

GENERAL REPORT ON WEATHER CONDITIONS FOR THE YEAR 1938

Rainfall.

The total for the year is 37.97ins. which is slightly above normal, the average for the past 52 years at Mount Edgecombe being 37.07ins.

On the whole the distribution was favourable for the sugarcane crop. March and May were unusually dry months, but the droughts were not long enough to have a very adverse effect, and over the rest of the growing season there was plenty of rain. There was somewhat too much unseasonable rain in June and July, which tended towards a low sucrose content of cane in the early part of the harvesting season, and would have been much more acceptable a few months earlier.

The rainfall for September, only 0.35ins., was the lowest ever recorded for that month at this station and delayed the planting of cane, but no doubt tended to continue the ripening of the cane until relatively late in the harvesting season and to make up for the low sucrose content of cane due to the late rains of June and July.

For the last three months of the year the rainfall was almost all that could be desired for the planting and early growth of cane.

Following is a summary of our annual rainfall returns to date recorded at this station:—

Year	Rainfall	Annual Normal	% Excess over normal	% Deficit under normal	No. of rain days
1926	25.42	40.22		-36.8	116
1927	42.46	39.85	+ 6.6		128
1928	27.56	39.66		-31.5	114
1929	43.83	39.71	+10.4		129
1930	30.03	37.57		-20.1	123
1931	28.01	37.36		-25.0	112
1932	41.36	37.46	+10.4		126
1933	27.14	36.64		-27.6	109
1934	39.42	36.69	+ 7.4		127
1935	53.25	37.03	+45.1		111
1936	45.36	37.33	+22.5		110
1937	33.21	37.19		-11.0	101
1938	37.97	37.07	+ 2.1		117
Means	36.54	37.90		- 3.6%	118

Besides being free from prolonged drought, the year 1938 did not suffer any abnormally heavy or destructive rains. The average rainfall per rain day was 0.32ins. which is very close to the normal, 0.30ins., for this station.

The highest fall for any single day of the year was 2.60ins. on February 14th. The only other day with a rainfall of over 2ins. was February 27th when it was 2.56ins.

There were six days having a rainfall of between one and two inches, of which two were in July, and one each in June, October, November, and December.

The rainfall for March, 0.40ins., is only eight per cent of the normal for that month, which has the the highest normal rainfall of any month. This is by far the lowest rainfall ever recorded here for March, the previous lowest being 1.07ins. in 1889.

Fortunately both February and April had abundant rains so that the drought was not very prolonged and the effects did not become evident in the appearance of the cane.

Similarly September with a rainfall of only 0.35ins. was also an absolute minimum for that month at this station, the previous lowest being 0.48 ins. in 1937. The normal rainfall for September is 2.73ins., but the month has come off very badly in recent years, the average over the past eight years being only 0.92ins., or only one-third of normal. Consequently conditions for some time have not favoured this normally excellent month for planting.

On the other hand the rainfall for February, 1938, 8.83ins., was abnormally heavy. The normal for this month is 4.47 ins. and the absolute maximum 14.12ins in 1920. There were 10.23ins. in February, 1932.

Two other months in which a rainfall far above normal was recorded are June, 3.40ins., normal 1.36ins., and July, 3.23ins., normal 1.12ins. However, both of these months, especially June, are liable to rainfalls far above normal (for example, June, 1935, 16.93ins.) though they are, of course, usually very dry.

The rainfall for 1938 by months compared with normal is as follows:—

56.88ins., through Tinley Manor, 46.35ins. to Darnall, 45.56ins. It was confined to a narrow belt near the sea, points a few miles inland such as Sinembe, Chaka's Kraal (Waldene), Riet Valley and Kearsney having a rainfall either below normal or only slightly above.

No other points except Illovo, on the South Coast had a rainfall considerably above normal.

Month	1938		Mean 1887-1938 (inclusive)		
	Total for month in inches	Total from January 1st	Total for month	Total from January 1st	Average rainfall per day
January	3.57	3.57	4.20	4.20	0.135
February	8.83	12.40	4.47	8.67	0.158
March	0.40	12.80	4.93	13.60	0.159
April	4.07	16.87	2.67	16.27	0.089
May	0.69	17.56	1.81	18.08	0.058
June	3.40	20.96	1.36	19.44	0.045
July	3.23	24.19	1.12	20.56	0.036
August	0.84	25.03	1.19	21.75	0.038
September	0.35	25.38	2.73	24.48	0.091
October	4.84	30.22	4.03	28.57	0.130
November	4.36	34.58	4.02	32.53	0.134
December	3.39	37.97	4.54	37.07	0.146
Totals	37.97		37.07		0.101ins.

From the year 1926 inclusive the rainfall has been recorded at the Experiment Station. For the 39 years preceding this period the records of Natal Estates, Ltd., at Mount Edgewcombe have been used, applying a factor, 0.926, that is indicated by the records of the past 13 years as the ratio of the rainfall at the Experiment Station to that of Natal Estates, Ltd.

No hailstorms were recorded here during the year. (See table 3 on page 19.)

The average for the year from 35 stations distributed along the sugar belt is 40.23ins. which is 4.9 per cent below the general average of the past 10 years, which is 42.19ins.

A comparison of the returns from different districts reveals some unusual results.

The locality with the highest average rainfall is the Eshowe-Felixton-Mtunzini area in Zululand. Other places with a normal rainfall well above the general average are scattered along the coast at irregular intervals, such as Port Shepstone, Park Rynie, Durban (Point), Umhlali and Kwambonambi.

During 1938, however, the district with the highest rainfall was the coastal area from Umhlali,

Umhlali, besides having the highest rainfall of the year of any station recorded, 56.88ins., shows the highest excess above normal, 11.57ins., or 25 per cent. Other stations having a rainfall for 1938 appreciably above their ten-year-average are Darnall, 12 per cent, Illovo, 11 per cent, Tinley Manor, 7 per cent, and La Mercy, 6 per cent.

The station with the second highest rainfall for 1938, Eshowe, which is usually the highest, recorded 46.40ins. which is 5.16ins. below normal for that station, or 10 per cent.

The district showing the greatest relative deficiency of rainfall, however, is the Zululand coast belt from Amatikulu north through Gingindhlovu, Mtunzini, Felixton, Empangeni, Kulu, Mposa, Kwambonambi, Umfolozi, Mtubatuba and Hluhluwe, a stretch of over 110 miles. Of these the greatest deficiency is shown by Kwambonambi, 10.95ins. (24.7 per cent), Felixton, 11.46ins. (22.9 per cent), Empangeni, (Z.S.M.), 7.25ins. (17.4 per cent), and Mposa, 6.96ins. (17.4 per cent).

Other places with a marked deficiency of rainfall were Durban (Point) 6.05 ins. (12.6 per cent), and Renishaw, 5.35 ins. (12.9 per cent).

