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**THE**  
**RAINFALL OF TRINIDAD**

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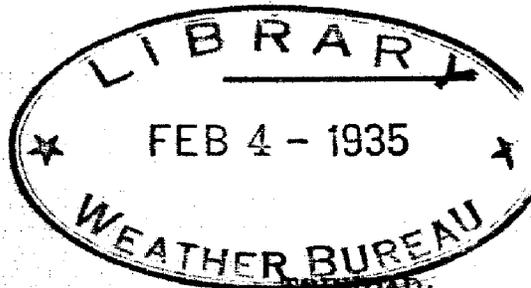
**METEOROLOGICAL NOTES**

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BY

F. M. BAIN, B.S.A., A.C.I.C., Dip. Agric. (I.C.T.A.)

53853



PRINTED BY THE GOVERNMENT PRINTER,  
GOVERNMENT PRINTING OFFICE,  
PORT-OF-SPAIN.

1934.

QC  
925.2  
.T7  
B35  
1862-1933

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March 28, 2002

## ACKNOWLEDGMENTS.

*The Department of Agriculture is much indebted to planters, to members of the Constabulary Force, and to others who have regularly in the past forwarded rainfall records to the Department, and who have thus made possible the preparation of this bulletin.*

*Acknowledgment is also due to Mr. Elmo Beardon, local representative of the Pan-American Airways, for the data on wind velocity presented in Table IV.*

*Finally, I desire to record my appreciation of the careful manner in which Mr. F. M. Bain, B.S.A., has tabulated and analysed the mass of figures that have been accumulated over a series of years.*

E. J. WORTLEY,  
*Director of Agriculture.*



DEPARTMENT OF AGRICULTURE.

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THE RAINFALL OF TRINIDAD

WITH

METEOROLOGICAL NOTES

BY

F. M. BAIN, B.S.A., A.C.I.C., Dip. Agric. (I.C.T.A.)

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- I.—Rainfall Records.
  - II.—General Meteorological Data, St. Clair Experiment Station.
  - III.—Wind Velocity and Direction in the free Atmosphere.
  - IV.—Notes on the Hurricane in 1933.
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INTRODUCTORY.

Rainfall records from a large number of stations scattered throughout the island have been kept by the Department of Agriculture for a number of years. It is considered that the time over which these records have extended is of a sufficiently long period to give a representative idea of the general rainfall conditions prevailing in the island. A summary of as well as general observations bearing on these records is presented in this paper. A discussion of this meteorological factor should be of particular value to the agricultural community, and it is hoped that it may also be of interest to the public in general.

2. Although this paper is primarily concerned with rainfall conditions, a brief discussion of other meteorological data recorded at the St. Clair Experiment Station for the past seventeen years has been included. In addition brief notes relating to the hurricane in 1933, as well as a summary of observations taken at the Pan-American Airways airport have also been included.

## I. RAINFALL RECORDS.

*Table of Stations and Rainfall Records.*

3. The monthly and yearly rainfall averages in Table 1 have been compiled from readings supplied from some 100 stations distributed throughout the agricultural sections of the island. The stations are comprised mainly of estates and constabulary stations. Readings are taken daily on standard gauges, supplied in many cases by the Department, and entered into rainfall books. These readings are sent in monthly to the Department for record.

4. The records are based on periods up to 23 years and in the case of St. Clair Experiment Station for 71 years. Stations which have been recording for a period of less than five years have not been included. In a few instances the reliability of the figures submitted appeared doubtful and these records were discarded in computing the averages given.

*Geographical Distribution of Rainfall.*

5. Owing to the difficulty of demarcating rainfall zones within which the precipitation is more or less uniform, the island has been divided, quite arbitrarily, into nine sections. From North to South these divisions have been termed Northern, Midland, and Southern, respectively. These divisions have been further subdivided in a direction from East to West, into Eastern, Central and Western.

6. *North-West District.*—The average annual rainfall varies in this district from 45 inches to 80 inches. There is generally speaking an increase in rainfall as one moves in a Northerly direction towards the Range, and a decrease from East to West. On an average August and February tend to be the months of greatest and least rainfall, respectively.

7. *North-Central District.*—The average rainfall varies in this area from 55 inches to 95 inches. As in the case of the previous district, there is an increase in rainfall in a Northerly direction and a decrease from East to West. August and March are on an average the wettest and driest months, respectively.

8. *North-East District.*—In this area an average rainfall varying from 75 inches to 120 inches occurs. The lowest rainfall is obtained in the extreme North-Eastern tip increasing from the coast line towards the Range in all directions. March is the driest month, June and July tending to be the months when maximum precipitation occurs.

# RAINFALL STATIONS TRINIDAD

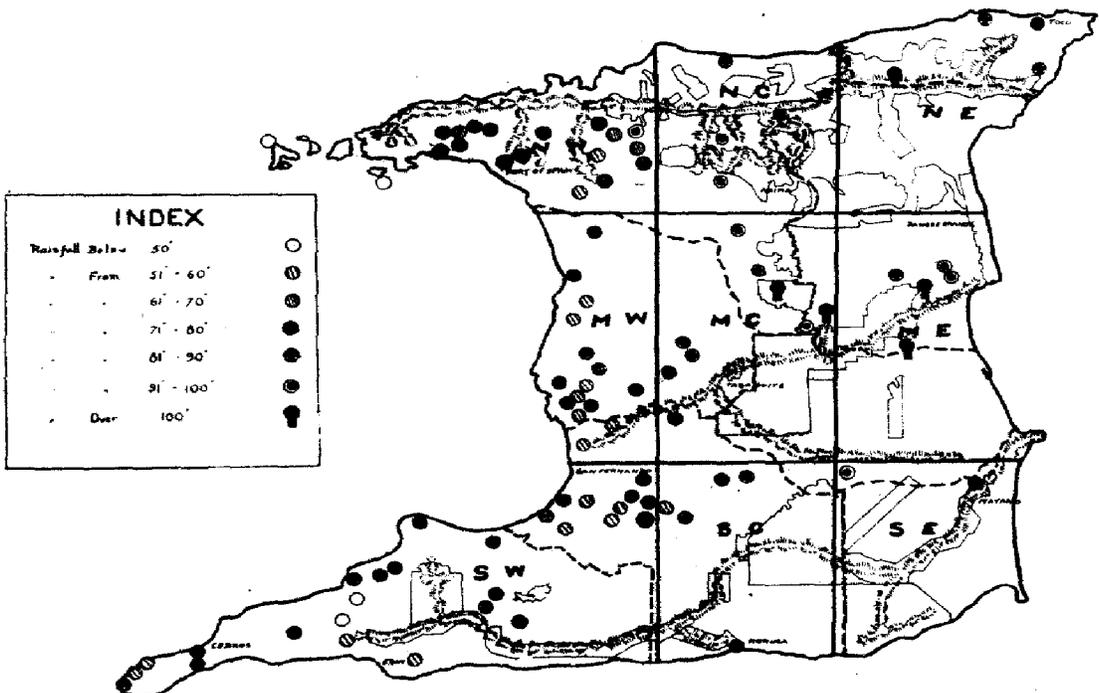


FIG. 1

9. *Mid-West District*.—The average annual rainfall in this area varies from 55 inches to 75 inches. Generally speaking the average rainfall increases in an Easterly direction. March is the driest month in this area. On an average July tends to be the period of maximum rainfall, although for individual stations June or August may be the wettest period of the year.

10. *Mid-Central District*.—In this area the average annual rainfall varies from 80 inches to 100 inches. The lowest rainfall is experienced on the western side of the area and the highest on the eastern side. The lowest rainfall for the year occurs in March, and July tends to be the wettest month, although for stations on the eastern side maximum precipitation occurs in June.

11. *Mid-East District*.—This is an area of high rainfall, the average annual rainfall varying from 90 inches to 105 inches. The amount of rainfall increases from the coast towards the western side of this area. The month of least rainfall is March. July tends to be the wettest month of the year, although for some stations June seems to be the period of maximum precipitation.

12. *South-West District*.—The average annual rainfall varies from 50 inches to 85 inches. The distribution over the area does not tend to follow any definite plan. March is the driest month of the year. On an average July tends to be the wettest month in this area, although for some stations June or August may be the wettest month.

13. *South-Central District*.—There are only four stations in this area. The highest rainfall is obtained in the northern part of the district. March is the driest month of the year, June and July being the wettest months.

