

# Annual Synopsis of Chemical Laboratory Reports from Natal Sugar Factories, Season 1928

By H. H. Dodds and Donald McRae

The following paper was read by Mr. McRae:--

Fourteen factories have reported, the same number as last year. One of those which reported last season (No. 19) has failed to do so this year, while another has presented a report for publication for the first time. The latter factory is shown under No. 2 in place of the factory under this number in recent years which is now dismantled.

This is the only change in identity of the numbers. The estates catered for by the former No. 2 now send their cane to factory No. 5, which has come into operation again after the lapse of a year.

It should be understood that the numbers assigned to the various factories have never been in any sequence of manufacturing results, but ten factories which originally reported for our first annual synopsis after the 1925 season were then arranged in order of sucrose content of cane, and other numbers have been allotted to each factory as it came into co-operation for our periodical reports.

The writers fully realize that these reports would be of much greater interest and value if the names of the various factories were given, but there is still a small minority of manufacturers who will only supply reports on condition that their names are not published.

There are two factories known to have complete chemical control that have not supplied us with figures for the past season, besides which there are seven small factories having more or less incomplete chemical control.

However, the statistics we are enabled to offer represent 83.3 per cent. of the total output, a proportion that has steadily increased year by year since our annual summaries were begun.

Year.	No. of factories reporting.	No. of factories in operation.	Per cent. of total output of sugar represented in these reports.
1925 . . . . .	11	25	60.4
1926 . . . . .	13	23	73.3
1927 . . . . .	14	21	81.0
1928 . . . . .	14	25	83.3

The total output of sugar for the past season (296,000 tons) shows that the increase recorded every year since 1924 has been well maintained and there is every indication that by next year the 300,000 ton mark will be well overtaken given even a moderately good season.

It is early yet to say what proportion of the world's output this will be, but the last four years have seen a small steady increase in proportion of the world's output of cane sugar.

Year.	Natal output in tons.	World's output of cane sugar in tons.	Natal's percentage of total.
1924/25 . . . . .	161,250	15,627,767	1.03
1925/26 . . . . .	239,851	16,286,406	1.47
1926/27 . . . . .	242,662	16,057,220	1.51
1927/28 . . . . .	247,273	16,089,745	1.54
1928/29 . . . . .	296,000	—	—

Taking the relative increase in the world's beet sugar output over the past few years, the percentage of the whole of the world's sugar output (including both cane and beet) made in South Africa remains very constant at almost exactly 1 per cent.

It was pointed out last season that the increase in sucrose per cent. cane and lower ratio of cane to sugar was largely accounted for by the very irregular rainfall of 1927 and abnormally low rainfall during the crushing season.

These conditions were accentuated during the year 1928, which was one of the driest years on record over the greater part of the sugar belt.

The rainfall for the year at Mount Edgecombe was 27.56 inches, or only 69.5 per cent. of normal. During the months of the crushing season, May to November, the total rainfall was 10.78 inches, or only 62 per cent. of normal, while for the four months from April to July a total of only 2.18 inches, or 31 per cent. of normal was recorded.

As in the previous year the scanty rainfall during the crushing season led to unusually high values of sucrose, but in 1928 the drought was so pronounced as to affect very adversely the purity of the juice, which showed the unusually low average for this country of only 83.8 for mixed juice during the July period.

This had its effect in the boiling-house recovery which was unusually low in the drought-stricken areas in the early part of the season.

It was also very unfortunate for planters, much of the cane being below the standard of purity of juice for rejection under the Fahey conference agreement, but had to be cut prematurely to save the life of the roots.

The drought, however, did not extend over the whole of the sugar districts, and the portion north of Inyoni of the Zululand area of Natal enjoyed excellent weather conditions until after the end of the crushing season.

For this reason it is difficult to compare the performances of the different factories, those in the older portions of Natal having to contend not only with low purities, but in certain cases with actual shortage of water for manufacturing purposes.

No. 1 factory, however, although within the very drought-stricken Inanda division, still managed to maintain its lead in over-all recovery (78.40) by virtue of its high extraction (93.72), although surpassed by many factories in boiling-house recovery. This factory shows an average sucrose per cent. of bagasse for the season of only 2.79.

No. 5 factory, after a slow beginning, due to difficulties connected with starting up a new plant, maintained from July onwards a crushing rate of 74 to 78 tons of cane per hour associated with an extraction up to the average and the only boiling-house efficiency of over 100.

No. 6 factory in the Zululand area had an excellent season, being supplied with a quality of cane much above the average, and attaining an over-all recovery of 78, only surpassed by factory No. 1. The ratio of the cane to sugar, 8.7, is the lowest recorded in Natal, showing the record figure of 8.0 for the September period.

No. 7 factory again shows the highest boiling-house recovery for the season (87.03) and the highest Java Ratio.