The lowest rainfall for the year excluding Hluhluwe, which is not properly within the sugar

Station.	Recorder.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	Avgc.
Port Shepstone ...	Lightkeeper, S.A.R. & H. ...	61.89	42.82	51.06	49.71	40.58	38.55	42.01	49.63	38.25	42.52	45.70
Esperanza ...	Hawksworth & Sons, Ltd. ...	57.47	42.10	36.13	38.36	32.81	46.13	43.70	44.74	36.14	41.41	41.90
Renishaw ...	Crookes Bros., Ltd. ...	58.24	37.22	31.86	41.56	34.43	42.17	42.69	46.10	44.40	36.13	41.48
Park Rynie... ..	V. J. S. Crookes ...	58.84	39.25	38.94	44.14	37.71	46.53	47.89	52.85	46.10	43.22	45.55
Illovo	Illovo Sugar Estates, Ltd. ...	49.22	38.12	31.54	36.89	26.94	41.00	39.03	51.65	30.79	43.09	38.83
Umbogintwini ...	African Explosives & Industries, Ltd.	47.88	42.10	32.42	39.67	36.43	45.59	52.87	53.09	34.78	41.94	42.68
Durban (Berea) ...	M. Cruickshank ...	46.87	38.93	31.51	44.74	31.61	42.28	58.08	46.71	36.09	41.23	41.81
Durban (Point) ...	South African Railways & Harbours .	59.97	38.92	43.68	49.45	34.42	47.45	60.93	56.85	45.84	41.89	47.94
Mount Edgecombe	Natal Estates, Ltd. ...	47.04	34.52	32.98	43.51	30.94	40.03	57.41	49.60	36.65	43.13	41.58
Mount Edgecombe	S.A.S.A. Experiment Station ...	43.83	30.03	28.01	41.36	27.14	39.42	53.25	45.36	33.21	37.97	37.96
La Mercy	Gersigny Bros. ...	53.37	36.40	29.26	56.65	31.16	37.64	56.27	45.65	35.17	45.36	42.69
Tongaat	Tongaat Sugar Co., Ltd. ...	50.55	34.26	29.88	48.79	26.59	38.44	47.54	50.87	35.61	40.85	40.34
Sinembe	H. C. Heenan ...	49.78	37.02	30.36	52.71	38.64	49.99	41.48	56.80	35.17	42.07	43.40
Umhlali	G. P. Ladlau... ..	50.38	40.07	29.09	49.85	35.13	41.20	53.61	56.57	40.29	56.88	45.31
Chaka's Kraal ...	Waldene Sugar Estate ...	42.78	33.06	22.25	43.09	30.14	35.09	43.38	46.74	32.87	38.40	36.78
Tinley Manor ...	Sir J. L. Hulett & Sons, Ltd. ...	51.36	33.22	30.97	47.44	35.44	41.20	50.97	56.83	38.38	46.35	43.22
Riet Valley... ..	H. E. Essery ...	50.07	35.65	25.38	54.64	37.98	47.70	44.33	65.99	35.28	41.96	43.90
Kearsney	Sir J. L. Hulett & Sons, Ltd. ...	49.20	43.36	26.31	55.49	37.45	53.57	38.42	64.34	39.73	44.30	45.22
Darnall... ..	Mrs. M. C. Rouillard ...	40.75	37.36	23.03	44.14	25.45	49.91	44.04	56.32	40.68	45.56	40.72
Darnall... ..	Sir J. L. Hulett & Sons, Ltd. ...	42.38	40.63	24.31	52.27	29.22	48.24	40.23	52.09	39.75	43.74	41.29
Sitebe	J. W. H. Morris ...	42.05	40.41	24.40	51.27	28.10	53.33	42.57	50.10	34.50	40.86*	40.76
Amatikulu	Sir J. L. Hulett & Sons, Ltd. ...	42.23	40.80	21.09	47.16	29.86	47.66	43.41	47.86	35.38	37.24	39.27
Gingindhlovu ...	P. C. Lilburn ...	42.42	47.72	24.60	53.85	33.08	50.91	53.16	52.68	39.62	40.10	43.81
Mtunzini	R. D. Shaw ...	42.57	48.99	32.92	61.97	40.03	59.28	53.02	55.62	43.57	44.23	48.22
Eshowe... ..	District Forest Officer... ..	49.97	44.26	30.36	65.05	47.31	71.85	46.18	66.61	47.56	46.40	51.56
Felixton	Sir J. L. Hulett & Sons, Ltd. ...	59.39	44.57	38.03	69.08	31.43	58.82	50.16	58.71	51.96	38.62	50.08
Empangeni West .	W. H. Simpson ...	51.61	36.82	20.56	48.32	22.92	41.08	36.40	36.62	39.10	32.93	36.64
Empangeni	Morris Bros. ...	46.05	33.56	30.35	49.58	27.72	45.60	37.28	47.54	45.31	35.99	39.90
Empangeni	Zululand Sugar Millers & Planters, Ltd. ...	48.95	33.80	31.98	55.34	29.55	48.72	38.18	49.48	47.87	33.49	41.74
Kulu Halt	S. B. Forrest... ..	51.94	37.44	25.96	66.55	30.15	48.26	35.03	48.39	56.80	36.95	43.75
Mposa	W. Springorum ...	45.80	37.83	24.29	59.33	25.43	46.45	29.59	46.81	51.80	33.08	40.04
Kwambonambi ...	A. E. Larsen... ..	55.97	42.99	28.14	64.34	29.35	64.21	34.27	41.64	49.37	33.42	44.37
Eteza	Haworth Bros. ...	41.27	36.86	31.27	59.48	29.85	44.05	25.73	42.21	49.95	35.98	39.67
Mtubatuba	Dukuduku Forester ...	42.96	36.14	36.87	61.35	23.99	49.23	24.70	57.27	36.60	35.36	40.45
Hluhluwe	Government Experiment Station ...	27.76	38.52	15.43	40.36	27.24	30.15	11.34	27.97	37.20	25.37	28.13
		48.94	38.74	29.86	51.07	31.89	46.62	43.40	50.81	40.62	40.23	42.19

* Mandini (J. Francis).

belt, was at Empangeni West, 32.93ins. Other places with a rainfall of less than 34ins. were Empangeni (Z.S.M.) 33.49ins., Kwambonambi, 33.42ins., and Mposa, 33.08ins.

The only stations with a ten-year-average rainfall below 38ins. are Empangeni West, 36.64ins., Chaka's Kraal, 36.78ins., and Mount Edgecombe (Experiment Station), 37.96ins.

Temperatures.

The annual mean temperature for 1938 recorded in a standard Stevenson screen was 68.3°, which is very close to the normal, 68.2°, calculated over the past 11 years.

