

WEATHER REPORT FOR THE YEAR 1st JUNE 1964, TO 31st MAY, 1965

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General Scope of Report

It has been correctly said that "Climate is what you should have, and weather is what you get". This report records the weather experienced along the South African sugar-belt during the year ending 31st May, 1965, and compares it with the climate we should have had if conditions had been average. As in previous years, the report will deal primarily with the rainfall recorded by 54 measuring stations scattered throughout the cane-growing areas from Port Shepstone in the south to Pongola in the north. Other climatic data quoted, such as evaporation rates and soil and air temperatures, refer specifically to Mount Edgecombe where these readings were taken. These figures will, however, reflect broadly the conditions prevailing in the rest of the area.

Rainfall during the year under review will be discussed in some detail. In addition, the rainfall experienced during the year June, 1963, to May, 1964, will be referred to, since the crop being harvested this season will have been influenced by the weather during both years.

Tabulated Data

Table I gives the annual rainfall recorded at each of the 54 measuring stations for the past 5 years.

Table II indicates the mean monthly rainfall during the past year for each of the magisterial districts covered by this survey, as well as for each of the three main sub-divisions.

In table III can be seen the calculated mean rainfall for the past 41 years, as well as the monthly percentage distribution. Also given are the actual mean monthly rainfall figures for all recording stations, plus the corresponding evaporation figures for the Experiment Station. The evaporation figures are recorded from an open water surface in a square "Symons" tank.

Table IV gives the rainfall distribution for 2 years according to growing periods for the magisterial districts and for the main sub-divisions.

Table V gives the monthly rainfall for the 54 centres for the past 4 years, and also the rainfall deficiency, if any, per month.

Table VI is a list of the maximum, minimum, and mean screen temperatures as recorded at the Experiment Station during the past year, plus the comparative mean figures over the past 37 years.

Table VII lists the mean monthly earth temperatures at Mount Edgecombe over the past year, as well as the figures for the past 30 years for comparison.