Factories Nos. 8, 9 and 11, all within the South Coast area, show relatively low recoveries associated with the low juice purities of this drought-stricken district. One of these factories was also much hampered by an actual shortage of water for factory use.

The ratio of cane to sugar for the season shows another progressive fall as a result of increased sucrose content of cane and recovery.

As in previous years, however, there is a marked variation in this figure between the middle of the season and the earlier and later portions.

Thus, if the 144,981 tons cane crushed last season in May with a ratio as high as 10.54 had been spread evenly over the months of August, September and October with an average ratio of 9.06, it is evident that 16,000 tons of sugar would have been obtained from it instead of 13,750, an increase of over 16 per cent. in yield—in other words, 2,250 tons of sugar were lost through harvesting this cane in May instead of later in the season.

It is realised that during the past abnormally dry season much cane was cut early because it would not have survived to the later part of the season, but in ordinary years all the cane would very well keep and improve on keeping both in maturity and even in weight.

Even June harvesting is too early for the most efficient results. If the 273,155 tons of cane cut in June when the ratio of 9.83 prevailed had been distributed equally over the months of August, September and October with an average ratio of 9.06 a yield of sugar of 29,372 tons of sugar instead of 27,788 would have been obtained, a clear gain of 5.7 per cent., or 1,584 tons of sugar.

Evidently it behoves the industry to make special efforts to concentrate the harvesting and crushing season as far as possible in the months from July to November.

Not only is the sucrose content of the cane much better in normal seasons during the months mentioned, but the purity is higher, resulting in better boiling-house and over-all recoveries, and the content of fibre in the cane is at its lowest.

The mill extraction for the season recently closed is better than the preceding year, but not so good as in the 1926 season. However, the over-all recovery (75.06) is considerably higher than that of any previous year, largely due to much improved boiling-house work.

Although several factories formerly making mill white sugars are now making raws, the average polarization of all sugars made is still up to 98.00, only a fraction lower than last year and appreciably higher than in 1926.

In discussing the increased sucrose content of cane for the 1927 season in last year's report, we stated that it would probably be found that there would be a further fall in yield of cane per acre.

The statistics since issued by the Department of Customs show this to have been the case, the average cane tonnage per acre being 19.28, with a sucrose yield per acre of 1.92 tons, compared with 20.4. This is equivalent to an annual yield of only 0.96 tons of sugar per acre per annum, since the great majority of our cane fields are harvested in alternate years.

An analysis of the area harvested and yield of cane by districts reveals that the Zululand district of Natal suffered the greatest effects of the drought in 1927, the average yield of cane in that area being diminished by 2.3 tons from 1926 to 1927, whereas the average for the rest of Natal showed a fall of only 0.6 tons, the yields per acre for the Umzinto and Inanda divisions showing no appreciable drop at all.

Nevertheless, the Zululand area still maintains a considerable advantage in cane per acre over the rest of Natal, especially the Lower Umfolozi division, which again gives the highest average yield, although surpassed in actual tonnage in the 1927 season by the Lower Tugela division.

For that season the Inanda division no longer shows the lowest yields, that honour on this occasion being usurped by Port Shepstone; but since the latter division has a total output of only 35,000 tons of cane, representing 1.6 per cent. of the total for the country, this change is perhaps not of any great moment.

The records do not reveal any considerable extension of the sugar growing areas. The acreage under cane in Zululand relative to the total area for Natal shows an increase from 35.7 per cent. to 37.1 per cent., and the South Coast acreage has increased from 22.6 per cent. to 22.8 per cent. of the whole, both increases of course at the expense of the remaining North Coast area, which has decreased from 41.7 per cent. of the whole to 40.1 per cent.

The relative increase in area in Zululand may be mostly accounted for by land in the Hlabisa district, north of Umfolozi, now producing cane for the mills.

Unfortunately the statistics for area of cane and tonnage harvested in the 1928 season are not yet available, but the results no doubt will show that Zululand has increased its ascendancy in yields over the rest of Natal, the droughts of the early part of the season having prevailed only to the south of Inyoni, as already stated.

In general the factory records for the 1928 season show that the sustained improvement in output and efficiency of the last few years has been well maintained, but that much still remains to be done to get the maximum results from the natural resources of our sugar industry.

Experiment Station,  
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March, 1929.