14. *South-East District*.—There are only two stations in this area, the average annual rainfall being 73 inches and 93 inches, respectively. March tends to be the driest month for both stations. June is the month of highest average rainfall for the inland station whilst for the coastal station, June and July have approximately the same average rainfall.

#### *Rainfall Maps.*

15. In order to reflect graphically the rainfall of the island, two maps have been prepared. On the first map (Fig. 1) the positions, as well as the average annual rainfall of the stations included in Table I are shown. Forest reserves and mountain

ranges are marked. A large portion of the agricultural districts of the island is covered by stations, but, it will be seen, there are still a few districts in which stations are very sparse or totally absent.

16. In Fig. 2 an attempt has been made to produce a rainfall map of Trinidad divided into zones of uniform rainfall. In the areas in Fig. 1 in which rainfall stations are not shown, records extending over a period of three years, are available from places scattered over these areas. The averages from these places have been compared with the averages for the nearest established stations, over the same period, and a probable average for the area estimated.

17. A study of the rainfall maps (Figs. 1 and 2) as well as of Table I, shows that the distribution of rainfall over the island is very uneven. The average yearly figures range from less than 50 inches to 120 inches. Broadly, the greatest precipitations occur in the districts around the Ranges, especially in the vicinity of the Northern and Central Ranges. The highest rainfall recorded is in the North-Eastern section of the Northern Range. The rainfall decreases as one moves away from the Ranges towards the coastal regions in any direction, reaching a minimum in the districts of the extreme West. There are a few exceptions to this general rule at some points along the western coast line, especially in the Guapo area.

#### *Seasonal Distribution.*

18. As is generally known, the year may be divided into two seasons from the point of view of rainfall distribution. There is a relatively dry period for the first five months of the year, followed by a comparatively wet period, although during the months of September and October a dry spell usually occurs which is termed an "Indian Summer." In Fig. 3 graphs showing the relative distribution of rainfall over the year from three stations selected from an Eastern, Central and Western area, respectively, are given. It will be seen that the two seasons are more or less clearly defined in all parts of the island, the only difference being one of intensity of rainfall in the various sections.

#### *Prevailing Winds as an Explanation of the Rainfall Distribution.*

19. In seeking an explanation for the prevailing rainfall conditions of any country, a study of the prevailing winds is necessary. During the early part of the year, which coincides with the dry season, the prevailing winds in Trinidad are from the North-East. These winds coming from higher latitudes are moving from regions of lower to those of higher temperatures. As the capacity of the

# TRINIDAD

## RAINFALL MAP ~ 1910-32

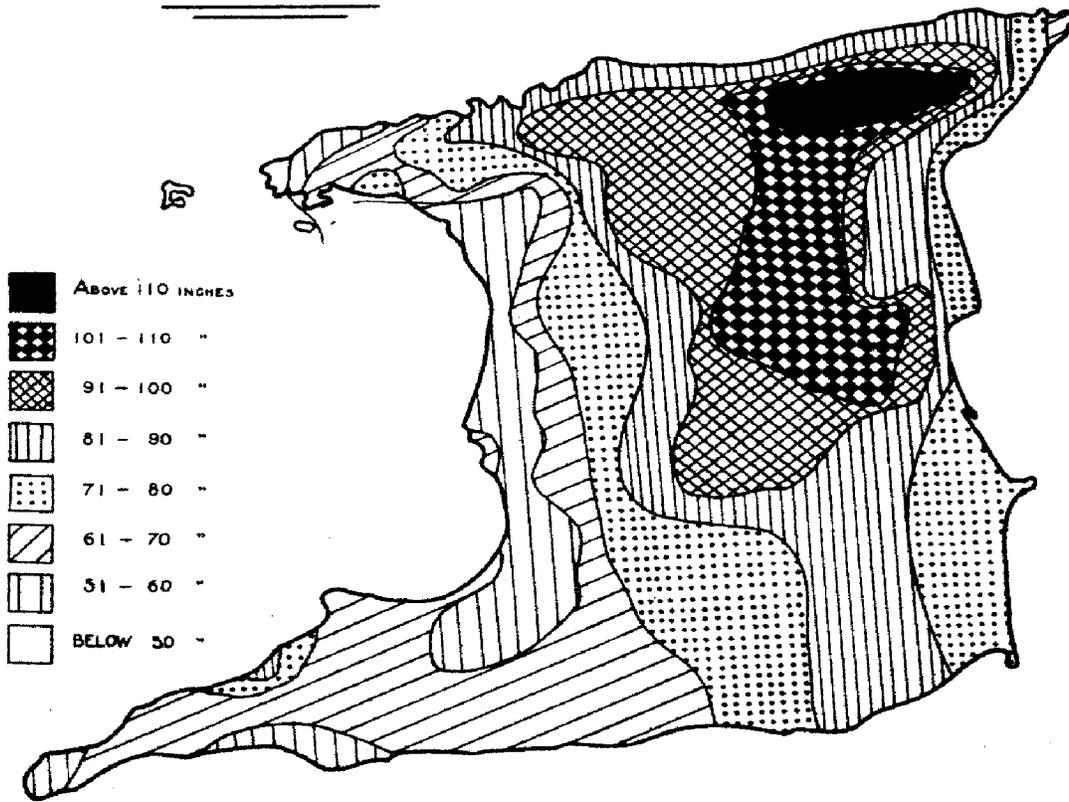


FIG. 2

atmosphere for holding water vapour increases with rise of temperature, these winds on reaching the island are seldom ever saturated with moisture and may be considered to be relatively dry. During this period of the year, therefore, comparatively little rainfall is to be expected. At a later period in the year, around the months of July and August, these winds change in direction and tend to come from an easterly and south-easterly direction. Winds coming from the east have traversed long distances over areas of high temperatures, these areas being the waters of the Equatorial Atlantic. Such winds arrive in Trinidad highly saturated with aqueous vapour and heavy precipitations are to be expected at this season.

20. The uneven distribution of rainfall over the island may be explained by the fact that during the rainy months, rain clouds coming from an easterly direction deposit some of the moisture on the east coast. On reaching the higher lands these winds ascend to higher altitudes where the temperature is lower. As the capacity of the air for holding moisture decreases with the drop in temperature, the majority of water vapour condenses, thus causing heavy rains in these areas. On arriving further west these clouds have already been greatly depleted of moisture, the western areas of the island receiving a decreased rainfall.

21. From the rainfall map, Fig. 2, it will be seen that around the Guapo district a higher average rainfall is apparently recorded than for stations situated further east in contradiction to the general rule. This applies in a smaller degree to a few stations along the western coast. It is possible that this increased rainfall may be due to westerly winds, the marked increase in the Guapo section being due to the presence of foothills in that area. In the absence of more specific meteorological data, however, this explanation is merely tentative.

#### *Cloud Bursts.*

22. In some of the districts of the island, principally in the valleys of the Northern Range, exceptionally heavy rainfalls—known as cloud-bursts—occur in very short periods of time. These (3) are supposed to be caused by the sudden stoppage of ascending air currents, carrying a great quantity of accumulated water. When the stoppage occurs, the water, which the air had been supporting, falls, the extent of the fall depending on the amount of accumulated water.

*Rainfall Periodicity.*

23. In Table II the monthly and total annual rainfall figures over a long period of years for the St. Clair Experiment Station is given. These figures may be taken as being fairly typical of the general annual variation in rainfall conditions throughout the island. As in most countries there exists locally a large amount of weather lore. Forecasting of the weather, based on the belief that meteorological phenomena show a periodicity, is frequently indulged in. It will be seen from Table II that there is no fixed periodicity as far as wet and dry years are concerned in Trinidad, the intervals of time between respective wet or dry years being very variable. The same obtains with reference to drought periods as well. Any system of forecasting wet and dry periods, therefore, based on the assumption mentioned above would be very problematical.

## II. GENERAL METEOROLOGICAL DATA, ST. CLAIR EXPERIMENT STATION.

24. As has been mentioned previously, readings have been recorded at this station for the past 17 years. These readings have been taken daily at fixed times. While it must be admitted from the agricultural aspect, that continuous records are of greater value than readings at fixed periods, these latter readings, nevertheless, throw useful light on the general climatic conditions experienced locally.

25. The following standard instruments are kept at this station ; a Kew pattern barometer ; wet and dry bulb thermometers ; maximum and minimum thermometers, and a Campbell-Stokes sunshine recorder. Readings of wind direction are also taken. Readings are taken daily at 7 a.m. and 3 p.m., and a brief summary of the weather is prepared each day, and entered in a meteorological register.