Following is the record by individual months:—

Month	1938				1928-38 inclusive			
	Maximum	Minimum	Mean	Daily range	Maximum	Minimum	Mean	range Daily
January	79.9	66.5	73.2	13.4	80.6	66.5	73.6	14.1
February	81.1	66.0	73.6	15.1	81.2	66.7	74.0	14.5
March	82.0	65.8	73.9	16.2	80.2	65.1	72.7	15.1
April	78.5	64.2	71.3	14.3	78.0	61.6	69.7	16.4
May	75.5	57.4	66.4	18.1	75.5	56.6	66.1	18.9
June	72.3	53.5	62.9	16.8	72.5	52.7	62.6	19.8
July	71.6	53.1	62.4	18.5	71.5	51.7	61.6	19.8
August	70.5	54.0	62.3	16.5	72.4	53.3	62.8	19.1
September	75.4	56.8	66.1	18.6	74.3	56.3	65.3	18.0
October	76.2	62.2	69.2	14.0	75.9	60.3	68.1	15.6
November	77.4	61.6	69.5	15.8	77.6	62.8	70.2	14.8
December	80.5	66.2	73.4	14.3	80.0	65.4	72.7	14.6
Mean for year	76.7	60.6	68.7	16.1	76.6	59.9	68.3	16.7

For the first summer on record at the station, the warmest month has not been January or February, but March. The mean temperature for March, 1938, was 73.9°, which is the highest of any of the four summer months ending March, 1938.

It is not a record for March, however, having been equalled in March, 1937, and surpassed in March, 1933, when it was 74.0°, but on both of these occasions the preceding months had been much warmer than the summer of 1937/38.

This summer was cooler than usual, each of the months from December, 1937, to February, 1938, being considerably below normal. The relatively high temperature for March was no doubt associated with the very dry weather for that month that has already been noted.

Mean Temperatures.

December, 1937 - - - -	70.8°	December, 1928/38	72.7°
January, 1938 - - - -	73.2°	January, 1928/38 - - -	73.6°
February, 1938 - - - -	73.6°	February, 1928/38 - - -	74.0°
March, 1938 - - - -	73.9°	March, 1928/38 - - -	72.7°
Mean - - - -	72.9°	Mean - - - -	73.2°

The year was abnormal in showing a month's time lag in the coolest month also, which was August this year, 62.3°, instead of July as usual. The winter period comprising the months of June, July, and August showed a mean temperature of 62.5°, which is higher than the normal for that period, 62.3°.

Further evidence of the time lag of about a month in normal seasonal weather changes throughout 1938 is shown in the rainfall returns.

Thus the rainy season was protracted into April, instead of March as usual being the last month with plentiful rains. Also the dry season, was prolonged through September, when normally at least moderate rains may be expected.

Further evidence of the equability of temperatures of the year 1938 is the fact that no unusually high or low temperatures were recorded.

The absolute maximum shade temperature for the year was 94.5°, recorded on March 23rd. This is the highest ever recorded for March at this station.

There were only five other days when a temperature of 90° or over was recorded, one each in January, February and November, and two in December.

The absolute minimum screen temperature for the year was 46° on September 13th. There were seven other days on which a screen temperature of less than 50° was recorded, four in June, one in July, and two in August.

No damage by frost was recorded at this station, for the fourth year in succession.

The absolute grass minimum temperature for the year was 38.5° on June 25th. Only on one other occasion was it below 41°, on September 13th.

The earth thermometers showed the usual seasonal range, with maxima in March, and minima in August with one exception noted below.

	Maximum averages	Minimum averages	Average for year
1ft.	79.5° (March)	64.0° (July)	72.3°
2ft.	80.2° (March)	65.8° (August)	73.2°
4ft.	78.9° (March)	67.1° (August)	73.3°

From June to September inclusive the mean earth temperatures up to a depth of 4ft. were below 70°, (excepting the 4ft. reading for June, which was 71.4°). The inference is, therefore, that it would not have been economical to irrigate standard varieties of sugarcane during these months, except to ward off the effects of drought, since sugarcane is said not to make appreciable growth below 70°.

The coastal climate of Natal is remarkably equable, the difference between the mean maximum of the warmest month, February, 81.2°, and the mean minimum of the coolest month, July, 51.7°, being only 29.5°, and the difference in mean temperatures between those months only 12.4°.

Compare this with southern Louisiana, in similar latitude to Natal for instance, where the mean July temperature is over 82°, compared with our February mean of only 74°, and their mean January temperature of 52° compared with the mean of our coldest month, July, 61.6°.

Atmospheric Conditions.

The mean true barometric pressure at 300ft. elevation for the year was 29.75ins. which is the same as for 1937, and is very close to the mean of the past 11 years, 29.77ins.

The monthly average maximum pressure was 29.95ins. in June and the minimum 29.62ins. in

December. Between these months the usual regular sequence of rise or fall is shown.

The absolute maximum for the year was 30.24ins. on August 5th during the middle of a period of 28 consecutive days without any rain.

The absolute minimum was 29.21ins. at 1 p.m. on January 5th during very unsettled and stormy weather.

The mean humidity of atmosphere per cent of saturation for the year was 75.6 at 8.30 a.m. and 63.7 at 1 p.m. These are the highest annual means of humidity recorded here.

The most humid month was April with the very high relative humidity of 84.0 per cent at 8.30 a.m. and 68.0 per cent at 1 p.m., and the driest month was September with a relative humidity of 71.4 per cent at 8.30 a.m. and 60.0 per cent at 1 p.m.

The mean daily rate of evaporation from a free water surface was 0.12ins or 43.8in. for the year. The maximum months were January and December when the daily evaporation was 0.17ins., and the minimum, July when it was 0.07ins. It is mainly a function of temperature, although humidity also plays a part.

The total hours of sunshine were 2,359, corresponding to 53.8 per cent of total hours of daylight. The sunniest month was July with 70.5 per cent of hours of daylight, and the cloudiest October with only 33.7 per cent.

