

GENERAL REPORT ON WEATHER CONDITIONS FOR THE YEAR 1941.

RAINFALL.

The year 1941 has the most unfortunate distinction of having the lowest rainfall on record, here or at Natal Estates, Moun Edgecombe, the records of the latter going back to 1887.

The total rainfall for the year at this station was 24.35 inches, which is only 65.9 per cent. of normal. Not only is this total very deficient, but the distribution was unfavourable.

The two most important growing months of January and February had a total rainfall of only 3.70 inches, or less than 43 per cent. of normal, thus giving the sugarcane crop a very severe setback at the beginning of the year. March, with 3.43 inches rainfall, was not quite so bad, and April, with 4.93 inches, had a rainfall above normal. This, however, is late in the growing season, and the temperature had of course fallen considerably.

From April 19th to September 11th a time of unexampled drought set in, the total rainfall over that period of nearly five months being only 1.75 inches.—September and October were better, and eventually good planting conditions supervened which continued throughout November, though good soaking rains which might have replenished soil reserves of moisture and benefited the older canes were still conspicuously absent. The year ended characteristically in unseasonable dry conditions, once more with abnormally hot and dry atmospheric conditions.

The total number of rain days, 107, while considerably below the average for this station, is not so extremely low as to account for the very low rainfall. The average rainfall per rain day, however, was only 0.227 inch, which is much below the fifteen-year average of 0.314 inch and was only lower once, in 1926, when it was 0.219 inch.

The heaviest fall for any single day was 1.68 inches on April 19th, and the only other days with a rainfall of over an inch were March 21st with 1.60 inches, and April 18th with 1.15 inches. This is very remarkable, since there are normally many days in the year with over one inch of rain, and usually a few with 2 inches or more.

Following is the rainfall for 1941 by months compared with the 54-year average:—

Month.	1941.			Mean 1887/1940 inclusive.		
	Total for month in inches.	Aggregate from Jan. 1st in inches.	Per cent. of normal aggregate.	Total for month in inches.	Aggregate from Jan. 1st in inches.	Average rainfall per day in inches.
January ...	2.26	2.26	45.5	4.14	4.14	0.134
February ...	1.44	3.70	42.9	4.49	8.63	0.159
March ...	3.43	7.13	52.8	4.87	13.50	0.157
April ...	4.93	12.06	74.8	2.63	16.13	0.088
May ...	0.06	12.12	66.7	1.99	18.12	0.064
June ...	0.36	12.48	64.0	1.38	19.50	0.046
July ...	0.52	13.00	63.0	1.13	20.63	0.036
August ...	0.53	13.53	62.1	1.17	21.80	0.038
September .	2.96	16.49	67.2	2.74	24.54	0.091
October ...	2.12	18.61	60.3	4.00	28.54	0.129
November .	4.04	22.65	65.0	4.13	32.67	0.138
December...	1.70	24.35	65.5	4.52	37.19	0.146
Totals...	<u>24.35</u>			<u>37.19</u>		Mean 0.102

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., factory at Mount Edgecombe have been used, applying a factor, 0.9259, that is indicated by the 15 years 1926 to 1940 inclusive as the ratio of the rainfall at the Experiment Station to that at Natal Estates' factory. According to this ratio the average rainfall at the Experiment Station site for these 39 years was 37.24 inches, the factory average being 40.22 inches over that period.

The annual rainfall recorded at this Experiment Station to date is as follows:—

Year.	Rain-fall in inches.	Calculated normal from 1887 at date in inches.	Per cent. of normal.	No. of rain days.	Average rainfall per rain day in inches.	Year.
1926	25.42	36.94	68.81	116	0.219	1926
1927	42.46	37.08	114.51	128	0.332	1927
1928	27.56	36.85	74.79	114	0.242	1928
1929	43.83	37.01	118.43	129	0.340	1929
1930	30.03	36.86	81.47	123	0.244	1930
1931	28.01	36.66	76.40	112	0.250	1931
1932	41.36	36.76	112.51	126	0.328	1932
1933	27.14	36.56	74.23	109	0.249	1933
1934	39.42	36.62	107.65	127	0.310	1934
1935	53.25	36.96	144.07	111	0.480	1935
1936	45.36	37.12	122.20	110	0.412	1936
1937	33.21	37.05	89.64	101	0.329	1937
1938	37.97	37.06	102.46	117	0.325	1938
1939	42.87	37.17	115.33	134	0.320	1939
1940	37.31	37.18	100.35	108	0.345	1940
1941	24.35	36.95	65.90	107	0.227	1941
Means	<u>36.22</u>	<u>36.95</u>	<u>98.02</u>	<u>118</u>	<u>0.313</u>	Means