*Pressure.*

26. The monthly average pressure throughout the year is shown in Table III. These readings are mentioned for the purpose of record only, as they serve no useful purpose for discussion. It will be seen that there is a marked daily variation in that the pressure is uniformly lower at 3 p.m. than at 7 a.m. With reference to the annual variation, the maximum pressure occurs in the dry months, and the minimum in October and November.

# AVERAGE RAINFALL

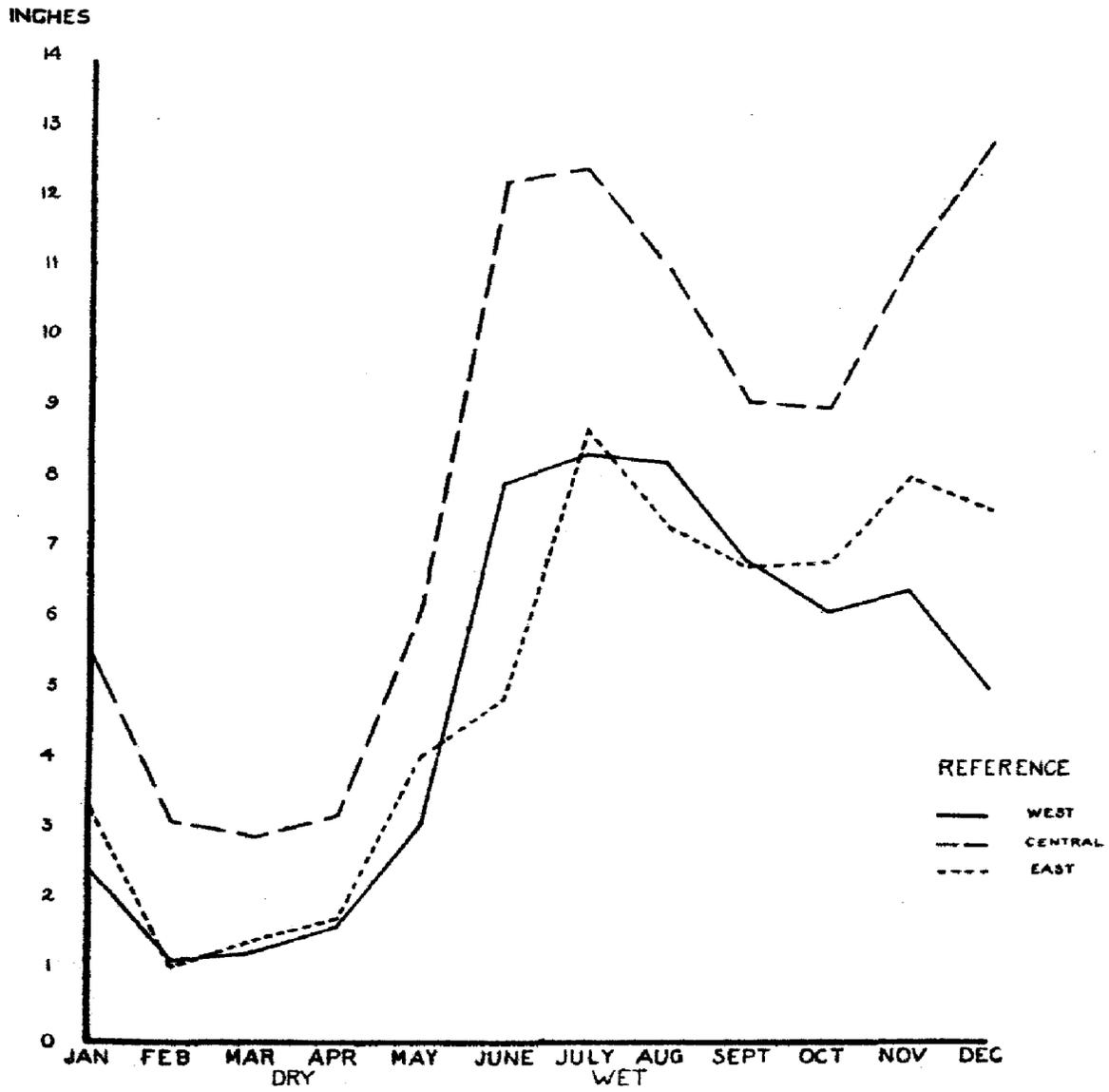


FIG.3

*Temperature.*

27. The average maximum, minimum and mean temperature readings are given for each month of the year in Table III. The mean temperature has been taken as being the average of the maximum and minimum temperatures. This value is usually slightly higher than the true mean. Temperature graphs are shown in Fig. 4.

28. The average monthly maximum temperature varies between  $86.4^{\circ}\text{F}$ . in January and  $89.8^{\circ}\text{F}$ . in May, the range being  $3.4^{\circ}\text{F}$ . From Fig. 4 it will be seen that the curve for maximum temperatures shows two maxima points in May and October, respectively.

29. The average monthly minimum temperature shows a slightly greater variation than the maximum. The range is  $4.2^{\circ}\text{F}$ . the minimum being  $67.6^{\circ}\text{F}$ . in February and  $71.8^{\circ}\text{F}$ . in September. On an average the minimum is lower during the dry season than in the wet season.

30. As is to be expected from the respective variations of the maximum and minimum temperatures throughout the year, the average daily range is greater during the dry season than in the wet period of the year.

31. The mean temperature variation is  $3.1^{\circ}\text{F}$ . The mean temperature curve shows two minima and two maxima points. The minima points are in February and July, the former being the smaller. The maxima values occur in May and October and are approximately the same.

32. Variation in temperature (2) depends on the amount of heat coming from the sun at different periods of the year, and as there is only a slight variation in the amount of heat coming from the sun in Trinidad throughout the year, the temperature range is consequently small. The small change in the diurnal temperature variation throughout the year is accounted for by the relatively small variation in the respective lengths of day and night throughout the year. The greater range during the dry season is accounted for by the more rapid radiation at nights during that period thus producing a lower minimum temperature.

33. During a normal day (1) the maximum temperature occurs approximately at 2 p.m. and the minimum at 6 a.m. The reason for this periodic variation is as follows: As the sun rises in the early morning the amount of energy reaching the earth gradually becomes greater than the amount radiated from the earth. This continues with a corresponding rise in temperature until equilibrium is reached.

The equilibrium point is reached at approximately 2 p.m. After this period the amount lost by radiation is greater than the amount received and there is a corresponding fall in temperature. The balance is again reached around sunrise when the minimum temperature is reached. It will be seen that the time of minimum temperature varies with the time of sunrise.

34. The variation in the annual temperature curve may be explained similarly. As the sun crosses the equator twice each year two maxima and two minima periods are to be expected for any point in the tropical zone. These periods of maximum insolation occur in March and September. The maximum temperatures occur in May and October because, even after the period of maximum insolation occurs, the amount of heat received daily from the sun is greater than the amount lost. The time of the year when equilibrium is reached is, therefore, sometime later than the period of maximum insolation.

#### *Humidity.*

35. In Table III relative humidity figures throughout the year are given. These are shown graphically in Fig. 5.

36. The relative humidity of the atmosphere in Trinidad is very high. At 7 a.m. the relative humidity throughout the year is above 90 per cent., being slightly higher during the wet months than for the correspondingly dry period. At 3 p.m. the relative humidity drops during the dry season to below 70 per cent., being about 60 per cent. in April and May. During the rainy months the fall is not as great, the average being about 73 per cent. This decrease in relative humidity during the afternoon is a result of the increased temperature at that period, the actual amount of water vapour, as shown by Vapour Tension Values, being greater in the afternoon. As is to be expected the average vapour tension is greater during the rainy months than in the dry season.

37. During the rainy months the weather is often referred to as being "hot." This is due to the warm, humid state of the atmosphere during that period. In the early part of the year, in January and February especially, cool, dry winds prevail and these months tend to be relatively cool.

