureau of Sugar Experiment Stations, Queensland. ² From the Hawaiian Sugar Planters' Association Experiment Station.
³ From Association of Sugar Technologists, Formosa, 21st Annual Statement.

Average Manufacturing Results by periods for Natal Sugar Factories Reporting to the Experiment Station, Season 1936-37.

Period ending	JUNE 27th, 1936.	AUGUST 1st, 1936.	AUGUST 29th, 1936.	OCTOBER 3rd, 1936.	OCTOBER 31st, 1936.	NOV. 28th, 1936.	JAN. 2nd, 1936.	SEASON.
Tons of 2,000 lbs. Cane crushed This period To date	425,325 425,325	663,714 1,089,039	584,240 1,673,281	723,468 2,396,749	567,413 2,964,162	471,278 3,445,981	450,088 3,910,881	3,989,532 short tons. 3,619,299 metric tons
Tons of 2,000 lbs. Sugar bagged and estimated.. This period To date	38,702 38,702	66,513 105,215	65,449 170,663	85,517 256,181	65,295 322,107	50,416 373,679	46,875 422,205	429,278 short tons. 389,440 metric tons.
Tons Cane per ton Sugar This period To date	10.99 10.99	9.98 10.35	8.93 9.80	8.46 9.36	8.61 9.20	9.35 9.22	9.60 9.26	9.29
Tons Cane per ton of Sugar calculated as sugar of } This period 96° Pol } To date	10.69 10.69	9.72 10.08	8.71 9.55	8.25 9.12	8.40 8.97	9.13 8.99	9.37 9.03	9.06
Sucrose per cent. Cane This period To date	11.90 11.90	12.67 12.37	13.81 12.87	14.39 13.33	14.13 13.48	13.11 13.43	12.64 13.34	13.30
Fibre per cent. Cane This period To date	15.83 15.83	15.65 15.72	14.87 15.42	14.58 15.17	14.60 15.06	14.56 14.99	15.10 15.01	15.01
Java Ratio This period To date	78.19 78.19	77.65 77.92	77.71 77.88	77.90 77.87	77.06 77.69	78.03 77.74	75.36 77.47	77.44
Sucrose per cent. Bagasse This period To date	3.26 3.26	3.26 3.26	3.49 3.34	3.57 3.41	3.48 3.47	3.37 3.41	3.12 3.38	3.40
Moisture per cent. Bagasse This period To date	52.68 52.68	52.65 52.67	52.66 52.67	52.58 52.64	52.99 52.71	53.05 52.75	53.24 52.81	52.76
Imbibition per cent. Cane This period To date	34.38 34.38	35.29 34.98	32.83 34.23	32.38 33.67	31.47 33.26	30.28 32.79	30.71 31.74	32.40
Extraction This period To date	89.91 89.91	90.64 90.37	91.23 90.46	91.56 90.97	91.55 91.09	91.23 91.10	91.64 91.11	91.08
Recovery on Mixed Juice This period To date	83.93 83.93	86.01 85.23	87.49 86.30	88.28 86.80	88.40 87.12	87.96 87.26	88.82 87.45	87.44
Overall Recovery This period To date	75.47 75.47	78.00 77.02	79.81 78.07	80.83 78.97	80.93 79.36	80.25 79.49	81.39 79.68	79.64
Purity of Mixed Juice This period To date	83.28 83.28	84.48 84.03	85.40 84.32	86.32 85.12	86.53 85.40	85.90 85.52	84.92 85.48	85.43
Reducing Sugar Ratio This period To date	4.40 4.40	3.34 3.29	3.03 3.05	2.72 2.95	2.34 2.76	2.50 2.60	3.03 3.00	3.04
Purity of Syrup This period To date	85.27 85.27	87.76 86.07	86.66 86.62	88.38 87.16	88.73 87.49	88.39 87.61	87.25 87.58	87.53
Sucrose in Filter Cake This period To date	2.67 2.67	2.80 2.75	3.16 2.89	3.35 3.10	3.46 3.20	3.13 3.08	3.12 3.09	3.20
Purity of Final Molasses This period To date	42.27 42.27	42.72 42.61	43.53 42.77	43.59 43.11	44.13 43.54	44.43 43.68	44.14 43.56	43.89
Average Polarization of Sugar This period To date	98.73 98.73	98.54 98.61	98.39 98.53	98.42 98.49	98.39 98.47	98.33 98.45	98.38 98.44	98.43
SO ₂ in Sugar p.p.m. This period To date	50.17 50.17	66.00 57.48	57.07 56.22	59.74 57.32	66.57 64.90	67.55 67.50	56.68 57.61	57.26

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).—(Continued)

COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	YIELD OF CANE IN TONS.									
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.
PORT SHEPSTONE..	37,421	34,891	48,662	54,068	68,770	60,231	81,823	64,018	67,974	59,259
UMZINTO	308,038	319,105	470,723	498,795	449,410	486,803	638,701	598,308	611,231	553,401
DURBAN AND PINETOWN	102,218	102,218	123,231	135,604	164,849	136,979	159,020	138,096	185,118	137,805
Total South of Umgeni River	445,814	456,214	642,616	688,467	683,029	684,013	879,544	800,422	864,323	750,465
Ratio to 1926 (= 100)..	100.0	102.3	144.1	154.4	153.2	153.4	197.3	179.54	193.9	168.3
INANDA	328,554	340,501	351,677	415,176	414,466	375,763	455,816	504,540	618,853	672,954
LOWER TUGELA	499,583	468,315	654,828	684,601	873,467	648,693	754,022	829,067	1,012,784	1,033,633
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	1,706,587
Ratio to 1926 (= 100)..	100.0	97.6	121.5	132.8	155.5	123.7	146.1	161.00	197.0	206.1
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	2,457,052
Ratio to 1926 (= 100)..	100.0	99.3	129.4	139.3	154.7	134.1	164.0	167.51	195.9	192.9
MTUNZINI	332,465	326,502	354,523	349,925	434,124	331,561	360,130	353,287	414,821	403,121
ESHOWE	52,578	57,882	91,866	74,203	146,256	109,525	105,836	120,099	130,104	128,191
LOWER UMFOLOZI	523,629	456,517	484,622	519,332	580,925	426,516	525,498	582,636	489,547	496,591
HLABISA	—	51,470	64,768	66,184	110,840	59,657	74,379	80,552	63,866	50,529
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	1,078,432
Ratio to 1926 (= 100)..	100.0	98.2	109.6	111.1	140.0	102.0	117.3	125.08	120.9	118.7
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	3,535,484
Ratio to 1926 (= 100)..	100.0	98.8	121.1	128.2	148.6	120.8	144.6	149.85	164.7	162.0

ERRATA

Certain figures in table appearing on page 54 (opposite) are in error and the corrections are indicated by the italicized figures shown in the extract below :

Extraction .. .. .	..	..	..	..	..	This period	89.91	90.64	91.23	91.56	91.55	91.23	<i>91.27</i>	
						To date	89.91	90.37	90.46	90.97	91.09	91.10	91.11	91.08
Overall Recovery .. .. .	..	..	..	..	..	This period	75.47	78.00	79.81	80.83	80.93	80.25	<i>81.07</i>	
						To date	75.47	77.02	78.07	78.97	79.36	79.49	79.68	79.64

