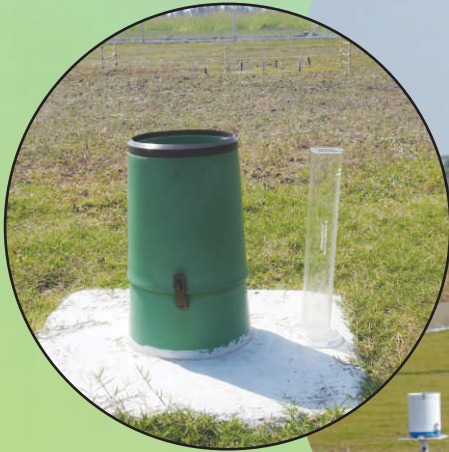


Variation in Climatic Features at Baramati : A Decade Study



भाकृअनुप - राष्ट्रीय अजैविक स्ट्रेस प्रबंधन संस्थान
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February, 2019

Published by

Director

ICAR-National Institute of Abiotic Stress Management

Malegaon, Baramati, 413 115, Pune, Maharashtra

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Citation

Potekar, S.V, Singh, Y. and Singh, N. P. 2019. Variation in Climatic Features at Baramati: A Decade Study. ICAR-NIASM Technical Bulletin No-30, ICAR-National Institute of Abiotic Stress Management, Malegaon, Baramati - 413 115, Pune, Maharashtra, India. P. 42.

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Printed at:

M/s. Sakalp Printing Press

"Amardeep", Indapur Road,

Baramati - 413102



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भारतीय कृषि अनुसंधान परिषद, कृषि अनुसंधान एवं शिक्षा विभाग
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Director



PREFACE

Indian agriculture is becoming more vulnerable to various weather vagaries under changing climatic scenario. Due to aberrations in monsoon behaviour in terms of onset, distribution and withdrawal, farmers continue to face hardships in agricultural operations and often experience huge crop losses. The increased incidences of extreme weather events have been causing widespread damage and loss to agricultural sector especially during the past decade.

Agriculture production in a country like India is extremely sensitive to weather fluctuations. Each crop has its own weather optima for full expression of its yield potential. Using a knowledge base of weather conditions, stakeholders used to apply available agro techniques and management practices to get the actual yield. But, in a monsoon dominated country like India, intra and inter annual weather variability has very high influence on crop yield and thus controls the crop yield and farmers income.

Considering the very high importance of weather in agriculture, ICAR-NIASM, maintains an agrometeorological observatory at Malegaon, Baramati and is now part of the India Meteorological Department's (IMD) National agrometeorological network. Considering the increasing importance of the weather parameters due to climate change issues, it is very much necessary to summarise the daily weather characteristics for the last decade, so that the peculiarities of the weather for a particular period can be better perceived by different stakeholders, including researchers and farmers to obtain better yield and profit. While summarising the information for 2009-2018 on daily, weekly and monthly time scales we have come across some features of changing weather at Baramati over the years, with implications of cropping and other activities.

We earnestly hope that information summarised and data contained in this bulletin will be of immense use for developing suitable management strategies for different cropping / farming systems as well as for the regional climate modellers and weather forecasters; this apart from the agro-advisory units and serve as a reference manual for many other stakeholders.

(Narendra Pratap Singh)



कृषि वैज्ञानिक चयन मंडल

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Foreword

It is a well-known fact that weather is a major factor that influences crop growth and productivity. Agriculture is sensitive to short-term changes in weather and to seasonal, annual and longer-term variations in climate. The variations in the meteorological parameters are more of transitory in nature and have paramount influence on the agricultural production systems, although other parameters, like soil characteristic, seed genetics, pest and diseases and agronomic practices also do impact crop yields. In the recent past, significant variations in the spatial and temporal distribution of climatic parameters have been observed. The frequency of extreme weather events like droughts, floods, cold / heat waves and hailstorms have significantly increased in India.

Analysis of the food grains production and productivity data for the last decade reveals a tremendous increase, but it appears that negative impact of vagaries of monsoon has been large throughout the period. In this context, the determination of the nature of variability in weather parameters, particularly the rainfall received in a season/year as well its distribution within the season would prove an important index. These observations should be very useful to coupled with the management practices such as optimal time of sowing, level of pesticides and fertilizer application etc.

It is indeed gratifying to note that the authors, ICAR-NIASM have compiled information on variation in climatic features at Baramati during this decade in the form of a bulletin. This will help to the agro-advisory units and farmers of the area and serve as a reference manual in future.

I appreciate the authors for bringing out this useful publication for the benefit of farming community and other stakeholders.

(A.K. Srivastava)

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SUMMARY

In the context of climate change, it is pertinent to ascertain whether the characteristics of weather variables are also changing at micro level. Using daily weather data for the period of 2009-2018 analysis were carried out, to find out the changes in frequency and intensity of weather parameters. Weather variables are measured using standard manually operated instruments used in the IMD recognized agro - meteorological observatories across the country. These data sets are summarised on weekly and monthly basis are presented in tabular formats for the period January, 2009 to December, 2018.

Key observations on the weather variables recorded during last ten years are summarised below:

- ◆ Decadal mean, maximum and minimum temperatures at ICAR-NIASM Baramati were 25.7°C, 32.8°C and 18.6°C, respectively which are slightly less than the normal.
- ◆ During the decade mean annual rainfall, recorded was 612.3 mm (7 % excess of normal i.e. 571 mm) and monsoon rainfall occurred 432.0 mm (8 % excess of normal i.e. 399 mm) in 27 rainy days.
- ◆ Amount of rainfall during monsoon season is less in last 5 years, compared to normal however it is higher than normal in pre monsoon season. It indicates shifting of rainfall duration earlier to monsoon.
- ◆ The distribution of rainfall on weekly basis expected at 75% probability is less than 10 mm in almost all the weeks during south west monsoon period which adds uncertainty factor in rainfed crops production.
- ◆ During this decade, SW monsoon rainfall was in the ranges of normal, excess, deficit and scanty in 4, 3, 2 and 1 number of years, respectively.
- ◆ The frequency of occurrence of meteorological and agricultural drought for Baramati shows that during this decade, meteorological drought was witnessed in three no. of years with the annual rainfall shortages were more than 25%. However, agricultural drought situation prevailed in as many as six years.
- ◆ During last five years (2014-2018), annual mean daily relative humidity remained 59 % whereas annual daily mean wind speed stood at 7.2 kmhr⁻¹.
- ◆ In last five years annual total evaporative demand was 222.01 cm which is about 3 times the rainfall whereas annual total reference evapotranspiration (PET) computed using FAO 56 standard Penmann Montheith equation was about 193.26 cm.
- ◆ The ratio between reference crop evapotranspiration (ET_{ref}) and Class A Open pan evaporation (Pan-E) varied between 0.81 (in January) and 0.95 (in November).
- ◆ During the period of last five years annual mean daily bright sunshine duration was 6.8 hrs and average intensity of incoming solar radiation during the daytime hours stood at 19.1 MJm⁻²d⁻¹.

1. INTRODUCTION

Agro-climatic characterization at a micro scale would help in local adjustment of crop cultivation practices, irrigation schedules based on expectancy of rainfall, micro-watershed management, reclassifying agro-climate zones under the changing climate scenario, better implementation of weather based crop insurance schemes and other decisions that depend on weather variables. Knowing agro-climatic features at micro level (e.g., block or village) helps farmers in adjusting farming schedule and would be useful for adoption of climate smart management practices. Outcome of such research would also help in formulating appropriate adaptation and/or mitigation strategies for agriculture in the climate change regime.

Baramati falls under the arid to semi-arid western Maharashtra Scarcity zone (MH-6) located in the *deccan* plateau interspersed with hillocks and hills. The area is characterized by low effective annual rainfall. Occurrence of droughts is a common feature with frequency of meteorological drought is one in every 3-4 years. Apart from overall low rainfall, its spatio-temporal variability is also high; even within few kilometers there could be huge rainfall variations. Spatial distribution and frequency of agro-meteorological observational network in India needs to be improved to capture the true nature of climate change and climatic variability and to enrich the national data pool for better climate prediction.

Weather conditions during crop seasons strongly influence the crop growth and development. The climate regulates and the weather determines the growth development and finally the yield of the crop. It is therefore; necessary to measure the meteorological parameters in all agricultural experimental stations. The interpretation of experimental results in the light of weather conditions prevailing during the period of crop growth is important. Weather observations are also required for accurate weather forecasting and comparison of forecasted weather.

Micro-scale characterization of climatic conditions assumes still greater significance for all regions. Therefore, variable soil moisture regime associated with quantity and distribution of rainfall becomes the most limiting factor for crop production. In addition, any weather abnormalities such as cyclones, floods, droughts, hailstorms, frost, high winds and extreme temperatures impact agricultural productivity and cause associated adverse effects on socio-economic conditions. Keeping above in view, an attempt has been made to analyse the weather parameters recorded at the Agro meteorological observatory, ICAR-NIASM, Malegaon Kh., Baramati (Pune) and to present in this bulletin.

2. METHODOLOGY

Daily data recorded at ICAR-NIASM Malegaon, Baramati (2012-2018) and at Maharashtra State Irrigation Department Office, Malegaon Colony, Baramati (2009-2011) situated about three kilometres from the NIASM campus was used for decadal weather analysis. Long-term weather data (1886-2018) was analysed for three variables, viz. the maximum and minimum temperature and rainfall to have an insight of the local climate. For other weather variables daily data are available for a part of the aforesaid period.

Initiation of weather observation within the ICAR-NIASM began from January, 2012 with the establishment of an automatic weather station (AWS) at the highest elevation point of the campus (Latitude: 18° 09'14.07" N Longitude: 74° 30' 02.40" E Altitude: 570 m AMSL). During the month of June, 2013 the AWS was relocated in the midst of the agricultural farm situated in the southern side (Latitude: 18° 09'30.62" N Longitude: 74° 30' 03.08" E Altitude : 550 m AMSL). Although measurements of some important weather parameters using standard manually operated instruments such as rain gauge and open pan evaporimeter were done at different micro-watersheds (for rainfall) during this period, systematic observations using IMD's prescribed criteria for class-II Agromet observatory could be started only after October, 2013. Since then the weather observatory at NIASM is functioning full-fledged with standard Agromet instruments to cater to the scientific needs of the Institute.

This agro-meteorological observatory is class-II type wherein temperatures are recorded mandatorily twice daily at 0700 & 1400 LMT (Local Mean Time) whereas rainfall and evaporation atleast once daily at 0830 IST (Indian Standard Time). Daily data records are available for the variables, viz. the maximum and minimum temperature, morning and afternoon relative humidity, wind speed, wind direction, soil temperature, bright sunshine hours, pan evaporation, rainfall and dew observation corresponding to the period Jan 2014 to Dec 2018. The daily, weekly, monthly, seasonal and annual weather data are presented along with the entire statistical parameters viz. mean, standard deviation, coefficient of variation, lowest and highest values.

The PET Calculator v3.0 a software developed by AICRPAM, CRIDA, Hyderabad used to estimate PET using different approaches like Modified Penman-Monteith Method on daily, weekly and monthly basis. Assessment of dry and wet spell has been carried out using weekly rainfall data using Weather cock 15 software based on Markov chain probability model developed by AICRPAM, CRIDA, Hyderabad.

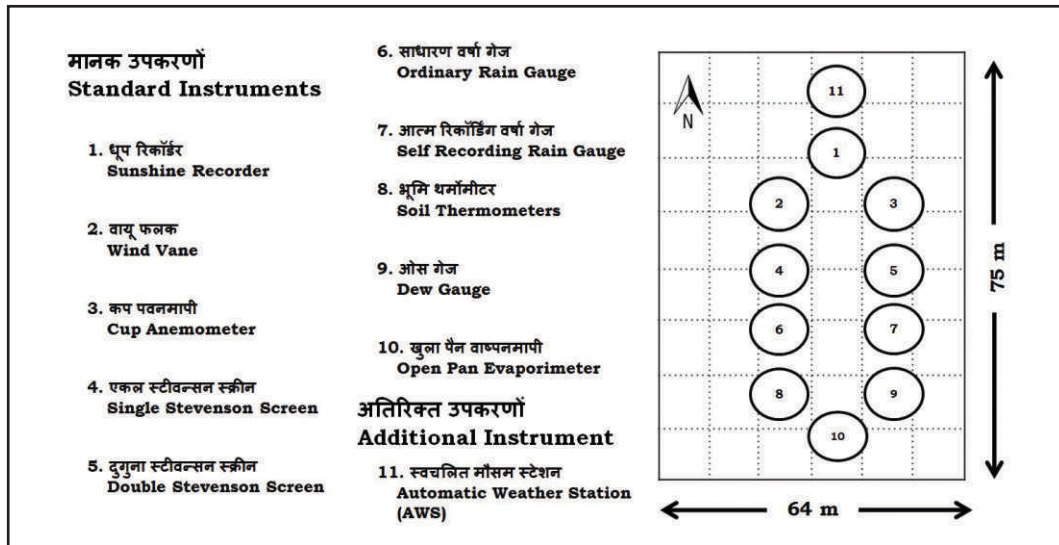


Fig. 2.1. Layout of ICAR-NIASM Agrometeorological Observatory (Class-II)



Fig. 2.2. Sequence of Agromet Observatory establishment

STANDARD INSTRUMENTS IN AGROMET OBSERVATORY



Campbell Stokes Sunshine Recorder
Use: Recording of Bright Sunshine Duration (hrs)



Wind Vane
Use: Indication of Wind Direction



Cup Counter Anemometer
Use: Measurement of Wind Speed (Km hr^{-1})



Thermometers (Maximum, Minimum, Dry Bulb & Wet Bulb) inside Single Stevenson Screen
Use: Recording of Maximum and Minimum Temperature ($^{\circ}\text{C}$), Rel. Humidity (%)



Pan Evaporimeter
Use: Measurement of Evaporation (mm)



Rain Gauge (non-recording)
Use: Measurement of Rainfall (mm)



Rain Gauge (self-recording)
Use: Measurement of Rainfall (mm)



Soil Thermometers
Use: Recording of Soil Temperature ($^{\circ}\text{C}$)



Dew Gauge
Use: Measurement of Dew amount (mm)

Fig. 2.3 Details of Standard Instruments in Agromet Observatory.

3. RESULTS AND DISCUSSION

Statistics with respect to weather variables, viz. the maximum and minimum temperature, morning and afternoon relative humidity, wind speed, wind direction, soil temperature, no. of bright sunshine hours, pan evaporation, rainfall based on daily records are described in sections 3.1 to 3.7.

3.1 Temperature :

Long term annual daily mean, maximum and minimum temperatures for this location are 26.3, 33.0 and 19.5°C, respectively. During last 10 years (2009-2018), daily annual mean temperature at NIASM, Malegaon stood at 25.7°C and varied between 24.8°C and 26.3°C. The annual mean daily minimum temperature during ten years showed a range of about 2.1°C, fluctuating between 17.4°C and 19.5°C whereas, the mean annual maximum temperature ranged between 31.9°C and 34.3°C i.e. a difference of 2.4°C. Monthly mean temperature varied between 18.7°C (January) and 31.6°C (May). Monthly maximum temperature reached its peak in April (41.4°C) and dipped to 27.5°C in January. For minimum temperature, May records the highest (23.4°C) and January the lowest value (9.9°C).