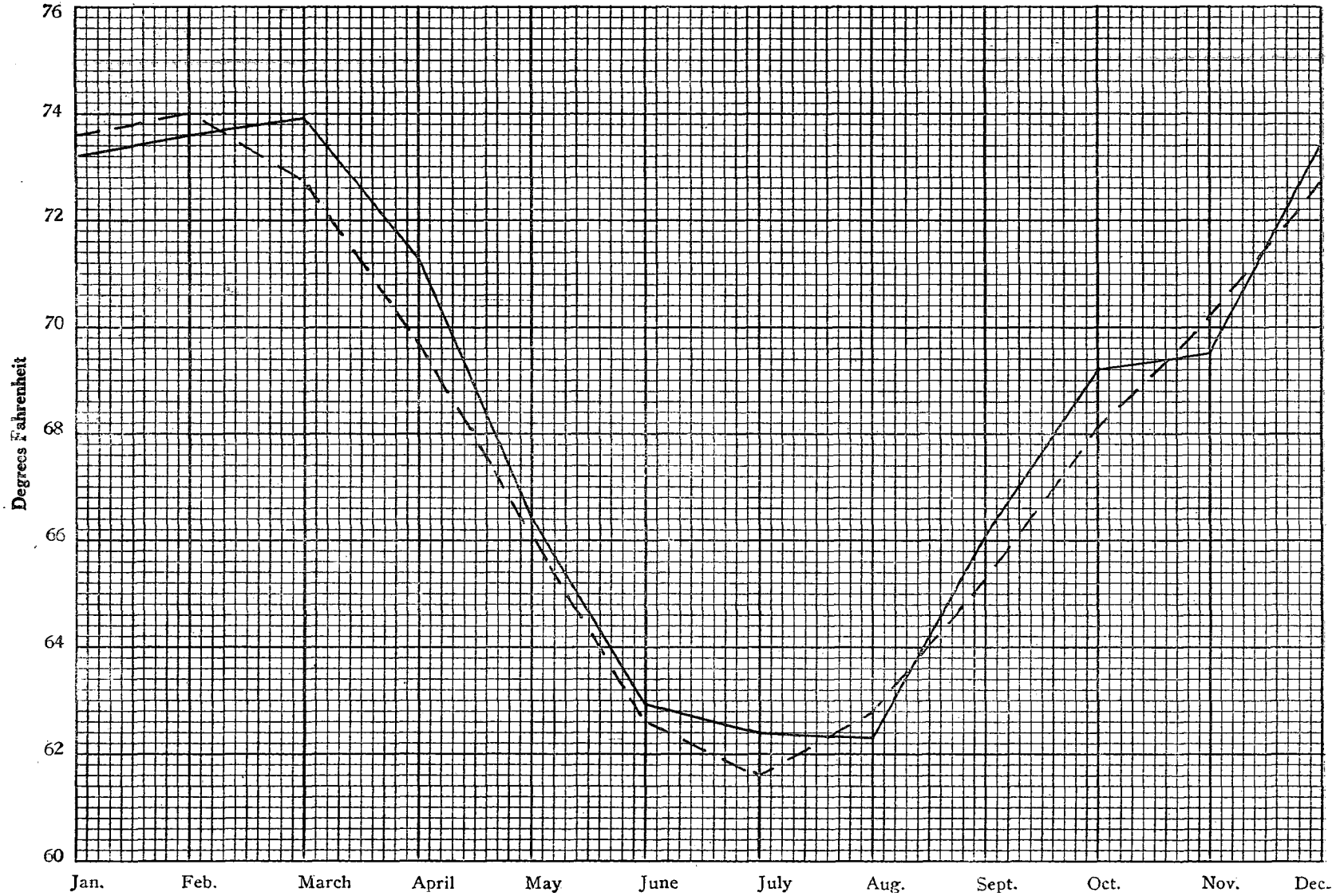
Conclusion.

In general, 1938 may be considered to have been on the whole a very favourable year in weather conditions for growing sugarcane, in this locality at least.