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

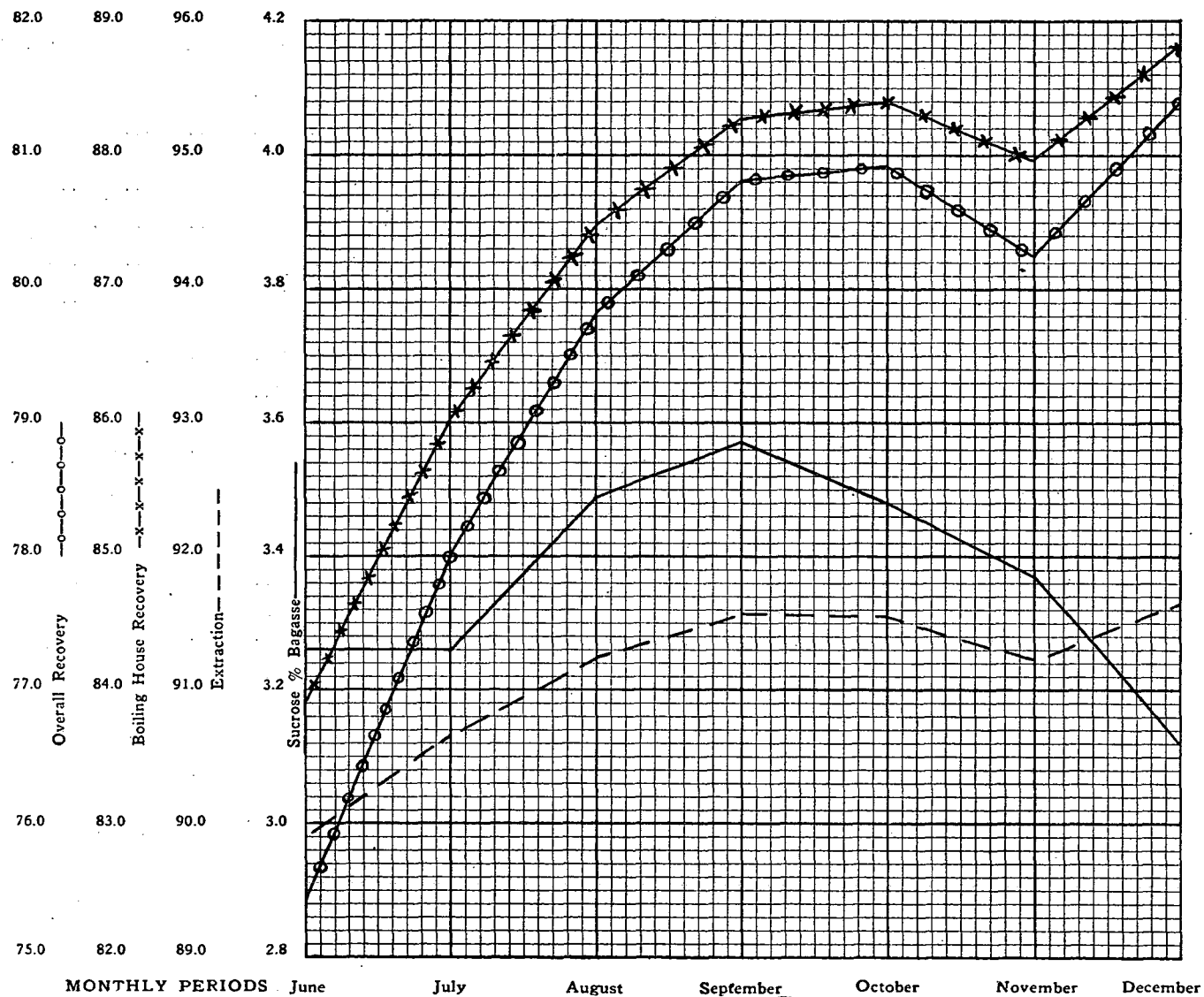
COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	TONS CANE PER ACRE.									
	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.	1934.	1935.
PORT SHEPSTONE..	17.68	16.72	19.98	17.40	18.60	18.80	19.57	20.47	16.34	14.78
UMZINTO	17.74	17.57	19.33	20.10	22.30	20.80	22.24	21.68	20.69	18.20
DURBAN AND PINETOWN	21.39	19.49	22.64	24.80	26.77	22.90	21.75	23.00	23.34	20.27
Total South of Umgeni River	18.44	17.89	19.77	20.60	22.76	21.00	21.87	21.79	20.76	18.21
Ratio to 1926 (= 100)	100.0	97.00	107.20	111.70	123.40	114.10	118.60	118.17	112.58	98.75
INANDA	16.72	16.79	18.45	20.50	22.01	19.20	20.14	22.80	25.90	26.76
LOWER TUGELA	20.10	19.02	20.08	20.80	22.12	18.20	18.36	19.45	21.62	20.83
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	22.83
Ratio to 1926 (= 100)	100.00	96.80	104.70	111.10	118.10	100.00	102.00	110.64	123.97	122.68
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	21.19
Ratio to 1926 (= 100)	100.00	96.90	105.60	111.30	120.30	104.60	108.40	113.37	119.73	114.23
MTUNZINI	22.39	21.16	20.84	20.70	22.53	18.10	17.55	18.40	19.56	18.75
ESHOWE	22.55	20.88	22.76	20.60	20.22	18.90	16.69	17.47	17.95	17.64
LOWER UMFOLOZI	25.00	22.57	22.99	21.60	23.83	18.00	18.63	19.84	17.93	18.28
HLABISA	—	16.93	18.58	17.80	19.55	14.60	16.17	17.31	14.79	12.72
Total North of the Tugela (Zululand) .	23.83	21.50	21.83	20.92	22.50	17.90	17.86	18.91	18.28	18.00
Ratio to 1926 (= 100)	100.00	90.20	91.60	87.80	94.40	75.20	74.95	79.35	76.71	75.54
GRAND TOTAL FOR NATAL (including Zululand)	20.44	19.28	20.38	20.75	22.39	18.90	19.29	20.24	20.84	20.10
Ratio to 1926 (= 100)	100.00	94.30	99.70	101.50	109.50	92.60	94.40	99.02	101.96	98.34
Average Rainfall of all Districts (inches)	—	—	—	48.94	38.74	29.86	51.07	31.89	46.62	43.40