Weekly means of the maximum temperature varied between 39.3 (± 1.2) and 29.3 (± 1.4)°C corresponding to the week 20 (14 May - 20 May) and week 30 (23 July - 29 July), respectively. On the other hand, weekly means of minimum temperature varied between 23.2 (± 1.8) and 11.0 (± 2.9)°C, those correspond to the week 20 (14 May - 20 May) and week 52 (24-31 December), respectively. Daily differences in extreme temperatures i.e. difference between maximum and minimum temperature showed a wide range, between 1.7°C and 28.0°C and its overall mean of 10 years stood at 14.2°C. Daily maximum temperature has reached up to 43.0°C (29 and 30 April 2009, 17 and 18 April 2010) while lowest daily minimum temperature dipped up to 5.7°C (29 Dec 2018).

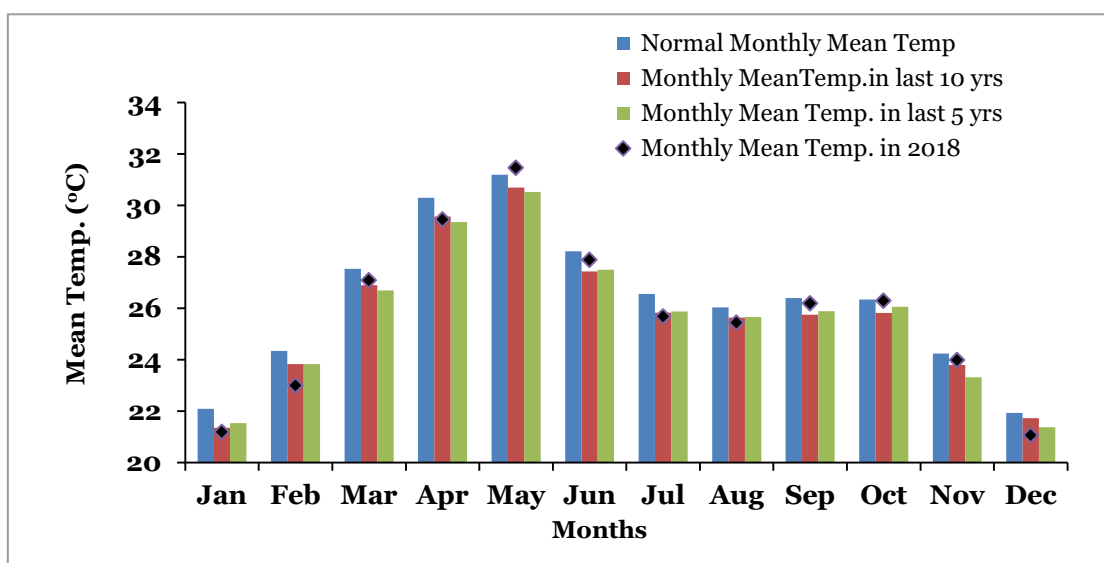


Fig. 3.1. Monthly mean temperature deviation during 2009-2018.

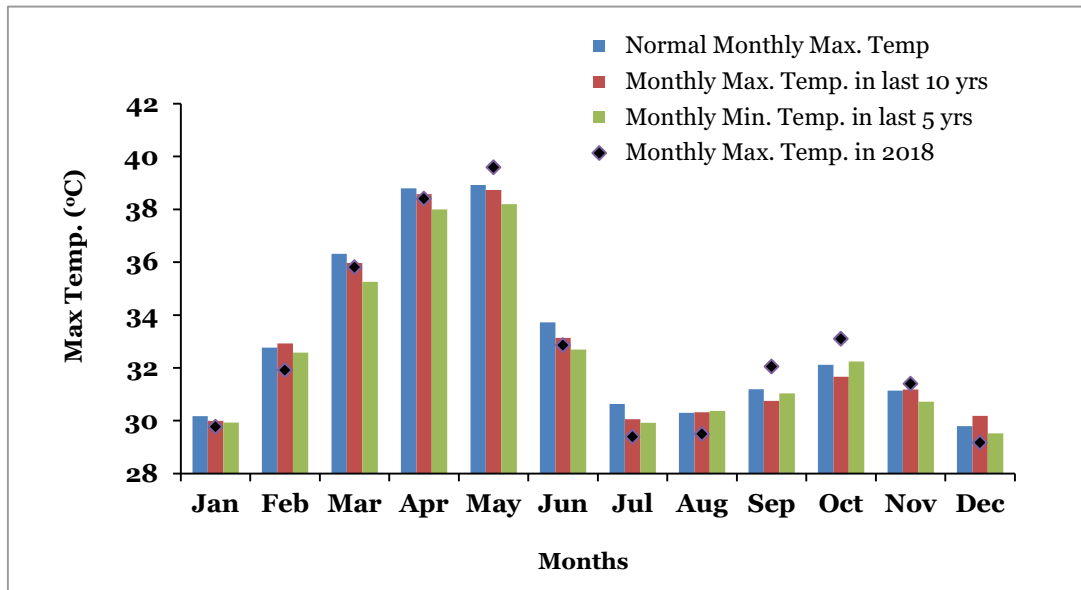


Fig. 3.2. Monthly maximum temperature deviation during 2009-2018.

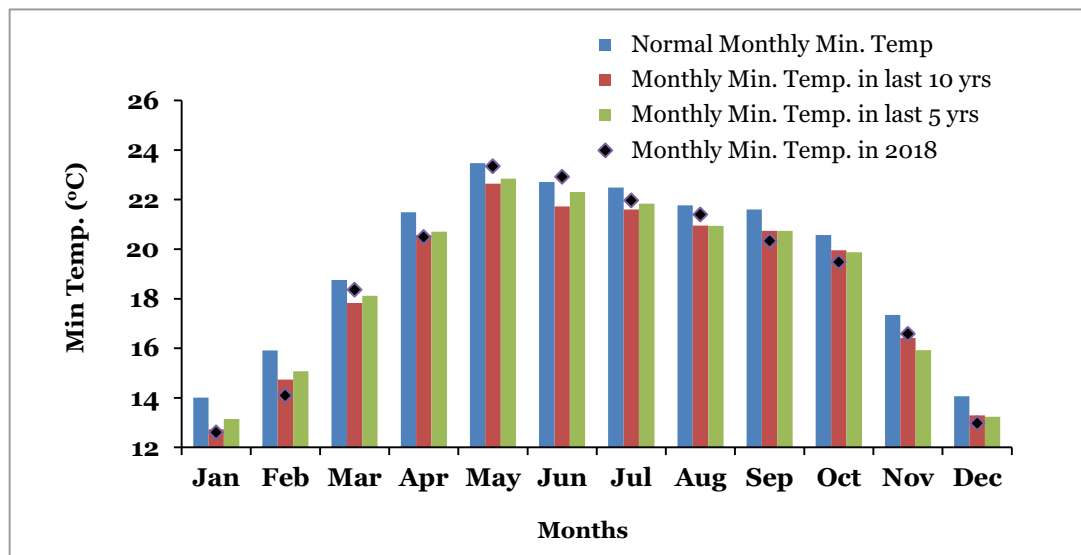


Fig. 3.3 Monthly minimum temperature deviation during 2009-2018.

Table 3.1. Annual mean, maximum and minimum temperature under various classes.

Parameters	Normal (1986-2018)	Last Ten years (2009-2018)	Last five years (2014-2018)	Last year (2018)
Annual mean temp. (°C)	26.3	25.7	25.6	25.7
Annual avg. maximum temp. (°C)	33.0	32.8	32.5	32.7
Annual avg. minimum temp. (°C)	19.5	18.6	18.7	18.7

Extreme Temperature Frequency

During the period 2009-2018, on an average, the number of days in a year in which the maximum temperature exceeded 40°C was 17; however, there was a large variation year to year. In 2011, no day recorded the maximum temperature higher than 40°C whereas in 2010 as many as 47 days exceeded the same. For a higher temperature threshold of 42°C, only 4 days in last 10 years (2009-2018) could be found that exceeds such limit. Day's minimum temperature dipping to 10°C and below, particularly during winter months were more common at this location with an average 17 no. of days per year witnessed such condition in last 10 years. Occurrences of daily minimum temperature in the range of 7-10°C have become more frequent. In 2012 and 2018 three days each year had minimum temperature between 5 and 6°C while minimum temperature in the range of 6-7°C have witnessed on 17 no. of days in the decade.

3.2 Rainfall

With respect to rainfall, long term average (LTA) for the period of 1986 to 2018 of this locality for the year is only 571 mm of which about 72 and 19 per cent occurs during southwest monsoon (June- September) and post-monsoon (October- December) period, respectively. Annual and seasonal rainfall averaged 612 mm and 432 mm for the period 2009-2018 and occurred 7% and 8% higher than the normal respectively, however during last five years (2014-2018) annual and seasonal rainfall occurred 550 mm and 388 mm which is 4 and 3% less than the normal. The maximum annual rainfall was received in year 2009 (1145 mm) followed by 2010 (948 mm) while lowest rainfall was received in year 2012 (289 mm) followed by 2018 (351 mm). Amount of rainfall during monsoon season is less in last 5 years, compared to normal however it is higher than normal in pre monsoon season. It indicates rainfall duration is slightly shifted earlier to monsoon season. During monsoon season, in the month of July considerably less amount of rainfall received which is 21 and 24 % less than normal and decadal mean during last five years. Similarly in October about 47% less than normal rainfall received during last five years.

The rain mainly commences from second week of June and withdraws from last week of September to second week of October. With respect to decade (2009-2018), the maximum rainfall received during September (157.8 mm) followed by June (117.4 mm) (Fig. 3.4). In the post-monsoon season, highest rainfall normally occurs in October (78.9 mm) followed by November (17.9 mm) and during the summer season in May (34.8 mm). Average rainfall for July and August was 67.4 mm and 88.6 mm, respectively. Other months of the year, viz. December, January, February, March and April received average rainfall < 20 mm. The variability in rainfall during south-west and the post-monsoon season is 49 and 88 per cent, respectively while the CV is 48 per cent for the annual rainfall. Effective rainfall is received only during the period May-October.

Table 3.2. Season wise distribution of rainfall (mm)

Season	Normal (1986-2018)	Last Ten years (2009-2018)	Last five years (2014-2018)	Last Year (2018)
SW Monsoon (Jun-Sep)	399.3	432.3	388.2	233.1
Pre Monsoon (Mar-May)	58.2	73.5	81.8	23.8
Post Monsoon (Oct-Dec)	113.6	106.5	79.9	94.3
Annual (Jan-Dec)	571.1	612.3	549.9	351.2

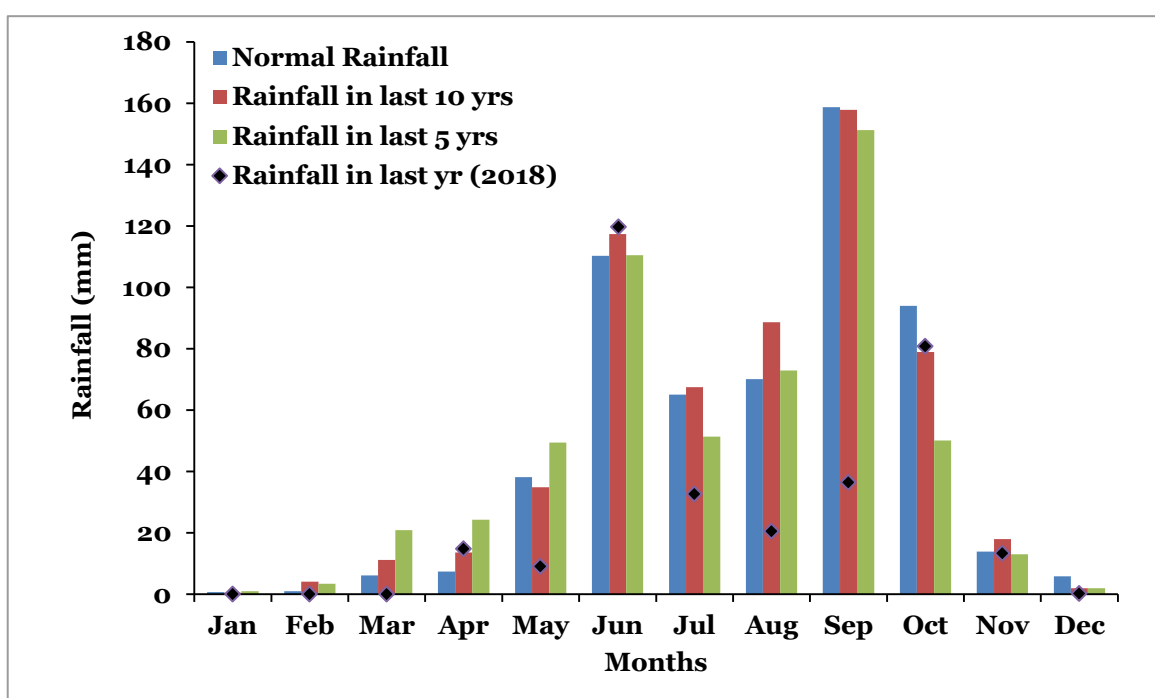


Fig. 3.4. Monthly rainfall at Baramati (2009-2018)

Weekly rainfall distribution

Normal and Dependable rainfall

Weekly rainfall means were computed along with dependable rainfall at various probability levels using incomplete gamma distribution (Fig. 3.5.). Long term average (LTA) was >20 mm in case of 11 weeks. Week no. 37 has the highest average rainfall (48.1 mm) whereas weeks 37 to 40, falling during the months of September and October have averages greater than 40 mm. Week 24 has the highest average rainfall (31.6 mm) followed by week 23 (28.8 mm) during the innitial monsoon season.

The distribution of rainfall on weekly basis which is very important and rainfall quantity expected at 75% probability is less than 10 mm in almost all the weeks during south west monsoon period which adds uncertainty factor in rainfed crops production. Standard week number 38 is receiving highest rainfall quantity of 8 mm at 75 per cent probability and at least 3 mm per week is expected during 20-25th SMW, 28-31st SWM and

35-40th which indicates potentiality for crop growing in dryland areas. However at 50% probability which means on every alternate year basis, there is definite rainfall receipt of more than 10 mm per week during the period between 22 and 25 while during 37 to 40 standard weeks period more than 20 mm rainfall per week can be expected. Agricultural strategies, farming operations need to be based on this type of analysis and advisories should be planned accordingly.