TABLE I
Rainfall for 54 Centres

	Rainfall for year 1st June 1960 to 31st May 1961	Rainfall for year 1st June 1961 to 31st May 1962	Rainfall for year 1st June 1962 to 31st May 1963	Rainfall for year 1st June 1963 to 31st May 1964	Rainfall for year 1st June 1964 to 31st May 1965
Port Shepstone					
Mehlomnyama	48.21	36.25	46.13	43.89	33.32
Umzinto					
Hibberdene	54.56	34.40	42.95	37.43	51.11
Mtwalume	41.32	25.76	36.52	37.17	45.91
Sczela Mill	45.84	32.06	39.66	42.62	52.44
Esperanza Mill	46.60	35.97	46.48	42.10	41.02
Renishaw Mill	48.06	37.79	42.50	40.88	40.87
Dumisa	46.82	31.42	39.85	35.97	42.20
Durban, Camperdown, etc.					
Illovo Mill	43.18	39.64	46.80	40.15	43.06
Umbumbulu	42.46	29.40	36.93	32.21	29.51
Thornville	43.06	26.64	27.23	35.41	24.53
Inanda					
Mount Edgecombe—					
Effingham	35.64	27.75	34.17	37.92	26.78
Experiment Station	38.91	30.83	36.46	35.00	23.50
Burnside	42.23	33.88	38.52	33.49	26.12
La Mercy	46.52	28.12	37.51	34.85	29.08
Canelands	50.51	31.74	47.89	42.26	24.73
Tonga—					
Frosterly	46.09	31.02	44.17	36.99	26.28
Inyaninga	43.86	31.97	41.06	36.62	22.50
Inanda	48.62	32.42	42.90	43.47	32.34
Tonga—					
Mwawine	48.10	31.33	36.10	37.50	30.47
Lower Tugela					
Maidstone Mill	45.10	28.41	38.04	33.38	25.74
Sinembe	44.37	33.19	40.18	32.21	26.90
Upper Tongaat	49.46	35.63	42.33	38.85	31.02
Frasers Estate	45.38	30.83	39.11	33.78	27.70
Chaka's Kraal Experi- mental Farm	42.79	32.51	40.68	34.88	26.82
Chaka's Kraal	42.01	29.98	43.14	35.15	26.69
Groutville	38.60	26.33	34.10	31.55	23.46
Kearsney	41.81	37.04	41.42	39.63	28.77
Doornkop Mill	38.89	28.79	33.71	33.25	22.71
Doornkop Sprinz	52.48	40.05	43.83	38.78	25.54
Gledhow Mill	42.44	34.36	38.41	35.14	24.99
Darnall Mill	47.75	36.50	46.49	40.97	26.33
Tugela Mouth	54.04	43.49	43.22	41.37	37.16
Mtunzini					
Mandeni	41.94	35.49	40.24	42.98	24.87
Amatikulu Mill	48.29	32.98	35.61	43.67	24.50
Inyoni	50.90	31.54	37.39	41.54	24.52
Mtunzini	66.73	49.76	43.26	54.33	37.16
Blackburn	54.49	36.73	37.72	46.30	27.34
Eshowe					
Entumeni Mill	46.57	36.99	43.51	38.39	25.07
Eshowe	50.12	39.19	51.32	54.56	29.10
Nkwaleni	37.30	20.54	30.26	35.04	15.69
Lower Umfolozi					
Felixton Mill	68.67	49.98	44.52	57.21	41.19
Empangeni West	48.31	31.70	32.48	52.45	24.66
Empangeni Mill	61.50	36.72	38.60	53.33	30.90
Logoza	60.93	39.56	38.21	54.67	26.55
Ukulu Properties	57.45	29.68	31.32	47.87	27.55
Mposa	54.91	39.19	33.05	53.71	25.94
Kwambonambi	54.49	47.11	36.88	56.60	31.24
Eteza	43.12	44.84	33.76	47.70	27.69
Hlabisa					
Mtubatuba Mill	36.24	39.50	30.86	40.89	22.06
U.L.O.A.	47.76	55.90	39.37	54.76	31.09
Nyalazi River	31.66	33.83	30.62	41.18	21.04
Hluhluwe	32.27	23.18	24.47	43.85	14.49
Ubombo					
Mkuzi	39.01	23.36	22.27	32.05	17.48
Piet Retief					
Pongola	28.67	18.24	24.92	21.59	16.95
Mean	<u>46.43</u>	<u>34.10</u>	<u>38.32</u>	<u>40.92</u>	<u>29.02</u>

Comments on Rainfall

During the past year the South African sugar industry has experienced the worst summer drought ever recorded. As a direct result of the drought there will be an estimated shortfall of 400,000 tons of sugar during the coming season, and imports have been authorized in an effort to fulfil the commitments of the industry.

Rainfall for the year totalled only 29.02 inches compared with a computed mean annual figure of 38.20 inches for the past 41 years. June and July, 1964, were fractionally wetter than usual. October was very wet with 6.71 inches of rain compared with an average of 3.61 inches for the month, and May, 1965, had very slightly more rain than the average. All other months were far drier than usual, including the entire period from November to April, inclusive. Any lack of rain during this period is very serious for the cane industry, since it has been estimated that in Natal 75.2 per cent of the annual cane-growth takes place during this time, provided that moisture conditions are satisfactory. No matter how much rain falls from May onwards, growth lost by a summer drought cannot be made good.

The mean rainfall for the November/April period during the last 41 years has been 26.05 inches. Coupled with the mean evaporation figure of 28.92 inches, this gives a mean "water deficit" of 2.87 inches. Comparable figures recorded during the past summer were 14.68 inches of rain and 34.56 inches of evaporation. This gives the astonishing figure of 19.88 inches of "water deficit", or just on 7 times the expected amount. It should be explained that evaporation figures are measured from an open water surface, and are therefore seldom equal to the combined evapo-transpiration losses experienced by a field of growing cane. In this country the evapo-transpiration losses are usually limited by the rainfall, assuming that side-effects such as run-off, water-table and irrigation are absent. Thus in the 6-month period quoted above, actual evapo-transpiration figures will have been nearer 14 inches rather than the 34-inch figure recorded from an open water surface.