DISTRICT.	Acreage Harvested.		Per cent. of Total Area.		Yield of Cane in Tons.		Per cent. of Total Tonnage		Tons Cane per Acre.	
	1926	1927	1926	1927	1926	1927	1926	1927	1926	1927
Port Shepstone .. .. .	2,116	2,087	2.0	1.9	37,421	34,891	1.7	1.6	17.68	16.72
Umzinto .. .. .	17,367	18,162	16.3	16.2	308,038	319,105	14.1	14.8	17.74	17.57
Durban and Pinetown.. .. .	4,691	5,245	4.4	4.7	100,355	102,218	4.6	4.7	21.39	19.49
<b>Total South of the Umgeni River..</b>	<b>24,174</b>	<b>25,494</b>	<b>22.6</b>	<b>22.8</b>	<b>445,814</b>	<b>456,214</b>	<b>20.4</b>	<b>21.1</b>	<b>18.44</b>	<b>17.89</b>
Inanda .. .. .	19,646	20,284	18.4	18.1	328,554	340,501	15.1	15.8	16.72	16.79
Lower Tugela .. .. .	24,857	24,620	23.3	22.0	499,583	468,315	22.8	21.7	20.10	19.02
<b>Total, North Coast, between Umgeni and Tugela Rivers.. .. .</b>	<b>44,503</b>	<b>44,907</b>	<b>41.7</b>	<b>40.1</b>	<b>828,317</b>	<b>808,816</b>	<b>37.9</b>	<b>37.5</b>	<b>18.61</b>	<b>18.01</b>
<b>Total for Natal South of the Tugela (excluding Zululand) .. .. .</b>	<b>68,677</b>	<b>70,398</b>	<b>64.3</b>	<b>62.9</b>	<b>1,273,951</b>	<b>1,265,030</b>	<b>58.3</b>	<b>58.6</b>	<b>18.55</b>	<b>17.97</b>
Mtunzini .. .. .	14,846	15,432	13.9	13.8	332,465	326,502	15.2	15.1	22.39	21.16
Eshowe .. .. .	2,332	2,812	2.2	2.5	52,578	57,882	2.4	2.7	22.55	20.58
Lower Umfolozi .. .. .	20,948	20,226	19.6	18.1	523,629	456,517	24.0	21.2	25.00	22.57
Hlabisa .. .. .	..	3,041	..	2.7	..	51,470	..	2.4	..	16.93
<b>Total North of the Tugela (Zululand)</b>	<b>38,126</b>	<b>41,511</b>	<b>35.7</b>	<b>37.1</b>	<b>908,672</b>	<b>892,371</b>	<b>41.6</b>	<b>41.4</b>	<b>23.83</b>	<b>21.50</b>
<b>Grand Total for Natal (including Zululand)</b>	<b>106,803</b>	<b>111,909</b>	<b>100.0</b>	<b>100.0</b>	<b>2,182,623</b>	<b>2,157,401</b>	<b>100.0</b>	<b>100.0</b>	<b>20.44</b>	<b>19.28</b>

### YIELDS OF CANE AND SUGAR PER ACRE FOR RECENT YEARS.

SEASON .. .. .	1924.	1925.	1926.	1927.
Acreage reaped.. .. .	92,695	109,362	114,279	128,734
Cane harvested.. .. .	1,729,344	2,638,000	2,335,406	2,482,000
Tons cane per acre .. .. .	18.66	24.12	20.44	19.28
Tons of sugar produced .. .. .	161,250	239,851	242,662	247,273
Tons cane per ton sugar .. .. .	10.73	11.00	9.62	10.03
Tons sugar per acre reaped .. .. .	1.74	2.19	2.12	1.92
Tons sugar per acre per annum .. .. .	0.87	1.10	1.06	0.96
Rainfall in inches (at Mount Edgecombe) .. .. .	29.93	43.80	25.42	42.46

NOTE.—To calculate the area harvested (line 1 above), the average yield of cane per acre given by those planters whose returns figure in the census reports was assumed to represent the whole of the crop and the area reaped worked back from the total tonnage of cane reported received by all mills. For the earlier years, the tonnage of cane from all mills not being available, an arbitrary addition of 7 per cent. to both area reaped and cane harvested was made to allow for fields not included in the census reports.