Table 3.3. Expected Weekly Rainfall Amount (mm) at Different Probability Levels

Standard week	Probability levels			
	90 %	75%	50%	25%
22 (28 th May to 3 rd Jun)	0.8	3.7	13.6	35.1
23 (4 th to 10 th Jun)	1.6	5.9	17.9	41.1
24 (11 th to 17 th Jun)	0.9	4.4	16.7	44.1
25 (18 th to 24 th Jun)	0.7	3.4	12.3	31.7
26 (25 th Jun to 1 st Jul)	0.6	2.2	7.1	16.8
27 (2 nd to 8 th Jul)	0.7	2.7	8.0	18.4
28 (9 th to 15 th Jul)	1.0	3.2	8.9	19.4
29 (16 th to 22 nd Jul)	1.3	4.3	12.5	27.9
30 (23 rd to 29 th Jul)	1.0	3.4	9.2	19.9
31 (30 th July to 5 th Aug)	0.7	3.0	9.4	22.3
32 (6 th to 12 th Aug)	0.4	2.0	8.0	21.7
33 (13 th to 19 th Aug)	0.5	1.9	5.7	13.0
34 (20 th to 26 th Aug)	0.5	2.9	12.8	36.6
35 (27 th Aug to 2 nd Sep)	0.7	3.1	10.3	25.0
36 (3 rd to 9 th Sep)	0.8	3.8	14.1	36.6
37 (10 th to 16 th Sep)	1.3	6.5	24.9	66.2
38 (17 th to 23 rd Sep)	2.2	8.2	24.9	57.4
39 (24 th to 30 th Sep)	1.4	6.2	21.1	52.3
40 (1 st to 7 th Oct)	1.7	7.2	24.6	61.0
41 (8 th to 15 th Oct)	0.2	2.0	10.2	32.2
42 (16 th to 23 rd Oct)	0.3	1.8	8.3	24.2

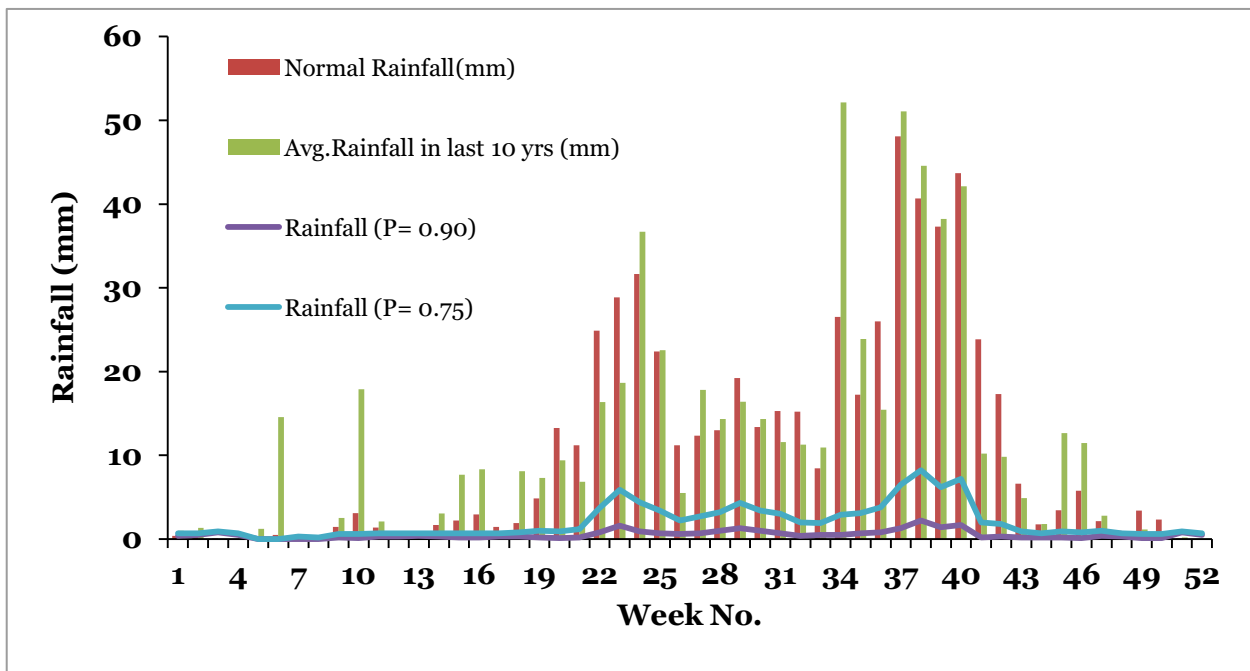
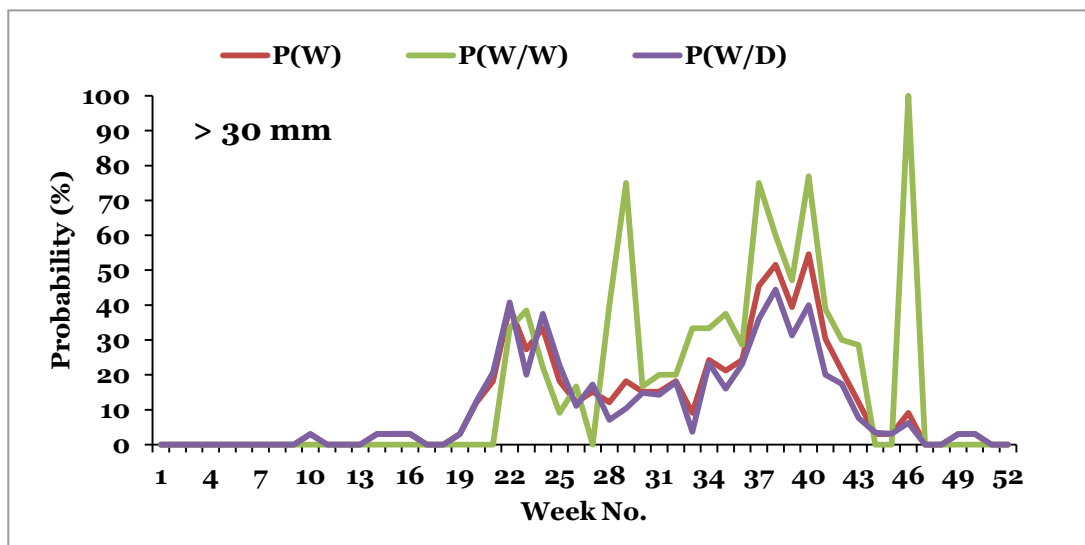
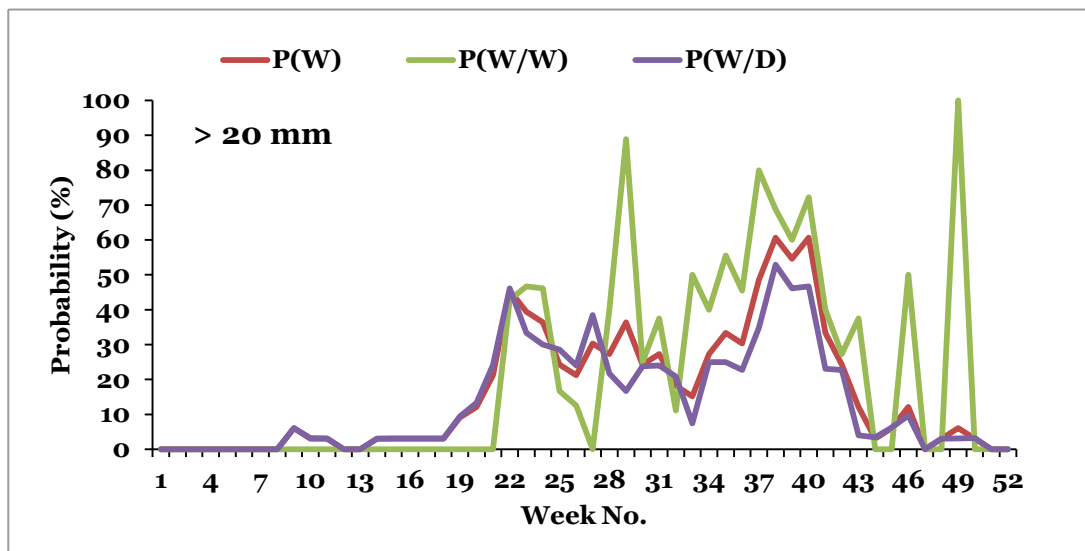
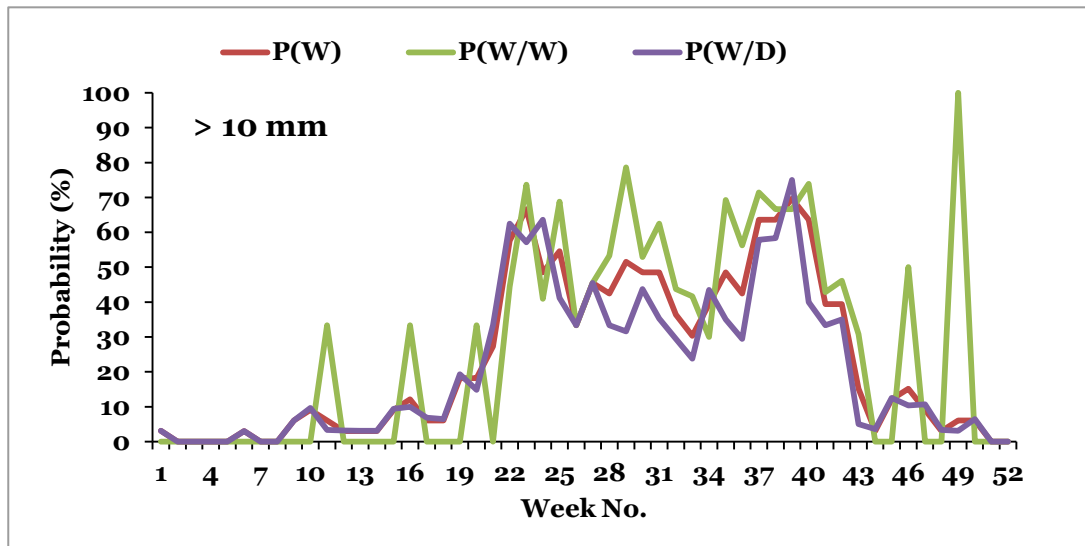


Fig. 3.5. Weekly average and dependable rainfall (p =0.75 and 0.90)

Weekly rainfall : initial and conditional probabilities

Since rainfall is highly variable, the initial and conditional probabilities of rainfall are useful for taking decision on agriculture operations and for irrigation management. Rainfall probability for a period (e.g. week) irrespective of the rainfall situation in earlier period (e.g. preceding week or weeks) is termed as initial probability whereas considering those of the previous period is defined as conditional probability. The notation for the probability (P) of a week being a wet (W) when the preceding week is a wet (W) or dry (D) is abbreviated as P(W/W) and P(W/D), respectively.

Initial, conditional probabilities and consecutive dry and wet week probabilities calculated for Baramati and the results in relevance with rainy season starts from the first week of June and ends during the second week of October (20th SMW – 41st SMW) only are discussed. The chances of occurrence of a week getting dry is high during early part of the season and the probability decreases with the progress of rainy season from 35th week onwards. Subsequently chance of occurrence of a week getting wet is high up to 41st week due to heavy downpour during return monsoon. Parallel patterns are followed for conditional probabilities and consecutive dry and wet week probabilities. Only the three weeks 38, 39 and 40 shows a probability higher than 50% for 20 mm rainfall. The chances of occurrence of dry week preceded by another dry week (PDD) are less during monsoon periods particularly from 38 to 40th SMW. The chances of occurrence of dry week preceded by another dry week (PDD) are high during rainy season from 28th to 36th SMW while the chances of occurrence of wet week preceded by another wet week (PWW) are high during 37th to 40th SMW.



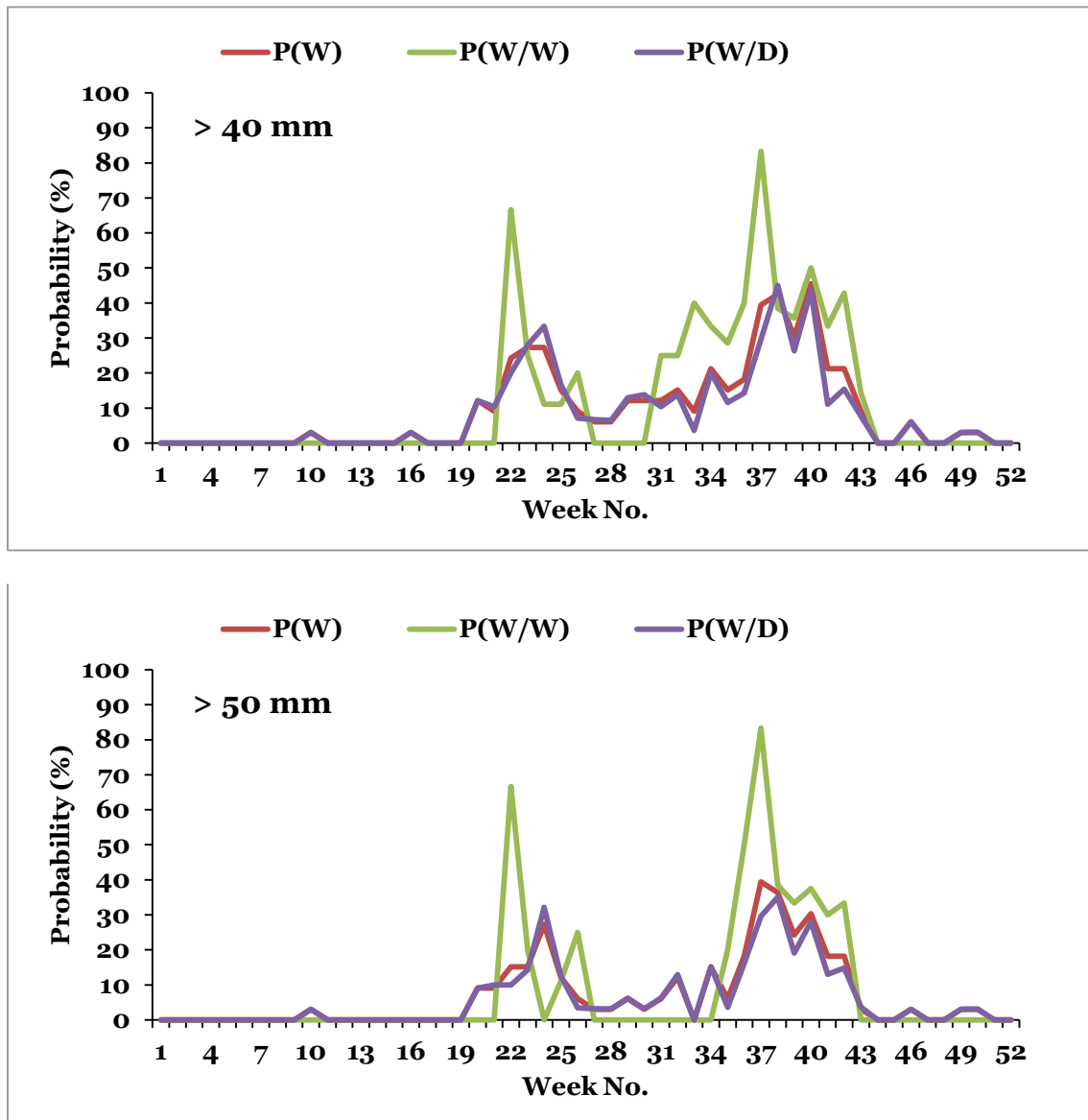


Fig. 3.6. Initial and conditional probabilities of receiving rainfall in all different weeks of a year

Rainfall Extremes

Variability in rainfall during (2009-2018) was assessed based on the deviation from the long term average rainfall. The four rainfall groups considered following the criteria of India Meteorological Department (IMD) were excess ($> 20\%$), normal (19 to -19%), deficit (-20 to -59%) and scanty ($< -59\%$). Number of years under each category, extreme rainfall years and amounts that occurred during the southwest monsoon (June-September) and post monsoon (October-December) seasons are given in table 3.4. During this decade, SW monsoon and post monsoon rainfall were in the normal range in 4 and 2 number of years, respectively. In case of annual total rainfall, 2 number of years received normal rainfall while in years it was excess. Single day highest rainfall (110 mm) was recorded on 3rd Oct, 2009.

Table 3.4. Years under various rainfall classes and extremes during 2009-2018.

Season	Number of years in rainfall category				Rainfall Total (mm)	
	Excess	Normal	Deficit	Scanty	Highest (year)	Lowest (year)
SW Monsoon (Jun-Sep)	3	4	2	1	762 (2010)	137 (2012)
Post Monsoon (Oct-Dec)	2	2	4	2	353 (2009)	46 (2011)
Annual Rainfall	4	2	3	1	1125 (2009)	221 (2012)

Rainfall Intensity

Average number of rainy days (rainfall >2.5mm) per month during the period June and October ranged between 5.1 and 7.4. However, the occurrence of heavy precipitation day (rainfall > 10 mm) are more during September, June and October than July and August resulting in considerably lower rainfall totals during the later months. Annual time series of no. of rainy days under various intensity classes is presented in figure 3.7.