This abnormally dry season of 1941 follows a cycle of seven successive years with only one rainfall below normal and an annual average of 41.34 inches. It may be that this is an isolated dry year like 1937, but more so, or we may be at the beginning of another period of mainly dry years, such as began in 1926 and continued till 1933, and had an average annual fall of only 33.23 inches.

The annual normal rainfall is now 36.95 inches, which is very close to what it was calculated to be at the beginning of our records. It declined to as low as 36.56 inches at the end of the dry cycle in 1933, and had increased to 37.18 inches at the end of 1940.

DISTRICT RAINFALL RETURNS.

The drought was experienced in every part of the sugarcane growing area, and the general deficiency was even greater over the 44 recording stations as a whole than at the Experiment Station. Thus the average rate for the 44 stations was 26.18 inches, the lowest on record, and only 63.9 per cent. of the 13-year annual average, whereas the rainfall at the Experiment Station was 65.4 per cent. of normal.

The lowest rainfall recorded for any station reporting to us was Riverview, at the extreme northern end of the sugar belt, where it was only 16.45 inches or 47.1 per cent. of normal. Another station with a rainfall of less than 20 inches was Esperanza on the South Coast with 19.49 inches, or 49.1 per cent. of normal.

There are as many as eight other stations with a recorded rainfall of less than 23 inches—Effingham, Blackburn and Ottawa in Natal Estates group, Tongaat and Chakas Kraal in the central North Coast, and Mposa, Kwambonambi and Eteza in the northern Zululand section.

Mtunzini with 39.08 inches, or 78.5 per cent. of normal, recorded the highest rainfall, and Eshowe was second with 36.57 inches or 70.4 per cent. of normal. Felixton had 30.08 inches (60.4 per cent. of normal), so that the wettest area was again the Eshowe-Mtunzini-Felixton triangle, which has a normal rainfall of 50.54 inches, which is considerably larger than anywhere else on the Natal coast.

This year, as in 1939, Gingindhlovu was also included in this area of relatively high rainfall.

Five other stations topped the 30 inches mark—Durban (Berea), 30.06 inches (73.2 per cent. of normal); Durban (Point),

ANNUAL RAINFALL, 1929-1941.