	Natal, 1925.	Natal, 1926.	Natal, 1927.	Natal, 1928.	Java, 1927.
Number of Factories represented.. .. .	11	11	13	14	171
CANE—					
Per cent. sucrose.. .. .	12.55	13.23	13.66	13.75	12.90
Per cent. fibre .. .. .	15.88	16.01	16.27	15.88	12.70
JUICES—					
Purity of first crusher juice .. .. .	87.24	87.11	88.3	87.8	—
Purity of mixed juice .. .. .	84.47	84.65	85.47	84.9	83.3
Purity of last mill juice .. .. .	78.20	76.12	80.2	78.5	—
Purity of syrup .. .. .	86.39	86.14	87.2	86.6	—
Drop in purity, crusher to mixed juice .. .	2.77	2.46	2.8	2.9	—
Drop in purity, crusher to last mill .. .. .	9.04	10.99	8.1	9.3	—
Drop in purity, crusher to syrup .. .. .	0.85	0.97	1.1	1.2	—
Increase in purity, mixed juice to syrup .. .	1.92	1.49	1.7	1.9	—
Java Ratio .. .. .	75.77	75.73	77.78	76.78	—
Natal Ratio .. .. .	—	—	—	76.99	—
BAGASSE—					
Per cent. sucrose .. .. .	4.03	3.53	4.06	4.10	2.90
Per cent. moisture .. .. .	49.38	49.33	49.89	50.01	45.50
EXTRACTION—					
Maceration per cent. cane .. .. .	—	—	—	26.34	—
Sucrose in juice per cent. sucrose in cane .. .	89.30	90.86	89.30	89.47	94.73
FILTER PRESS-CAKE—					
Per cent. sucrose .. .. .	5.24	6.46	5.41	5.15	3.40
Weight per cent. cane .. .. .	5.63	5.10	5.33	4.77	—
FINAL MOLASSES—					
Clerget purity .. .. .	44.5	45.3	46.1	45.3	29.3
RECOVERY—					
Sucrose per cent. cane lost in manufacture .. .	3.37	3.38	3.53	3.43	1.77
Sucrose in sugar per cent. sucrose in cane .. .	73.23	74.48	74.13	75.06	85.50
Sucrose in sugar per cent. sucrose in juice .. .	81.98	81.97	83.01	83.90	90.50
YIELD—					
Tons of cane per ton of sugar .. .. .	10.77	9.92	9.69	9.49	9.57
LOSSES—					
Sucrose in bagasse per cent. sucrose in cane .. .	10.70	9.14	10.70	10.53	5.60
Sucrose in press-cake per cent. sucrose in cane .. .	2.44	2.49	2.11	—	0.56
Sucrose in molasses per cent. sucrose in cane .. .	—	—	—	—	6.46
Undetermined sucrose per cent. sucrose in cane .. .	13.63	13.89	13.06	14.41	1.87
Sucrose lost in boiling-house per cent. sucrose .. .	16.06	16.38	15.17	14.41	8.39
in cane .. .. .	26.77	25.52	25.87	24.94	14.50
Sucrose in total losses per cent. sucrose in cane .. .	—	—	—	—	—
SUGAR—					
Average polarisation, all sugars.. .. .	98.89	97.74	98.08	98.00	—

NOTE.—Figures for Java are from the "International Sugar Journal."

# AVERAGE MANUFACTURING RESULTS FOR NATAL SUGAR FACTORIES BY PERIODS.

Season 1928.

PERIOD ENDING .. .. .		June 2nd	June 30th	July 28th	September 1st	September 30th	November 3rd	December 1st
Tons of cane crushed .. .. .	This period	144,981	273,155	304,957	408,042	333,563	368,147	232,611
	To date ..	144,981	452,392	722,915	1,198,297	1,529,869	1,900,009	2,132,621