The following is a month by month report on the year under review. June, 1964 was a dry month for most of the cane belt. The overall figure of 1.81 inches of rain was inflated by unseasonal floods on the South Coast, where some areas recorded more than 12 inches on one day (19th June). The rest of the area received less than one inch for the entire month, and crops already affected by a very dry May were feeling the stress. During the month frost was reported in greater or lesser severity on low-lying areas at Pongola, and other centres right throughout the cane belt.

Light showers, totalling 1.37 inches, were welcomed by cane growers during July, but conditions remained dry. The two most northerly centres, Pongola and Mkuzi, reported no rain at all for the month. Further isolated reports of frost were received, but little further damage was caused.

August was another dry month with only 0.69 inches of rain being recorded. Windy conditions further decreased the available soil moisture. September followed

with a below-average rainfall. Thus by the beginning of October good soaking rains were badly needed in all areas. During October the whole picture was transformed when the long-awaited good soaking rains did in fact eventuate. The general mean rainfall was 6.71 inches, or nearly double the average in past years. The South Coast was particularly favoured, with many centres reporting falls in the region of 12 inches of rain.

By the 1st November cane belt soils were thoroughly moist, and the industry was looking forward to the accelerated cane-growth which the warmer weather would provide. November rainfall was 30 per cent below normal, but the residual moisture from October permitted good growth for the entire month. December rainfall was 20 per cent down on the expected figure for the cane industry. Thus, at the end of 1964 conditions were dry, and most planters were of the opinion that although the cane was in fairly good condition, it had nevertheless not made the growth it should have done.

January, 1965 started the new year badly with only 2.65 inches of rain instead of the expected mean of 4.43 inches. The South Coast received more rain than other areas, and Zululand suffered most with a scant 1.64 inches for the month. The summer drought gained momentum when 2.64 inches of rain fell during February compared with a mean of 4.61 inches in the past. Again the South Coast fared rather better than the rest of the cane belt.

March is normally the wettest month for our cane growing region with a 41-year average of 5.12 inches of rain. A figure like this would have been most welcome in March this year, and the drought would have been relieved. The actual rainfall for the month proved to be a disappointing 1.22 inches and the severity of the drought increased sharply. Cane began dying on the shallower soils, and rivers dried up, thus preventing the irrigation of some fields previously thought to be safe from the hazard of drought.

The sad saga of our severe summer drought continued with April being the sixth consecutive month of below normal rainfall. The figure of 1.32 inches recorded was only 45 per cent of the expected 2.88 inches. Six months of low rainfall, and high evaporation had by this time appreciably reduced crop yields. The same conditions continued right up to the last day in May when widespread rains throughout the industry brought relief to most centres. A few areas such as Eshowe, Nkweleni Valley, Ntambanana and Pongola did not share much of the good rainfall. Crops in the rest of the cane belt ended the rainfall year on a dust-free note, and with a much reduced fire hazard.

In reviewing the rainfall position over the past two years, it can be said that conditions have been far from ideal. The 12-month period from June, 1963, onwards was a succession of alternately wet and dry cycles. One of the wet cycles was in June and July, 1963, when the cane was unable to take full advantage of the moist conditions through lack of heat. Conversely, a dry cycle occurred in February and March,

TABLE 2
Rainfall in Inches by Districts for Months of June, 1964, to May, 1965 inclusive