Station.	Recorder.	1929.	1930.	1931.	1932.	1933.	1934.	1935.	1936.	1937.	1938.	1939.	1940.	1941.	Average
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	44.08	27.66	23.12	42.45
Umzumbi ...	Mrs. M. G. Lomas ...	56.28	34.95	40.31	42.04	36.35	37.50	43.66	51.24	40.63	42.82	42.86	27.74	23.78	40.01
Esperanza ...	Hawksworth & Sons, Ltd. ...	57.47	42.10	36.13	38.36	32.81	46.13	43.70	44.74	36.14	41.41	47.31	30.48	19.49	39.71
Renishaw ...	Crookes Bros., Ltd. ...	58.24	37.22	31.86	41.56	34.43	42.17	42.69	46.10	44.40	36.13	46.90	31.83	25.16	39.90
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	56.25	34.46	27.40	44.12
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	42.22	30.10	26.17	37.44
Umbogintwiini ...	African Explosives & Industries, Ltd.	47.88	42.10	32.42	39.67	36.43	45.59	52.87	53.09	34.78	41.94	48.53	31.26	28.18	41.13
Durban (Berea) ...	M. Cruickshank... ..	46.87	38.93	31.51	44.74	31.61	42.28	58.08	46.71	36.09	41.23	47.26	38.35	30.06	41.06
Durban (Point) ...	S.A. Railways & Harbours ...	59.97	38.92	43.68	49.45	34.42	47.45	60.93	56.85	45.84	41.89	62.57	40.99	34.95	47.53
Effingham ...	Natal Estates, Ltd. ...	33.52	26.17	21.33	30.56	19.63	30.57	46.86	42.28	28.25	32.40	35.33	26.75	22.15	30.45
Westbrook ...	Natal Estates, Ltd. ...	46.97	33.01	27.03	45.62	31.18	38.49	55.06	52.14	33.56	41.68	45.75	40.05	29.09	39.97
Milkwood Kraal ...	Natal Estates, Ltd. ...	35.60	26.90	23.17	33.05	22.15	31.96	43.07	36.45	23.49	34.98	36.24	34.97	23.02	31.16
Mount Edgcombe ...	Natal Estates, Ltd. ...	48.30	34.52	32.98	40.19	30.94	40.03	57.41	49.60	36.55	43.13	46.06	40.23	28.34	40.64
Mount Edgcombe ...	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	42.87	37.31	24.35	37.24
Cornubia ...	Natal Estates, Ltd. ...	46.22	33.45	27.85	42.53	29.98	40.25	59.21	52.27	40.37	44.84	51.66	42.80	30.66	41.70
Burnside ...	Natal Estates, Ltd. ...	46.01	31.78	27.01	38.79	27.55	39.61	53.26	47.48	34.01	39.76	48.67	44.91	29.54	39.11
Blackburn ...	Natal Estates, Ltd. ...	48.97	34.09	23.78	37.52	24.94	33.94	48.78	43.67	34.70	35.45	49.84	36.99	22.68	36.57
Beach ...	Natal Estates, Ltd. ...	56.49	39.25	30.15	51.64	31.53	43.18	59.09	49.19	38.62	44.24	54.88	40.81	28.76	43.68
Saccharine ...	Natal Estates, Ltd. ...	48.73	32.82	29.76	38.37	29.22	42.38	51.95	55.98	32.07	36.91	42.05	38.41	23.73	38.64
Ottawa ...	Natal Estates, Ltd. ...	40.38	29.21	24.49	34.72	28.72	39.08	47.55	44.66	47.32	37.83	41.95	39.18	22.16	36.71
La Mercy ...	Gersigny Bros. ...	53.37	36.40	29.26	56.65	31.16	37.64	56.27	45.65	35.17	45.36	49.41	42.63	25.26	41.86
Tongaat ...	Tongaat Sugar Co., Ltd. ...	50.55	34.26	29.88	48.79	26.50	38.44	47.54	50.87	35.61	40.85	44.67	40.87	22.72	39.36
Sinembe ...	H. C. Heenan ...	49.78	37.02	30.36	52.71	38.64	49.99	41.84	56.80	35.17	42.07	45.80	43.53	25.25	42.20
Umhlabi... ..	G. P. Ladlau ...	50.38	40.07	29.09	49.85	35.13	41.20	53.61	56.57	40.29	56.88	58.14	39.72	29.49	44.65
Chakas Kraal ...	Waldene Sugar Estate ...	42.78	33.06	22.52	43.09	30.14	35.09	43.38	46.74	32.87	38.40	42.27	30.81	21.78	35.59
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	48.93	41.16	24.37	42.05
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	51.39	45.90	27.37	43.36
Kearsney ...	Sir J. L. Hulett & Sons, Ltd. ...	49.20	43.36	26.31	55.49	37.45	53.57	38.42	64.34	49.73	44.30	47.46	50.80	31.91	44.80
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	44.65	48.48	24.49	40.45
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	43.80	47.10	25.27	40.69
Mandini... ..	St. Andrews Estate ...	42.05	40.41	24.40	50.98	27.41	55.34	45.88	51.25	35.34	40.86	38.34	41.01	26.70	40.00
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	47.53	50.40	27.80	39.88
Gingindhlovu ...	P. C. Lilburn ...	42.42	47.72	24.60	53.85	33.08	50.91	53.16	52.68	39.62	40.10	54.12	53.75	30.35	44.34
Mtunzini ...	R. D. Shaw... ..	42.57	48.99	32.92	61.97	40.03	59.28	53.02	55.62	43.57	44.23	65.11	62.16	39.08	49.89
Eshowe ...	District Forest Officer ...	49.97	44.26	30.36	65.05	47.31	71.85	46.18	66.61	47.56	46.40	52.55	70.67	36.57	51.95
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	54.99	61.15	30.08	49.77
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	47.01	41.24	24.50	36.85
Empangeni ...	Morris Bros. ...	46.05	33.56	30.35	49.58	27.72	45.60	37.28	47.54	45.31	35.99	52.02	53.46	26.79	40.87
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	51.79	53.11	24.54	42.06
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	52.91	57.61	23.97	44.00
Mposa ...	W. Springorum ...	45.80	37.83	24.29	59.33	25.43	46.45	29.59	46.81	51.80	33.08	47.63	51.62	20.58	40.02
Kwambonambi ...	S. Larsen ...	55.97	42.99	28.14	64.34	29.35	64.21	34.27	41.64	49.37	33.42	42.91	53.82	20.81	43.17
Eteza ...	Haworth Bros. ...	41.27	36.86	31.27	59.48	29.85	44.05	25.73	42.21	49.94	35.98	41.26	61.81	22.04	40.14
Riverview ...	Umfolozi Co-op. Sugar Planters, Ltd.	34.65	38.45	22.38	51.29	25.05	37.36	21.44	35.98	39.45	36.33	39.93	54.95	16.45	34.90
		48.30	37.20	29.39	48.20	31.12	44.60	46.12	50.10	39.48	40.38	47.63	43.37	26.18	40.96

