

Annual Summary of Chemical Laboratory Reports from Natal Sugar Factories, 1927 Season

By H. H. DODDS and D. McRAE

Mr. Dodds read the following paper on this subject:—

Full reports have been received from 13 factories representing a sugar output of 200,000 tons or 80 per cent. of the total sugar manufactured for the season in South Africa (247,273 tons). Two factories that reported last year have closed down (Nos. 5 and 13) and four other factories have begun to send us reports.

Only one mill with chemical control is not yet included in our summary, together with seven small factories not having chemical control.

The small but steady increase in total output of sugar of the last year or two has been maintained as shown in the following table:—

Season	1924/5	1925/6	1926/7	1927/8
Acreage reaped	92,695	109,362	114,279	Not yet known.
Cane harvested	1,729,344	2,638,000	2,335,406	2,482,000
Tons cane per acre	18.66	24.12	20.44	—
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	—
Tons sugar per acre per annum	0.87	1.10	1.06	—
Rainfall in inches	29.93	43.80	25.42	42.46

QUALITY OF CANE MILLED.

The season recently closed has shown a further increase in sucrose and fibre content and purity of juice of cane, probably due to continued conditions of drought.

Although the rainfall for 1927 at Mount Edgecombe was 42.46 inches which is 2.61 inches above normal the rain was very irregularly distributed, no less than 19 inches falling in March. The rainfall of the succeeding four months totalled only 1.97 inches or only 28 per cent. of normal. Another unusually dry spell was from September to November when 5.95 inches were recorded or less than half the normal. These conditions contributed to the maintenance of high sucrose contents and purities right up to the end of the crushing season in December.

Statistics of acreage of cane harvested are not yet available, but it may be anticipated that in view of the general conditions just stated the yields of cane per acre will be again low as they proved to be last year.

Planters are fortunate in having been paid for cane on a sucrose basis according to the new arrangements in terms of the Fahey agreement so that they have received compensation for their low yields of cane per acre, which would not have been the case under the old terms of payment by weight.

Factory No. 7 has the remarkable average sucrose value per cent. cane of 14.65 for the season, with a peak of 15.49 in September.

These seasonal fluctuations in average monthly sucrose content of cane and in sucrose account for all mills reporting are also shown below, and show again the advisability of concentrating harvesting and manufacture as far as practicable during the months from July to November in order to get the maximum sugar from the crop, even though during the year under review, high sucrose contents and purities were maintained abnormally late in the season as stated.

MILL EFFICIENCIES.

Although the average extraction showed a falling off after July, no doubt due to increased crushing rates, together with increased sucrose content the overall recovery records a steady rise throughout the season associated with a regular increase in boiling house recovery. For the month of September, Factory No. 6 showed an average boiling house recovery of 88.52 sucrose in sugar per cent. of sucrose in juice.

The general average of this figure for the whole season 83.01 shows an appreciable increase over that of previous years due to decrease in sucrose losses in filter press cake, molasses, and in undetermined losses. This increase is even better than is apparent at first sight since there has been also an increase in average polarization of sugars from 97.74 for 1926/7 to 98.08 for 1927/8.

The total relative losses of sucrose (25.87 per cent. of sucrose in cane), however are still very high compared with those of most other cane sugar pro-

ducing countries; as mentioned in our report last year this is probably mainly due to the abnormal properties of Uba cane and juice in this country. Uba is the only cane grown commercially at present, in view of the temporary prohibition of all other varieties in Natal (including, of course, Zululand).

The milling extraction (sucrose in juice per cent. sucrose in cane) 89.30 is exactly the same as in the 1925/26 season but shows a decrease of 1.56 per cent. compared with the previous year, both sucrose per cent. of bagasse and bagasse per cent. of cane having increased. This is in part due to the fact that the average extraction of the four factories that have reported for the first time during the past season is slightly lower than that of the factories reporting before and has consequently brought down the general averages.

Nevertheless, a separate comparison of eight mills that have sent in complete reports both for the 1927/28 and for the 1926/27 seasons show that there has been a general falling off in extraction.