District	No. of Centres	1964								1965				Total June 1964 to May 1965
		June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	
Port Shepstone	1	11.06	0.40	0.31	1.10	8.56	2.69	1.44	2.38	3.10	0.25	0.58	1.45	33.32
Umzinto	6	7.74	1.22	0.78	2.17	10.95	4.25	3.75	4.71	4.31	0.88	1.69	3.14	45.60
Durban, Pinetown, etc.	3	1.12	0.70	0.58	2.58	7.33	2.75	5.82	3.85	3.36	1.19	0.64	2.47	32.36
Mean: S. Coast	10	6.09	0.98	0.67	2.19	9.62	3.64	4.14	4.22	3.91	0.91	1.26	2.77	40.40
Inanda	9	1.40	1.10	0.31	1.74	5.39	2.69	4.34	2.96	2.15	0.67	0.92	3.19	26.86
Lower Tugela	13	0.68	1.26	0.44	2.34	5.71	2.75	4.08	2.93	2.49	1.38	1.20	1.96	27.22
Mean: N. Coast	22	0.97	1.20	0.39	2.09	5.58	2.72	4.19	2.94	2.35	1.09	2.46	1.90	27.07
Mean: S. of Tugela	32	2.57	1.13	0.48	2.12	6.84	3.01	4.17	3.34	2.84	1.04	1.14	2.56	31.24
Mtunzini	5	0.69	1.74	0.83	1.88	5.90	3.92	3.47	1.77	2.83	1.58	1.74	1.32	27.68
Eshowe	3	0.66	0.61	0.70	1.29	5.49	3.26	3.14	2.72	1.98	1.14	1.59	0.72	23.28
Lower Umfolozi	8	0.99	2.29	1.40	1.26	7.01	3.31	3.46	1.68	2.85	1.49	1.76	1.96	29.47
Hlabisa	4	0.36	1.29	0.88	0.39	7.63	2.56	1.70	1.18	1.55	1.74	1.27	1.63	22.17
Ubombo	1	0.46	0.00	0.97	0.08	5.56	2.68	3.19	0.41	0.96	1.29	1.36	0.52	17.48
Piet Retief	1	0.04	0.00	0.00	0.23	5.25	1.88	5.25	0.61	1.96	1.01	0.68	0.04	16.95
Mean: Zululand and Piet Retief	22	0.70	1.55	1.00	1.15	6.52	3.21	3.17	1.64	2.36	1.48	1.58	1.43	25.77
General Mean	54	1.81	1.30	0.69	1.73	6.71	3.09	3.76	2.65	2.64	1.22	1.32	2.10	29.02

TABLE 3
Rainfall and Evaporation Data

Month	Mean Percentage Rainfall Distribution 1924-1965	Computed Mean Rainfall for 54 Centres 1924-1965	Actual Rainfall for 54 Centres June, 1964, to May, 1965	Evaporation at Experiment Station	
				Mean 1936-1965	June, 1964, to May, 1965
June	4.00	1.53	1.81	2.38	2.66
July	3.09	1.18	1.30	2.54	2.56
August	3.59	1.37	0.69	2.98	3.50
September	6.54	2.50	1.73	3.67	3.58
October	9.45	3.61	6.71	4.19	3.61
November	11.31	4.32	3.09	4.79	5.54
December	12.28	4.69	3.76	5.44	6.55
January	11.60	4.43	2.65	5.70	6.10
February	12.07	4.61	2.64	4.89	5.81
March	13.40	5.12	1.22	4.60	6.34
April	7.54	2.88	1.32	3.50	4.22
May	5.13	1.96	2.10	2.85	3.00
	100.00	38.20	29.02	47.53	53.47

TABLE 4

Rainfall in Inches by Districts for the Two-year Period June, 1963 to May, 1965 inclusive

	No. of Centres	1963 Winter Growth June to August	1963 Early Growth Sept. and October	1963-1964 Optimum Growth Nov. to March	1964 Late Growth April and May	1964 Winter Growth June to August	1964 Early Growth Sept. and October	1964-1965 Optimum Growth Nov. to March	1965 Late Growth April and May	Total for Two Years June, 1963 to May, 1965
Port Shepstone	1	6.92	6.33	27.98	2.66	11.77	9.66	9.86	2.03	77.21
Umzinto	6	7.26	5.22	23.44	3.45	9.74	13.12	17.90	4.83	84.97
Durban, Pinetown, etc.	3	6.15	5.39	20.18	4.20	2.40	9.91	16.97	3.11	68.29
Mean: South Coast	10	6.89	5.38	22.92	3.59	7.74	11.81	16.82	4.03	79.18
Inanda	9	7.40	4.13	22.71	3.31	2.81	7.13	12.81	4.11	64.43
Lower Tugela	13	8.71	4.28	19.35	3.71	2.38	8.05	13.63	3.16	63.29
Mean: North Coast	22	8.18	4.22	20.73	3.55	2.56	7.67	13.29	3.55	63.76
Mean: South of Tugela	32	7.78	4.59	21.42	3.57	4.18	8.96	14.40	3.70	68.58
Mtunzini	5	13.18	5.55	20.63	5.49	3.26	7.78	13.57	3.06	73.44
Eshowe	3	12.43	4.07	24.77	5.14	1.97	6.78	12.24	2.31	65.95
Lower Umfolozi	8	21.90	4.20	20.40	4.87	4.68	8.27	12.79	3.72	82.41
Hlabisa	4	17.03	3.44	18.60	6.10	2.53	8.02	8.73	2.90	67.34
Ubombo	1	8.31	3.04	17.12	3.58	1.43	5.64	8.53	1.88	49.53
Piet Retief	1	3.93	2.26	13.39	2.01	0.04	5.48	10.71	0.72	38.54
Mean: Zululand and Piet Retief	22	16.30	4.21	20.25	5.09	3.25	7.67	11.86	3.01	71.90
Mean: General	54	11.25	4.43	20.95	4.19	3.80	8.44	13.36	3.42	69.93
Computed Mean for 41 Years		4.08	6.11	23.17	4.84	4.08	6.11	23.17	4.84	76.40