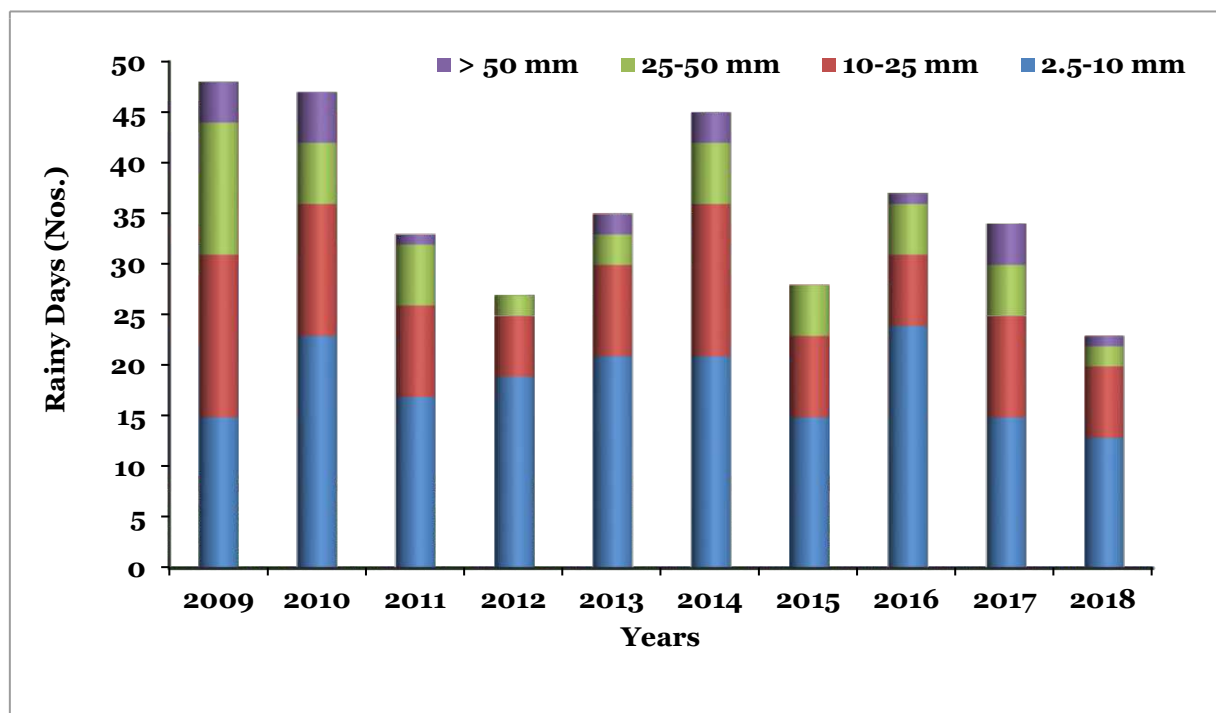


Fig. 3.7. Rainfall intensity distribution in decade (2009-2018)

Number of rainy days during monsoon season were more in decade in comparison with normal however less number of rainy days witnessed during last 5 years in monsoon and post monsoon period. While in pre-monsoon season number of rainy days was more compared to normal. (Table 3.5.)

Table 3.5. Number of rainy days under various classes.

Season	Normal (1986-2018)	Last Ten years (2009-2018)	Last five years (2014-2018)	Last Year (2018)
SW Monsoon (Jun-Sep)	25	27	24	15
Pre Monsoon (Mar-May)	3	3	4	2
Post Monsoon (Oct-Dec)	6	6	5	6
Annual (Jan-Dec)	34	36	33	23

Drought

There are different approaches to define drought. India Meteorological Department (IMD) has defined drought based on meteorological conditions arising out of rainfall deficiency compared to the long-term average or normal during a given period. Generally, a week is considered as the minimum duration for which droughts are to be considered. If the deficiency in rainfall is 26 to 50%, the situation is termed as moderate meteorological drought and if it exceeds 50% then it is severe drought. For agricultural usage, the distribution rather than the total rainfall is more important, particularly for rainfed areas. IMD has laid out separate criteria for such situation to recognise agricultural drought. When the rainfall for a week is half of the normal or less provided the normal for that week is 5mm or more and if this continues for 4 consecutive weeks between middle of May to October, when 80 % of the country crops are sown, it is considered as agricultural drought. However, for micro analysis with respect to Baramati area, the aforesaid period of investigation for agricultural drought analysis was chosen in such a manner that it coincides with its major sowing time windows.

In Baramati, *kharif* sowing is done with the onset of monsoon i.e. in the second week of June and the *rabi* sowing normally starts in October. The frequency of occurrence of meteorological and agricultural drought worked out for Baramati shows that during 2009-2018, meteorological drought was witnessed in three no. of years with the annual rainfall shortages were more than 25 %. However, agricultural drought situation prevailed in as many as 6 years. Three years i.e. 2012, 2015 and 2018 witnessed both types of droughts. The year 2012 was the worst with rainfall of 221 mm only. The area is classified as chronically drought affected with a strong probability of occurrence of agricultural drought in consecutive years. Annual rainfall for agricultural drought affected years and block of weeks that witnessed severe meteorological drought leading to the agricultural drought are given in table 3.6.

Table 3.6. : Agricultural drought years (2009-2018)

Year	Drought Period (No. of consecutive weeks)	Annual Rainfall (mm)
2012	W 27 - W 30 (4)	294
2013	W 32 - W 35 (4)	525
2014	W 23 - W 26 (4)	760
2015	W 31 - W 36 (6)	385
2016	W 33 - W 36 (4)	493
2018	W 34 - W 37 (4)	351

3.3 Relative humidity

Relative humidity measured at the standard hours in the morning (RH I) and afternoon (RH II) during the period 2014 and 2018 were used for computation of monthly statistics. RH I varied between 69 per cent (March and April) and 84 percent (September). On the other hand, variation in RH II was between 28 (March and April) and 55 percent (July). Annual mean for the daily average RH stood at 59 percent (Fig. 3.8.). Higher diurnal ranges in RH were observed in the months of January, February, April, October and December when it was more than 40 %. Lowest diurnal range was observed in the month of July (28 %). Other months that showed a diurnal range (<30 %) were March, May, June, August and September.

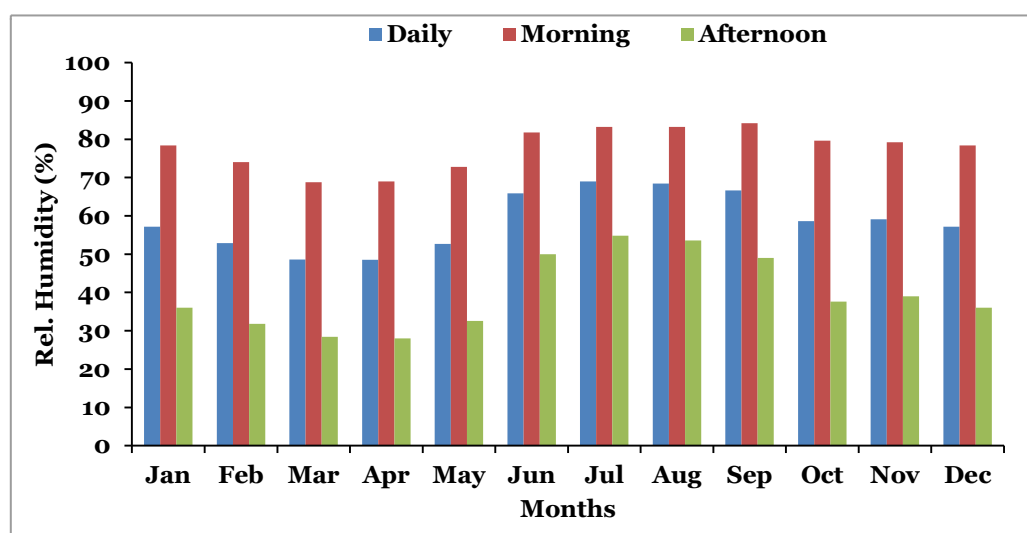


Fig. 3.8. Relative Humidity (RH) in various months (2014-2018)

3.4 Wind

During last five years (2014-2018), annual daily average wind speed stood at 7.2 kmhr⁻¹ and varied between 6.9 and 7.6 kmhr⁻¹. During the year, monthly average values have been found to vary between 5.06 (November) and 10.13 kmhr⁻¹ (July). Weekly means of the wind velocity varied between 4.00 kmhr⁻¹ week 48 (26 Nov - 02 Dec) and 52 (24 Dec - 31 Dec) and 12.15 kmhr⁻¹ week 29 (16 Jul – 22 Jul). Daily maximum wind velocity

has reached up to 21.6 kmhr^{-1} (13 June 2018) while lowest daily minimum wind velocity is recorded 1.5 kmhr^{-1} (6 Jan 2016, 2 Dec 2016 and 23 Dec 2016). Average wind speed showed a consistently increasing trend during January to June-July and a consistent decreasing trend during July to December. It is relatively low in the months October and November.

During morning hours (0700 LMT) wind blew mostly from two prominent sectors, viz. south-west to west and west to north-west directions it contributes about 66%. On the other hand, wind directions showed higher variability during the afternoon observations at 1400 LMT and prominent directions were south-east (12.1%), west of south-west (11.2%), north-east (10.7%) and west (10.1%).

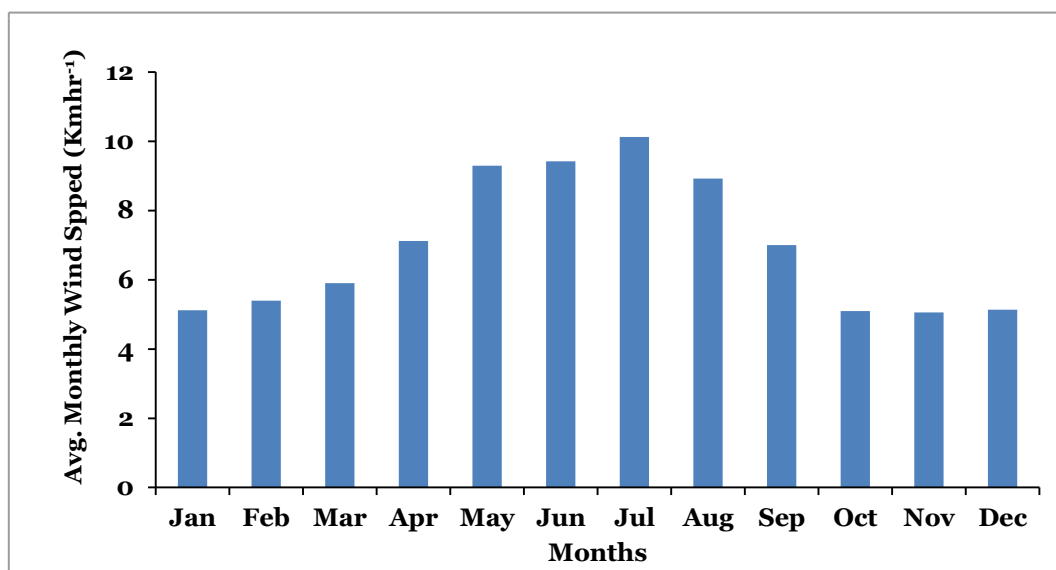


Fig. 3.9. Wind Speed in various months (2014-2018)

3.5 Evaporation

Annual average Class A open pan evaporation (Pan-E) aggregates to 2220.1 mm which is about 3 times the rainfall. During the period between Jan, 2014 to December, 2018, open pan evaporation (Pan-E) varied between 4.8 mmd^{-1} (November and December) and 9.0 mmd^{-1} (May) and the annual average of daily Pan-E was 6.1 mm. Reference crop evapotranspiration (E_{Tref}) computed using FAO 56 standard Penmann-Monteith equation, ranged between 4.1 mmd^{-1} (December) and 7.8 mmd^{-1} (May). Monthly rate of Pan-E showed a consistently increasing trend during January and May and a consistent decreasing trend during October to December. During monsoon, in the months of June to September, pan evaporation fluctuated as per the prevailing radiation and cloud and rainfall situation. With the exception of March to June, changes in E_{Tref} followed that of Pan-E (Fig. 3.10.). The ratio $E_{Tref}/\text{Pan-E}$ varied as per the climatic situation of various months. These were found to be 0.91 in June, 0.89 in July, 0.88 in August, and 0.93 in September. It becomes relatively low in the months January to March. During the later months the rate of Pan-E remains high due to high climatic water demand but plant canopy is unable to match up the same on account of bulk surface resistance arising out

of insufficient soil moisture and/or stomatal closure. On the contrary, during months when potential climatic water demand remains low at this place the ratio value tends more nearer to 1.0. These months were June, September, October and November.

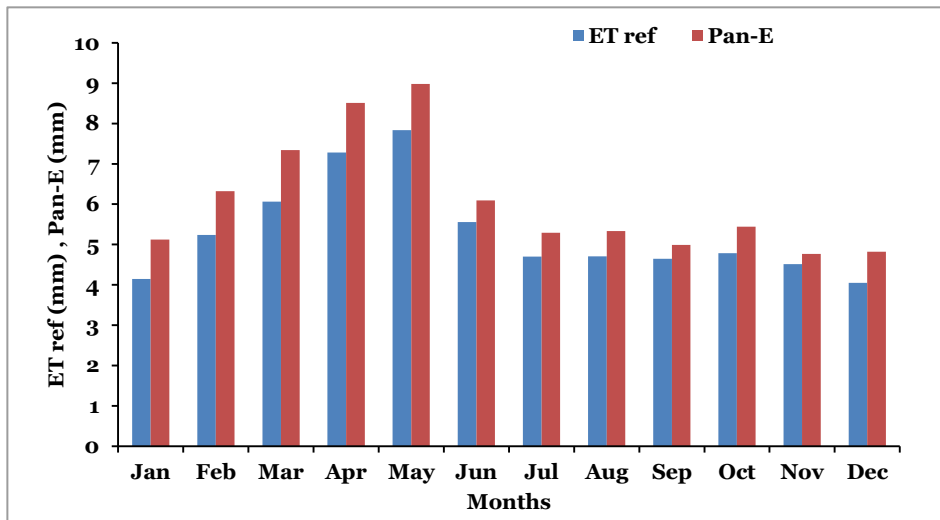


Fig. 3.10. Monthly dynamics of reference evapotranspiration (ETref) and pan evaporation (Pan-E) (2014-2018)

3.6 Radiation and Sunshine duration

During last five years (2014-2018), annual mean daily bright sunshine duration was 6.8 hrs and varied between 6.6 and 7.0 hrs. During the year, monthly average values have been found to vary between 4.3 (July) and 8.4 (February and April) (Fig 3.11.). Weekly means of the bright sunshine duration varied between 1.9 hrs week 29 (16 Jul – 22 Jul) and 10.0 hrs week 17 (23 Apr – 29 Apr). Daily maximum bright sunshine duration has reached upto 11.5 hrs (24 April 2016).