	Average of 8 mills reporting both seasons.		Average of all mills for both seasons.	
	1926/7	1927/8	1926/7	1927/8
Sucrose per cent. cane	13.17	13.64	13.23	13.66
Fibre per cent. cane	15.87	16.07	16.01	16.27
Extraction (sucrose in juice per cent. sucrose in cane) — — — —	91.41	90.22	90.86	89.30
Tons cane per ton sugar — — — —	9.84	9.40	9.92	9.69
Boiling house recovery (sucrose in sugar, per cent. sucrose in juice)	82.54	84.79	81.97	83.01
Overall recovery (sucrose in sugar, per cent. sucrose in cane)	75.45	76.50	74.48	74.13
Sucrose per cent. bagasse — — — —	3.48	3.61	3.53	4.06
Average polarization of all sugars — — — —	97.73	98.13	97.74	98.08
	Average of four mills reporting for first time 1927/8 season.		Average of mills for 1927/8 season that reported in previous years.	
Extraction — — — —	86.50		89.79	
Boiling House Recovery	78.67		84.27	
Overall Recovery — — — —	68.05		75.67	

In the case of these factories, however, there is an increase of 1.05 per cent. in overall recovery for the last season, the deficiency in extraction being more than compensated for by the increased boiling house recovery.

This nett increase in efficiency, however, is lost sight of in the general average for all factories owing to the factories coming into the records for the first time having lower recoveries than those represented in both years.

The falling off in extraction compared with the former year may be attributed to the increased crushing rate of mills compared with previous years and to increased sucrose and fibre content of cane.

No. 1 factory has regained its premier position for extraction (93.9) as well as for overall recovery (79.6) and for total output of sugar (29,160 tons).

The ratio of cane milled to sugar produced shows a satisfactory improvement, the slight apparent fall in overall recovery for reasons explained above being more than compensated for by the increased sucrose in cane, bearing in mind also the effect of the increased average polarization of the sugars produced in tending to lower recovery.

However, when we come to compare our results with those of the more highly developed sugar producing countries, the need for improvement to approach more nearly their standards is very evident.

The writers wish to express their thanks to the sugar manufacturing firms who have supplied reports, also to make acknowledgments to the "International Sugar Journal" of London for the information relating to Java and to the Philippine Sugar Association for their very complete statistics of manufacture and analysis.

NOTE:

In connection with the yields of cane per acre harvested in the 1926/27 season a census report recently issued gives some interesting statistics from the individual districts.

SEASON 1926/1927.

District.	Acreage harvested.	Yield of cane in tons.	Tons cane per acre.
Port Shepstone — — —	2,116	37,421	17.7
Umzinto — — — — —	17,367	308,038	17.7
Durban and Pinetown	4,691	100,355	21.4
TOTAL south of the Umgeni River — — — —	24,174	445,814	18.4
Inanda — — — — —	19,646	328,554	16.7
Lower Tugela — — — —	24,857	499,583	20.1
TOTAL North Coast, between Umgeni and Tugela rivers — — — —	44,503	828,137	18.6
Mtunzini — — — — —	14,846	332,465	22.4
Eshowe — — — — —	2,332	52,578	22.5
Lower Umfolozi — — —	20,948	523,629	25.0
TOTAL north of the Tugela (Zululand) — —	38,126	908,672	23.8
GRAND TOTAL for Natal (including Zululand) — — — — —	106,803	2,182,623	20.4

These figures include European-owned plantations only.

In order to arrive at an approximately accurate estimate of the total cane harvested and ratio of cane to sugar in the table on the first page of this report 7 per cent. was added to these figures in order to include native and Indian owned cane.

For the 1927/28 season, however, the total tonnage of cane milled was available from the factory records for the first time.

Mount Edgecombe,
March, 1928.

MANUFACTURING RESULTS FROM CERTAIN NATAL SUGAR FACTORIES—SEASON 1927.