Tons of sugar bagged and estimated ..	This period	13,753	27,788	31,985	57,194	37,642	40,491	24,823
	To date ..	13,753	44,686	73,526	124,311	161,863	202,372	227,230
Tons of cane per ton of sugar .. .. .	This period	10.54	9.83	9.53	9.20	8.86	9.11	9.37
	To date ..	10.54	10.13	9.83	9.64	9.45	9.39	9.39
Tons of cane crushed per hour .. .. .	This period	365	510	561	568	579	571	497
	To date ..	365	491	519	533	542	548	549
Sucrose per cent. cane .. .. .	This period	12.64	13.30	13.63	14.02	14.54	14.28	13.87
	To date ..	12.64	13.06	13.31	13.54	13.77	13.86	13.86
Fibre per cent. cane .. .. .	This period	16.47	16.16	15.80	15.86	15.55	15.71	15.85
	To date ..	16.47	16.17	16.19	16.02	15.94	15.91	15.90
Sucrose per cent. bagasse.. .. .	This period	3.56	3.78	3.88	4.08	4.25	4.30	4.23
	To date ..	3.56	3.78	3.78	3.93	4.00	4.06	4.08
Moisture per cent. bagasse .. .. .	This period	49.78	49.95	49.82	49.82	49.68	49.46	49.96
	To date ..	49.78	49.88	49.87	49.85	49.81	49.76	49.79
Maceration per cent. cane .. .. .	This period	27.82	27.34	26.98	26.68	25.96	25.69	26.88
	To date ..	27.82	28.09	27.09	27.38	27.10	26.80	26.80
Extraction .. .. .	This period	89.87	89.86	89.87	89.76	89.90	89.43	89.15
	To date ..	89.87	89.87	89.87	89.70	89.74	89.68	89.62
Boiling-house recovery .. .. .	This period	82.18	83.63	83.81	84.61	84.67	84.31	83.97
	To date ..	82.18	82.99	83.41	83.84	84.03	84.09	84.08
Overall recovery .. .. .	This period	73.85	75.15	75.32	75.94	76.12	75.39	74.86
	To date ..	73.85	74.42	74.96	75.20	75.41	75.41	75.36
Java Ratio .. .. .	This period	77.42	76.82	76.41	76.51	76.56	76.62	76.52
	To date ..	77.42	77.23	76.88	76.77	76.77	76.72	76.66
Natal Ratio.. .. .	This period	76.46	76.91	77.04	76.79	77.20	76.97	76.83
	To date ..	76.46	76.92	76.94	77.02	77.08	77.08	77.03
Purity of mixed juice .. .. .	This period	84.13	84.50	83.84	84.84	85.66	85.79	85.22
	To date ..	84.13	84.35	84.15	84.39	84.68	84.91	84.94
Reducing sugar ratio .. .. .	This period	5.36	4.04	4.27	3.84	3.38	3.55	3.95
	To date ..	5.36	4.16	4.23	4.13	3.96	3.84	3.87
Purity of syrup .. .. .	This period	86.10	85.80	85.50	86.40	87.40	87.80	87.90
	To date ..	86.10	86.00	85.80	86.00	86.40	86.60	86.90
Sucrose in press-cake .. .. .	This period	3.75	4.47	4.93	5.03	5.48	5.80	5.42
	To date ..	3.75	4.20	4.49	4.67	4.85	5.00	5.06
Purity of final molasses .. .. .	This period	—	43.70	44.60	44.50	45.80	46.10	46.20
	To date ..	—	43.90	44.70	44.50	44.80	45.10	45.30
Average polarisation of sugar .. .. .	This period	98.43	98.26	97.92	97.98	98.10	98.06	97.30
	To date ..	98.43	98.36	98.11	98.13	98.18	98.12	98.03