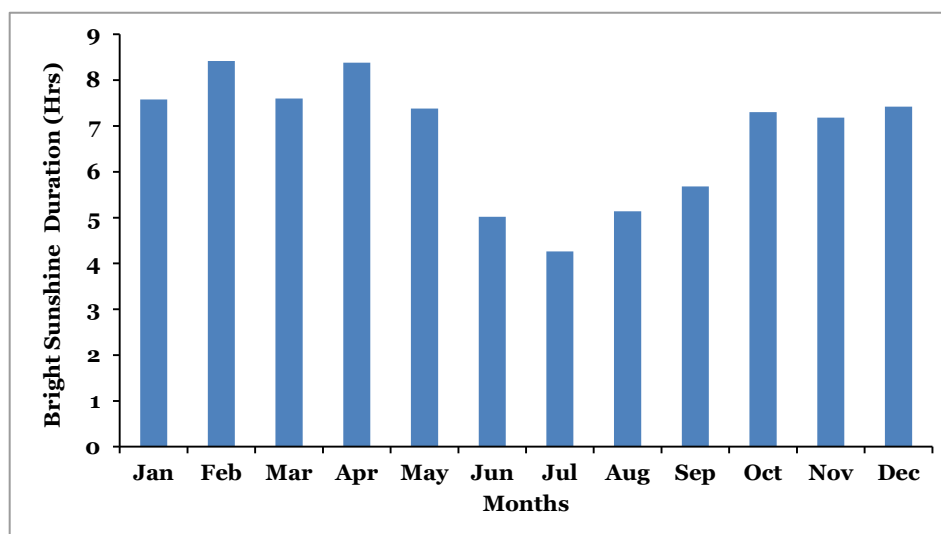


Fig. 3.11. Bright sunshine duration in various months (2014-2018)

During the period between Feb, 2012 to December, 2013 average intensity of incoming solar radiation during the daytime hours stood at $19.1 \text{ MJm}^{-2}\text{d}^{-1}$. Weekly mean for daily insolation was ranged between $13.1 \text{ MJm}^{-2}\text{d}^{-1}$ week 29 (16 Jul – 22 Jul) and $26.5 \text{ MJm}^{-2}\text{d}^{-1}$ week 18 (30 Apr – 06 May) (Fig 3.12.).

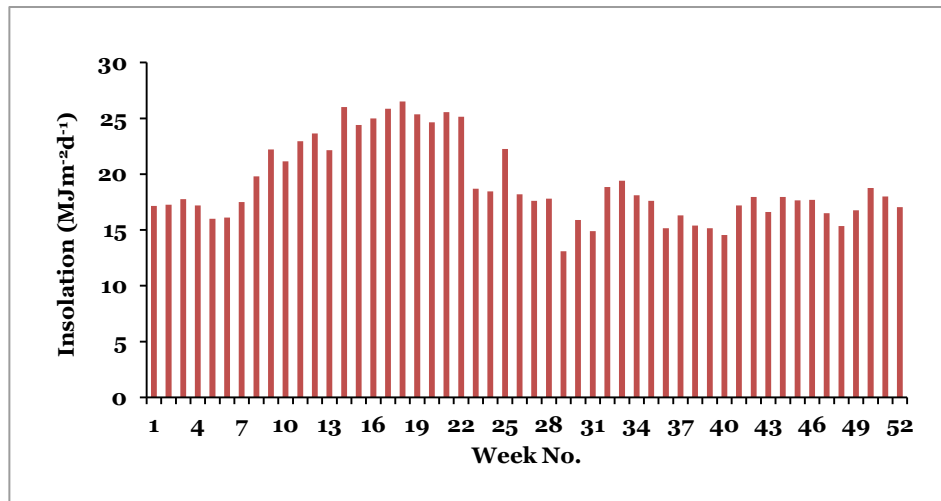


Fig. 3.12. Weekly average solar insolation throughout the year (2012-2013)

3.7 Soil temperature

During the period between Jan 2014 to Dec 2018, annual average values of soil temperature recorded at 5, 10 and 15 cm depths have been found to $24.1 (\pm 5.3)$, $25.9 (\pm 5.0)$ and $27.9 (\pm 4.1) ^\circ\text{C}$ during morning at 0700 hr LMT whereas during afternoon at 1400 hr LMT annual average stood at $37.0 (\pm 5.9)$, $33.7 (\pm 5.4)$ and $30.8 (\pm 5.2) ^\circ\text{C}$ respectively. Monthly mean Soil temperature at 5 cm depth varied between $18.6 ^\circ\text{C}$ (January) and $29.2 ^\circ\text{C}$ (May) during morning at 0700 hr LMT whereas during afternoon at 1400 hr LMT it varied between $32.8 ^\circ\text{C}$ (July) and $44.6 ^\circ\text{C}$ (May). Monthly soil temperature at 10 cm depth have been ranged between $21.3 ^\circ\text{C}$ (January) and $31.2 ^\circ\text{C}$ (May) in morning and $29.6 ^\circ\text{C}$ (January) and $40.3 ^\circ\text{C}$ (May) in afternoon. In case of soil temperature at 15 cm depth May ($33.1 ^\circ\text{C}$) recorded highest and January ($23.8 ^\circ\text{C}$) recorded lowest value in morning whereas during afternoon May recorded the highest ($36.4 ^\circ\text{C}$) and January the lowest value ($26.1 ^\circ\text{C}$).

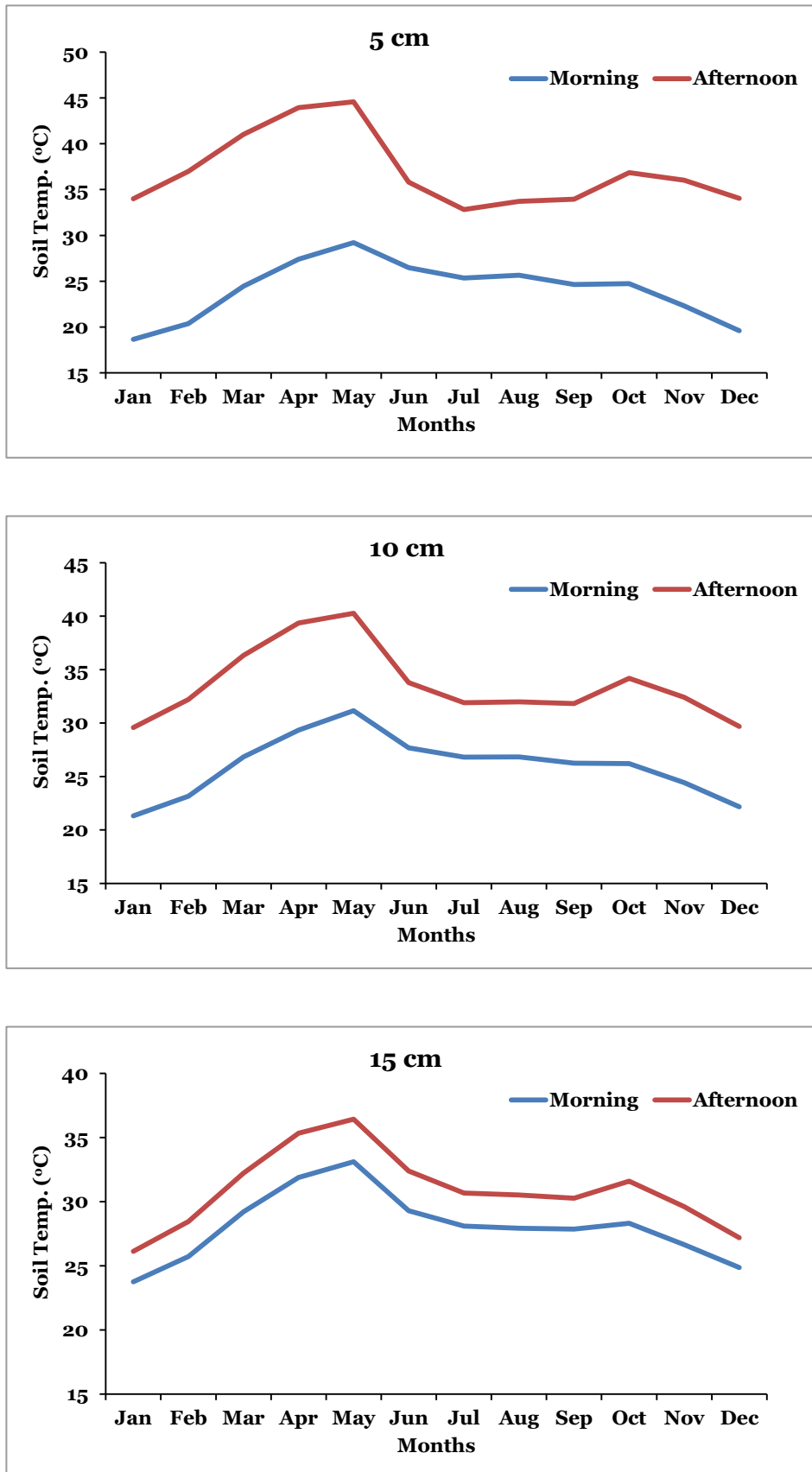


Fig. 3.13. Soil Temperature deviation at various depths throughout the year. (2014-2018)

APPENDIX-I
Weekly Weather Data

Weekly Mean Weather Data during 2009

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max		
1	32.1	11.0	21.6	76	0.0	22.0
2	31.9	13.0	22.5	74	0.0	34.0
3	31.4	11.0	21.2	81	0.0	28.0
4	33.0	12.0	22.5	75	0.0	24.0
5	34.4	14.3	24.4	76	0.0	33.0
6	35.0	13.6	24.3	68	0.0	36.0
7	33.7	12.7	23.2	72	0.0	38.0
8	34.6	15.0	24.8	74	0.0	42.0
9	37.4	15.3	26.4	68	0.0	45.0
10	37.9	16.4	27.2	61	0.0	41.0
11	36.1	16.6	26.4	71	7.0	34.0
12	38.4	17.4	27.9	68	0.0	42.0
13	38.3	17.4	27.9	56	0.0	47.5
14	39.9	20.4	30.2	67	0.0	48.6
15	40.1	19.0	29.6	58	0.0	49.0
16	41.3	20.7	31.0	61	0.0	51.0
17	40.4	20.3	30.4	59	0.0	43.0
18	42.1	22.1	32.1	61	0.0	49.9
19	41.7	21.6	31.7	64	0.0	48.0
20	40.9	21.4	31.2	78	87.0	49.0
21	37.4	21.9	29.7	71	0.0	39.5
22	38.7	21.7	30.2	75	33.0	46.0
23	36.3	21.6	29.0	80	46.0	39.9
24	37.4	22.0	29.7	75	0.0	42.0
25	35.7	20.9	28.3	85	43.0	30.2
26	33.6	21.3	27.5	79	0.0	32.0
27	31.6	21.3	26.5	87	32.0	22.0
28	30.0	21.0	25.5	88	16.0	11.3
29	29.3	20.3	24.8	86	18.0	20.0
30	29.7	20.3	25.0	82	12.0	18.5
31	31.9	20.3	26.1	77	0.0	28.0
32	32.1	20.6	26.4	77	0.0	31.0
33	33.0	20.7	26.9	79	42.2	29.6
34	30.6	19.9	25.3	90	235.0	20.0
35	30.6	20.6	25.6	85	49.0	24.0
36	30.4	20.7	25.6	83	20.0	21.0
37	32.9	21.4	27.2	85	20.0	23.3
38	33.6	20.9	27.3	82	99.0	20.0
39	33.9	20.9	27.4	85	33.0	26.0
40	29.7	19.9	24.8	83	217.0	22.0
41	31.4	19.1	25.3	82	36.5	22.5
42	33.6	19.4	26.5	77	0.0	27.0
43	34.0	15.6	24.8	69	0.0	28.0
44	34.6	13.3	24.0	68	0.0	32.0
45	32.7	18.6	25.7	85	31.0	21.5
46	29.6	19.1	24.4	74	66.0	6.9
47	32.0	15.1	23.6	68	0.0	16.2
48	31.4	13.1	22.3	77	0.0	20.5
49	31.7	14.1	22.9	82	0.0	20.0
50	31.7	13.6	22.7	79	0.0	21.6
51	30.9	13.7	22.3	84	2.0	15.0
52	30.1	11.6	20.9	71	0.0	18.2
Total	1782.7	935.7	1359.2	3918	1144.7	1596.2
Mean	34.3	17.9	26.1	76	22.0	30.8
S.D.	3.6	3.5	2.9	8.5	47.3	11.5
C.V.%	10.6	19.7	11.0	11.3	214.8	37.3

Weekly Mean Weather Data during 2010

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max		
1	29.4	13.9	21.7	73	0.0	14.0
2	31.0	14.3	22.7	70	0.0	23.5
3	31.7	14.3	23.0	75	0.0	21.0
4	31.4	10.6	21.0	70	0.0	26.5
5	32.0	12.7	22.4	74	0.0	29.5
6	33.9	14.4	24.2	79	0.0	32.5
7	34.0	16.3	25.2	69	0.0	36.0
8	35.9	14.9	25.4	67	0.0	38.3
9	36.6	16.0	26.3	67	0.0	42.0
10	38.3	16.9	27.6	72	0.0	42.0
11	38.4	17.1	27.8	68	0.0	44.5
12	39.4	18.7	29.1	61	0.0	48.0
13	40.1	19.7	29.9	63	0.0	50.0
14	41.0	18.7	29.9	56	0.0	52.0
15	41.4	21.7	31.6	65	0.0	49.2
16	41.9	21.6	31.8	65	0.0	59.0
17	41.0	21.7	31.4	63	0.0	57.3
18	38.4	20.7	29.6	64	6.0	48.0
19	40.6	21.6	31.1	57	0.0	62.0
20	41.9	22.9	32.4	70	0.0	61.0
21	41.7	23.9	32.8	68	0.0	64.0
22	40.7	22.7	31.7	70	15.0	62.0
23	37.9	22.0	30.0	74	10.0	62.0
24	34.0	20.1	27.1	88	271.0	18.0
25	31.7	22.0	26.9	89	17.0	34.0
26	31.9	21.7	26.8	84	1.0	37.5
27	30.1	20.6	25.4	84	24.0	31.0
28	31.4	21.3	26.4	84	5.0	33.0
29	30.7	21.9	26.3	84	2.0	26.0
30	28.3	20.6	24.5	90	46.5	12.5
31	28.9	21.0	25.0	86	8.0	18.0
32	30.9	20.7	25.8	83	10.0	34.0
33	31.3	21.4	26.4	74	23.0	18.0
34	30.1	20.7	25.4	88	37.0	15.5
35	28.7	19.9	24.3	90	45.0	15.1
36	30.1	20.9	25.5	87	5.0	21.2
37	31.0	19.0	25.0	87	4.0	30.0
38	31.0	21.7	26.4	50	22.0	17.0
39	28.0	20.6	24.3	88	216.0	25.0
40	26.4	20.3	23.4	86	36.0	18.0
41	27.4	20.1	23.8	80	4.0	31.0
42	30.3	21.4	25.9	89	68.0	11.0
43	26.7	20.0	23.4	85	35.0	21.0
44	26.9	18.6	22.8	80	0.0	15.0
45	29.9	18.9	24.4	87	19.0	10.5
46	32.0	19.3	25.7	87	10.0	24.0
47	32.0	20.4	26.2	83	2.0	26.0
48	31.3	20.0	25.7	82	0.0	15.0
49	29.9	19.6	24.8	74	6.0	11.0
50	29.6	13.6	21.6	82	0.0	8.0
51	29.0	8.6	18.8	78	0.0	7.0
52	29.8	8.9	19.4	70	0.0	16.0
Total	1727.9	981.1	1354.5	3959	947.5	1609
Mean	33.3	18.8	26.0	76	18.2	31.2
S.D.	4.7	3.6	3.3	10.2	48.2	16.7
C.V.%	14.3	19.0	12.7	13.4	264.6	53.4