Factory Number...	1	2	4	6	7	8	9	10	11	12	14	16	19	20	Average and Total
Tons of cane crushed ...	262,456	196,935	107,189	186,521	81,800	116,639	37,194	224,539	176,906	194,877	191,693	43,881	60,862	104,112	1,941,73
Tons of sugar made and estimated ...	29,160	20,419	10,064	21,011	9,245	10,667	3,318	21,823	16,742	20,663	20,675	4,566	5,965	10,657	200,40
YIELD—															
Tons cane per ton sugar ...	9.00	9.64	10.65	8.88	8.84	10.93	11.23	10.28	10.5	9.43	9.27	9.60	10.20	9.77	9.69
CANE—															
Per cent. sucrose ...	13.82	13.46	14.14	14.16	14.65	13.37	13.37	12.58	13.53	13.68	13.89	—	14.07	13.67	13.66
Per cent. fibre ...	15.77	—	16.43	14.66	15.77	18.16	18.07	16.76	16.90	16.70	16.11	—	16.35	15.22	16.27
JUICES—															
Purity of first crusher juice (C.J.) ...	86.8*	86.1*	89.8*	89.8*	89.2*	86.8*	88.5*	88.5*	87.8	88.7*	89.5*	90.3*	88.0*	86.9*	88.3
Sucrose in first crusher juice ...	17.69	17.53	18.62	18.18	18.75	17.76	17.56	16.61	17.26	18.20	18.41	18.75	18.26	17.52	17.79
Purity of mixed juice (M.J.) ...	84.00	86.1†	87.1	87.0	86.9	84.9	86.6†	85.14	83.9	86.3	87.2	87.6	85.8*	84.1*	85.47
Purity of last roller juice (L.J.) ...	79.2*	73.5*	79.8*	81.1*	82.0*	82.3*	79.5*	77.6*	81.4*	81.6*	82.5*	81.5*	82.0*	79.2*	80.2
Purity of syrup (S.) ...	89.51	86.4	86.6*	87.6*	88.8*	84.6*	87.9*	86.0*	86.0*	86.5*	88.7*	90.2*	86.8*	85.7*	87.2
Drop in purity (C.J.)—(M.J.) ...	2.83	—	2.7	2.8	2.3	1.9	1.94	3.34	3.9	2.4	2.3	2.7	2.2	2.8	2.8
Drop in purity (C.J.)—(L.J.) ...	7.64	12.6	10.0	8.7	7.2	4.5	9.06	10.88	6.4	7.1	7.0	8.8	6.0	7.7	8.1
Drop in purity (C.J.)—(S.) ...	-2.68	-0.3	3.2	2.2	0.4	2.2	0.56	2.51	1.8	2.2	0.8	0.1	1.2	1.2	1.1
Increase in purity (M.J.)—(S.) ...	5.51	—	-0.5	0.6	1.9	-0.3	1.38	0.83	2.1	0.2	1.5	2.6	1.0	1.6	1.7
Java ratio ...	78.12	76.78	75.94	77.9	78.16	75.28	75.55	75.73	78.3	75.16	75.45	—	77.05	78.3	76.78
BAGASSE—															
Per cent. sucrose ...	2.61	4.24	5.59	4.27	5.47	4.59	4.29	2.94	4.81	3.78	3.92	—	5.13	4.72	4.06
Per cent. moisture ...	47.81	49.3	49.97	52.63	49.34	50.0	47.42	50.0	50.0	50.05	51.66	—	48.70	47.29	49.89
Weight per cent. cane ...	32.28	—	38.21	34.81	35.85	40.89	38.31	36.27	38.32	36.84	36.96	—	36.34	32.46	36.10
EXTRACTION—															
Normal juice per cent. cane ...	76.11	—	—	71.87	69.45	66.07	69.17	71.46	70.8	69.14	69.35	—	—	71.58	71.02
Dilution per cent. normal juice ...	32.66	—	—	33.46	29.96	31.76	23.14	19.87	30.1	26.30	25.07	—	21.63	14.23	27.13
Sucrose in juice per cent. of sucrose in cane...	93.90	89.49	84.79	89.50	86.60	85.95	87.64	91.51	86.41	89.82	89.57	—	86.71	88.74	89.30
PRESS CAKE—															
Per cent. sucrose ...	0.90	6.82	6.69	7.36	5.73	9.07	7.45	7.20	7.83	7.51	8.81	8.35	8.33	10.37	5.41
Weight per cent. cane ...	12.38	3.54	1.19	3.68	4.41	5.24	3.59	5.77	—	3.64	4.33	—	4.56	4.06	5.33
FINAL MOLASSES—															
Clerget purity ...	44.10	47.4	49.0	43.8	45.4	48.8	—	44.50	—	45.7	46.7	45.7	—	—	46.1
Apparent purity...	43.56	—	—	43.3	—	46.2	—	—	38.0	—	—	—	46.5	42.0	49.9
RECOVERY—															
Sucrose per cent. cane lost in manufacture ...	2.81	3.28	4.86	3.16	3.58	4.60	3.9	3.10	4.19	3.30	3.38	—	4.42	3.69	3.53
Sucrose in sugar per cent. sucrose in cane ...	79.63	75.62	65.60	77.72	75.54	65.63	67.07	75.38	69.01	75.87	75.69	—	68.59	73.0	74.13
Sucrose in sugar per cent. sucrose in juice ...	84.80	86.24	77.37	86.84	87.23	76.35	76.54	82.38	79.86	84.45	84.50	—	79.10	82.27	83.01
LOSSES—															
Sucrose in bagasse per cent. sucrose in cane...	6.10	10.51	15.21	10.50	13.40	14.05	12.36	8.49	13.59	10.18	10.43	—	13.29	11.26	10.70
Sucrose in press cake per cent. sucrose in cane	0.80	1.80	0.56	1.92	1.72	3.55	2.01	3.31	—	1.97	2.73	—	2.70	3.07	2.11
Sucrose in molasses per cent. sucrose in cane	8.04	10.21	11.56	8.04	7.11	12.16	15.0	6.45	—	—	—	—	—	—	—
Undetermined sucrose per cent. sucrose in cane	5.43	1.86	7.07	1.82	2.23	4.61	3.56	6.37	17.40	11.98	11.15	—	15.42	12.67	13.06
Sucrose lost in boiling house per cent. sucrose in cane	14.27	13.87	19.19	11.78	11.06	20.32	20.57	16.13	17.40	13.95	13.88	—	18.12	15.74	15.17
Sucrose in total losses per cent. sucrose in cane	20.37	24.38	34.40	22.28	24.46	34.37	32.93	24.62	30.99	24.13	24.31	—	31.41	27.0	25.87
SUGAR—															
Average polarization ...	99.08	98.14	98.7	97.78	97.94	96.0	99.72	97.56	98.66	97.90	97.50	96.8	98.51	97.47	98.08