## LABORATORY RECORDS OF NATAL SUGAR FACTORIES FOR THE SEASON 1928.

FACTORY.	No. 1	No. 2	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 14	No. 16	No. 20	Totals and Averages
Tons of cane crushed .. .. .	275,889	121,969	153,234	257,071	201,179	104,566	132,686	35,609	252,063	214,882	195,296	214,499	66,740	114,588	2,340,271
Tons of sugar bagged and estimated .. .. .	30,220	11,064	15,604	27,824	23,098	11,585	12,835	3,088	25,820	21,208	21,375	23,600	7,284	11,925	246,529
Tons cane per ton of sugar .. .. .	9.13	11.0	9.82	9.24	8.71	9.02	10.33	11.53	9.76	10.13	9.13	9.08	9.16	9.6	9.49
Time crushing per cent. available time .. .. .	91.08	—	89.20	90.89	88.72	90.95	85.41	90.71	91.96	—	96.44	88.78	84.49	88.9	89.79 (B)
Tons of cane per hour actual crushing .. .. .	64.74	48.06	37.67	64.87	64.34	25.40	40.74	12.56	65.1	74.8	68.06	56.38	21.66	24.93	47.81 (B)
Tons of white sugar made .. .. .	29,223	—	10,341	—	—	—	—	3,067	—	14,681	—	—	—	—	57,312
Tons of raw sugar made .. .. .	561	—	5,161	27,600	23,098	11,528	218	—	25,668	6,333	21,283	23,510	—	11,200	156,860
Tons of low grade sugar made .. .. .	418	—	72	—	—	—	356	—	152	194	190	10	—	25	1,435
Sucrose per cent. cane .. .. .	13.95	12.44	14.42	13.87	14.38	14.35	13.18	12.96	13.09	13.49	13.79	14.03	14.36	13.84	13.75
Fibre per cent. cane .. .. .	15.31	15.73	15.42	15.72	15.19	15.65	17.47	17.08	17.03	15.21	16.48	15.63	16.33	15.90	15.88
Java Ratio .. .. .	77.76	77.41	77.73	76.08	76.82	78.07	77.35	75.61	74.93	77.3	75.85	77.22	75.73	76.89	76.78 (D)
Natal Ratio .. .. .	—	—	78.54	—	77.69	77.67	77.48	75.0	76.77	—	75.23	77.22	75.71	—	76.99
Maceration per cent. cane .. .. .	34.12	17.31	21.36	26.71	25.86	24.60	32.77	26.29	24.30	29.8	25.79	24.22	22.22	24.95	26.34
Sucrose in juice per cent. Sucrose in cane .. .. .	93.72	86.81	88.80	89.46	90.26	86.59	87.01	88.09	90.98	86.73	90.01	89.09	87.78	89.68	89.47
Sucrose per cent. bagasse .. .. .	2.79	4.50	4.64	4.19	4.06	5.37	4.31	4.06	3.18	5.13	3.86	4.13	4.98	4.14	4.10
Moisture per cent. bagasse .. .. .	47.56	51.28	49.50	49.58	50.84	49.63	50.95	48.38	49.98	—	49.80	52.72	47.56	48.47	50.01
Sucrose per cent. cane lost in manufacture .. .. .	3.03	3.61	4.39	3.28	3.16	3.53	3.91	4.31	3.08	3.74	3.11	3.26	3.73	3.68	3.43
Sucrose in sugar per cent. Sucrose in cane .. .. .	78.40	70.97	69.54	76.34	78.05	75.37	70.31	66.72	76.47	72.21	77.41	76.74	74.01	73.38	75.06
Sucrose in sugar per cent. Sucrose in juice .. .. .	83.65	81.75	78.32	85.33	86.47	87.03	80.80	75.74	84.05	83.28	86.01	86.14	84.31	81.82	83.90
Available sucrose per cent. Sucrose in juice .. .. .	84.02	—	87.88	84.93	89.73	87.65	85.99	81.54	87.47	—	86.77	87.99	89.87	—	86.71 (B)
Boiling-house efficiency .. .. .	99.56	—	89.15	100.47	96.36	99.30	93.97	92.89	96.10	—	99.12	97.90	93.81	—	96.24 (B)
Sucrose in bagasse per cent. Sucrose in cane .. .. .	6.28	13.19	11.20	10.54	9.74	13.41	12.99	11.91	9.02	13.26	9.99	10.91	12.22	10.32	10.53
Sucrose in press cake per cent. Sucrose in cane .. .. .	0.50	1.68	2.39	1.46	2.32	1.85	2.29	1.18	3.82	—	1.49	2.42	—	2.95	—
Sucrose in molasses per cent. Sucrose in cane .. .. .	9.54	10.10	9.30	9.86	8.18	7.82	11.30	16.17	—	—	8.42	8.41	—	—	—
Undetermined sucrose per cent. Sucrose in cane .. .. .	5.28	4.06	7.57	1.80	1.72	1.55	16.79	4.02	10.69	—	2.68	1.52	—	13.35	14.41
Sucrose lost in boiling-house per cent. Sucrose in cane .. .. .	15.32	15.83	19.26	13.12	12.22	11.22	29.69	22.37	14.51	14.53	12.60	12.35	13.77	16.30	14.41
Sucrose in total losses per cent. Sucrose in cane .. .. .	21.60	29.02	30.46	23.66	21.95	24.63	—	33.28	23.53	27.79	22.59	23.26	25.99	26.62	24.94
FIRST CRUSHER JUICE—															
Brix .. .. .	20.67	18.60	20.9	21.05	20.75	20.78	20.01	19.95	19.75	19.66	20.75	20.85	20.96	20.59	20.38 (B)
Purity (Apparent) .. .. .	86.8	86.4	88.7	86.7	90.2	88.4	85.1	85.9	88.5	88.7 (c)	87.6	88.5	90.4	87.4	87.8 (B)
LAST ROLLER JUICE—															
Brix .. .. .	4.70	8.75	5.3	4.73	6.51	6.89	6.35	6.10	4.0	5.88	5.12	5.38	10.41	5.76	6.13 (B)
Purity (apparent) .. .. .	78.5	79.5	76.1	78.0	80.1	81.2	81.7	63.9	77.5	80.4 (c)	79.5	81.5	83.0	78.1	78.5 (B)
Purity drop from first crusher .. .. .	8.3	6.9	12.6	8.7	10.1	7.2	3.4	3322.0	11.0	8.3	8.1	7.0	7.4	9.3	9.3
MIXED JUICE—															
Brix .. .. .	15.22	15.68	17.2	16.18	16.24	16.24	14.68	15.89	16.03	14.82	16.20	16.62	16.51	16.45	16.00 (B)
Purity (Clerget) .. .. .	83.49	85.3	86.2	83.6	87.4	86.0	83.5	81.45	85.2	84.0	85.1	86.2	87.7	83.3 (A)	84.9 (B)
Reducing sugar ratio .. .. .	5.20	4.00	2.50	—	2.83	3.93	4.48	—	4.01	—	3.56	3.66	2.36	5.90	3.86 (B)
Mgs. SO <sub>2</sub> per litre .. .. .	—	—	1,777	—	950	3,347	2,130	1,513	2,205	—	1,884	2,217	1,730	940	1,869 (B)
Purity drop from first crusher .. .. .	3.3	1.1	—	3.1	2.8	2.4	1.6	4.45	3.3	4.7	2.5	3.3	2.7	4.1	2.9