38. The diurnal variation in humidity is approximately the inverse of the temperature variation. Normally in Trinidad saturation of the atmosphere with water vapour occurs each night, the temperature falling below the average dew-point around midnight. In the early part of the year when radiation at night is very

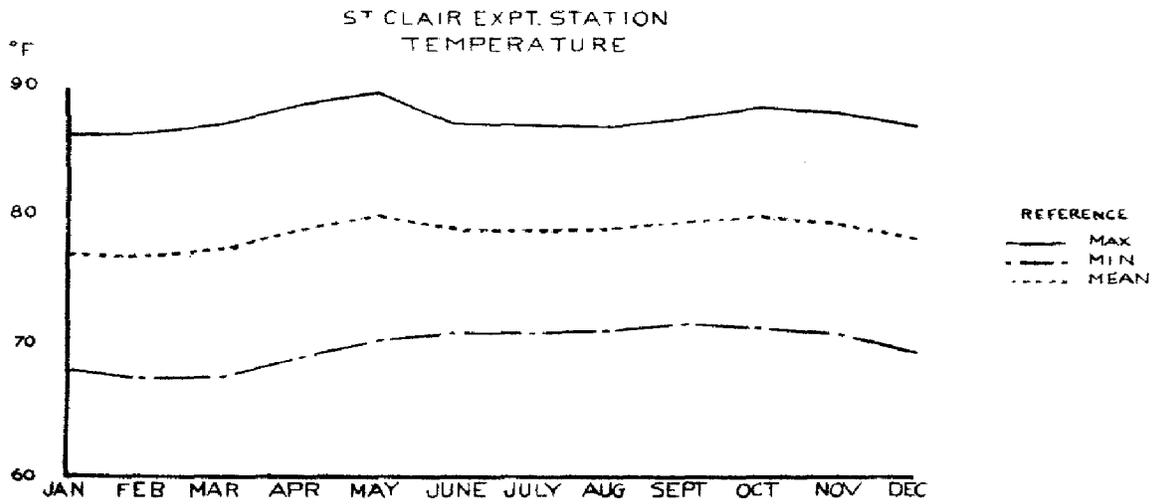


FIG 4

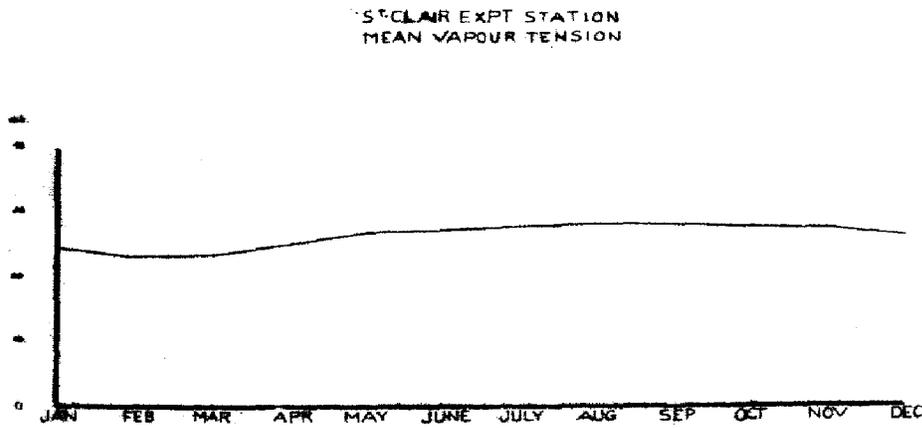


FIG 5

rapid this occurs before mid-night. As the sun rises, the temperature of the atmosphere increases. The actual amount of water vapour in the air also increases, but not to the same extent as the capacity of the air for water vapour. The humidity therefore drops. This continues until about 2 p.m. when the maximum temperature is obtained. When the temperature starts to decrease the opposite effect occurs.

#### *Sunshine.*

39. Average figures for the daily hours of sunshine throughout the year are given in Table III. The averages are computed from readings taken during the past four years. Unfortunately weather conditions have been rather abnormal over a large part of this period and the averages may possibly be on the low side for some months of the year at least. As is to be expected the average number of hours of sunshine is high. The variation in the monthly average throughout the year is not very large, the average tending to be higher during the dry months than during the corresponding wet period. The number of days on which no sunshine is recorded is comparatively small.

### III. WIND VELOCITY AND DIRECTION IN THE FREE ATMOSPHERE.

40. In Table IV, average wind direction and velocity in miles per hour, recorded at the Pan-American Airways Station, Cocorite, are shown. These readings were taken at varying heights from the surface to 12,000 feet during the year 1933. One record to a maximum height of 35,000 feet is also given. It will be seen that winds from an east south-easterly direction predominated at all heights throughout the year, a fact that coincides with the abnormally wet conditions experienced during that period. On an average, wind velocity increased with increase of height, the maximum velocity recorded being 45 miles per hour at 6,200 feet on 27th June, the same date as the hurricane. Average wind velocity at the surface was normal throughout the year, wind direction during the early part of the year being somewhat abnormal.

### IV. NOTES ON THE HURRICANE IN 1933.

41. On the night of 27th June, 1933, the south coast of Trinidad was struck by a cyclonic disturbance of undoubted hurricane intensity. While the island has been free in the past from disturbances of such intensity, this occurrence reminds us that Trinidad is included in the zone of West Indian hurricanes. As far as records are available this was the most serious disturbance of that nature experienced during the last century at least.

*History of previous Cyclones of serious Intensity.*

42. In the Meteorological magazine for September, 1933, reference is made to two previous disturbances in 1884 and 1810, respectively.

43. The disturbance of 24th February, 1884, does not appear to have been very severe, the extent of the damage being apparently the blowing down of a few trees near Port-of-Spain. The hurricane of 12th May, 1810, was of a more serious nature. Houses were blown down and damage was done to shipping.

44. Charts (6) published from records of the United States Weather Bureau, showing the tracks of cyclones which have occurred in the West Indies in the period 1887-1930, depict two cyclones of hurricane intensity as having struck the island in October, 1891, and 1892, respectively. The former struck the north-eastern tip of the island around Toco, moving in a north-westerly direction. The latter moved across the northern part of the island moving in a westerly direction. Records of these two disturbances have been traced in issues of the *Port-of-Spain Gazette* of that period. Reference is made to a "heavy thunderstorm" which occurred on 9th October, 1891. Houses were damaged in the Santa Cruz Valley and damage was also reported at Arouca. A cyclonic disturbance is also reported to have taken place on 6th October, 1892. This was apparently more serious than the one of the preceding year. A church was unroofed at Toco and houses blown down. A jetty was also damaged in Tobago. It was also reported not to have touched Grenada, Barbados and St. Vincent. This agrees with the track of the storm as shown in the charts already mentioned. It must be noticed that all these disturbances affected the northern part of the island only.

*Description of Hurricane in 1933.*

45. The description of this hurricane is taken chiefly from an account, published in the *Meteorological Magazine* (5), which was made up from local newspaper cuttings containing a description given by Mr. H. Fahey of Erin. Information from other residents in the hurricane area has also been used.

46. The hurricane winds started from the north and maintained this direction, gradually increasing in force, for about an hour. The wind then veered from North to East within the next hour, finally shifting to a direction south-east by south. The final stages were accompanied by heavy rain with a few violent gusts. Reports as to the time various places were struck by the hurricane are very