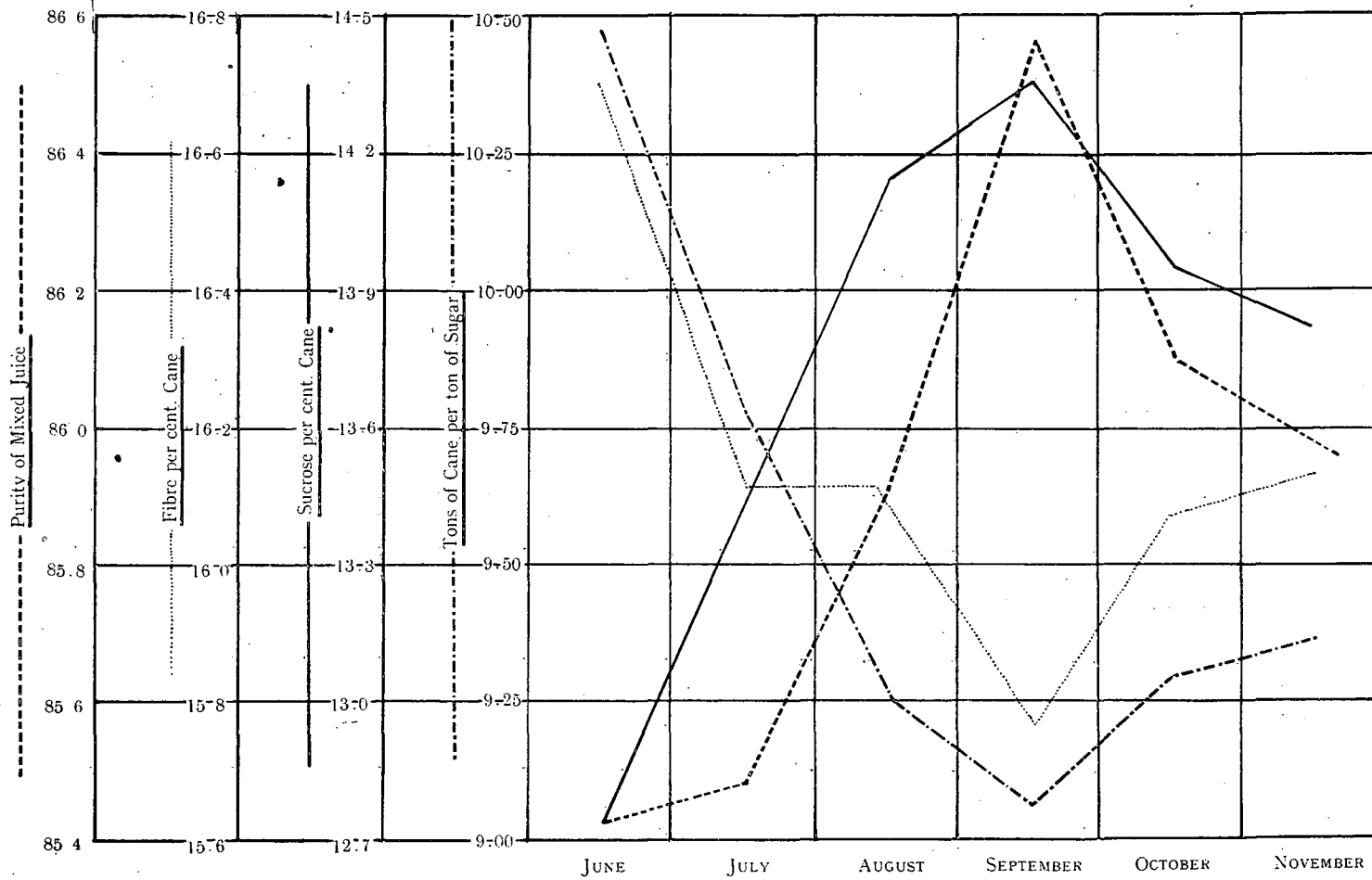
* Apparent purity ; unless otherwise stated all purities are calculated using Clerget Sucrose.
 † These figures are for clarified juice, and are not included in the average.