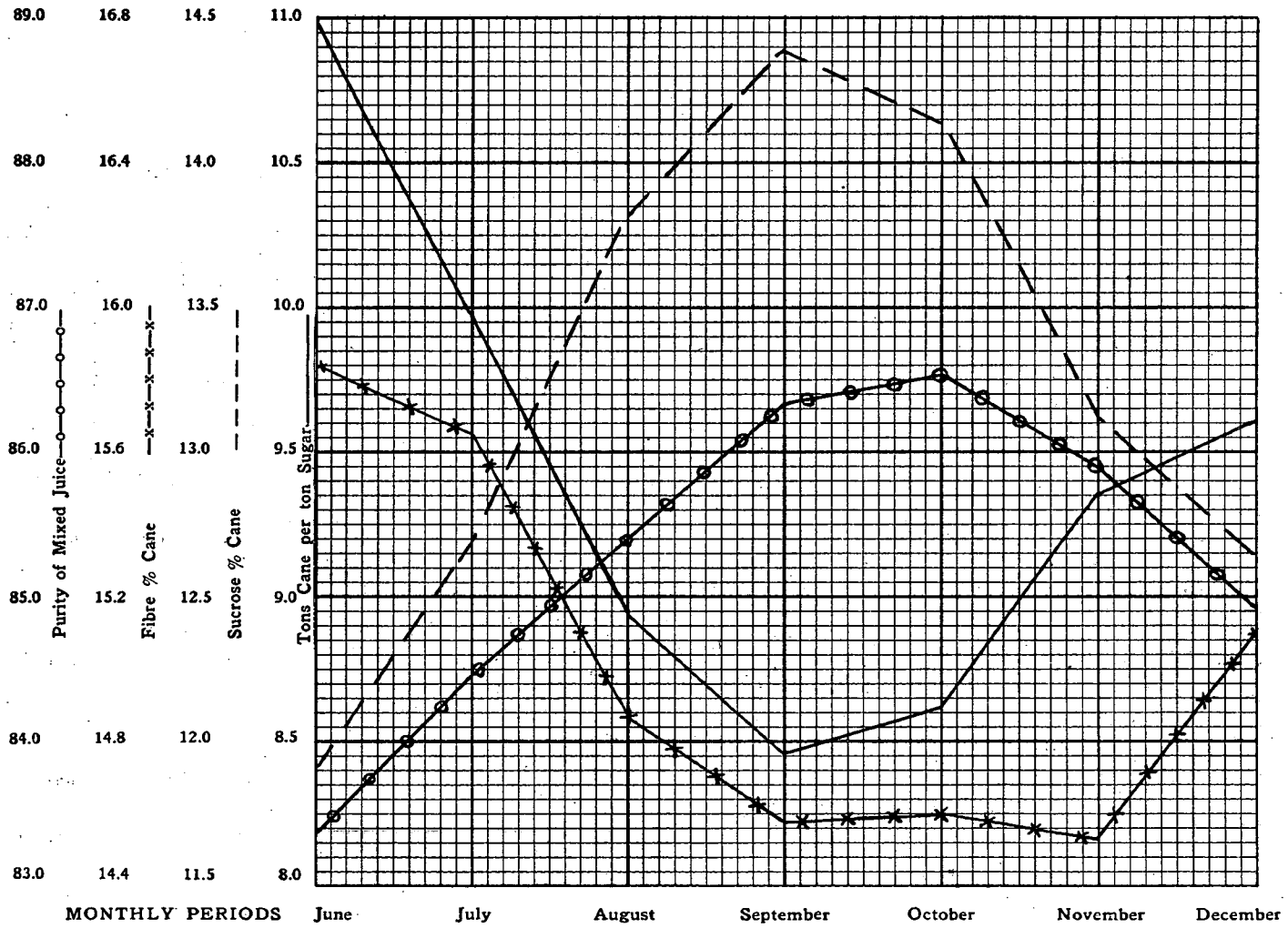
AREA OF CANE HARVESTED AND YIELDS BY DISTRICTS (EUROPEAN PLANTERS ONLY).—(Continued).
COMPILED FROM UNION DEPARTMENT OF CENSUS RETURNS.