Brix .. .. .	13.76	—	16.9	—	16.15	14.66	15.36	17.01	14.81	14.30	15.0	17.61	16.73	16.91	15.77 (B)
Purity (apparent) .. .. .	88.8 (c)	85.6	86.6	—	87.55	88.2	84.7	82.9 (c)	87.0	87.5 (c)	85.7	87.9	88.4	83.9	86.5 (B)
Reducing sugar ratio.. .. .	3.38	—	—	—	2.41	2.93	4.24	—	—	—	3.57	2.87	2.50	5.31	3.40 (B)
pH .. .. .	6.68	—	6.8	—	6.99	7.2	—	—	—	—	6.9	7.0	7.36	—	6.99 (B)
PRESS CAKE—															
Per cent. sucrose .. .. .	0.61	9.80	7.26	5.47	7.24	5.92	6.84	4.44	6.90	7.30	5.51	8.43	7.55	9.01	5.15 (I)
Weight per cent. cane.. .. .	11.50	2.12	4.75	3.73	4.61	4.50	4.49	3.44	7.25	—	3.73	4.0	—	4.50	4.77 (I)
SYRUP—															
Brix .. .. .	55.79	—	49.1	55.04	51.24	55.11	55.58	47.28	53.07	—	52.8	58.20	51.08	51.8	53.0 (F)
Purity (apparent) .. .. .	88.9 (c)	85.6	85.8	86.5 (c)	87.3	88.2	84.3	82.7 (c)	86.7	88.0 (c)	86.3	88.1	90.8 (c)	84.1	86.6 (F)
Reducing sugar ratio .. .. .	3.39	—	2.11	—	2.40	2.83	4.15	—	—	—	2.25	2.76	2.80	5.05	3.98 (E)
pH .. .. .	—	—	6.4	—	6.86	7.3	—	—	7.0	—	6.9	7.2	—	—	6.94 (B)
Purity drop from first crusher .. .. .	-2.1	0.8	2.9	0.2	2.9	0.2	0.8	3.2	1.8	0.7	1.3	0.4	-0.4	3.3	1.2
Purity increase from mixed juice .. .. .	5.4	0.3	-0.4	2.9	-0.1	2.2	0.8	-1.25	1.5	4.0	1.2	1.9	3.1	0.8	1.7
Brix .. .. .	92.70	94.83	92.8	91.87	92.62	93.16	90.78	90.0	92.76	91.32	92.8	93.58	92.75	91.8	92.4 (B)
Purity (apparent) .. .. .	86.4	82.25 (c)	85.2	84.0 (c)	82.4	85.1	83.7	78.7	77.1	85.6	79.7	78.6	85.1	82.1	82.6 (B)
Purity of run-off .. .. .	67.8	—	63.3	65.9	59.6	63.1	64.1	57.8	58.5	—	61.2	59.2	65.5	—	62.4 (B)
SECOND MASSECUITE—															
Brix .. .. .	95.40	97.09	95.4	92.55	95.09	94.41	92.38	83.5	94.05	92.18	93.2	93.78	94.43	93.1	93.3 (B)
Purity (apparent) .. .. .	74.1	66.63 (c)	73.4	69.7 (c)	70.2	70.5	74.1	56.3	67.8	69.0	70.0	74.1	70.41	68.6	69.6 (B)
Purity of run-off .. .. .	54.8	—	50.0	52.0	45.9	49.6	52.5	51.0	50.9	—	50.9	55.7	51.6	—	51.4 (B)
THIRD MASSECUITE—															
Brix .. .. .	96.45	—	94.8	—	96.09	—	—	83.3	95.10	93.07	—	95.10	94.14	93.2	93.5 (B)
Purity (apparent) .. .. .	62.8	—	66.3	—	63.4	—	—	48.7	63.1	62.5	—	68.8	59.6	62.9	62.0 (B)
Purity of run-off .. .. .	46.0	—	44.1	—	41.6	—	—	44.9	—	—	—	50.8	—	—	45.5 (B)
JELLY—															
Brix .. .. .	—	—	88.7	91.13	94.0	92.34	88.56	—	91.0	—	90.5	90.98	—	92.1	91.0 (B)
Purity (apparent) .. .. .	—	—	53.8	52.4 (c)	46.4	50.2	54.3	—	50.9	—	51.0	52.1	—	50.5	51.3 (B)
Purity of run-off .. .. .	—	—	48.4	—	43.6	—	46.4	—	—	—	—	—	—	—	46.1 (B)
FINAL MOLASSES—															
Brix .. .. .	88.35	88.23	86.9	82.48	87.55	83.14	80.61	81.5	85.71	—	83.74	83.26	85.75	88.6	85.1 (B)
Purity (apparent) .. .. .	44.56	44.43	44.0	46.1	42.3	45.6	48.4	44.86 (B)	46.2	42.8 (A)	47.0	47.0	46.5	44.8 (A)	45.3 (B)
85° brix per cent. cane .. .. .	3.50	—	3.55	3.5	3.21	2.96	3.61	5.50	—	—	2.95	2.95	—	—	3.5 (B)
POLARISATION OF SUGAR—															
White .. .. .	99.83	—	—	—	—	—	—	99.74	—	—	—	—	—	—	99.79 (B)
Raw .. .. .	96.72	—	—	97.86	97.76	98.22	—	—	97.80	—	93.5	97.84	—	97.62	97.70 (B)
Low grade .. .. .	91.62	—	—	—	—	89.70	—	—	90.0	—	93.5	88.50	—	—	90.66 (B)
Average of all sugars.. .. .	99.65	97.35	98.52	97.86	97.76	97.62	95.86	99.74	97.7	98.68	97.5	97.84	97.4	97.62	98.0

(A) = Apparent purity.