Weekly Mean Weather Data during 2011

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max		
1	29.6	9.9	19.8	77	0.0	13.0
2	24.0	7.7	15.9	77	0.0	18.0
3	24.9	10.4	17.7	72	0.0	25.0
4	30.0	11.0	20.5	72	0.0	28.0
5	31.0	11.7	21.4	78	0.0	30.0
6	31.6	12.0	21.8	66	0.0	40.0
7	32.0	11.7	21.9	67	0.0	35.0
8	32.0	12.9	22.5	70	0.0	31.0
9	32.1	16.4	24.3	71	24.0	34.0
10	33.9	16.9	25.4	60	0.0	42.5
11	35.3	18.0	26.7	61	0.0	45.5
12	36.0	17.4	26.7	61	0.0	45.8
13	37.6	17.0	27.3	58	0.0	48.0
14	37.6	16.6	27.1	61	0.0	49.0
15	38.1	18.0	28.1	67	12.0	44.5
16	38.1	20.0	29.1	62	0.0	43.0
17	38.0	20.0	29.0	62	0.0	45.5
18	38.7	22.3	30.5	68	0.0	54.5
19	39.0	23.0	31.0	70	0.0	62.0
20	39.0	23.0	31.0	70	0.0	63.0
21	39.0	23.0	31.0	70	0.0	63.0
22	36.0	20.9	28.5	76	3.0	50.0
23	30.7	17.1	23.9	82	70.0	23.0
24	28.9	16.0	22.5	80	3.0	24.0
25	31.4	18.0	24.7	81	0.0	38.0
26	29.1	19.9	24.5	77	0.0	34.0
27	30.0	21.6	25.8	80	55.0	36.0
28	29.9	19.1	24.5	86	34.0	29.0
29	27.4	18.9	23.2	88	42.0	19.5
30	27.7	19.4	23.6	84	13.0	30.0
31	28.0	20.9	24.5	82	14.0	31.0
32	28.0	22.0	25.0	79	0.0	31.0
33	28.0	20.3	24.2	84	10.0	29.0
34	28.0	20.0	24.0	90	82.0	25.0
35	26.0	22.0	24.0	86	17.0	22.0
36	26.3	20.9	23.6	86	0.0	24.0
37	27.1	20.4	23.8	83	17.0	33.5
38	29.0	19.9	24.5	84	0.0	32.0
39	29.7	19.0	24.4	75	28.0	35.0
40	28.7	22.3	25.5	87	5.5	20.0
41	32.9	22.4	27.7	89	30.2	19.0
42	33.4	21.3	27.4	88	9.7	22.5
43	34.4	22.4	28.4	84	0.0	22.3
44	34.3	18.4	26.4	81	0.0	21.1
45	34.0	16.6	25.3	85	0.0	24.0
46	34.4	14.4	24.4	86	0.0	23.9
47	33.3	12.7	23.0	85	0.0	21.9
48	32.9	17.6	25.3	81	0.0	15.0
49	34.4	13.7	24.1	79	0.0	14.2
50	34.0	12.9	23.5	84	0.0	14.4
51	33.3	9.9	21.6	89	0.0	14.5
52	32.9	9.8	21.4	90	0.0	17.3
Total	1671.6	909.6	1290.6	4011	469.4	1656.4
Mean	32.1	17.4	24.8	77	9.0	31.9
S.D.	4.0	4.2	3.2	9.3	18.2	13.1
C.V.%	12.5	24.1	12.8	12.0	201.9	41.1

Weekly Mean Weather Data during 2012

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Rain (mm)	Insolation (MJm ⁻² d ⁻¹)
	Max	Min	Mean	Max	Min	Mean		
1	34.6	15.0	24.8	90	26	58	0.0	7.0
2	32.1	7.3	19.7	89	25	57	0.0	6.3
3	31.4	7.1	19.3	89	23	56	0.0	6.0
4	32.6	11.6	22.1	89	24	57	0.0	5.8
5	31.9	12.8	22.4	80	27	54	0.0	7.5
6	30.7	13.6	22.2	58	18	38	0.0	7.5
7	33.6	15.5	24.6	61	16	39	0.0	7.7
8	34.6	16.8	25.7	56	13	35	0.0	7.5
9	35.4	14.7	25.1	64	9	37	0.0	9.2
10	34.5	15.3	24.9	58	10	34	0.0	10.1
11	36.0	17.5	26.8	46	11	29	0.0	7.8
12	38.0	19.4	28.7	44	7	26	0.0	8.2
13	37.9	20.1	29.0	74	11	43	0.0	8.1
14	38.5	21.1	29.8	71	13	42	4.5	10.4
15	38.4	22.4	30.4	70	14	42	2.5	9.9
16	37.9	22.6	30.3	76	19	48	6.0	10.2
17	38.1	22.5	30.3	52	13	33	1.3	12.0
18	38.6	21.4	30.0	73	12	43	0.0	14.7
19	37.6	21.9	29.8	85	22	54	14.1	12.5
20	39.6	22.4	31.0	71	13	42	0.0	15.2
21	39.3	22.4	30.9	76	12	44	0.0	17.2
22	37.5	22.9	30.2	75	21	48	0.0	20.3
23	34.2	23.1	28.7	87	37	62	16.3	15.0
24	34.6	23.4	29.0	81	39	60	0.5	14.8
25	34.0	23.7	28.9	81	39	60	0.0	23.9
26	32.9	23.1	28.0	86	43	65	31.4	16.8
27	31.6	22.8	27.2	91	50	71	0.0	15.7
28	33.2	23.5	28.4	84	43	64	0.0	18.4
29	31.2	23.2	27.2	89	51	70	7.1	20.6
30	30.3	23.1	26.7	89	54	72	3.8	24.2
31	28.7	22.0	25.4	93	61	77	36.8	20.3
32	29.9	22.4	26.2	94	57	76	14.6	19.5
33	31.6	21.5	26.6	90	47	69	4.0	19.5
34	32.4	21.6	27.0	88	43	66	0.0	13.7
35	31.7	22.8	27.3	92	52	72	13.8	12.9
36	29.3	21.9	25.6	96	62	79	37.3	12.6
37	30.0	21.3	25.7	94	55	75	9.0	13.3
38	31.2	21.3	26.3	93	44	69	2.3	9.5
39	32.8	21.1	27.0	90	36	63	24.1	9.7
40	29.3	22.1	25.7	99	64	82	49.2	7.0
41	32.4	20.7	26.6	93	31	62	0.3	6.3
42	32.3	19.0	25.7	72	27	50	0.0	9.5
43	31.2	20.5	25.9	87	41	64	1.5	7.8
44	30.4	18.8	24.6	81	34	58	8.8	8.6
45	32.5	19.2	25.9	77	33	55	0.0	6.6
46	29.4	15.6	22.5	70	24	47	0.0	7.7
47	30.9	16.2	23.6	65	30	48	0.0	6.8
48	31.2	17.3	24.3	74	29	52	0.0	6.3
49	31.3	18.4	24.9	75	33	54	0.0	7.2
50	31.3	14.7	23.0	79	23	51	0.0	6.6
51	29.4	15.0	22.2	70	30	50	0.0	8.1
52	29.7	14.7	22.2	68	29	49	0.0	6.7
Total	1729.7	1000.3	1365.0	4075	1600.0	2838.0	289.2	596.7
Mean	33.0	19.5	26.3	78.0	30.0	54.0	5.6	11.5
S.D.	3.1	4.1	2.9	13.4	15.8	13.8	11.1	5.1
C.V.%	9.4	21.4	10.9	17.0	51.4	25.2	199.9	44.5

Weekly Mean Weather Data during 2013

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Rain (mm)	Insolation (MJm ⁻² d ⁻¹)
	Max	Min	Mean	Max	Min	Mean		
1	33.0	15.5	24.3	74	21	48	0.0	7.5
2	30.6	14.8	22.7	61	24	43	0.0	6.4
3	30.8	14.2	22.5	70	21	46	0.0	6.9
4	31.4	15.5	23.5	64	21	43	0.0	6.9
5	31.4	17.5	24.5	64	26	45	0.0	7.5
6	31.8	18.0	24.9	72	27	50	0.0	8.4
7	32.0	17.3	24.7	66	22	44	0.0	8.9
8	34.4	16.9	25.7	54	15	35	0.0	7.2
9	34.3	17.2	25.8	40	12	26	0.0	8.1
10	35.6	19.4	27.5	41	14	28	0.0	8.5
11	35.8	19.5	27.7	62	15	39	0.0	8.8
12	36.7	19.4	28.1	52	12	32	0.0	9.3
13	37.6	21.0	29.3	56	14	35	0.0	10.5
14	38.4	18.8	28.6	60	9	35	0.0	11.6
15	39.2	23.3	31.3	50	12	31	0.0	11.5
16	36.7	19.1	27.9	73	12	43	0.0	13.3
17	39.4	23.8	31.6	66	14	40	0.0	10.4
18	40.4	24.2	32.3	60	12	36	0.0	12.4
19	39.7	23.6	31.7	69	14	42	0.0	15.8
20	38.6	24.6	31.6	71	18	45	0.0	14.3
21	37.9	24.5	31.2	72	24	48	0.0	19.7
22	36.5	23.0	29.8	84	28	56	47.3	16.5
23	31.7	22.8	27.3	94	52	73	18.8	9.9
24	29.6	22.7	26.2	92	59	76	17.2	11.0
25	31.3	22.1	26.7	93	51	72	11.8	13.7
26	29.6	22.2	25.9	93	57	75	7.3	10.3
27	29.8	22.0	25.9	93	58	76	24.0	12.5
28	27.9	22.1	25.0	91	65	78	20.1	13.0
29	26.7	21.9	24.3	96	73	85	28.4	12.0
30	27.6	21.9	24.8	95	69	82	17.9	11.3
31	27.9	20.9	24.4	96	63	80	22.4	11.8
32	30.0	21.3	25.7	93	55	74	0.3	12.4
33	31.0	22.1	26.6	91	51	71	0.3	12.3
34	29.5	21.9	25.7	87	51	69	3.6	14.3
35	32.6	20.3	26.5	93	40	67	1.5	10.0
36	31.5	20.3	25.9	92	44	68	60.6	10.1
37	31.3	21.5	26.4	99	56	78	96.9	6.7
38	28.8	21.0	24.9	96	61	79	117.1	11.3
39	30.3	20.4	25.4	97	55	76	0.3	8.3
40	31.6	21.2	26.4	97	49	73	7.8	7.2
41	31.5	20.7	26.1	94	44	69	0.0	8.4
42	33.4	22.1	27.8	94	40	67	13.3	4.9
43	31.9	21.3	26.6	92	44	68	3.3	6.8
44	31.4	19.0	25.2	88	39	64	0.0	5.7
45	30.0	16.5	23.3	86	32	59	0.0	5.9
46	29.5	13.9	21.7	84	31	58	0.0	5.6
47	30.8	15.7	23.3	83	33	58	0.0	4.7
48	30.0	18.8	24.4	93	43	68	2.8	6.1
49	28.9	14.2	21.6	92	29	61	0.0	5.1
50	29.0	9.6	19.3	83	19	51	0.0	4.5
51	28.5	10.9	19.7	85	28	57	0.0	5.1
52	27.7	13.8	20.8	89	39	64	0.0	6.0
Total	1683.5	1016.2	1349.9	4132	1817	2975	523.0	497.3
Mean	32.4	19.5	25.9	80	35	57	10.1	9.5
S.D.	3.6	3.5	3.0	16.3	18.3	16.7	23.2	3.4
C.V.%	11.3	18.0	11.5	20.6	52.5	29.2	230.8	35.5

Weekly Mean Weather Data during 2014

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (K _{mh} r ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
1	33.5	17.0	25.3	78	31	55	7.5	8.4	0.0	45.2
2	29.8	16.7	23.3	83	48	66	6.5	5.3	8.4	28.3
3	29.4	13.7	21.6	85	42	64	5.3	7.1	0.0	27.7
4	28.7	14.4	21.6	90	41	66	5.4	6.9	0.0	27.6
5	29.6	12.0	20.8	83	39	61	5.0	8.6	0.0	33.8
6	32.9	20.7	26.8	80	46	63	7.8	7.3	0.4	40.2
7	28.6	10.9	19.8	89	28	59	6.2	10	0.0	45.3
8	30.5	16.0	23.3	86	43	65	5.3	8.9	0.0	41.6
9	30.8	14.9	22.9	77	39	58	5.9	8.2	0.6	44.7
10	33.4	21.0	27.2	79	48	64	8.4	5.5	85.4	35.1
11	32.4	18.0	25.2	86	34	60	5.2	7.7	14.0	35.1
12	35.8	18.1	27.0	69	21	45	6.1	8.4	0.0	53.0
13	35.4	18.5	27.0	63	23	43	5.4	7.9	0.0	50.2
14	31.4	18.9	25.2	82	46	64	7.8	5.8	4.6	34.8
15	33.7	18.0	25.9	75	27	51	6.3	8.9	0.1	45.5
16	36.4	20.9	28.7	79	27	53	6.7	8.4	46.2	49.4
17	37.8	22.5	30.2	68	23	46	6.4	8.7	7.6	55.0
18	33.9	18.3	26.1	80	36	58	5.9	7.1	10.0	35.7
19	31.6	18.9	25.3	82	46	64	7.7	5.9	2.0	36.2
20	36.2	22.8	29.5	70	28	49	8.4	6.7	0.2	51.9
21	37.6	22.2	29.9	73	23	48	9.7	8.8	67.0	122.2
22	34.3	18.4	26.4	83	36	60	7.3	7.9	14.8	40.2
23	33.3	22.0	27.7	79	44	62	7.8	6.4	6.5	38.9
24	32.8	19.7	26.3	81	41	61	9.6	7.8	0.0	48.8
25	32.6	23.1	27.9	74	48	61	14.9	4.2	0.0	60.8
26	33.4	20.9	27.2	75	36	56	12.1	5.3	0.0	61.8
27	33.7	20.5	27.1	76	37	57	7.7	7.4	27.0	45.8
28	30.5	18.9	24.7	84	53	69	9.7	4.1	0.0	38.8
29	29.4	22.3	25.9	84	64	74	13.3	1.8	4.7	31.8
30	29.1	20.9	25.0	88	66	77	11.8	4.1	22.6	28.2
31	31.6	19.1	25.4	84	49	67	7.5	4.1	33.7	38.1
32	31.6	19.2	25.4	79	51	65	8.6	5.2	9.1	35.9
33	30.4	20.9	25.7	85	61	73	9.6	5.3	8.8	39.9
34	31.9	21.4	26.7	93	63	78	5.7	4	83.2	32.9
35	29.4	18.6	24.0	90	62	76	6.4	2.8	79.4	24.8
36	31.4	20.6	26.0	84	54	69	8.4	4.1	13.8	33.2
37	30.4	18.6	24.5	83	44	64	6.5	6.7	11.2	33.9
38	31.1	20.6	25.9	89	53	71	7.0	4.8	65.6	36.9
39	32.5	21.0	26.8	81	39	60	5.0	8	1.2	31.9
40	32.3	17.4	24.9	81	37	59	7.1	7.1	56.4	32.5
41	31.4	18.9	25.2	82	38	60	7.0	7	4.7	34.9
42	33.4	20.6	27.0	83	40	62	4.5	7.8	1.2	36.0
43	28.8	18.8	23.8	79	52	66	6.1	4.7	9.3	32.7
44	30.6	14.1	22.4	76	31	54	5.2	8.9	8.8	35.5
45	31.6	21.4	26.5	83	45	64	9.2	6.5	0.0	39.2
46	28.9	19.3	24.1	92	60	76	5.4	4.2	38.7	22.4
47	29.7	16.0	22.9	90	41	66	4.0	7.5	5.3	24.3
48	28.9	11.6	20.3	86	34	60	4.2	8.6	0.0	28.9
49	32.4	20.0	26.2	78	40	59	9.4	7.3	0.0	45.4
50	29.6	16.6	23.1	87	46	67	6.1	7.2	7.6	29.6
51	26.6	9.6	18.1	84	38	61	4.5	8.6	0.0	24.2
52	28.3	10.3	19.3	84	38	61	4.2	7.9	0.0	27.4
Total	1651.3	955.7	1303.5	4234	2180	3207	374.7	347.8	760.1	2043.9
Mean	31.7	18.8	25.0	81	42	62	7.2	6.7	14.6	39.5
S.D.	2.5	3.3	2.6	6.2	11.2	7.9	2.3	1.8	23.8	14.9
C.V.%	7.8	18.1	10.4	7.6	26.7	12.9	32.1	27.5	162.8	37.6