DISTRICT.	TONS CANE PER ACRE, 1935.		PERCENTAGE OF NON-UBA CANES UNDER CULTIVATION.			ACREAGE UNDER CULTIVATION.					
	Uba.	Non-Uba.	1933.	1934.	1935.	PLANT CANE.			FIRST RATOON.		
						Uba.	Non-Uba.	Non-Uba % of Total	Uba.	Non-Uba.	Non-Uba % of Total
PORT SHEPSTONE	14.54	21.60	0.3	4.4	19.5	894	1,628	64.6	1,838	158	7.9
UMZINTO	17.78	25.12	2.4	10.3	23.4	3,156	12,796	80.2	8,228	1,917	18.9
DURBAN AND PINETOWN	20.22	21.26	2.1	12.1	30.2	782	3,445	81.5	1,349	386	22.2
Total South of Umgeni River..	17.86	24.29	2.2	10.0	24.0	4,832	17,869	79.5	11,415	2,461	17.7
Ratio to 1926 (= 100).. .. .	96.9	131.7	—	—	—	—	—	—	—	—	—
INANDA	26.11	32.39	5.1	14.3	24.6	3,593	8,218	69.6	10,021	2,770	21.7
LOWER TUGELA	20.45	24.27	4.2	16.5	32.3	6,055	25,528	80.8	22,472	6,438	22.3
Total for North Coast between Umgeni and Tugela Rivers..	22.35	27.06	4.5	15.8	29.9	9,648	33,746	77.8	32,493	9,208	22.1
Ratio to 1926 (= 100).. .. .	120.1	145.4	—	—	—	—	—	—	—	—	—
Total for Natal South of the Tugela (excluding Zululand)	20.70	26.44	3.6	13.6	27.8	14,480	51,615	78.1	43,908	11,669	21.0
Ratio to 1926 (= 100).. .. .	111.6	142.5	—	—	—	—	—	—	—	—	—
MTUNZINI	18.31	24.91	3.4	16.4	31.0	3,755	11,342	75.1	9,460	1,767	15.7
ESHOWE	17.08	33.57	2.1	8.7	22.1	1,228	3,042	71.2	2,290	275	10.7
LOWER UMFOLOZI	17.07	28.13	7.2	20.0	40.6	2,018	18,192	90.0	9,014	3,642	28.8
HLABISA	11.54	28.27	4.4	17.2	34.5	559	2,400	81.1	1,121	363	24.4
Total North of the Tugela (Zululand)	17.15	27.47	5.1	17.2	34.5	7,560	34,976	82.2	21,885	6,047	21.6
Ratio to 1926 (= 100).. .. .	72.0	115.3	—	—	—	—	—	—	—	—	—
GRAND TOTAL FOR NATAL (including Zululand)	19.49	26.78	4.2	14.9	30.1	22,040	86,591	79.7	65,793	17,716	21.2
Ratio to 1926 (= 100).. .. .	95.4	131.0	—	—	—	—	—	—	—	—	—
Average Rainfall of all Districts (inches)	43.40	43.40	—	—	—	—	—	—	—	—	—

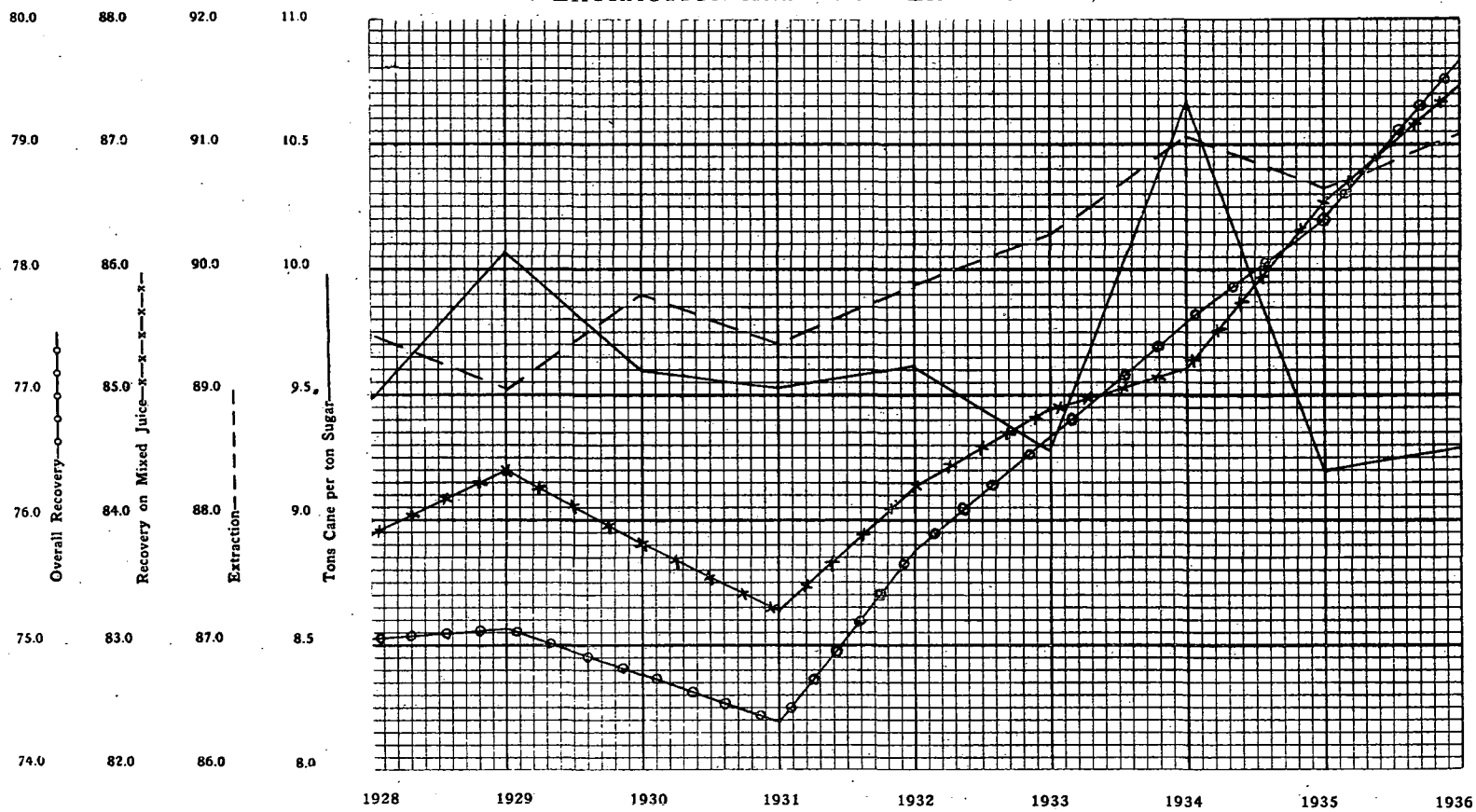
MONTHLY AVERAGES FOR NATAL SUGAR FACTORIES
SEASON 1936/37.