(B) = Arithmetical average. These averages are of uncertain value, owing to differences in capacity of factories and incomplete returns.

(C) = Clerget purity.

(D) Weighted average for factories giving total Ratio figures = 76.56.

(E) Weighted averages for twelve factories only.

Secretary: I would like to say a few words from the Planters' point of view in connection with the very important feature of the report suggesting the shortening of the cane crushing season. I don't know whether the writers looked at this question from the Planters' point of view but it has a very important bearing on the subject. You all know that the labour condition under which we are working is to a large extent dominated by the six months contract, and every planter in organising his work for the year has got to take that into account. I don't know how in particular it may effect this question, but it has to be kept in mind. A Native's contract covers seven calendar months, so that the Planters' labour obligations are spread over seven calendar months, and that fact ought to be taken into account in valuating any saving that it is suggested could be made by concentrating the crushing season from July to November. I am not prepared to value that particular factor in this matter; I only suggest it is a very important factor and ought to be kept in view if this matter of shortening the season is discussed.

Mr. Booth: Might I ask the effect on the Planter's cheque of the shortening the sugar season and increasing the average sucrose in their cane?

Secretary: It was on that account that I stated I was not prepared to value this factor. But I do know that the organisation of labour if disturbed by thus shortening the season would have a very important financial effect. Whether it would be compensated for by a bigger cheque for cane I am not prepared to say. I doubt it.

Mr. Booth: Would the millers put more capital into their mills to enable the shortened season to be effected?

Chairman: We realise that there are great difficulties against contracting the season very much, but on the other hand we point out in this paper the gains that are attainable if the ways and means could be devised. We stated that a crushing season—July to November—would probably be within the best sucrose yielding margin, that is five calendar months, or six including December, which could very well be used by the Planter for planting. There certainly is a difficulty in fitting in a seven months period with the period of his maximum activity. However, we suggest that strong efforts should be exerted to make this saving. With regard to Mr. Booth's remark, however we may dispose of the sugar, I take it that it is all to the good to increase our production per acre and thereby reduce the cost of production.

Mr. Paul: I must heartily congratulate the authors on having drawn up such a very able paper in connection with the work of the season. In connection with shortening the season there are various matters to be considered over this, and although the Planters would like to see it contracted, and I know the Millers also would like to

see the period shortened because it would tend to the economical working of the factories, yet you cannot say it will reduce the working costs of running the factory nor an estate, because in the first place you have to engage your labour for a certain period not under seven calendar months. Assuming we did reduce the period to four months, there is nobody here, not even the Director of Native Affairs, would be prepared to guarantee you that you would get all the labour required to reap your crop in four months, and that all your labour will be delivered by say the 1st July. The result would be that we would have the crop dragged on and we would not be able to complete it in that period, and the biggest loser would be the planter. That I look upon as one of the most serious features in connection with the proposed reduction of the harvesting period. Where the miller is concerned he would welcome a reduction as is being done in all parts of the world; but he dare not go out and put in a huge amount of capital to purchase the necessary plant and machinery to enable us to complete your crop in a reduced period of say four months, because he is absolutely certain of the fact that he would not get all the crop harvested in that period. If you were to fix the 1st July as the commencement of the crop I know this that, the month of June has frequently proved a very dry month when we suffer almost as much from drought as we do in any other month, and it is important that those who have big areas to harvest should have the most of those portions which are subject to drought reaped before the drought actually starts, because in those areas when the drought does start it causes the cane to go off in a matter of a fortnight or inside three weeks when the westerly winds start to blow early in the mornings. We would find again that the planter is the bigger loser. If this question was ever considered I don't think that you could possibly leave it to the 1st July, it would have to be made to start at an earlier date, not later than the 1st June. The cane, admittedly, is not fully mature then, but if a start is made at that time I don't think it is possible that the crop could be finished before the end of October. At the same time I do think that certain guarantees would be required from some source for the planters that they would be able to obtain the necessary labour to reap the crop in that time, and that the miller would not be held responsible for any loss in cane through the fact that a planter's cane was not reaped in the required period.—(Hear hear and applause).

Chairman: I very much appreciate Mr. Paul's remarks, but it occurs to me that to make a beginning even on the 1st June would mark a considerable advance, as it is during the month of May in particular that most sugar is lost in premature harvesting. A beginning in June would cover the seven months contract period for labour, allowing for a month's planting of new fields and cultivation of ratoons after the harvesting was finished.