TABLE 5

Rainfall and Evaporation in Inches for the Past Four Years

Month	1961 - 1962			1962 - 1963			1963 - 1964			1964 - 1965		
	Evaporation	Rainfall	Rainfall Deficiency	Evaporation	Rainfall	Rainfall Deficiency	Evaporation	Rainfall	Rainfall Deficiency	Evaporation	Rainfall	Rainfall Deficiency
June	2.15	3.76	0.00	2.95	0.04	2.91	2.41	4.47	0.00	2.66	1.81	0.85
July	2.51	1.08	1.43	3.11	0.32	2.79	2.36	6.62	0.00	2.56	1.30	1.26
August	3.60	0.80	2.80	3.43	2.97	0.47	3.47	0.44	3.03	3.50	0.69	2.81
September	4.14	3.18	0.96	4.33	0.80	3.53	3.68	0.87	2.81	3.58	1.73	1.85
October	4.97	3.60	1.37	4.57	3.89	0.69	4.59	3.57	1.02	3.61	6.71	0.00
November	5.13	4.14	0.99	4.82	6.83	0.00	5.93	3.50	2.43	5.54	3.09	2.45
December	6.07	2.72	3.35	6.39	3.30	3.13	6.41	3.98	2.43	6.55	3.76	2.79
January	5.80	4.08	1.72	6.28	7.01	0.00	6.53	8.52	0.00	6.10	2.65	3.45
February	5.07	2.70	2.37	6.37	3.07	3.30	5.96	2.67	3.29	5.81	2.64	3.17
March	5.28	5.20	0.08	4.88	7.45	0.00	5.28	2.11	3.17	6.34	1.22	5.12
April	4.30	1.99	2.31	4.09	2.44	1.65	4.91	3.71	1.20	4.22	1.32	2.90
May	3.34	0.85	2.49	3.80	0.20	3.60	2.63	0.46	2.17	3.00	2.10	0.90
Total	52.36	34.10	19.87	55.02	38.32	22.07	54.16	40.92	21.55	53.47	29.02	27.55

TABLE 6

The following are the Screen Temperatures by Months in Degrees Fahrenheit at the Experiment Station for the Year June, 1964 to May, 1965, compared with the Means for the Period 1928 to 1965

Month	THIS PERIOD					AVERAGE 1928 TO 1963 INCLUSIVE			
	Maximum	Minimum	Mean	Plus or Minus Average	Daily Range	Maximum	Minimum	Mean	Daily Range
June	72.0	51.1	61.5	— 1.4	20.9	72.9	52.7	62.9	20.2
July	70.3	49.6	60.0	— 2.2	20.7	72.4	52.0	62.2	20.4
August	70.9	52.9	61.9	— 1.7	18.0	73.3	53.9	63.6	19.4
September	72.7	58.5	65.6	— 0.3	14.2	74.3	57.5	65.9	16.8
October	73.6	61.3	67.4	— 1.0	12.3	75.7	61.0	68.4	14.7
November	76.1	63.7	69.9	— 0.7	12.4	77.7	63.6	70.6	14.1
December	78.6	66.0	72.3	— 0.5	12.6	79.8	65.8	72.8	14.0
January	79.9	67.5	73.7	— 0.4	12.4	80.9	67.3	74.1	13.6
February	82.0	68.5	75.2	† 0.5	13.5	81.5	67.8	74.7	13.7
March	82.0	65.8	73.9	† 0.6	16.2	80.5	66.2	73.3	14.3
April	77.0	61.5	69.3	— 0.8	15.5	78.1	62.2	70.1	15.9
May	73.8	55.6	64.7	— 1.7	18.2	75.7	57.0	66.4	18.7
Means	75.7	60.2	67.9	— 0.8	15.5	76.9	60.6	68.7	16.3