**NATAL MILLING REPORTS FOR RECENT YEARS COMPARED WITH
RESULTS FROM JAVA AND THE PHILIPPINES.**

	Natal, 1925	Natal, 1926	Natal, 1927	Phillipines, 1926-27	Java, 1926
Number of Factories represented	11	11	13	17	168
CANE—					
Per cent. sucrose	12.55	13.23	13.66	13.27	12.40
Per cent. fibre	15.88	16.01	16.27	11.41	12.80
JUICE—					
Purity of first mill or crusher juice	87.24	87.11	88.3	86.06	—
Sucrose in first mill or crusher juice	16.57	17.47	17.79	15.89	—
Purity of mixed juice	84.47	84.65	85.47	84.12	80.90
Purity of last mill juice	78.20	76.12	80.2	76.79	—
Purity of syrup	86.39	86.14	87.2	85.06	—
Drop in purity crusher to mixed juice	2.77	2.46	2.8	1.94	—
Drop in purity crusher to last mill	9.04	10.99	8.1	9.27	—
Drop in purity crusher to syrup	0.85	0.97	1.1	1.0	—
Increase in purity mixed juice to syrup	1.92	1.49	1.7	0.94	—
Java ratio	75.77	75.73	76.78	83.5	—
BAGASSE—					
Per cent. sucrose	4.03	3.53	4.06	3.55	3.0
Per cent. moisture	49.38	49.33	49.89	47.84	48.70
EXTRACTION—					
Dilution per cent. normal juice	23.03	—	27.13	—	—
Sucrose in juice per cent. sucrose in cane	89.30	90.86	89.30	93.59	94.35
FILTER PRESS CAKE—					
Per cent. sucrose	5.24	6.46	5.41	4.23	3.50
Weight per cent. cane	5.63	5.10	5.33	1.80	—
FINAL MOLASSES—					
Clerget purity	44.5	45.30	46.1	36.56	30.0
Apparent purity... ..	42.9	43.31	49.9	—	—
RECOVERY—					
Sucrose per cent. cane lost in manufacture	3.37	3.38	3.53	1.83	2.07
Sucrose in commercial product per cent. sucrose in cane	73.23	74.48	74.13	85.59	83.30
Sucrose in commercial product per cent. sucrose in juice	81.98	81.97	83.01	91.45	88.30
YIELD—					
Tons of cane per ton of sugar	10.77	9.92	9.69	8.56	9.22
LOSSES—					
Sucrose in bagasse per cent. sucrose in cane... ..	10.70	9.14	10.70	6.41	5.73
Sucrose in press-cake per cent. sucrose in cane	2.44	2.49	2.11	0.57	0.48
Sucrose in molasses per cent. sucrose in cane	—	—	—	6.55	8.39
Undetermined sucrose per cent. sucrose in cane	13.63	13.89	13.06	0.88	2.10
Sucrose lost in boiling house per cent. sucrose in cane	16.06	16.38	15.17	—	10.97
Sucrose in total losses per cent. sucrose in cane	26.77	25.52	25.87	14.41	16.70
SUGAR—					
Average polarization all sugars	98.89	97.74	98.08	96.65	—