34.95 inches (73.5 per cent. of normal); Cornubia (Natal Estates), 30.66 inches (73.5 per cent. of normal); Kearsney, 31.91 inches (71.2 per cent. of normal), and Gingindhlovu, 30.35 inches (68.4 per cent. of normal).

The deficiency of rainfall was most marked at the extreme north and south, the four most northerly stations of Riverview, Eteza, Kwambonambi and Mposa having an average rainfall of 19.97 inches or 50.5 per cent. of normal, and the three most southerly stations of Port Shepstone, Umzumbi and Esperanza an average of 22.13 inches or 54.3 per cent. of normal.

In the area from Durban to about Mount Edgecombe the deficiency of rainfall was less marked, a group of seven neighbouring stations having a rainfall of from 72 to 75 per cent. of normal, the only station exceeding this percentage of normal being Mtunzini with 78.5 per cent., as already stated.

This year our district rainfall record going back to 1929 has been considerably extended to include nine stations not previously listed. These are Effingham, Westbrook, Milkwood Kraal, Saccharine, Cornubia, Burnside, Blackburn, Beach, and Ottawa, all within Natal Estates and are distributed over an area of approximately eight miles long and seven miles wide, giving now a total of 11 stations within this limited area.

This perhaps tends to overweight this area somewhat in arriving at the general mean of all stations, especially since the average rainfall of the 11 stations in this district is 37.81 inches, compared with a general average of 40.96 inches for all stations.

According to "Rainfall Normals" published by the Union Meteorological Office in 1927, part of the Durban North and Mount Edgecombe area is one of the very few places where the 30 inches to 40 inches annual rainfall zone characteristic for about 200 miles inland of the upland regions immediately behind the sugar growing belt, penetrates that belt and the only place where it actually reaches the coast anywhere between Port Shepstone (excepting possibly near Umzumbi) and Portuguese Africa. The rest of the sugar-growing belt is within the 40 inches to 50 inches zone, except for a section between the mouths of the Amatikulu and Umfolozi Rivers, extending back from the coast at one point as far as Eshowe, within the 50 inches to 60 inches zone.

However, the inclusion of the new recording stations mentioned only brings down the 14-year general average from 41.26 inches to 40.96 inches, and since they each represent important sugar-growing centres where accurate rainfall records have been kept for many years, they have been included.

TEMPERATURES.

The mean average daily temperature in the shade was 69.9°, the highest on record for any year at this station excepting 1940, which was the same.

	Mean shade temperature in degrees F.	Annual means at date in degrees F.
1928	67.8	67.8
1929	67.5	67.6
1930	67.8	67.7
1931	68.8	68.0
1932	69.2	68.2
1933	68.9	68.3
1934	68.9	68.4
1935	66.8	68.2
1936	67.9	68.2
1937	68.8	68.3
1938	68.3	68.3
1939	68.1	68.3
1940	69.9	68.4
1941	69.9	68.5
General mean	68.5	