MEAN MONTHLY TEMPERATURE

1938 —————

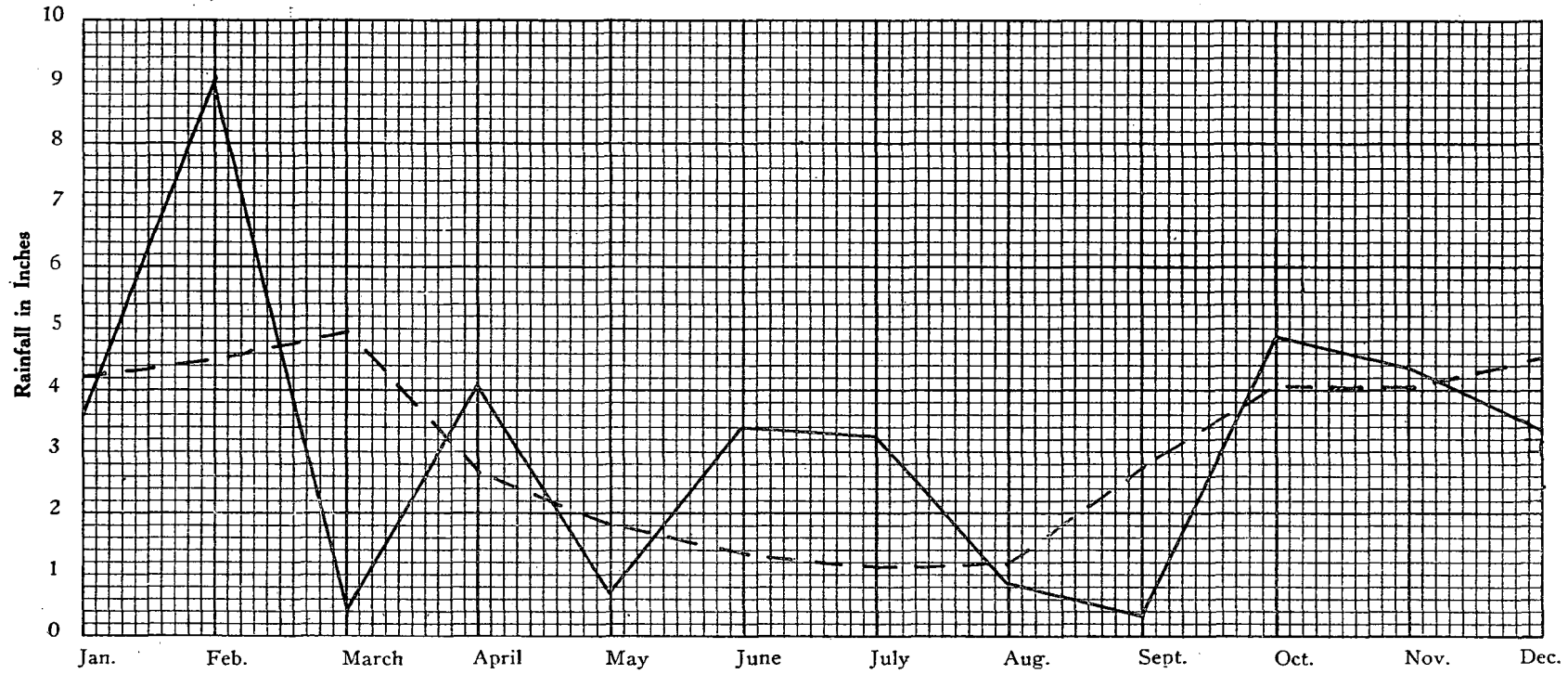
Average 1928/1938 - - - - -



RAINFALL BY MONTHS

1938 —————

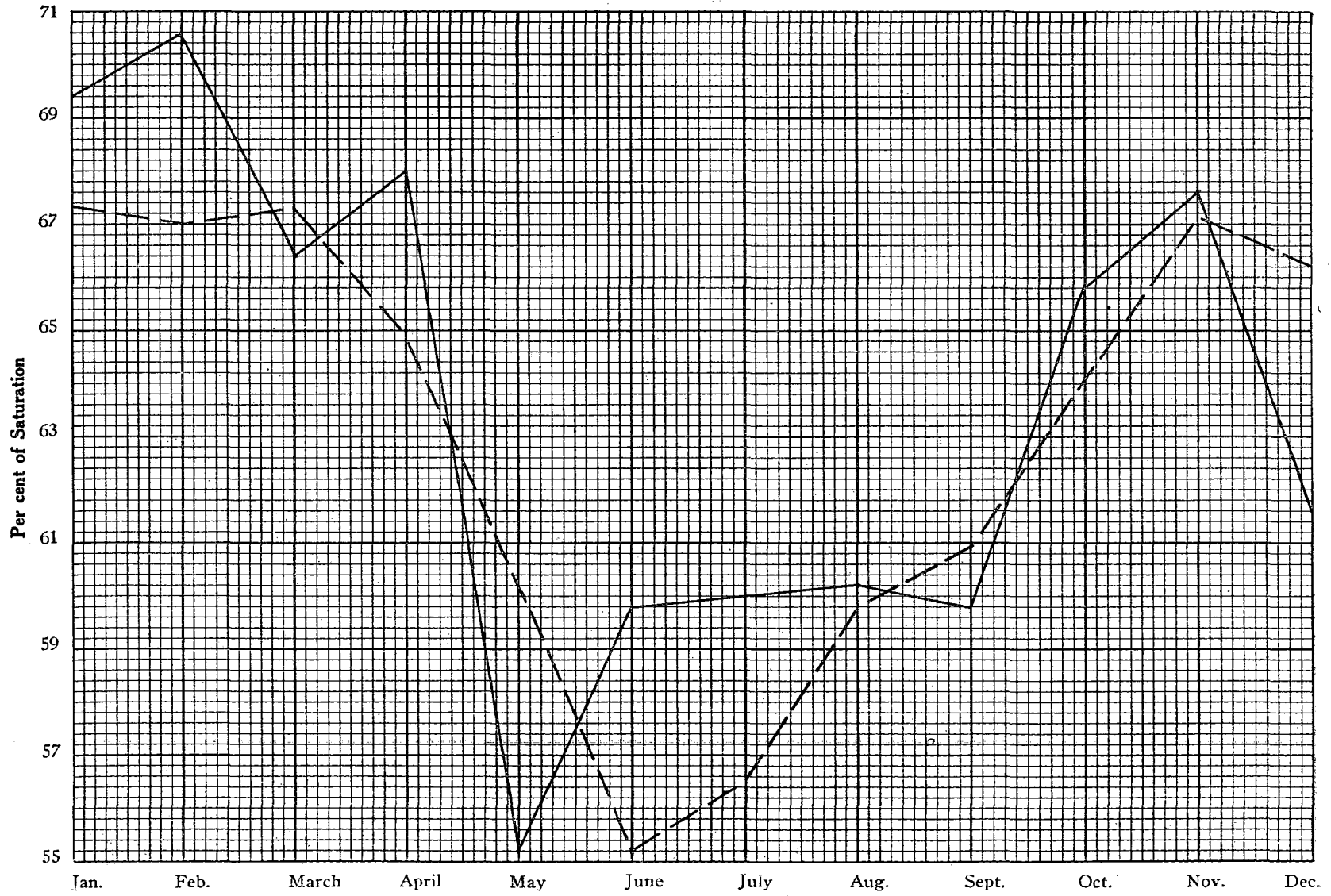
Average 1928/1938 - - - - -



AVERAGE DAILY HUMIDITY

1938 —————

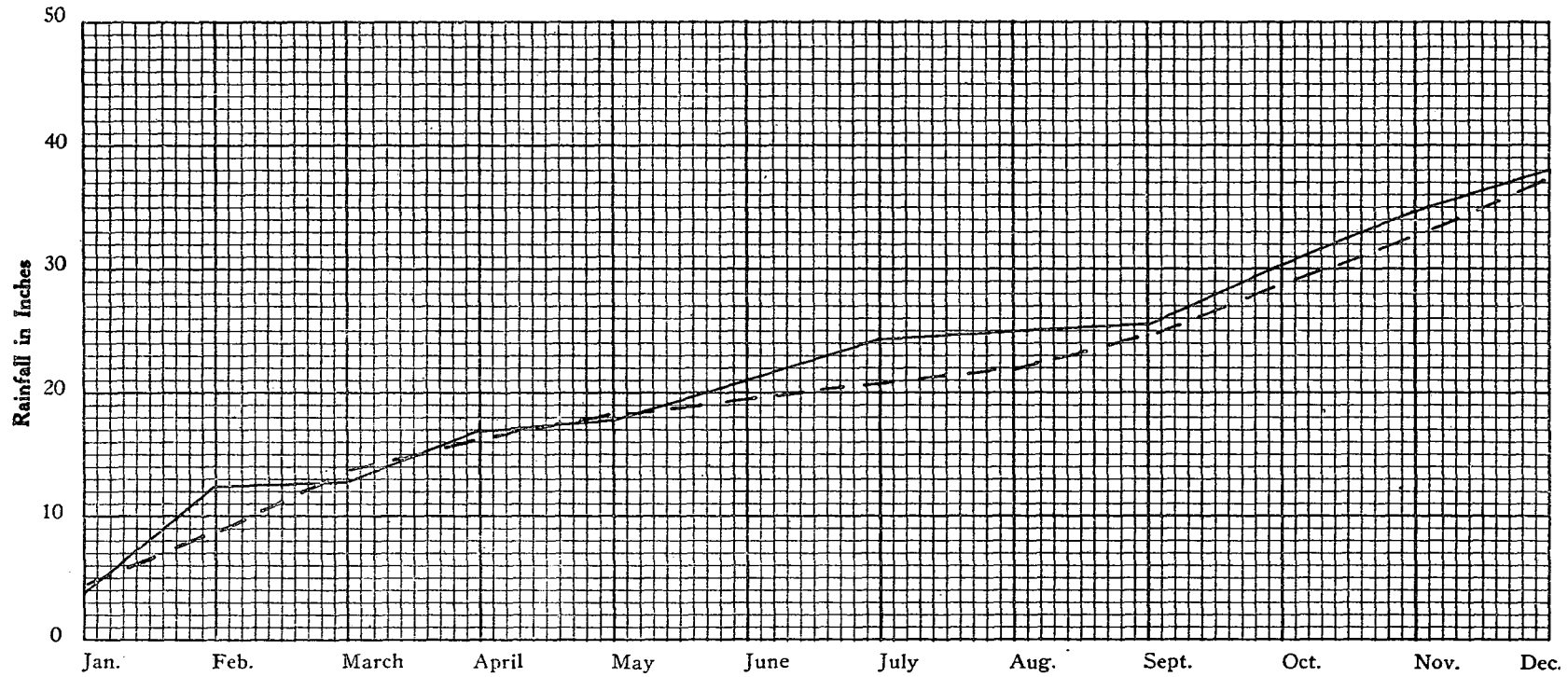
Average 1928/1938 - - - - -



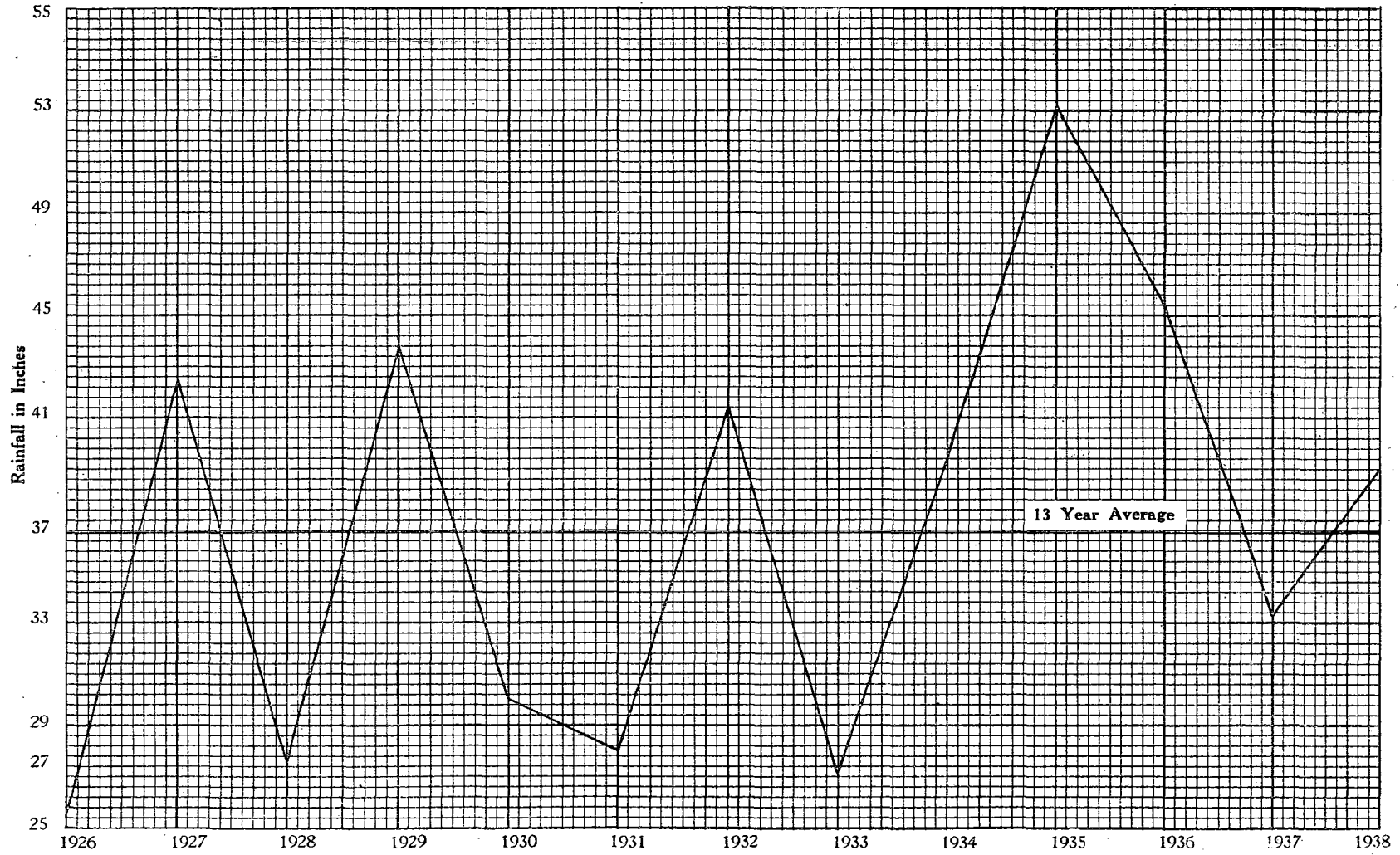
TOTAL RAINFALL FROM JANUARY

1938 —————

Average 1928/1938 - - - - -



ANNUAL RAINFALL FOR EXPERIMENT STATION 1926/1938



The PRESIDENT: I am sure we are indebted to Mr. Dodds and the Experiment Station staff very much for this Report. Every year it gives us a pretty true record of what is being done in the factory and in the field. I think the record, as he points out, is improving every year, and I hope it will continue to improve. There are one or two points where we are not improving—moisture in bagasse is still much too high. It came down last year but went up again this season. It is an important job for the Milling Committee to see what they can do in the matter. Natal Estates, No. 1 factory, are still showing us the way. I think they are to be congratulated on the work they are doing. Most factories have improved their extraction and recovery figures. I would not say this is all due to the new canes; I think it is due to the work of this Association, which has brought the factories up to date and helped them along, and their figures have improved. I think by improved work. I don't think it makes much difference whether you crush Uba or soft cane, you get the same results from the factory, and I would like some of you to express your opinions on that.

Mr. DYMOND: Mr. Dodds points out to us the effect of the shortening of the season on page 8, on top of the right-hand side. He shows that if we had crushed more cane, in the peak periods of August to November, and left out May and June, we would have required only 696,000 tons of cane, and we would have had a saving of 136,200 tons of cane. The only way, in the past, to save that cane, has been considerably increased capital cost in milling plant, and the result would have been that we would have been faced with a greater surplus than we have today. The point I want to make is why not save that 136,000 tons, why not have 100% efficiency and make alcohol?