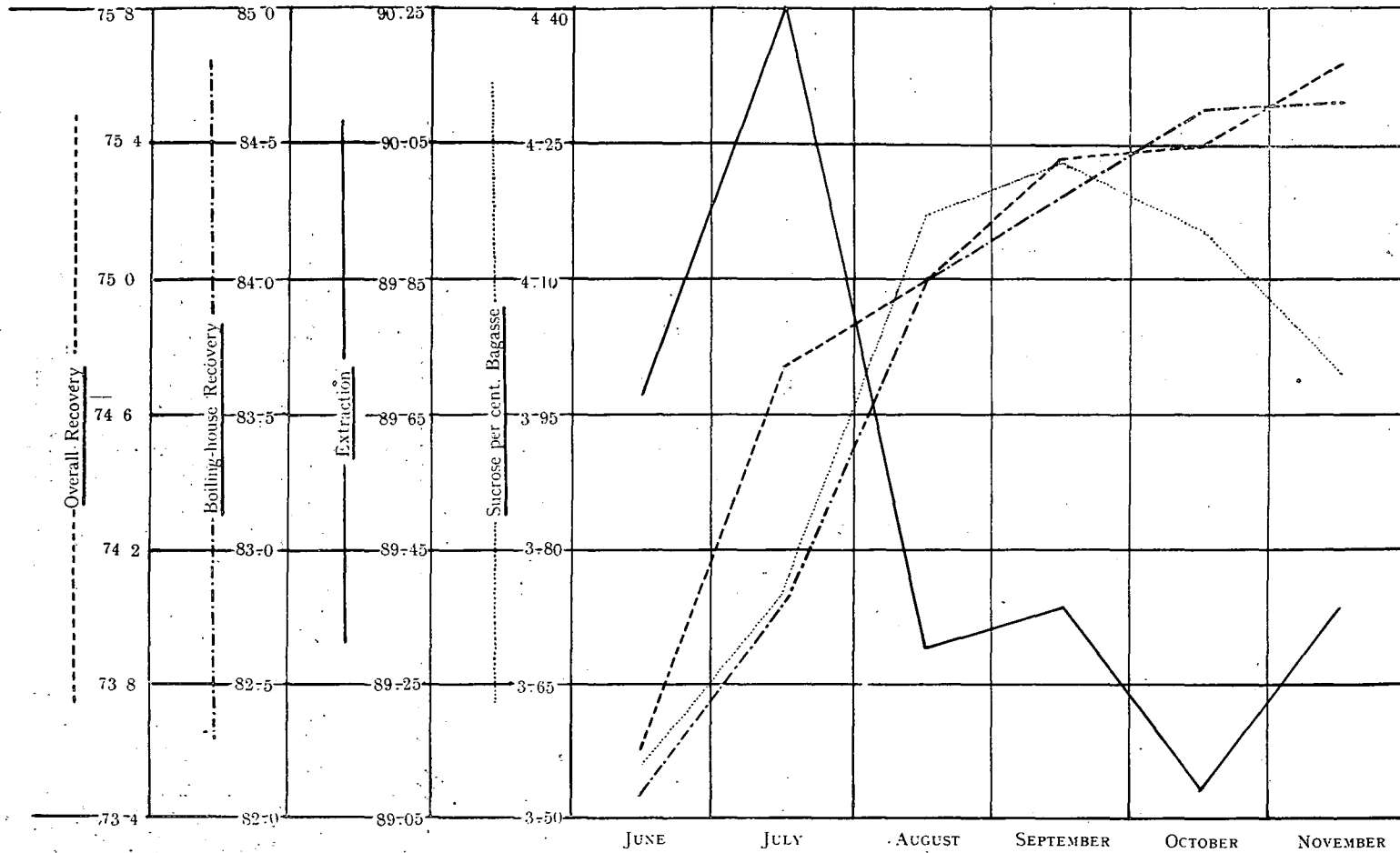
NATAL SUGAR FACTORIES—SEASON 1927.

MONTHLY AVERAGES OF ALL FACTORIES.








NATAL SUGAR FACTORIES—SEASON 1927.