TABLE 7

The following table gives the mean monthly earth temperatures

Month	Experiment Station 1935-65			Experiment Station June 1964 to May 1965		
	1 foot	2 feet	4 feet	1 foot	2 feet	4 feet
June	64.0	66.5	69.4	62.4	65.1	69.3
July	62.6	64.5	66.9	59.9	61.3	65.5
August	64.5	65.6	66.6	63.0	63.3	64.8
September	67.8	68.2	68.1	67.6	66.9	66.4
October	70.8	70.9	70.2	69.1	68.9	68.0
November	73.6	73.4	72.6	73.6	72.3	70.0
December	76.5	76.2	74.5	77.4	75.7	72.3
January	78.7	78.7	76.6	79.3	77.5	74.1
February	79.6	79.4	77.8	81.7	80.1	76.1
March	78.2	78.8	78.0	79.2	78.4	76.3
April	74.7	76.0	76.5	73.9	75.2	75.2
May	69.2	71.3	73.3	67.1	69.3	71.6
Mean	71.7	72.5	72.5	71.2	71.2	79.8

1964 when the high temperatures prevailing at that time would have given excellent growth if moisture had been available. Frost was experienced in some areas during the 1964 winter. Furthermore, crops were very dry by the end of September. Excellent rains during October gave promise of the beginning of a bumper crop. Good growth was maintained during November, despite below average rainfall. From then onwards, however, a disastrous summer drought prevailed right through until the last day of May, 1965, when soaking rains fell over most parts of the cane belt. Given reasonably average rains over the next few years, the South African sugar industry will show its resilience, as in the past, and record sugar crops will again be harvested.

Temperatures

The mean screen temperature for the year under review was 67.9° F. at the Experiment Station. This was 0.8° colder than the 37 years' mean. With the exception of February and March, all months from June, 1964 to May, 1965 were below normal in regard to air temperature. The soil was also colder more often than not. There were several occasions during the year when the grass minimum thermometer recorded below freezing conditions. This occurred once in June, twice in July, and twice in August.

Evaporation

This year the evaporation from a free water surface was particularly high. When coupled with the very low rainfall, this gave an abnormally high rainfall deficiency. The deficiency was most pronounced in the vital 6-month November/April period. The only month without a rainfall deficiency was October. The most disappointing month was March, which is normally the wettest month in the sugar belt. Instead of a rainfall surplus of 0.68 inches, which has been the

average in the past, we had a rainfall deficit of 5.1 inches for this month.

Hours of Sunshine

During the year Mount Edgecombe has had 2,499.2 hours of sunshine, representing 5.4 per cent more than the 38-year average. All months were more sunny than usual, with the exception of September, October, and May. With its 16 rain-days, October had only 118.6 hours of sunshine, compared with the customary 190.3 hours expected.

Wind

An Anemometer was installed in the Experiment Station's meteorology site at the end of February, 1964. With no previous comparable recordings available, it can only be said that during the past 15 months 52,138 miles of air has passed the site. The rate has varied from 3 m.p.h. average throughout June, up to 6.4 m.p.h. for November. With something as variable as the wind it must take several years before a reliable pattern for wind-speed can be evolved, and obviously the above figures can be regarded only as indications.

Conclusions

Poor growing conditions have been experienced by the South African sugar industry during the past two years. During the 1963/64 season moisture conditions fluctuated between wet and dry on a number of occasions. Frost damage during the 1964 winter was more pronounced than normal. Satisfactory rains in October last year were unfortunately not repeated in the following months, and from November until the end of May the most disastrous summer drought ever recorded took place. The drought was broken by good rains at the end of May, and in mid June.