Weekly Mean Weather Data during 2015

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (K _m hr ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
1	33.4	18.0	25.7	78	46	62	7.6	5.4	10.0	49.2
2	30.6	16.7	23.7	80	38	59	6.6	8.9	0.0	37.3
3	28.9	11.0	20.0	81	32	57	4.3	8.2	0.0	30.2
4	29.5	14.3	21.9	86	35	61	4.3	7.7	0.0	30.2
5	30.7	14.6	22.7	83	38	61	4.4	7.6	12.4	30.4
6	34.6	20.4	27.5	78	39	59	9.2	6.8	1.0	53.0
7	32.9	13.7	23.3	76	25	51	4.0	9.6	0.0	41.2
8	33.4	13.5	23.5	74	19	47	4.9	9.8	0.0	47.5
9	32.1	14.6	23.4	77	29	53	5.4	8.5	0.0	42.5
10	34.1	20.1	27.1	79	40	60	8.8	7.1	28.0	55.8
11	33.1	17.4	25.3	79	34	57	5.9	8.3	0.0	46.4
12	36.1	19.9	28.0	60	23	42	4.9	8.1	0.0	54.9
13	35.7	19.9	27.8	71	28	50	5.5	5.6	0.0	50.9
14	34.8	18.1	26.5	67	33	50	9.1	7.4	0.0	61.0
15	32.1	18.6	25.4	78	35	57	5.1	7.7	10.4	39.0
16	36.2	22.1	29.2	71	23	47	5.5	8.8	16.2	58.0
17	38.5	20.9	29.7	65	17	41	7.9	10.1	0.0	71.7
18	35.2	15.2	25.2	74	29	52	7.2	7.6	6.0	56.0
19	32.1	20.7	26.4	80	45	63	7.6	5.9	23.5	38.2
20	37.1	23.4	30.3	72	32	52	8.0	7.2	0.0	55.3
21	38.6	22.4	30.5	72	27	50	11.9	9.6	0.0	78.1
22	35.3	18.2	26.8	79	30	55	8.3	7.2	41.4	50.7
23	33.8	20.1	27.0	78	39	59	9.0	7.1	10.2	46.9
24	31.1	20.4	25.8	85	58	72	9.3	4.3	11.4	40.7
25	29.4	22.1	25.8	89	75	82	10.5	0.3	20.0	26.7
26	30.6	20.3	25.5	83	52	68	8.6	4.3	0.2	32.3
27	33.6	18.6	26.1	74	34	54	7.6	7.7	2.1	51.1
28	33.2	19.5	26.4	78	40	59	7.0	8.6	15.4	45.4
29	31.0	22.2	26.6	84	62	73	11.9	1.8	3.4	38.5
30	30.5	21.5	26.0	80	57	69	10.1	1.5	7.0	36.5
31	32.4	17.4	24.9	81	34	58	7.2	7.0	0.3	43.8
32	32.4	19.6	26.0	79	45	62	7.1	6.2	4.8	43.3
33	31.4	21.1	26.3	83	50	67	9.0	5.3	0.5	39.3
34	32.6	21.4	27.0	79	53	66	10.3	6.5	2.6	50.0
35	31.2	13.6	22.4	80	52	66	7.4	5.6	0.3	36.7
36	34.0	21.8	27.9	78	41	60	8.5	5.7	0.0	51.5
37	31.7	19.0	25.4	85	49	67	5.1	4.3	79.7	26.8
38	29.4	21.0	25.2	88	59	74	8.2	4.5	9.8	31.2
39	33.6	20.4	27.0	83	36	60	5.3	8.2	0.0	45.0
40	33.4	18.1	25.8	81	36	59	7.9	7.5	37.4	44.7
41	31.8	20.1	26.0	83	48	66	5.1	5.3	5.0	33.2
42	34.1	20.1	27.1	72	31	52	4.2	8.7	0.0	42.3
43	33.9	20.7	27.3	75	35	55	3.7	7.9	0.0	40.2
44	32.1	16.6	24.4	78	35	57	5.5	7.9	0.4	38.3
45	32.6	20.7	26.7	81	44	63	6.6	6.9	22.2	36.3
46	32.1	14.6	23.4	66	30	48	5.3	8.5	0.0	38.4
47	29.9	19.1	24.5	78	50	64	6.7	4.6	4.6	34.6
48	30.9	14.7	22.8	79	31	55	4.3	8.0	0.0	32.2
49	33.8	20.9	27.4	81	45	63	7.5	4.0	0.8	46.1
50	32.9	17.4	25.2	75	36	56	4.2	8.2	0.2	32.9
51	32.3	15.6	24.0	76	36	56	4.2	7.5	0.0	34.0
52	29.2	9.4	19.3	67	24	46	4.0	8.8	0.0	37.0
Total	1705.9	961.7	1333.8	4039	2014	3027	357.7	355.8	387.2	2250.2
Mean	32.8	18.4	25.6	78	39	58	6.8	6.8	7.4	43.3
S.D.	2.2	3.1	2.3	5.9	11.7	8.2	2.1	2.1	14.1	10.7
C.V.%	6.8	16.9	8.8	7.6	30.1	14.2	31.2	30.6	189.8	24.6

Weekly Mean Weather Data during 2016

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (K _m hr ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
1	35.1	19.5	27.3	61	32	47	2.9	6.5	0.0	55.7
2	30.5	16.8	23.7	77	58	68	2.0	4.1	0.0	31.5
3	28.8	12.4	20.6	79	31	55	4.8	8.7	0.0	33.1
4	29.9	11.3	20.6	67	29	48	4.0	8.9	0.0	32.2
5	34.2	14.1	24.2	69	23	46	4.3	8.7	0.0	41.0
6	31.5	21.6	26.6	78	53	66	0.6	4.4	24.0	34.9
7	32.0	14.4	23.2	71	30	51	4.4	9.0	0.0	39.8
8	35.3	18.2	26.8	61	29	45	5.5	9.4	0.0	53.0
9	35.4	17.0	26.2	65	25	45	4.5	7.4	0.8	54.7
10	31.5	20.1	25.8	78	49	64	0.5	4.5	64.6	41.4
11	35.4	16.2	25.8	71	22	47	6.1	8.5	0.0	58.3
12	38.0	18.9	28.5	53	17	35	7.1	8.2	0.0	74.0
13	37.4	18.8	28.1	51	18	35	5.6	8.1	0.0	60.9
14	34.4	20.2	27.3	74	38	56	N.A.	6.0	20.1	48.3
15	33.9	18.6	26.3	68	35	52	N.A.	7.1	20.4	52.7
16	40.9	23.9	32.4	44	20	32	N.A.	9.9	0.0	84.5
17	39.7	21.2	30.5	57	20	39	N.A.	10.4	0.0	88.8
18	35.9	18.5	27.2	65	28	47	N.A.	6.7	50.6	60.1
19	30.8	19.9	25.4	80	51	66	N.A.	5.8	8.9	37.7
20	40.6	25.0	32.8	57	24	41	N.A.	6.7	0.0	77.9
21	37.7	24.1	30.9	69	34	52	N.A.	10.1	0.0	85.1
22	35.2	18.9	27.1	72	28	50	N.A.	9.4	6.8	55.6
23	32.0	20.7	26.4	84	50	67	N.A.	5.4	7.8	38.4
24	32.9	20.9	26.9	72	39	56	N.A.	8.5	0.0	60.0
25	32.1	22.7	27.4	83	57	70	N.A.	3.2	16.8	40.4
26	29.5	20.9	25.2	83	64	74	N.A.	1.8	10.0	29.4
27	32.6	19.8	26.2	76	37	57	N.A.	5.9	1.7	41.9
28	30.4	18.1	24.3	85	49	67	N.A.	6.7	0.1	34.4
29	29.9	21.7	25.8	88	68	78	N.A.	1.3	3.4	39.5
30	30.5	21.6	26.1	87	63	75	N.A.	2.1	17.0	24.0
31	32.9	18.4	25.7	70	36	53	N.A.	6.4	0.3	45.3
32	30.2	18.5	24.4	79	48	64	N.A.	6.0	4.0	33.5
33	30.5	21.8	26.2	80	52	66	N.A.	6.8	1.2	45.7
34	31.3	20.6	26.0	83	51	67	N.A.	6.9	0.1	41.3
35	31.2	19.3	25.3	80	51	66	N.A.	3.1	3.6	34.4
36	33.6	21.4	27.5	70	40	55	N.A.	5.8	0.6	45.8
37	29.0	18.3	23.7	89	59	74	N.A.	4.0	49.6	23.2
38	27.8	21.1	24.5	90	74	82	N.A.	1.5	91.9	19.4
39	29.6	20.4	25.0	91	63	77	N.A.	4.1	66.4	24.4
40	34.2	18.6	26.4	72	39	56	1.5	5.4	10.8	45.8
41	31.2	17.6	24.4	83	43	63	1.7	6.3	2.2	33.0
42	31.8	18.1	25.0	87	28	58	3.3	9.0	0.0	41.3
43	31.6	17.9	24.8	77	30	54	3.4	8.2	0.0	35.3
44	33.4	16.7	25.1	65	32	49	3.5	8.3	0.0	45.7
45	30.9	20.2	25.6	76	48	62	0.4	4.6	4.3	31.8
46	30.1	14.9	22.5	75	40	58	3.9	7.0	0.0	26.7
47	29.5	10.6	20.1	68	27	48	3.2	9.5	0.0	28.2
48	31.1	11.0	21.1	76	26	51	3.3	8.7	0.0	30.8
49	33.3	22.1	27.7	67	40	54	0.7	6.2	2.2	49.4
50	29.1	14.6	21.9	79	45	62	4.5	6.0	0.8	28.4
51	29.7	11.8	20.8	78	30	54	2.7	7.6	0.0	24.3
52	30.0	10.1	20.1	74	26	50	2.8	8.2	0.0	29.8
Total	1696.0	960.0	1328.0	3834	2049	2942	N.A.	343.0	491.0	2271.6
Mean	32.6	18.4	25.5	73.4	39	56	N.A.	6.6	9.4	43.7
S.D.	3.1	3.5	2.8	10.3	14.3	11.6	N.A.	2.3	19.7	16.5
C.V.%	9.5	19.1	10.9	14.0	36.2	20.6	N.A.	35.1	209.0	37.7

Weekly Mean Weather Data during 2017

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (K _m hr ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
1	34.6	18.1	26.4	67	29	48	5.8	8.0	0.0	48.4
2	29.7	16.4	23.1	82	46	64	5.5	7.0	0.2	29.2
3	28.4	14.0	21.2	79	34	57	4.6	5.5	0.0	28.8
4	30.7	13.3	22.0	75	32	54	4.2	9.0	0.0	33.3
5	32.7	13.7	23.2	67	25	46	4.5	8.9	0.0	38.8
6	33.4	20.9	27.2	81	46	64	7.0	6.3	104.6	36.8
7	31.2	13.8	22.5	63	27	45	5.8	9.3	0.0	42.0
8	35.4	14.4	24.9	59	14	37	4.6	10.5	0.0	51.6
9	33.9	14.4	24.2	57	18	38	4.7	9.6	0.0	48.1
10	33.2	21.4	27.3	83	46	65	7.5	7.2	0.0	41.6
11	33.7	16.4	25.1	65	24	45	4.7	8.6	0.0	47.1
12	36.4	17.7	27.1	59	16	38	4.9	8.7	0.0	59.7
13	37.6	19.8	28.7	62	19	41	5.5	8.2	0.0	58.3
14	34.9	20.1	27.5	74	36	55	9.2	6.9	0.8	54.3
15	34.8	19.0	26.9	77	29	53	6.3	8.6	0.0	49.8
16	40.4	20.1	30.3	65	16	41	8.8	10.0	0.0	83.3
17	37.9	19.8	28.9	68	22	45	7.4	10.1	0.0	78.2
18	35.1	17.2	26.2	66	23	45	5.8	9.2	0.0	52.0
19	32.5	21.0	26.8	79	42	61	10.0	5.2	0.0	51.0
20	39.2	23.0	31.1	66	26	46	10.5	8.3	0.0	79.8
21	39.4	23.0	31.2	65	28	47	10.4	7.8	1.4	79.4
22	34.2	18.6	26.4	75	33	54	10.7	9.6	0.2	58.2
23	35.1	22.3	28.7	82	41	62	9.9	4.9	0.0	56.1
24	30.2	20.7	25.5	91	67	79	6.1	3.7	63.8	27.8
25	33.2	22.7	28.0	87	55	71	10.3	8.0	5.4	46.7
26	31.2	20.9	26.1	84	54	69	8.9	3.1	2.9	38.3
27	34.9	19.8	27.4	76	33	55	9.0	7.9	0.2	52.0
28	30.3	21.1	25.7	87	59	73	9.9	5.0	51.8	33.2
29	29.4	21.9	25.7	91	72	82	10.7	2.0	27.8	30.6
30	30.0	22.1	26.1	82	58	70	13.6	4.0	0.6	40.3
31	33.8	17.6	25.7	73	30	52	8.6	8.0	0.2	50.5
32	31.9	20.6	26.3	86	54	70	8.8	6.5	69.2	33.8
33	31.4	21.0	26.2	89	58	74	9.9	2.7	6.0	34.0
34	28.7	20.5	24.6	93	72	83	9.5	4.4	73.9	26.0
35	29.5	18.5	24.0	89	61	75	7.8	5.7	27.2	24.6
36	34.5	20.6	27.6	73	40	57	9.2	7.3	8.2	53.8
37	30.8	19.7	25.3	94	54	74	4.8	5.5	223.2	20.6
38	28.2	21.4	24.8	90	72	81	9.0	2.9	3.0	23.1
39	32.4	21.8	27.1	93	50	72	6.2	6.6	12.4	28.8
40	34.1	17.6	25.9	70	33	52	7.0	8.3	1.0	50.7
41	31.3	20.7	26.0	90	61	76	5.2	5.1	19.0	30.7
42	32.5	19.6	26.1	94	42	68	5.1	6.7	2.0	31.8
43	32.7	19.4	26.1	83	33	58	5.3	8.1	0.0	32.2
44	32.4	15.4	23.9	71	24	48	5.7	8.6	0.0	46.0
45	32.4	20.9	26.7	84	52	68	7.7	6.0	50.2	41.1
46	30.3	14.9	22.6	82	32	57	4.5	8.1	0.0	31.9
47	31.4	18.7	25.1	88	46	67	5.3	5.5	2.8	27.6
48	30.1	12.3	21.2	77	31	54	3.9	8.8	0.0	32.3
49	33.5	20.4	27.0	77	41	59	9.0	5.9	1.6	51.7
50	30.4	15.4	22.9	91	40	66	4.7	7.4	0.2	26.5
51	28.7	11.9	20.3	80	29	55	5.8	7.7	0.0	33.4
52	28.6	10.3	19.5	83	30	57	4.6	8.6	0.0	31.4
Total	1703.2	966.8	1335.0	4064	2055	3060	374.4	365.5	759.8	2237.2
Mean	32.8	18.5	25.6	78	39	59	7.2	7.1	14.6	43.0
S.D.	2.9	3.2	2.5	10.4	15.7	12.6	2.3	2.1	37.4	15.1
C.V.%	8.9	17.2	9.7	13.3	39.7	21.4	32.5	29.5	256.0	35.1