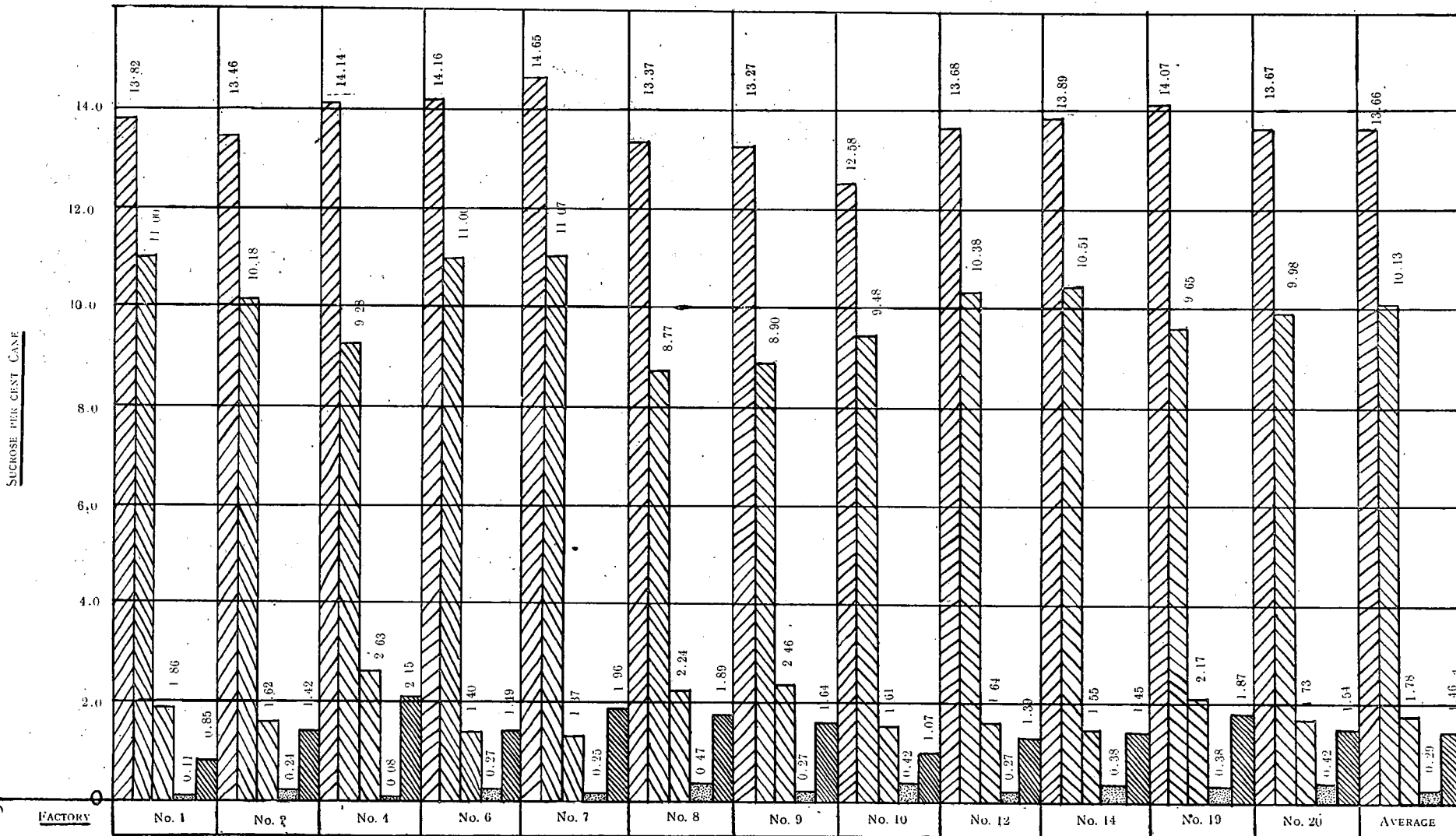
MONTHLY AVERAGES OF ALL FACTORIES.



NATAL SUGAR FACTORIES—SEASON 1927.






FINAL REPORTS.

-  Cane.
-  Sugar made and estimated.
-  Molasses and undetermined losses.
-  Filter press cake.
-  Bagasse.



**NATAL SUGAR FACTORIES.
SEASON 1927.**

MONTHLY AVERAGES
OF ALL FACTORIES.

-  Cane.
-  Sugar made and estimated.
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-  Bagasse.
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