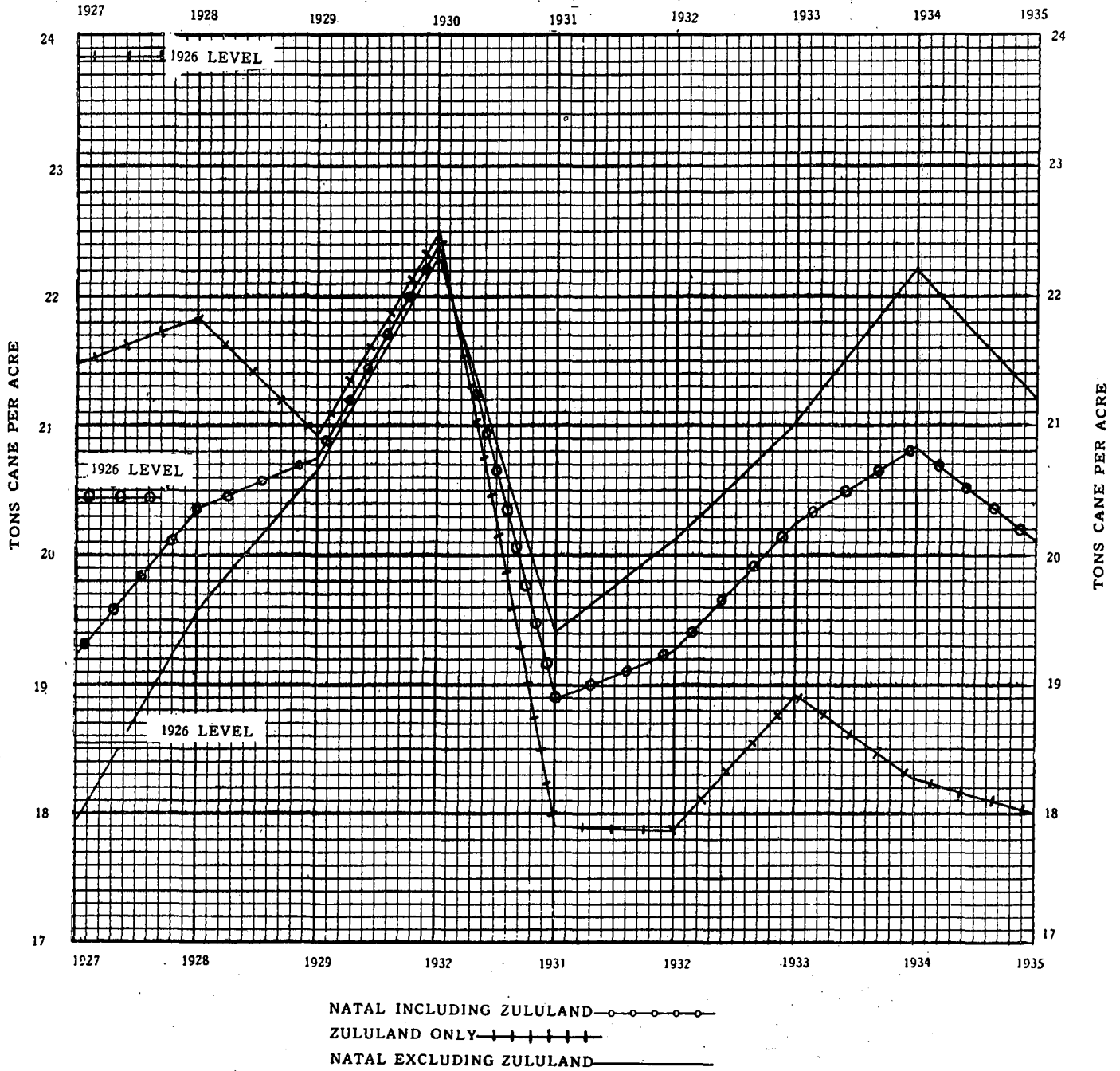
**MONTHLY AVERAGES FOR NATAL SUGAR FACTORIES,
SEASON, 1936/37.**



EXTRACTION AND RECOVERY FIGURES, 1928 to 1936.