DIAGRAMMATIC REPRESENTATION OF HURRICANE 1933

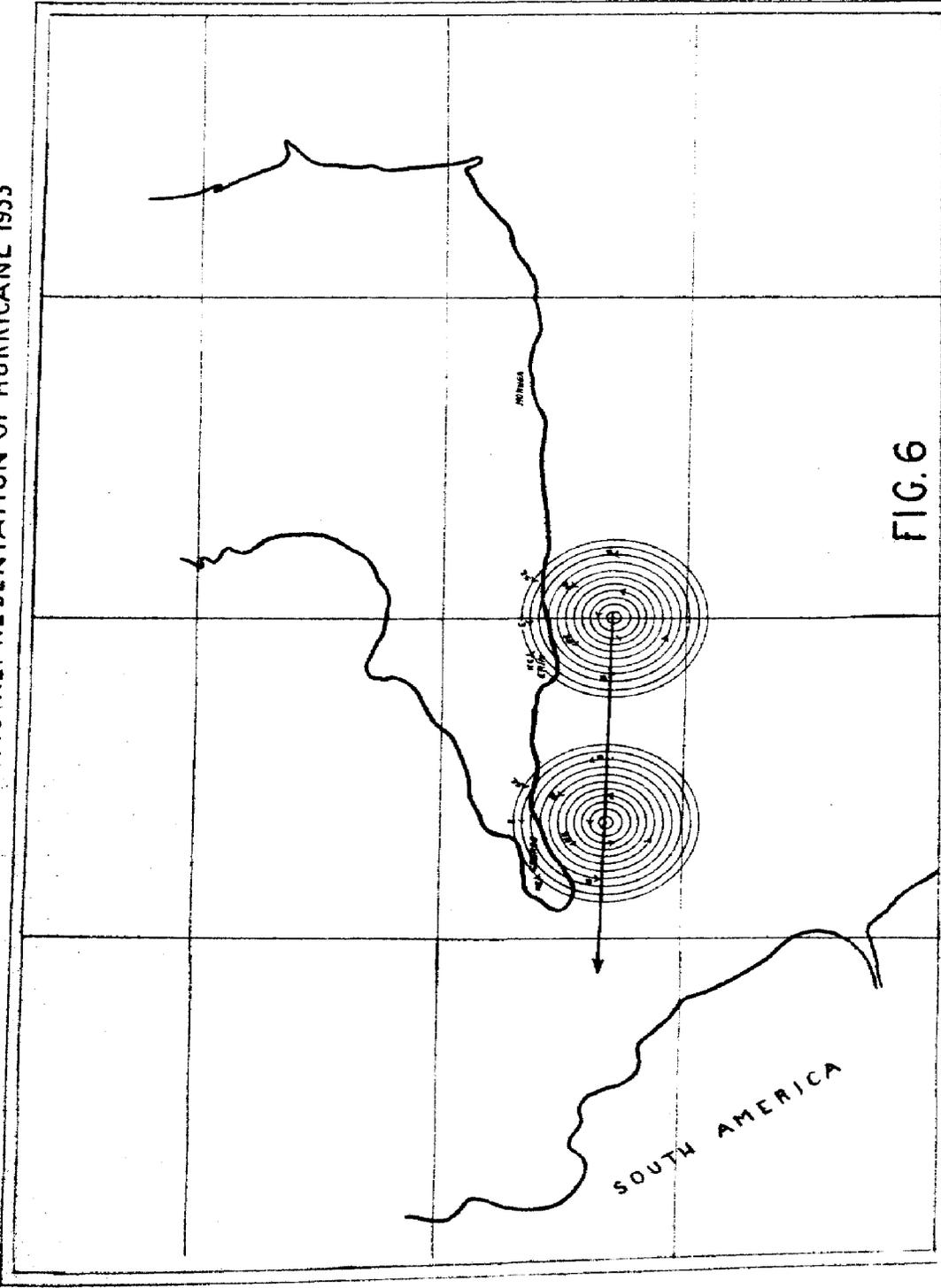


FIG. 6

conflicting. It would appear, however, that the storm was moving at about 15 to 20 miles per hour. From this it would appear that the diameter of the storm along the track was about 50 miles. The diameter of the storm is estimated by Mr. Fahey to have been about 35 miles.

47. From these observations it can be clearly seen that the storm centre passed to the south of Trinidad moving in a more or less westerly direction. This is shown diagrammatically in Fig. 6. After passing Trinidad the storm (4, 5) travelled in a westerly direction for about 100 miles, and then turned towards the north-west. It then passed south of Jamaica striking Grand Cayman Island. The hurricane then passed about 300 miles west of Key West, eventually moving across Texas. The extreme southerly position of its track as well as the violence and long life of so small a centre were outstanding features of this hurricane.

#### ACKNOWLEDGMENTS.

48. The writer wishes to acknowledge thanks to Mr. Elmo Beardon, Manager, Pan-American Airways, Ltd., for the information contained in Table IV, and to Mr. F. C. Almandoz, Jr., Librarian, for the maps contained in the paper. To the Honourable E. J. Wortley, O.B.E., Director of Agriculture, the writer is also indebted for many valuable suggestions in the arrangement and preparation of the paper.

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Table I  
RAINFALL STATIONS.

Station.	Years	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<b>NORTH-WEST DISTRICT.</b>														
Constabulary Headquarters	23	1.94	1.36	1.15	1.26	2.20	6.30	7.03	8.40	6.35	6.38	5.66	4.25	52.28
Colonial Hospital, Port-of-Spain	23	1.77	0.91	1.09	1.28	1.97	5.51	6.48	8.02	5.96	5.24	6.12	4.32	48.67
St. Clair Experiment Station	70	2.70	1.48	1.80	1.86	3.46	7.65	8.74	9.52	7.29	6.66	7.10	4.78	63.03
St. Ann's Reservoir	23	2.94	1.64	1.89	1.63	3.62	7.77	10.03	11.36	8.58	7.92	8.57	5.66	71.61
Maraval Reservoir	23	2.82	2.23	2.07	1.77	3.44	7.17	9.14	10.78	8.70	7.75	8.12	5.34	69.33
Maraval Constabulary Station	23	3.26	2.00	2.26	2.04	4.10	7.86	10.14	12.23	10.18	8.60	8.48	5.80	76.95
River Estate	23	3.24	1.90	2.01	1.90	3.39	7.38	9.36	10.35	8.76	6.91	7.18	5.63	68.01
Carenage Constabulary Station	23	2.97	2.07	2.60	2.26	4.40	8.46	11.14	11.00	8.70	8.13	9.33	6.31	77.37
Carrera Convict Depot	7	1.76	1.40	0.93	0.85	2.39	5.75	6.83	7.96	5.08	5.21	6.40	2.72	47.28
Diego Martin Constabulary Station	23	3.51	2.14	2.22	2.14	4.17	8.38	10.43	11.55	10.21	7.99	8.09	5.93	76.76
Diego Martin Waterworks	23	3.26	1.83	2.00	2.01	3.51	7.43	9.49	10.39	9.13	6.96	7.35	5.37	68.73
Santa Cruz Constabulary Station	19	3.62	2.41	2.53	1.89	3.68	7.86	10.75	12.68	9.71	7.96	8.18	6.93	78.20
<b>NORTH-CENTRAL DISTRICT.</b>														
Ortinola Estate	23	3.74	2.68	1.89	1.96	3.34	7.46	8.77	9.64	8.53	6.67	7.09	6.16	67.93
Wardour Estate	19	2.50	1.55	1.23	2.22	2.87	6.70	8.12	8.50	8.75	6.38	7.30	4.50	60.62
El Manacal Estate	12	7.19	4.55	3.97	3.22	4.44	9.64	10.94	13.20	11.37	7.47	8.63	11.39	95.91
La Florida Estate	12	3.02	2.20	1.95	2.41	4.01	9.28	9.43	10.75	8.88	6.88	7.50	6.94	73.25
La Concordia Estate	12	3.58	1.97	1.74	2.03	3.48	8.54	8.59	10.74	8.23	6.45	7.48	7.16	69.99
Mount St. Benedict	7	2.20	0.68	0.70	1.12	2.34	6.58	8.64	9.51	7.03	5.65	6.91	4.02	55.38
Government Farm	22	2.47	1.18	1.29	1.63	3.11	7.96	8.38	8.28	6.86	6.14	6.45	5.02	58.77
Imperial College of Trop. Agric.	10	3.52	1.95	1.57	2.24	4.27	8.99	9.50	10.07	8.19	6.48	7.45	6.34	70.57
Marsacas Government School	13	3.34	2.27	2.25	1.54	3.33	7.72	8.40	10.42	8.69	7.79	7.12	5.70	68.57
Verdant Vale Estate	9	5.34	2.40	1.72	3.70	5.43	12.99	12.28	13.51	9.38	8.69	10.41	8.76	94.61
Torreccilla Estate	19	4.21	2.84	1.85	2.54	5.64	13.93	12.69	12.02	10.12	9.36	10.66	7.99	93.86

RAINFALL STATIONS.—Continued.