Mr. MOBERLY: A point which came to me on reading this report, and that is about the graph on page 29—the new one added—which shows the exceedingly interesting way in which seasonal sucrose per cent cane gives just the form which one would expect. Actually it starts lower than normal when we are concentrating on old ratoons of Uba, and rises above the normal curve, when we pass over to the new varieties—whatever may be said about them nobody contradicts their improved sucrose. The second curve illustrates the point I have already noticed in other years, that is the flatness of the mixed juice purity curve in recent seasons. Starting with a sharp rise, it passes off immediately to a flat curve in the three middle months of the season, and then drops off. The exact cause of that I don't know, but I have noticed it before. The third curve for fibre per cent cane is rather puzzling. It does not take quite the form which one would expect—in May and June, when we were working off old Uba ratoons, the drop below normal of the fibre was greater than in the

latter part of the season, when very large quantities of the new varieties were being crushed, and that in a year which, as was explained in the text of the Report, was rather checked by drought in the early growing months.

Mr. FELTHAM: There are one or two points I would like to ask Mr. Dodds. I notice that the yield of Uba is 20.38, as against 28.91 for non-Uba cane. I am rather interested to know whether any records have been kept which would indicate the relative improvement, or otherwise, of the non-Uba canes. I presume that the increased average tonnage of cane per acre, as shown in the graph on page 27 is due to the greater planting of non-Uba cane, because—unfortunately I haven't the figures with me—so far as the analysis of the non-Uba canes are concerned, it would indicate that the non-Uba cane is rather falling off in sucrose as compared with Uba for the last three years. I would be rather interested to know whether any record has been kept which would show whether the non-Uba canes are actually falling off, or Uba is improving.

Mr. BECHARD: Some very interesting points arise out of the table of comparison on page 12, in the main body of the Report. One of them might have been discussed after the Clarification Committee this afternoon, and that is the sucrose in filter cake per cent sucrose in cane. We all know that factories 4 and 5 have new mechanical filters. Factory No. 4 more especially deserves a lot of attention. They have certainly made a success of the use of mechanical filters, from the mechanical point of view, at any rate.