YIELD OF CANE IN TONS PER ACRE OVER RECENT YEARS (European Planters).



The PRESIDENT: As in previous years, Mr. Dodds has given us some very interesting facts and figures. The Report is now open for discussion.

Mr. MOBERLY: There is a point I raised, I think, last year, in connection with rainfall returns, which, I said at the time, would have been very useful if they had been given, as well as on the ordinary annual basis from January to December, also for the growing period of the cane, say from the time of planting till a year later. I think it would give a better reflection of the effect of rainfall on the cane. I don't know if it would be difficult to get figures in that form, but I think it would be a very good thing to do. It would be a good thing if the rainfall for individual districts could be shown. It would give us an opportunity of ascertaining some of the fluctuations between district and district.

Mr. DODDS: With regard to Mr. Moberly's remark, you may remember that last year Mr. Beater went into the matter of rainfall records. In his paper, summarising rainfall records for the past 12 years, he showed that it made no appreciable difference to the rainfall seasonal record whether the annual total was made in July or January. The rainfall records for districts and general annual weather report are issued from the Experiment Station in the early part of the year. I have often wondered whether it was of sufficient interest to make a paper for this Annual Conference, but decided that on the whole it was perhaps not, and that it was preferable to publish it earlier, when the matter was still of more recent interest but all the figures of the districts are on record, and can be inserted in any of these tables, if desired.

Mr. MOBERLY: Arising out of that, there is a new interest in these district rainfall returns now, because under the new Agreement, it is necessary for Mill Group Boards, at the beginning of each season, to make some sort of estimate of the amount of cane they are going to require for making each ton of sugar, and that has to be done in April, before the first sucrose figures are out. Well, we have been trying to make such a study, in my office, of the effect of the distribution of rainfall in the early part of the year on the general sucrose level. The work was not really plotted, but only begins to show that some sort of prophecy can be made, roughly, of the general sucrose level, based on the distribution of rainfall over those months immediately preceding the crop. It is not actually possible to predict very closely in April, but we find that we can say this, that with a certain percentage of the rain falling in May, it is probable that the crop average of sucrose will be reached, say, during the third week in July. I don't know whether that is the figure. And with another percentage of rain in April and a small percentage of rain, say, in May, we find that the week in which the crop level is reached moves to a different point. There is a cer-

tain degree of error in that, but it does give a possibility of estimating fairly early in the season what the final level of sucrose is to be, and therefore a guide to the final level of cane to sugar. This is a matter of very great importance indeed to the Industry now, that the Mill Group Board should be able to make some sort of estimate. It is true those are available in the Sugar Journal, but if they could be tabulated, even perhaps if it is too late to be included here, the fall could be tabulated by the Experiment Station and distributed to Mill Group Boards from time to time during the season, it would be a guide to them in making these very important estimates.

Mr. BECHARD: On the various points raised by Mr. Moberly just now, I quite agree with him about the rainfall distribution as from the rainy period as against the calendar year. While I quite agree with Mr. Dodds also, on the point that the calendar months in the rain year give you the same average, at the same time, making them year by year, you very often explain every short crop if you take that particular year by itself. It certainly makes no difference at all as far as average rainfall for a particular district is concerned. We have returns at Amatikulu for the last 25 or 26 years, tabulated by the calendar year and for the rain year. But perhaps what throws more light on the yield of cane per acre is the cumulative rainfall for the preceding 20 months before the beginning of the crop.

On the point of sucrose-bearing cane, that point has also been considered by me, and the thing that struck me very forcibly was the work done by Mr. Beater last year on the hours of sunshine, which is about the best graph one could get—sucrose per cane. It is a most remarkable correlation between the hours of sunshine and sucrose per cent. cane, so much so that I am hoping that more work may be done on those lines.

Mr. DODDS: Two or three years ago, in this Annual Summary, we prepared a graph showing the relation between the distribution of rainfall in the first few months of the year and the sucrose content of the cane during the season, and we were able to show a remarkably close relation between the two over a number of years. However, for the one or two following years, the relations were not nearly so consistent. The reports of weather conditions compiled at the Experiment Station are distributed to all persons whom we believe to be interested, and are published in the Sugar Journal, but if any other people would like to have copies, as Mr. Moberly suggests, we would be glad to add them to the list. The record of the amount of sunshine is important, as Mr. Bechard points out, but it is not only a matter of actual sunshine, but of temperature also, and records have been taken in other countries in which the growth of cane has been measured under various

temperature conditions. The general conclusion arrived at is that at temperatures below 70°, very little growth of cane may be expected, no matter how favourable the rainfall and sunshine conditions may be, but growth begins about 70°F. and is very active at temperatures above 75. That was worked out in Australia, and also in Hawaii, and no doubt in other countries also. I hope we will be able to do some growth measurements of sugar cane here, within the next year or two, in correlation with the temperature and sunshine records.