Station.	Years	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<b>NORTH-EAST DISTRICT.</b>														
Aragua House, Toco	22	5.23	3.26	2.17	2.76	4.69	9.69	9.66	9.10	7.97	9.61	10.07	6.99	81.20
Mon Plaisir Estate	22	7.47	5.35	3.98	4.33	7.63	13.68	13.25	12.76	10.24	11.82	14.67	11.00	116.18
Toco Constabulary Station	22	5.01	2.73	1.91	2.45	4.41	9.00	8.46	8.00	7.20	9.00	9.69	6.87	74.73
Blanchisseuse Constabulary Station	20	6.79	4.15	3.37	2.61	4.70	10.79	11.41	9.94	6.97	5.94	8.90	8.30	83.87
Atondale Estate	9	5.78	2.55	2.78	2.39	3.28	9.23	10.58	12.12	10.36	9.94	10.76	10.64	90.41
<b>MID-WEST DISTRICT.</b>														
Chaguanas Constabulary Station	23	2.50	1.48	0.94	1.59	3.16	7.88	8.22	7.93	6.79	5.47	6.44	5.16	57.56
Frederick Estate	22	3.58	2.11	1.68	2.59	3.97	10.06	10.22	10.18	8.13	7.93	8.82	6.16	75.43
Woodford Lodge Estate	6	2.66	1.57	1.20	2.90	4.27	9.17	8.86	8.53	7.48	6.38	6.51	5.89	65.42
Waterloo Estate	23	2.87	1.63	1.18	1.73	3.47	8.82	9.54	9.28	8.19	6.73	8.15	6.20	67.79
Exchange Estate	23	2.14	1.37	0.89	1.63	2.57	6.79	7.79	8.52	6.86	6.32	6.60	5.25	56.73
Spring Estate	23	3.55	2.36	1.68	2.12	3.96	9.94	9.61	10.29	8.32	7.32	8.78	7.29	75.22
Friendship Hall Estate	19	2.88	1.50	1.24	1.64	3.36	8.20	9.62	8.86	7.47	6.21	7.48	6.69	65.15
Brechin Castle Estate	23	2.52	1.64	1.32	1.68	3.13	8.10	8.26	9.26	7.44	6.23	7.26	5.64	62.48
Perseverance Estate	22	2.23	1.53	1.18	1.47	2.78	7.36	8.09	8.64	7.18	6.18	6.64	4.97	58.25
Camden Estate	22	2.50	1.38	0.95	1.45	2.68	6.54	7.52	7.87	6.43	5.66	6.58	5.45	55.01
Milton Estate	19	2.67	1.93	0.92	1.80	2.79	8.70	8.89	9.30	8.01	6.58	7.55	6.30	65.44
Esperanza Estate	20	2.09	1.14	0.70	1.22	2.32	7.15	7.80	8.28	6.82	6.03	6.78	5.02	55.35
McBean Estate	16	2.44	1.39	1.32	1.79	3.11	7.76	9.47	8.84	7.29	6.57	7.43	6.40	63.81
Forres Park Estate	23	2.63	1.39	0.72	1.73	2.71	7.51	7.84	7.67	6.29	5.27	7.01	4.90	55.67
Plein Palais Estate	18	2.34	1.24	0.72	1.31	2.44	7.77	7.86	7.24	6.56	6.37	7.07	5.16	56.08
Montserrat Constabulary Station	23	3.41	2.00	0.95	1.83	3.32	9.09	9.63	8.51	6.67	5.92	8.08	6.19	65.60

RAINFALL STATIONS.—Continued.

Stations.	Years	Jan.	Feb.	Mar.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<b>MID-CENTRAL DISTRICT.</b>														
La Vega Estate	23	4.77	3.03	1.90	2.30	5.23	12.42	12.81	10.42	8.42	8.70	10.59	9.11	89.70
La Mariana Estate	16	4.51	2.83	2.15	2.51	5.34	10.93	12.61	8.94	8.88	7.53	10.02	9.13	85.38
Trelawney Estate	9	4.48	3.27	2.45	2.82	4.15	10.74	11.62	9.34	9.97	7.09	10.44	9.01	85.38
Mamoral Vale Estate	13	4.95	3.07	2.35	2.39	5.43	10.93	12.24	8.62	8.77	7.42	10.57	10.14	86.88
Sta Marta Estate	21	5.54	3.15	2.92	3.21	6.21	12.27	12.42	11.01	9.10	9.03	11.19	12.85	98.90
El Quemado Estate	9	4.95	4.05	2.98	3.49	5.61	12.95	12.26	10.58	9.99	9.20	13.99	11.92	101.97
Talparo Estate	22	4.41	2.90	1.90	2.47	5.40	11.37	11.22	10.45	7.53	7.20	9.51	8.10	82.46
San Rafael Constabulary Station	23	5.20	3.15	2.20	2.81	5.98	13.33	12.50	12.06	9.31	8.96	10.97	9.58	96.05
<b>MID-EASTERN DISTRICT.</b>														
Manzanilla Constabulary Station	23	5.56	3.84	2.41	3.47	5.78	12.24	10.14	10.96	8.96	9.64	11.53	11.29	95.82
Evasdale Estate	21	5.22	3.26	2.64	3.30	5.75	11.20	10.89	9.61	8.06	8.61	11.28	10.55	90.37
Grovesnor Estate	21	6.18	3.61	3.12	3.71	6.66	12.24	12.40	11.15	9.56	10.42	13.38	13.25	105.68
El Recerado Estate	17	5.87	3.30	3.01	3.28	5.66	10.96	11.15	10.77	9.52	9.78	11.81	11.58	96.69
El Branch, San Francisco Estate	15	5.86	3.86	3.39	3.95	6.00	11.50	11.60	10.41	9.58	10.04	12.05	13.04	101.28
Newlands Estate	17	6.25	2.78	2.92	2.97	6.36	11.43	13.44	10.89	9.68	9.46	11.11	13.26	100.55
La Corona Estate	17	6.22	3.47	3.29	3.86	6.63	11.68	13.07	11.22	10.05	10.55	12.90	12.81	105.75
<b>SOUTH-WESTERN DISTRICT.</b>														
Lewisville House	21	3.58	1.66	1.44	1.98	3.50	8.28	9.55	9.70	7.04	6.89	7.60	6.41	67.63
Tarouba Estate	23	2.53	1.41	1.17	1.32	2.40	6.56	7.16	7.37	5.45	5.56	6.10	4.58	51.61
Williamsville Estate	23	3.77	2.05	1.44	1.73	3.69	9.43	9.13	9.78	6.74	6.38	7.54	7.21	68.89
Malgretoute Estate	23	3.66	2.19	1.42	1.79	3.55	9.10	9.24	8.83	6.61	6.79	7.91	7.03	68.12
Cedar Hill Estate	23	2.96	1.96	1.42	1.62	3.34	8.45	8.66	8.78	6.43	6.47	7.34	6.37	63.80
Umina Ste. Madeleine Estate	23	3.22	2.08	1.56	1.94	3.37	8.47	8.72	8.44	6.56	6.47	7.57	6.20	64.60
Petite Morne Estate	11	3.05	1.31	1.08	1.54	2.93	6.70	9.10	7.55	6.18	6.47	7.34	6.90	60.15
Farmidge Estate	16	3.17	1.30	0.99	1.62	3.69	7.05	8.86	8.14	6.16	5.80	7.46	5.97	60.21