It is very interesting to see that although the sucrose in filter cake is only 0.21 per cent of that of the cane, which is approximately one-fifth of what is obtained in most of the factories, undetermined losses are rather high.

Passing now to another subject, the question of extraction. Mill No. 16, which we all look to most with the exception of the mill quoted by Mr. Moberly just now, for recoveries (they always give us an excellent recovery), and I have heard it said that probably it was due to their low extraction. That does not seem to follow, because Mill No. 16, solely through high efficiency, last year have increased their extraction tremendously. Mill No. 16 could only obtain an extraction in the past ranging round 87. Looking to the figures today, you will see what a big step forward they have made—due to the employment of the right man in the right place. A very interesting point about this mill is that the moisture is one of the lowest in the country, and yet we have at mill No. 16 only three mills, I believe. I think the last mill is of the big mill type, yet they get a moisture of 47, which I do not doubt for one moment, because I

have examined their bagasse. I have no doubt whatever that their bagasse is one of the best in the country. Their boiling house recovery too is still leading all factories by a substantial margin. The gaining of high extraction therefore should not deter milling companies through fear of getting a lower recovery.

Another point. Mill 14 now determines refractive total solids for brix and purity, I understand No. 2 does the same and I would like information from the representative of Mill No. 2, who I notice is here.

Mr. DODDS: We seem to have elicited a number of comments covering quite a wide field, and the queries are very interesting. It is one thing to start a Report like this, and it is another thing to answer all the comments that might arise out of it. With regard to your remarks, Mr. Chairman, about the allocation of the credit of the improved performance to the factory technique and cane quality, I think both have played an important part. I do not think you can possibly have canes of improved quality going into the mill, such as we have, without improving results, apart from technique. I believe also that technique has very largely improved, as one would naturally expect from the improvement in equipment that we see in nearly every factory.

I was very interested in Mr. Dymond's suggestion that we should use the cane in the earlier and later parts of the season for making a greater proportion of alcohol. At that time of the year undoubtedly the juices are of a lower quality. They are not necessarily so much lower in total fermentable sugars, however, as they are in sucrose. That opens up a new possibility of reducing these losses from unseasonable harvesting.

Mr. Moberly raised several interesting points.

One that he did not mention however, he has asked in past years. He usually asks what the rainfall was during the twelve months ending with June, and I really intended to put it in the Report this year, but did not do so, and have recorded as usual the rainfall figures for the calendar year 1938, January to the end of December in the Report. That rainfall was 37.97 inches, but from July, 1937 to June, 1938, it was 38.50 inches, and for the preceding twelve months, that is to say from July, 1936, to July, 1937, it was 33.63. There is very little difference, therefore between the 1938 calendar year, and the twelve months ending June, 1938.

The seasonal change in fibre content of cane does not follow quite the course we would have expected, but, as Mr. Moberly knows, last year was rather abnormal in that respect, and it was difficult to trace the changes in quality of cane because of the

very varying proportion of the new varieties, and it may be that the relatively high fibre content later in the season, and the minimum of fibre content occurring a month or two earlier than we expected, might have been due to the greater proportion of Co. 281, which is high in fibre, being harvested in the latter part of the season. There was in fact a marked increase in proportion of Co. 281 after August. A great deal of 281 has not yet got past the plant cane stage, and therefore was harvested to a greater degree later in the season, whereas Co. 290 cane, which normally has a lower fibre content than 281, has now reached the ratoon stage in many instances, and so would be harvested in the earlier part of the season. That I think is the probable explanation.

Mr. Feltham has raised the question of the relative yields of Uba to non-Uba cane in different localities. We have not very much data on that, so far. We only have the figures that I have quoted, and certain experiments that we have in different parts of the sugar belt, but they are not sufficient to show evidence of any relative changes in difference of yield. We must always keep in mind that the last few years have been very favourable from the point of view of rainfall, and it will be very interesting to see what happens when we get a really severe drought, both from the point of view of the resistance of the new canes to drought compared with Uba, and also their temporary changes in composition as a result of drought. In a rather severe drought in 1933, Co. 281 showed much greater powers of resistance than Uba at the Experiment Station, but Co. 290 and P.O.J. 2725 were not quite so satisfactory.

Mr. Bechard, as he did last year, mentioned the fact that the changes in equipment might very well account for changes in performance in individual factories, as well as for the factories as a whole. That, no doubt, is the case, and it would be very interesting—I would have attempted it this last season if I had been here—to get from the factories some information as to what new equipment had been put in, and whether they would be willing to have their experience with such special equipment recorded and the effect of their performance. That I hope to do in the coming season.

No. 2 factory, I believe, has been using the refractometer for the determination of total solids in juice for several seasons, but I did not know that No. 14 was following the same practice. If we have anybody here from No. 2, I would like to have his comments on that, and let us know what he thinks of the comparison of the refractometer returns with those from the Brix hydrometer.

Mr. DUCHENNE: With reference to the question asked about the density of juice and molasses determined by refractometer, we make refractometer records as well as Brix, but we publish only the Brix hydrometer returns.

The difference between the two usually runs seven to eight degrees in molasses, but is practically negligible in juices.

Mr. RAULT: Might I be allowed to give you some information in answer to previous speakers. I have here some cane variety returns from our district:

	Tons Cane per Acre.		
	1936	1937	1938
Uba	27.8	28.7	30.1
Co.290	38.6	35.1	43.1
Co.281	35.3	30.6	41.3
P.O.J.2725	31.7	37.1	36.8
P.O.J.2878	38.9	30.5	40.2
All varieties	<u>29.7</u>	<u>30.4</u>	<u>37.1</u>

It is clear from these figures that we are not justified in speaking of deterioration of Uba. It has, in fact, been increasing in yield. This year the factory crushed only old ratoons of Uba and 30.1 tons were reaped per acre. Surely this is not a sign of deterioration. The same is true of the other canes.

Another point raised by Mr. Bechard in remarking on the increase in mill extraction, while maintaining a record boiling house recovery at one of the factories. We have increased our extraction to a record for South Africa, as you have been told, and hope in future to make it still better, but we could not find that increase in extraction in any way tended to lower our boiling house recovery.

Mr. Pougnet wished to know whether the yields quoted by Mr. Rault were due to irrigation or resulted from normal rainfall.

Mr. DODDS: There is one special feature about Uba cane and the figures that Mr. Rault quoted. Presumably the cane comes from the Mount Edgecombe district, and is Natal Estates own cane; in that area streak disease has been kept within bounds, to some extent over recent years, and there is far less streak disease in Uba in the Inanda district generally than in the rest of the country. Streak disease, is undoubtedly an important factor in the deterioration of Uba cane. It is very interesting and instructive to have these figures from Mr. Rault, I wish we could have had them before—the relative yields from the different varieties. It is indeed most instructive. Perhaps Mr. Rault will tell us in answer to Mr. Pougnet whether these gains were predominantly under irrigated areas.