Following are the screen temperatures in degrees Fahrenheit by months:—

Month.	1941.				1928-1940 inclusive.			
	Maxi-mum.	Mini-mum.	Mean	Daily range	Maxi-mum.	Mini-mum.	Mean	Daily range
January...	82.4	67.6	75.0	14.8	80.8	66.6	73.7	14.2
February .	84.2	69.0	76.6	15.2	81.6	67.1	74.4	14.5
March ...	81.7	65.8	73.8	15.9	80.2	65.3	72.8	14.9
April ...	80.6	64.4	72.5	16.2	78.2	61.6	69.9	16.6
May... ..	79.6	59.5	69.5	20.1	75.7	56.8	66.2	18.9
June ...	73.2	52.7	62.9	20.5	72.6	53.0	62.8	19.6
July... ..	71.1	52.4	61.7	18.7	71.5	51.7	61.6	19.8
August ...	75.5	54.3	64.9	21.2	72.4	53.6	63.0	18.8
September	73.9	57.4	65.6	16.5	74.1	56.5	65.3	17.6
October ...	78.6	61.7	70.2	16.9	76.0	60.3	68.2	15.7
November	79.1	62.9	71.0	16.2	77.5	63.0	70.2	14.5
December	83.3	67.2	75.3	16.1	80.1	65.6	72.8	14.5
Mean for year	78.6	61.2	69.9	17.4	76.7	60.1	68.4	16.6

It will be seen that every month had a temperature above normal; and in fact the months of April, May and October had the highest mean temperatures ever recorded for those months.

As usual, February was the warmest month and July the coolest.

The mean temperature for the three months ending February, 1941, is the highest on record for that period, and was only equalled once before for any three-months period, the first quarter of 1940, when it was also 75.6°.

The mean daily range of temperature, 17.4°, was higher than normal, probably due to the lack of the moderating effect of rain on temperature.

No doubt for the same reason there were some abnormally high temperatures. Thus there were the unusual number of 12 days with a maximum shade temperature of between 90° and 100°, and two days of over 100°—October 10th with 101.5° and December 30th with 113.5°. The latter is the absolute maximum for this station, the previous highest shade temperature being 104° on January 15th, 1932.

The mean maximum shade temperature for the year, 78.6°, is the highest on record at this station, the previous highest being 78.2° for 1940, and the mean of the 13 years ending 1940, 76.7°.

The absolute minimum screen temperature for the year was 45° on August 6th. For the seventh successive year there were no ground frosts, although the grass thermometer recorded a temperature as low as 35.5° on August 6th. The average grass thermometer minimum for the year was 56.6°, the annual normal being 55.2°.

The mean solar radiation maximum temperature (vacuum bulb thermometer) for the year was 126.7°, and the absolute maximum 167° on December 30th; the previous absolute maximum 160° on January 15th, 1939.

The mean earth temperatures were the highest on record at each of the 1 ft., 2 ft. and 4 ft. levels; they were 72.7°, 73.7° and 73.7° respectively. They ranged from 80.4° in February at 1 ft. and 2 ft. levels to 63.2° at the 1 ft. level in July. They indicated that irrigation of sugarcane would have resulted in increased growth during every month except those of June to September inclusive, and would have been particularly beneficial in the months of January, February, March and December.

ATMOSPHERIC CONDITIONS.

The mean true atmospheric pressure for the year at 300 feet elevation was 29.74 inches, which is the lowest on record for any year at this station. July, as usual, was the highest with a mean pressure of 29.92 inches, and December was the lowest with a mean of only 29.62 inches.

The range for the year was from 29.19 inches on December 22nd to 30.26 inches on August 22nd.

The mean humidity for the year is the lowest ever recorded for any year at this station, being 69.9 per cent. of saturation at 8.30 a.m. and 61.1 per cent. at 1 p.m. The most humid months were March and April, that had moderate rainfalls, and the driest were June with a relative humidity of only 54.8 per cent. of saturation at 1 p.m., and December with a mean relative humidity of 56.3 per cent. of saturation at 1 p.m. and 61.8 per cent. at 8.30 a.m.

On the abnormally hot day of December 30th the relative humidity was only 8 per cent. of saturation at 1.20 p.m.

The mean daily rate of evaporation from a free water surface was 0.13 inch for the year, ranging from 0.07 inch in July to 0.20 inch in January.

The total evaporation for the year was consequently 48.46 inches, or almost double the rainfall, a further indication of the aridity of 1941.