## RAINFALL STATIONS.—Continued.

Stations.	Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<b>SOUTH-WEST. DISTRICT.—Contd.</b>														
Picton Estate	22	3.01	1.70	1.29	1.38	3.46	7.63	8.72	8.14	6.08	5.73	7.01	5.72	59.87
Palmiste Estate	22	2.98	1.59	1.34	1.81	3.68	8.42	9.31	9.34	6.93	6.50	7.77	6.62	66.29
Princes Town Constabulary Station	22	2.85	1.81	1.19	1.45	2.87	7.59	6.99	6.68	4.86	5.06	6.55	5.88	53.78
Siparia Constabulary Station	23	3.27	2.41	1.68	2.05	3.86	4.16	8.92	9.37	7.24	7.63	8.56	7.21	66.36
Alta Gracia Estate	18	3.64	2.37	1.69	2.26	4.24	8.17	9.19	9.35	8.98	8.07	8.12	7.38	73.46
Industry Estate	18	3.91	2.10	1.71	1.76	3.57	7.61	8.03	7.08	5.67	5.23	6.96	6.56	60.19
Oropuche Constabulary Station	9	3.54	1.99	1.41	1.86	3.64	8.56	10.54	8.45	6.38	8.62	8.11	5.02	68.12
La Retraite Estate (Guapo)	18	4.68	3.38	4.34	3.97	4.48	7.91	9.17	9.83	8.62	7.92	7.84	6.59	78.93
La Ressource Estate	21	2.96	2.37	1.61	1.51	3.03	7.09	6.41	6.13	4.36	4.61	6.31	6.89	53.28
Patna Estate	10	2.99	2.21	2.04	2.42	3.71	7.87	8.43	9.71	7.03	7.15	7.11	8.19	68.86
Point Fortin Constabulary Station	16	3.91	3.03	3.25	3.29	5.79	8.69	12.58	11.50	8.63	9.07	9.55	7.55	86.84
Perseverance Estate, Guapo	10	3.05	2.23	2.31	2.82	5.17	8.16	9.88	10.95	8.51	9.22	8.83	8.84	79.97
Cynos Estate	9	4.42	2.06	1.96	1.99	2.98	7.92	7.80	8.14	6.19	6.80	6.27	8.73	65.26
Ste Marie Estate	17	5.04	2.83	3.61	2.71	3.70	7.52	7.94	7.26	5.34	4.78	7.28	7.05	65.06
Perseverance Estate (Cedros)	19	4.17	2.52	2.92	2.17	3.42	7.11	7.29	6.88	5.05	4.33	6.19	6.12	58.17
St. Quintin Estate	15	4.09	2.56	3.18	2.07	3.48	7.11	6.44	6.49	4.74	3.83	6.79	6.20	56.98
Constance Estate	23	4.43	2.74	2.89	1.68	3.44	8.36	8.49	8.62	5.33	4.04	5.03	6.84	61.89
Chatham Government School	7	6.08	3.53	2.69	3.53	4.31	7.51	9.33	5.92	9.36	6.80	6.81	9.94	75.81
Cedros Constabulary Station	23	4.04	2.63	3.50	2.31	3.51	7.21	7.06	7.24	4.85	4.78	7.21	6.44	60.78
<b>SOUTH-CENTRAL DISTRICT.</b>														
Esmeralda Estate	15	4.43	2.35	1.41	2.20	4.22	10.51	10.25	8.87	7.97	6.99	9.05	7.50	75.75
La Retraite Estate	21	5.76	2.84	2.42	3.04	5.90	12.54	13.11	11.42	8.81	8.26	10.54	10.80	95.44
Craigish Estate	18	3.42	1.90	1.26	1.60	2.75	8.67	8.57	7.88	6.19	6.26	8.14	7.17	63.81
Moruga Constabulary Station	22	3.35	2.08	1.43	1.75	4.05	4.94	8.78	7.38	6.78	6.85	8.07	7.60	63.06
<b>SOUTH-EASTERN DISTRICT.</b>														
Rio Claro Constabulary Station	7	4.85	3.74	2.79	4.97	6.79	11.42	11.48	10.75	8.53	6.70	9.60	11.44	93.06
Mayaro Constabulary Station	23	4.57	2.39	1.83	2.24	4.75	9.91	8.82	8.02	6.58	6.89	8.53	8.99	73.52

Table II.

Year.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Annual Rainfall.	
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1862	..	.66	.77	.25	1.41	8.47	10.36	9.57	11.97	6.60	10.06	3.03	63.15													
1863	..	2.71	1.45	.85	1.26	9.12	10.12	10.53	12.11	6.24	4.30	6.57	66.80													
1864	..	.53	.36	.04	8.15	4.96	7.17	12.06	8.04	6.53	5.94	6.61	62.90													
1865	..	3.20	1.07	7.98	3.22	5.64	10.35	14.83	7.32	14.62	4.81	9.62	85.28													
1866	..	3.91	1.44	1.09	1.45	6.59	7.83	12.34	5.87	10.11	8.17	6.82	67.86													
1867	..	6.36	.83	1.32	2.33	5.30	12.20	15.21	10.45	7.87	.67	2.71	66.56													
1868	..	.82	3.20	.64	4.17	7.78	11.35	6.73	5.46	4.66	8.31	1.03	56.21													
1869	..	.93	.74	.41	.69	5.52	10.17	8.74	8.86	5.15	6.30	5.87	53.46													
1870	..	.56	1.46	1.51	4.65	8.81	11.91	9.00	10.63	3.98	5.94	8.29	69.35													
1871	..	1.40	2.89	.92	3.97	8.84	11.73	12.97	7.87	4.37	10.73	3.27	75.58													
1872	..	.07	.74	.39	3.14	7.09	5.45	10.82	3.07	4.80	9.89	3.04	49.95													
1873	..	1.78	1.98	.53	..	4.31	5.04	8.37	5.80	10.34	3.48	1.31	44.02													
1874	..	3.47	3.67	5.16	2.51	12.28	12.28	11.20	9.38	6.42	3.66	4.29	76.28													
1875	..	3.39	.91	.42	2.61	4.15	12.62	7.22	11.95	10.85	3.74	2.48	60.90													
1876	..	3.26	1.03	1.78	6.65	11.17	12.23	15.18	12.03	7.04	5.95	3.96	81.95													
1877	..	2.14	..	7.46	3.19	8.43	8.35	12.94	6.39	6.68	7.66	5.48	72.10													
1878	..	3.44	.70	..	4.99	5.78	5.42	8.88	11.15	5.89	8.72	3.05	61.24													
1879	..	1.52	2.76	4.56	3.03	14.92	6.86	10.35	6.15	3.54	4.28	4.38	65.43													
1880	..	11.72	6.53	.67	3.90	7.83	6.30	17.39	7.47	5.74	10.51	1.96	82.34													
1881	..	.57	.65	.23	4.66	11.05	7.82	10.90	10.59	3.36	12.06	2.23	65.72													
1882	..	1.33	2.38	.73	3.74	6.33	5.93	8.40	4.93	5.86	10.29	1.50	52.99													
1883	..	1.56	.71	.26	5.89	10.91	13.66	10.26	5.53	3.99	6.06	8.30	70.50													
1884	..	3.43	2.50	4.40	2.91	6.84	5.71	8.70	5.03	5.05	5.14	5.66	56.88													
1885	..	1.30	.89	1.49	5.27	3.44	5.87	4.56	6.08	4.08	5.37	4.44	43.22													

1862 TO 1899 AT THE ROYAL BOTANIC GARDENS. JANUARY, 1900 ONWARDS AT THE CLOSELY ADJACENT  
ST. CLAIR EXPERIMENT STATION.—Continued.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Rainfall.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1886	3.32	1.97	3.27	3.83	4.49	9.70	17.48 <del>x</del>	8.15	6.73	12.59	8.54	6.75	86.82
1887	2.69	1.46	1.67	1.08	3.98	7.40	5.51	9.93	5.07	5.84	7.60	11.86 <del>x</del>	64.09
1888	8.37	1.79	2.41	2.28	3.46	11.92	6.89	7.02	5.53	5.06	7.76	2.95	65.44
1889	.94	.85	4.16	1.05	6.34	11.66	12.14	11.73	3.76	6.30	7.38	7.48	73.79
1890	7.76	.51	2.09	7.62	5.14	9.68	12.89	11.65	3.37	10.98	5.93	5.28	82.90
1891	3.17	.92	.03 <del>x</del>	1.44	2.54	5.54	11.88	4.26 <del>x</del>	7.44	5.77	6.66	4.09	53.74
1892	1.93	2.19	1.85	7.59	11.55 <del>x</del>	16.26	15.55	9.21	3.57	11.49	5.40	4.69	91.28
1893	3.43	1.85	.19	3.61	11.35	10.19	13.28	16.32	11.73	5.47	7.84	7.23	92.49 <del>x</del>
1894	3.22	2.36	3.12	1.22	2.69	3.26	4.53	12.01	5.48	3.93	7.28	3.16	52.31
1895	2.52	1.33	2.27	2.52	2.11	5.00	2.57 <del>x</del>	4.86	5.69	10.89	15.15 <del>x</del>	7.32	62.23
1896	7.08	.88	1.59	2.33	1.62	10.29	6.35	7.66	6.46	6.05	9.81	6.33	66.45
1897	1.67	.75	3.96	.26	5.58	11.19	13.88	7.90	9.83	8.87	9.39	4.40	77.68
1898	3.05	2.18	2.10	1.17	1.49	6.46	5.87	10.55	7.13	6.15	9.13	3.57	58.85
1899	1.95	1.82	1.00	.75	.52	7.63	4.44	8.45	2.18 <del>x</del>	6.34	8.07	3.61	46.76
1900	3.56	.76	2.72	4.10	4.14	12.99	7.95	11.07	5.52	6.53	5.41	2.61	67.36
1901	1.95	1.51	1.85	.35	6.45	9.21	8.38	7.53	4.26	4.97	7.93	4.83	59.22
1902	2.56	.51	1.18	1.78	2.14	10.05	5.20	11.67	7.22	7.40	2.74	2.89	55.34
1903	1.51	.68	1.54	2.17	.95	5.42	9.40	9.45	11.41	2.12 <del>x</del>	2.59	4.20	51.44
1904	3.00	2.56	4.24	2.50	2.76	6.23	8.03	4.72	8.81	5.65	3.61	4.32	56.43
1905	2.41	.59	3.74	1.79	4.34	6.01	9.49	11.09	10.43	6.94	10.69	4.16	71.68
1906	.43	.50	.73	.46	7.96	10.95	11.42	8.55	6.54	6.80	5.00	5.64	64.98
1907	5.22	.44	1.71	.09	4.58	11.01	11.02	5.77	7.76	7.65	10.69	4.10	70.04
1908	.75	.45	1.79	.95	5.82	5.22	5.87	7.72	5.45	5.45	2.65	8.68	50.80
1909	5.69	2.43	1.15	1.78	3.87	8.31	10.72	6.29	6.95	7.15	3.93	6.31	64.58
1910	2.79	4.38	1.75	2.01	2.76	6.34	6.40	13.89	8.27	9.21	8.49	1.90	68.19