Mr. RAULT: I cannot give definite figures, but we do not irrigate all our fields. While we must give credit to our improved methods of obtaining the yield, we can give credit also to the new variety canes not only under irrigation since in our unirrigated fields also we are getting very good yields from them.

Mr. MURPHY: What is the proportion of Uba plant canes to ratoon canes, I would like to ask Mr. Rault.

Mr. RAULT: Very little. I think this year we have had only one per cent of Uba plant cane or even less. The Uba cane we are receiving at the mill is old ratoons, of two years growth, but even the previous season I noticed that we had practically no plant cane from Uba at the mill.

Mr. FELTHAM: Just a point of interest concerning varieties. I note from the figures that Mr. Rault has quoted, that Co.281 in 1938 yielded 41.3 tons per acre as against P.O.J.2878, 40.2. From my experience, from the figures which I received from many factories all along the coast, the indication is that the 281 is maintaining its level far better than P.O.J. or Co.290. Co.290 seems to appear to be deteriorating so far as sucrose is concerned. I would like to hear from Mr. Rault whether he has any figures concerning yield in sucrose per acre.

Mr. RAULT: Since you are interested also in returns of tons of sucrose per acre for the two last seasons, I quote from the report already used:—

	Tons Sucrose per Acre.		
	1936	1937	1938
Uba	3.812	4.070	4.057
Co.290	5.449	5.073	5.786
Co.281	5.132	4.435	5.848
P.O.J.2725	5.086	5.769	5.431
P.O.J.2878	6.104	4.576	5.902
All varieties	<u>4.170</u>	<u>4.360</u>	<u>5.086</u>

We maintain about 8 per cent of our plantings in P.O.J. canes, while the other two varieties, Co. 281 and Co.290 are increasing in percentage of cane planted.

Mr. POUCKET: Can Mr. Dodds give us the tonnage of sucrose per acre for 301?

Mr. DODDS: We have very little information about it on a manufacturing scale, but Mr. Moberly and Mr. Feltham will tell you what information they had during the last season was not favourable. It was low in sucrose during the earlier part of the season—apparently last season it was parti-

cularly late in ripening; sucrose on the whole was satisfactory in the later part of the season, though not particularly high. It may be that Co.301 is a late-ripening variety. We have had it under experiment for a good many years now, but have had no indication that it will be in any way inferior to the other Co. canes in sucrose content, at least in yield of sucrose per acre. In almost all our experiments Co.301 has given more sucrose per acre than the other Co. varieties at every cutting.

Concerning the yield of sucrose per acre from Natal Estates, one has to take into account the higher sucrose per cent cane in certain varieties. There is not much difference between the Co. varieties in that respect, perhaps, but you see that the sucrose content of P.O.J.2725 and P.O.J.2878 is so high that it tends to outweigh any deficiency in yield compared with other varieties. We have been doing a good deal of work at the botanical department of the Experiment Station on the effect of minor diseases on the new varieties, and undoubtedly Co.290 is subject to certain minor root and fungus diseases which tend to lessen its sucrose content and yield under certain conditions, and Co. 281 is much more resistant under our conditions. That will, no doubt, have considerable effect in certain years on the relative performances of the two varieties. I may say that our experience in that respect is entirely opposite to that of Louisiana. In Louisiana they grow 281 to the extent of 30 per cent of the crop. The reason is that it is a highly frost-resisting variety, which is the only reason for growing it, since it is inferior in all soils to Co.290, and to the new C.P. varieties. But they must grow a certain proportion of 281 for windrowing purposes until they are able to develop a variety of cane equally frost-resisting, which they have not been able to do up to the present. Co.281, under their conditions, is uniformly lower in yield, and is more subject to the minor diseases than is 290, which is exactly the reverse of our experience.

Co.281 and 290 in Louisiana were at one time giving higher yields than any other variety, but they have deteriorated a good deal during the past few years owing to mosaic disease and other diseases, and they have now fallen below the new C.P. varieties. All the C.P. varieties in cultivation are hybrids of 281, and are resistant to disease and give a much better yield, but they have the disadvantage that they are not as frost-resistant as 281 itself.

Mr. COIGNET: What is the life of the ratoons in the new varieties compared to the Uba?

The longer the cane can ratoon to yield a fairly high tonnage per acre, the cheaper is the cost of production. We all know that the Uba used to go to four or five ratoon crops.

Mr. DODDS: One of the reasons for the apparent delay in the release of new varieties, which often seems rather long, is because we feel we must test the ratooning power of those canes before they are released for general cultivation; and so we may say that all the varieties that have been released within recent years have been proved to have excellent ratooning powers, and compared with Uba as a standard, they are all at least equal, or, in most cases superior, to Uba in ratooning qualities. We have, for example, at the Experiment Station now, Co.281 under fourth ratoons compared with Uba, and at every crop 281 has increased its superiority over the Uba control. So that there is nothing to fear from the ratooning quality of that variety in similar conditions. We do find to get the best ratoon results, the cane must be cultivated in the type of soil to which it is suited, and a good many planters are not doing that, they are growing Co.281 where 290 ought to be grown, or vice versa. Under those conditions, the ratooning powers are not of the best. Grown in the best conditions, any of these new varieties released will ratoon remarkably well, with the exception of P.O.J.2714, which has now gone out of cultivation.

Mr. POUQUET: Has it not been proved that cane ratooned too often might be more liable to disease?

Mr. DODDS: Up to the present, we have had no serious disease in the new varieties. How far they are affected by minor diseases under continued ratooning, we are not in a position, yet, to say positively, but that matter is being studied. Up to the present, there is no indication that any serious disease is likely to affect them. As I said just now, Co.281 and 290 have both gone under with mosaic disease in Louisiana. After a few years their original resistance fell away, and now they are widely affected with mosaic disease. The same might possibly happen here. I can only say that up to the present we have had no mosaic disease in these new varieties at all. This matter was discussed at the International Congress in Louisiana, and Dr. Matz, who has probably more experience of mosaic disease in sugar cane than anyone, described the various strains of mosaic disease he found from different countries. I asked him if he could account for mosaic disease not affecting Co.281 and Co.290 canes in South Africa. He replied that he had found a certain strain of mosaic disease received from Hawaii that did not affect these two varieties, and it might be that we had the same or a similar strain here. Undoubtedly mosaic disease does exist in this country, and certain varieties fall to it very easily, but fortunately for us, up to the present, not any of the released varieties.

Mr. BOOTH: I have no other remarks but to say what a very good stand-by this Report is for anyone that is in the Industry. I, personally, make very much use of it throughout the year. I would

like to express our thanks to Mr. Dodds for compiling this information.

The PRESIDENT: We are all deeply indebted to Mr. Dodds for his interesting paper. Mr. Moberly mentioned Umzinkulu. They have, during the last few seasons, had an excellent grow-

ing season, with a sucrose of 14.78%, about 1% higher than any other place, and their extraction 91.82 with only three sets of mill rollers. They are running their factory at very low capacity, a low rate of crushing. It is giving very good results, and I think they are to be congratulated.