Mr. BOOTH: I see reference to the sugar we would have made had we crushed in August, September, and October. It still remains to decide whether it is advantageous to restrict our crop for three months. Some eight years ago the question of restriction of the months of crushing was drawn up, and I think it was pretty conclusively shown that the labour position was such that it was practically impossible to confine crushing to three months. Such a question is accentuated when you come to reckon with the eight-hours Bill that is coming on soon.

The next item upon which I wish to remark is with reference to your own statement, Mr. President, in your address, regarding the distribution of costs in the production of sugar. It is enlightening now to find, in the Appendix, that the Director tells us that the average yield of non-Uba Canes is 27.78 tons, as against 19½ Uba. I think a lot could be done by the Efficiency and Costing Committee to which you refer yourself, in the other distribution of manufacturing costs.

The third item I would mention is the parenthetical remark of Mr. Dodds when he referred to the possible high efficiency, or high overall recovery of Natal attaining the figure of Hawaii. This is an old song, and I wish simply to say that it is unduly optimistic. With all due deference to Mr. Macbeth, I cannot believe it. I also have talked with different people from Hawaii, and I believe the climatic conditions are so different that Natal will never be able to compare with Hawaii. We do not get the freezing cold in the mornings and the heat in the afternoons. I do not think that we can ever attain the overall recovery such as they get in Hawaii.

Mr. DODDS: The desirability of the restriction of the period of crushing has been discussed many times at our Annual Conferences, so I have not entered into it much this time, but I have contented myself with merely calling attention to the loss that undoubtedly does occur every year, by premature harvesting, and sometimes by harvesting too late. I realise there are many factors involved, and that all one can do is to urge people to do their best, for their own sake; to concentrate crushing, as far as possible, into the peak of the season,

when the cane is at its highest maturity, sucrose content and purity, and lowest fibre content.

With regard to the distribution of costs, that, of course, is a matter for the financial authorities of the Industry to consider, but one has to bear in mind that there is also the potential influence of these new varieties of cane on costs of manufacture in the factory, as well as production in the field. That would no doubt be taken into account.

I did not mean in my little parenthesis, that we should ever attain the records of Hawaii, and other countries favoured climatically, in their yield of cane or sugar per acre. When we consider our long, cool, dry season, which inhibits the growth of cane, we can never hope to get the annual yields that tropical countries do, even with irrigation. However, our climate does, at all events, promote a high sucrose content of cane and high purity. That, of course, is a great natural asset to the manufacturer, and should enable him, if he has the most suitable plant and experience of dealing with the new varieties, to get a very high efficiency. I confidently look forward to that time, although, no doubt, we shall find unanticipated difficulties to overcome, under the new conditions.

Mr. BIJOUX: Could Mr. Dodds give us any information as regards the percentage of molasses? If the percentage of molasses could also be included in this comparative table, it would also help us a great deal.

Mr. DODDS: That is so. As Mr. Bijoux points out, we have on several previous occasions called attention to this important omission in our records. We cannot classify losses of sucrose in manufacture properly, because so many of our factories are not able to give a reliable return of the amount of molasses produced, that we cannot give a general average for the whole. Therefore the loss of sucrose in molasses has to be included in the summary in the undetermined losses. That is an unfortunate defect in these reports that we cannot very well rectify until more factories—in fact nearly all factories—are prepared to give us an accurate record of the amount of molasses made. This year also, there are as many as nine factories that do not record any weight of final molasses.

The PRESIDENT: I have very much pleasure in calling upon Mr. Rault to propose a vote of thanks to Mr. Dodds for his paper.

Mr. RAULT: I am sure that all of us here have appreciated very much indeed the informative and interesting Report that Mr. Dodds, and his collaborator, Mr. Christianson, has issued to us. As you see, it is a mass of figures. It takes a long time to prepare them, and year by year the amount of work is increasing at the Experiment Station,

for which we are grateful indeed to Mr. Dodds. We do not at all feel that he is monopolising this Conference; on the contrary, we would like the Experiment Station to monopolise more by the supply of such information as this. I am also sure that Mr. Dodds must have been extremely pleased by the discussions that have arisen out of the information that he has given to us, and being the

next neighbour to him, I can testify to the amount of work that is being carried out at the Experiment Station every year, and it has become year by year of the greatest value to the Industry. In asking you to give a vote of thanks to Mr. Dodds and his collaborator, I am sure you do it with a hearty round of applause. (Applause).