1862 TO 1899 AT THE ROYAL BOTANIC GARDENS. JANUARY, 1900 ONWARDS AT THE CLOSELY ADJACENT ST. CLAIR EXPERIMENT STATION.—Continued.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Rainfall.
	Ins.												
1911	1.61	1.51	1.86	.74	1.27	7.15	5.20	13.68	4.03	10.22	3.57	3.53	54.37
1912	.62	Nil	.74	.03	2.18	7.54	12.16	5.56	5.87	2.73	6.28	5.64	49.35
1913	2.80	.50	1.42	.42	1.79	2.80	2.86	6.48	6.52	3.51	8.61	1.82	39.53
1914	.50	.61	1.28	1.01	2.05	7.34	5.05	9.15	7.80	6.14	7.61	5.58	54.12
1915	2.10	.66	..	2.63	2.76	7.05	12.76	5.27	4.21	9.28	7.84	1.75	56.31
1916	5.29	1.35	1.57	1.91	.94	10.30	8.04	11.57	10.78	6.68	9.32	1.98	69.73
1917	1.17	3.06	1.38	.50	4.24	6.30	10.13	9.96	7.24	5.43	6.61	8.22	64.24
1918	3.15	1.18	1.48	1.27	2.94	5.87	14.42	8.56	8.93	5.51	7.56	3.85	64.72
1919	.62	..	1.78	1.67	3.50	6.78	5.17	6.82	7.96	7.79	8.42	6.67	57.18
1920	1.39	1.66	.94	.28	.56	4.13	4.93	6.70	10.98	5.74	6.03	1.60	44.94
1921	2.43	1.60	5.03	4.09	1.43	9.91	10.06	10.30	10.17	6.53	7.71	6.25	75.51
1922	4.01	1.13	1.41	2.39	2.18	6.10	5.06	8.35	6.49	2.92	11.17	7.10	58.31
1923	1.91	1.66	.96	2.97	1.46	3.48	10.76	9.37	6.23	4.41	7.38	7.32	57.91
1924	1.54	.90	.14	1.11	.73	4.95	7.53	7.27	4.59	7.81	8.56	2.15	47.28
1925	1.77	1.06	2.67	.10	1.21	4.20	7.58	8.87	6.37	5.85	5.36	4.36	49.40
1926	.69	.39	.54	.23	2.12	5.26	5.25	10.85	11.20	14.78	9.71	7.56	68.58
1927	4.71	4.44	3.62	5.04	7.15	6.95	9.40	11.67	9.11	6.13	5.64	7.21	81.07
1928	4.22	.69	2.31	2.02	.67	5.75	8.07	8.66	7.36	9.13	8.42	5.94	63.24
1929	.84	.84	1.78	.81	7.33	6.43	5.10	8.90	5.21	3.40	9.30	1.51	51.45
1930	2.70	.08	.31	2.38	1.85	6.35	7.12	4.94	5.82	6.27	2.59	4.87	45.28
1931	1.68	1.11	.07	.29	1.12	6.94	10.96	8.99	4.85	6.59	7.94	5.77	56.21
1932	5.61	1.72	4.33	3.99	9.25	10.53	5.80	16.04	3.85	4.60	10.23	8.01	83.96
Grand Total	194.28	105.07	130.47	134.22	250.20	545.69	617.28	682.51	514.26	470.82	507.57	342.95	4,496.32
Avg. for 71 years	2.74	1.48	1.84	1.89	3.54	7.60	8.69	9.61	7.24	6.63	7.15	4.83	63.33

Table III.

METEOROLOGICAL DATA, 1916-1932.

ST. CLAIR EXPERIMENT STATION.

Month.	PRESSURE.		TEMPERATURE.				HUMIDITY.		VAPOUR TENSION.			SUNSHINE.*
	7h.	15h.	Max.	Min.	Range.	Mean.	7h.	15h.	7h.	15h.	Mean.	Av. hours per day.
January	30.033	29.993	86.4	68.2	18.2	77.3	92.9	67.5	23.7	26.0	24.8	6.4
February	30.046	30.006	86.5	6.76	18.9	77.1	92.8	63.0	22.8	24.2	23.5	7.2
March	30.048	29.997	87.2	6.79	19.3	77.6	93.4	62.2	22.8	24.8	23.8	7.6
April	30.028	29.987	88.8	69.3	19.5	79.1	92.3	59.9	26.1	25.1	25.6	7.2
May	30.029	29.982	89.8	70.5	19.3	80.2	91.3	59.5	27.3	26.8	27.1	6.8
June	30.029	30.000	87.4	71.0	16.4	79.2	92.4	66.3	27.6	28.0	27.8	5.7
July	30.043	30.009	87.4	71.0	16.4	79.2	93.2	72.9	27.3	29.1	28.2	6.1
August	30.029	29.993	87.2	71.3	15.9	79.3	94.5	72.9	27.6	29.8	28.7	6.7
September	30.000	29.953	87.8	71.8	16.0	79.8	94.1	73.5	27.4	29.7	28.5	6.1
October	29.984	29.938	88.7	71.5	17.2	80.1	94.3	72.2	27.5	29.0	28.2	6.6
November	29.978	29.929	88.2	71.0	17.2	79.6	94.2	74.2	26.9	29.2	28.0	6.4
December	30.006	29.956	87.3	69.7	17.6	78.5	93.4	72.8	25.4	28.1	26.7	5.9

† Average of four years.

\* Average of nine years.

Table IV.  
WINDS ALOFT.  
PORT-OF-SPAIN, 1933.

	Surface	700	1,400	2,000	2,600	4,500	6,200	9,200	12,000 ft.
January	E 1	SE 6	ESE 8	E 10	SE 14	SE 13	SE 9	SE 22	
February	ENE 6	ENE 10	ENE 13	E 16	ESE 18	ESE 18	ESE 14	ESE 18	E 16
March	ENE 4	ENE 6	ESE 8	ESE 12	ESE 16	ESE 20	ESE 20		
April	SE 4	SE 8	SE 12	SE 15	SE 17	SE 19	SE 15	SSE 13	SW 7
May	SE 5	SE 8	SE 12	SE 14	SE 16	SE 16	SE 20	SE 23	
June	ESE 4	SE 10	SE 12	SE 14	SE 16	SSE 15	SSE 17	SE 20	ESE 12
July	SE 4	SE 5	ESE 9	ESE 12	ESE 14	SE 14	SE 15	SE 18	
August	ESE 4	ESE 8	E 12	ESE 12	ESE 12	ESE 13	ESE 12	ESE 12	
September	ESE 4	ESE 8	ESE 10	ESE 12	ESE 14	ESE 14	ESE 12	ESE 12	E 7
October	NNW 3	ESE 6	ESE 8	ESE 10	ESE 12	ESE 10	ESE 7	E 8	
November	ESE 4	ESE 8	E 9	E 12	E 14	E 17	E 16	E 16	
December	ENE 2	NE 9	ENE 12	ENE 13	ENE 15	ENE 19	E 18	E 15	
Year	ESE 4	ESE 8	ESE 10	ESE 13	ESE 15	ESE 16	ESE 15	ESE 16	E 10
Highest	SW 25	SW 25	ENE 33	ENE 28	ESE 30	E 35	E 45	ESE 38	E 16
Date	Aug. 18	Aug. 18	Feb. 12	Feb. 15	Feb. 5	Dec. 20	June 27	June 11	Feb. 21

HIGHEST OBSERVATION.

7 A.M.—APRIL 12, 1933.

Surface	700	1,400	2,000	2,600	4,500	6,200	9,200	12,000
Calm	SE 2	SE 4	SE 13	ESE 21	SE 23	E 13	NNE 7	SW 7
15,000	W 18	W 16	WNW 27	WSW 32				

\*Observations made by Pan American Airways.