Experiment Station,
South African Sugar Association,
Mount Edgecombe.
March, 1942.

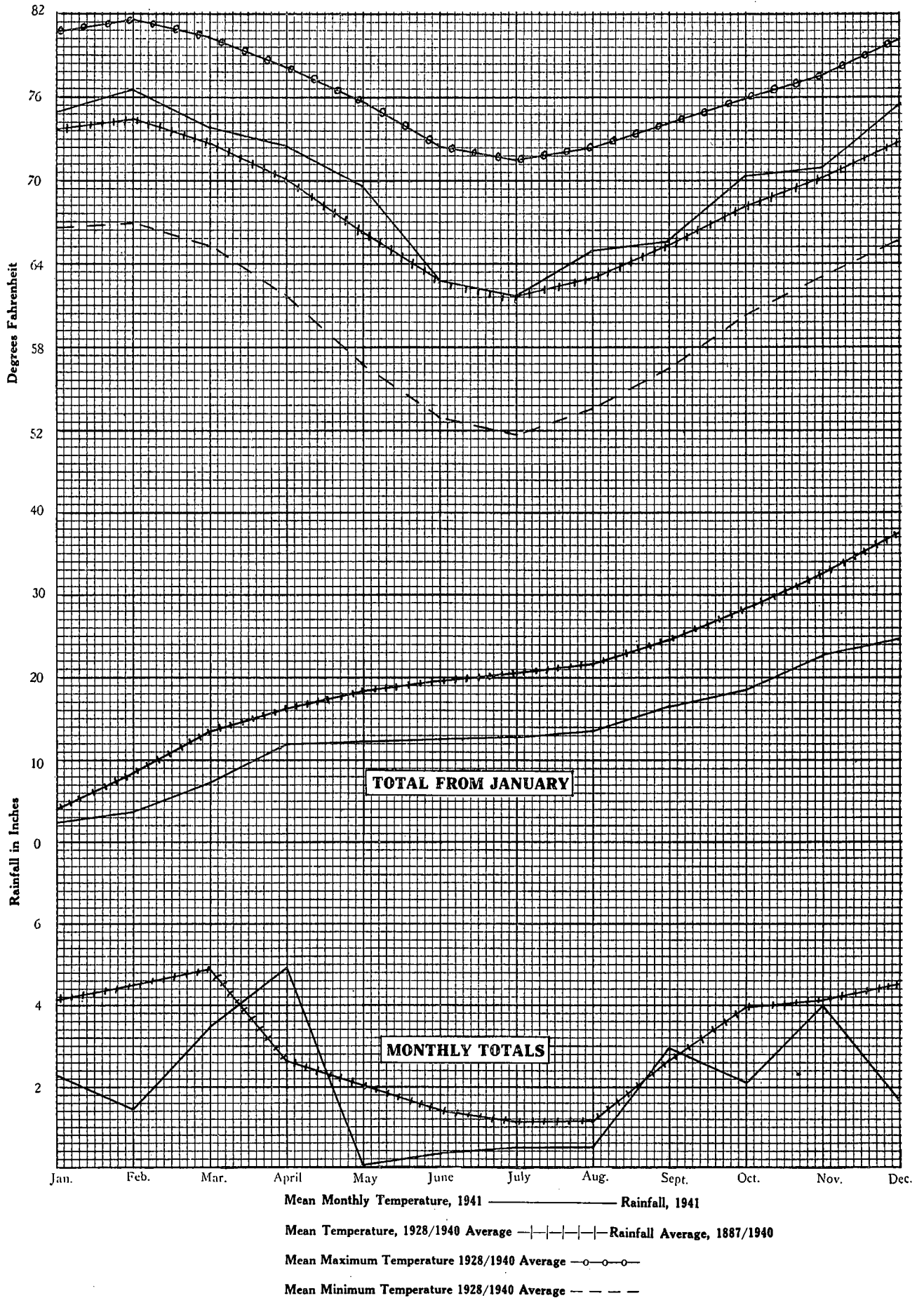
The total hours of sunshine during the year were 2,345.2 or 53.5 per cent. of total hours of daylight, which, as in 1940, is considerably above normal for this station.

The sunniest month was again May with 72.4 sunshine per cent. of hours of daylight, and the cloudiest February and October with 41.4 per cent. and 41.8 respectively.

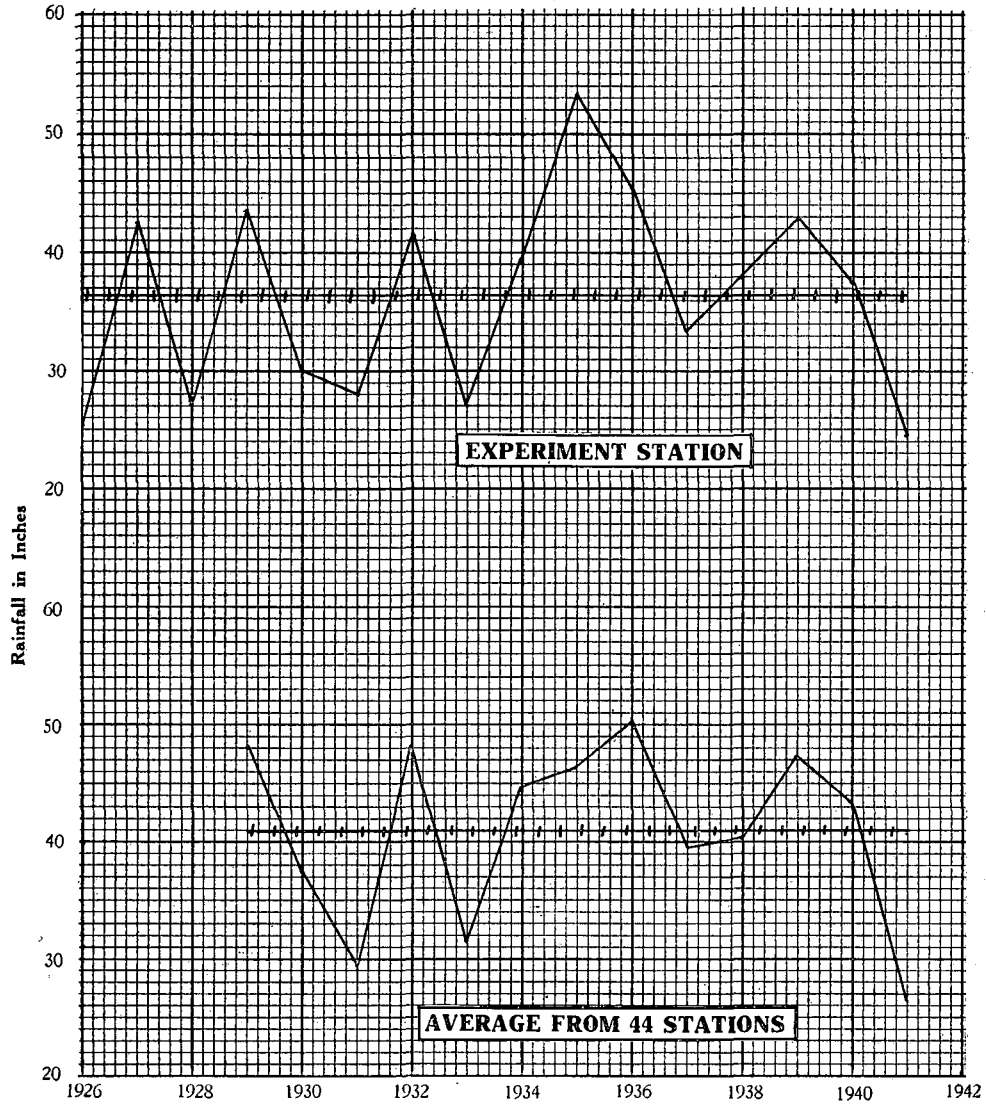
CONCLUSION.

1941 may be considered a disastrous year for sugarcane growing owing to a record deficient rainfall, especially in the most important growing months of January, February and December, when the loss of moisture by transpiration was particularly heavy. The drought was also very severe in July and August, adversely affecting the condition of the harvested sugarcane crop and the renewed growth of ratoons. The results are seen in the lowest crop of sugar for several years, and an even lower present estimate for the 1942 crop.

TEMPERATURE AND RAINFALL BY MONTHS



ANNUAL RAINFALL



Rainfall by Years —————

Average Rainfall, 1926/1941 and 1929/1941 -|-|-|-|-