Weekly Mean Weather Data during 2018

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmph ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
1	35.0	17.1	26.1	72	30	51	7.4	9.3	0.0	53.7
2	30.9	17.7	24.3	78	43	61	7.4	6.1	4.8	39.4
3	31.1	13.9	22.5	82	28	55	4.1	8.3	0.0	34.2
4	29.6	10.7	20.2	86	27	57	4.2	9.3	0.0	32.3
5	32.2	13.3	22.8	74	24	49	4.5	9.2	0.0	38.1
6	33.8	21.3	27.6	78	48	63	8.7	6.3	15.8	54.0
7	30.9	14.7	22.8	80	33	57	4.6	8.6	0.0	35.7
8	33.9	16.0	25.0	70	23	47	4.4	9.3	0.0	43.1
9	33.6	14.5	24.1	71	21	46	4.6	9.2	0.0	42.2
10	33.4	22.0	27.7	79	48	64	9.0	5.4	0.8	45.2
11	33.0	18.4	25.7	69	29	49	5.2	5.6	0.0	46.8
12	35.6	17.2	26.4	62	19	41	6.7	9.2	0.0	60.2
13	36.9	17.7	27.3	65	20	43	5.5	8.3	0.0	60.6
14	34.9	19.6	27.3	75	38	57	8.5	6.1	0.6	53.2
15	33.9	19.3	26.6	76	41	59	6.1	6.8	31.6	45.4
16	38.9	22.1	30.5	64	22	43	7.5	8.9	14.8	70.8
17	39.3	20.8	30.1	47	14	31	6.3	10.7	0.0	74.6
18	36.1	18.4	27.3	73	25	49	7.0	8.1	8.4	60.5
19	31.6	20.9	26.3	80	51	66	9.4	5.9	24.4	43.8
20	39.4	23.8	31.6	65	21	43	9.8	8.1	7.0	79.1
21	39.5	23.9	31.7	67	22	45	11.0	6.4	0.0	81.5
22	35.5	19.4	27.5	76	27	52	10.0	7.1	2.0	57.4
23	33.5	21.6	27.6	80	50	65	9.9	5.6	1.0	47.0
24	33.1	22.1	27.6	76	47	62	12.1	4.9	0.0	56.4
25	32.6	22.2	27.4	85	63	74	9.4	2.9	111.4	34.7
26	29.9	20.5	25.2	87	57	72	8.1	3.5	2.2	28.2
27	33.9	21.5	27.7	80	46	63	9.9	4.4	12.0	47.7
28	30.7	20.6	25.7	81	57	69	9.7	5.0	1.0	36.2
29	28.4	21.8	25.1	86	73	80	12.7	2.5	27.0	30.2
30	28.8	21.6	25.2	87	66	77	10.6	1.9	3.0	27.8
31	32.9	18.0	25.5	77	34	56	6.6	6.9	0.0	46.9
32	30.9	20.7	25.8	86	51	69	8.9	4.7	0.6	34.9
33	28.1	21.7	24.9	87	76	82	14.8	1.2	13.2	23.6
34	29.0	20.8	24.9	83	69	76	13.4	3.6	4.1	28.4
35	29.8	18.0	23.9	84	56	70	8.5	4.4	2.2	31.7
36	33.3	20.0	26.7	78	44	61	10.8	5.5	9.0	50.8
37	33.2	19.3	26.3	81	41	61	6.2	7.6	0.0	43.6
38	31.6	21.1	26.4	88	55	72	8.1	5.4	35.0	37.5
39	33.7	22.1	27.9	87	46	67	6.5	7.7	0.8	41.1
40	32.9	19.4	26.2	75	38	57	9.1	5.3	0.0	46.3
41	33.0	18.9	26.0	84	35	60	5.9	7.8	0.0	40.9
42	33.2	20.0	26.6	77	37	57	4.8	8.6	4.0	38.3
43	33.2	19.1	26.2	73	32	53	4.7	8.5	0.0	40.6
44	32.5	16.1	24.3	67	29	48	5.0	8.9	0.0	42.9
45	33.0	21.6	27.3	82	46	64	10.5	5.3	0.0	45.2
46	32.3	13.8	23.1	73	30	52	3.8	9.2	0.0	34.0
47	30.1	17.5	23.8	90	55	73	4.0	5.3	13.3	22.0
48	29.9	13.4	21.7	80	33	57	4.3	9.2	0.0	29.6
49	33.8	21.6	27.7	73	43	58	12.3	6.2	1.0	51.5
50	30.4	14.7	22.6	76	33	55	4.7	6.6	0.2	33.9
51	27.4	12.0	19.7	81	41	61	4.3	8.2	0.0	25.9
52	28.9	10.9	19.9	76	29	53	4.4	8.3	0.0	33.5
Total	1703.0	975.3	1339.2	4009	2066	3038	395.9	347.3	351.2	2283.1
Mean	32.8	18.7	25.7	77	40	58	7.6	6.7	6.8	43.9
S.D.	2.9	3.3	2.6	8.1	14.9	10.9	2.8	2.2	17.1	13.6
C.V.%	8.7	17.7	10.0	10.5	37.6	18.6	37.2	32.9	252.5	30.9

APPENDIX-II
Monthly Weather Data

Monthly Mean Weather Data during 2009

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%) Max	Rain (mm)	Evaporation (mm)
	Max	Min	Mean			
Jan	32.0	12.0	22.0	77	0.0	120.0
Feb	35.0	14.0	24.5	72	0.0	156.0
Mar	38.0	17.0	27.5	65	7.0	183.0
Apr	40.0	20.0	30.0	61	0.0	205.1
May	40.0	22.0	31.0	69	87.0	209.4
Jun	36.0	21.0	28.5	80	122.0	157.1
Jul	30.0	21.0	25.5	86	78.0	83.8
Aug	32.0	20.0	26.0	81	257.2	120.6
Sep	33.0	21.0	27.0	84	221.0	94.3
Oct	32.0	18.0	25.0	77	253.5	107.5
Nov	32.0	16.0	24.0	75	97.0	79.6
Dec	31.0	13.0	22.0	79	2.0	79.8
Total	411.0	215.0	313.0	906	1144.7	1596.2
Mean	34.3	17.9	26.1	76	93.7	133.0
S.D.	3.5	3.5	2.9	7.5	100.8	47.9
C.V.%	10.2	19.4	11.0	10.0	107.6	36.0
Highest	40.0	22.0	31.0	86	257.2	209.4
Lowest	30.0	12.0	22.0	61	0.0	79.6

Monthly Mean Weather Data during 2010

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%) Max	Rain (mm)	Evaporation (mm)
	Max	Min	Mean			
Jan	31.0	13.0	22.0	72	0.0	97.0
Feb	34.0	15.0	24.5	71	0.0	142.3
Mar	38.7	18.0	28.4	67	0.0	194.5
Apr	41.4	20.8	31.1	63	0.0	224.9
May	40.5	22.4	31.5	65	6.0	262.0
Jun	34.7	21.4	28.1	83	314.0	172.5
Jul	31.1	21.1	26.1	86	83.5	111.5
Aug	30.2	20.8	25.5	84	113.0	95.4
Sep	29.7	20.2	25.0	79	251.0	95.4
Oct	27.5	20.1	23.8	84	143.0	87.0
Nov	30.9	19.6	25.3	85	7.8	81.5
Dec	29.6	13.0	21.3	77	6.0	45.0
Total	399.3	225.4	312.4	916	947.5	1609.0
Mean	33.3	18.8	26.0	76	77.0	134.1
S.D.	4.6	3.3	3.2	8.4	109.0	65.8
C.V.%	13.9	17.6	12.3	11.0	141.5	49.1
Highest	41.4	22.4	31.5	86	314.0	262.0
Lowest	27.5	13.0	21.3	63	0.0	45.0

Monthly Mean Weather Data during 2011

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean		
Jan	27.5	9.9	18.7	75			0.0	98.0
Feb	31.8	12.5	22.2	71			24.0	136.0
Mar	35.2	17.3	26.3	61			0.0	194.8
Apr	38.0	18.6	28.3	63			12.0	195.5
May	39.0	22.9	31.0	70			0.0	272.0
Jun	30.2	17.6	23.9	80			76.0	127.0
Jul	28.7	19.9	24.3	85			131.0	129.5
Aug	27.7	21.0	24.4	84			92.0	121.0
Sep	27.7	20.3	24.0	82			35.0	132.5
Oct	32.5	22.0	27.3	87			45.0	89.8
Nov	33.7	15.4	24.6	83			0.0	95.9
Dec	33.6	11.7	22.7	86			0.0	64.4
Total	385.7	209.2	297.5	927			469.4	1656.4
Mean	32.1	17.4	24.8	77			34.6	138.0
S.D.	4.0	4.2	3.1	9.1			43.7	57.3
C.V.%	12.3	24.3	12.7	11.7			126.4	41.5
Highest	39.0	22.9	31.0	87			131.0	272.0
Lowest	27.5	9.9	18.7	61			0.0	64.4

Monthly Mean Weather Data during 2012

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Rain (mm)	Insolation (MJm ⁻² d ⁻¹)
	Max	Min	Mean	Max	Min	Mean		
Jan	29.8	13.5	21.7	89	18	54	0.0	7.5
Feb	33.0	15.4	24.2	59	16	38	0.0	7.8
Mar	36.3	17.3	26.8	57	10	34	0.0	8.7
Apr	38.3	22.1	30.2	68	14	41	2.0	10.6
May	38.7	22.1	30.4	76	15	46	7.6	15.6
Jun	34.3	23.4	28.9	83	38	61	8.7	18.2
Jul	31.3	23.0	27.2	89	50	70	32.6	19.0
Aug	31.1	22.1	26.6	91	51	71	33.8	17.7
Sep	30.9	21.5	26.2	94	49	72	61.9	11.4
Oct	31.2	20.2	25.7	86	39	63	65.9	7.8
Nov	30.9	17.6	24.3	74	31	53	8.5	7.0
Dec	30.4	15.7	23.1	73	29	51	0.0	7.1
Total	396.2	233.9	315.1	939	360	650	289.2	138.4
Mean	33.0	19.5	26.3	78	30	54	18.4	11.5
S.D.	3.1	3.4	2.7	12.4	15.3	13.1	24.3	4.7
C.V.%	9.5	17.5	10.3	15.9	51.0	24.3	132.2	41.2
Highest	38.7	23.4	30.4	94	51	72	65.9	19.0
Lowest	29.8	13.5	21.7	57	10	34	0.0	7.0

Monthly Mean Weather Data during 2013

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Rain (mm)	Insolation (MJm ⁻² d ⁻¹)
	Max	Min	Mean	Max	Min	Mean		
Jan	31.4	15.1	23.3	67	22	45	0.0	7.0
Feb	32.8	17.4	25.1	63	21	42	0.0	8.1
Mar	36.1	19.5	27.8	50	13	32	0.0	9.0
Apr	38.5	21.4	30.0	62	12	37	0.0	11.7
May	38.9	24.3	31.6	69	18	44	0.0	16.3
Jun	31.0	22.4	26.7	93	52	73	100.4	11.3
Jul	28.0	22.0	25.0	94	66	80	92.2	12.3
Aug	30.2	21.3	25.8	92	53	73	25.4	12.2
Sep	30.7	20.8	25.8	96	52	74	253.2	9.0
Oct	32.1	21.1	26.6	94	43	69	31.0	6.7
Nov	30.1	16.2	23.2	86	35	61	1.4	5.6
Dec	28.7	12.7	20.7	88	30	59	1.4	5.2
Total	388.5	234.2	311.4	954	417	686	523.0	114.4
Mean	32.4	19.5	25.9	80	35	57	42.1	9.5
S.D.	3.6	3.4	3.0	16.1	18.1	16.7	75.7	3.3
C.V.%	11.1	17.6	11.4	20.3	52.2	29.2	179.9	34.6
Highest	38.9	24.3	31.6	96	66	80	253.2	16.3
Lowest	28.0	12.7	20.7	50	12	32	0.0	5.2

Monthly Mean Weather Data during 2014

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmphr ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
Jan	28.7	13.0	20.9	88	42	65	4.8	6.7	0.0	110.9
Feb	30.3	13.3	21.8	84	34	59	5.4	9.4	0.6	166.4
Mar	33.3	17.4	25.3	78	33	56	5.9	7.8	80.4	182.5
Apr	36.9	20.9	28.9	67	23	45	6.7	8.7	54.4	231.6
May	36.8	21.9	29.3	73	28	51	8.3	8.0	107.6	295.3
Jun	34.3	22.4	28.4	77	42	60	12.2	6.1	84.6	228.0
Jul	30.1	21.7	25.9	84	64	74	12.0	2.4	89.4	155.9
Aug	30.0	21.1	25.5	90	66	78	8.0	3.7	191.7	133.9
Sep	30.2	20.6	25.4	87	54	70	8.1	5.1	73.7	138.7
Oct	32.0	19.5	25.7	82	39	61	5.5	6.8	26.1	158.8
Nov	30.2	16.3	23.3	83	39	61	5.0	7.4	44.0	132.5
Dec	28.4	11.8	20.1	84	38	61	4.5	8.3	7.6	109.7
Total	380.9	220.0	300.5	977	502	740	86.3	80.4	760.1	2043.9
Mean	31.7	18.3	25.0	81	42	62	7.2	6.7	63.3	170.3
S.D.	2.9	3.8	3.0	6.5	13.3	9.3	2.7	2.1	54.7	55.7
C.V.%	9.2	20.9	12.1	8.0	31.9	15.1	36.9	31.0	86.3	32.7
Highest	36.9	22.4	29.3	90	66	78	12.2	9.4	191.7	295.3
Lowest	28.4	11.8	20.1	67	23	45	4.5	2.4	0.0	109.7

Monthly Mean Weather Data during 2015

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmph ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
Jan	28.3	12.0	20.1	84	37	61	4.1	7.7	0.1	115.9
Feb	32.2	12.9	22.6	76	23	50	4.7	9.3	0.0	167.6
Mar	34.5	17.5	26.0	74	29	52	5.6	7.7	22.4	211.0
Apr	36.7	19.9	28.3	67	22	45	6.9	8.6	16.2	274.3
May	38.6	22.0	30.3	71	27	49	9.3	7.9	80.0	293.3
Jun	32.6	21.9	27.2	85	57	71	9.5	4.0	49.7	171.3
Jul	31.4	21.9	26.7	80	53	67	11.7	3.6	26.1	202.9
Aug	31.4	20.4	25.9	81	55	68	10.1	4.8	4.6	186.5
Sep	32.0	21.0	26.5	85	49	67	6.5	5.6	120.7	161.2
Oct	33.1	20.4	26.8	81	39	60	4.3	7.4	62.8	164.6
Nov	31.6	17.4	24.5	71	36	54	5.5	7.3	4.6	159.5
Dec	31.2	14.1	22.7	76	34	55	4.0	8.1	0.0	142.5
Total	393.6	221.3	307.5	932	464	698	82.1	82.1	387.2	2250.2
Mean	32.8	18.4	25.6	78	39	58	6.8	6.8	32.3	187.5
S.D.	2.7	3.6	2.8	6.0	12.4	8.7	2.6	1.9	38.6	51.7
C.V.%	8.2	19.8	10.8	7.7	32.1	15.0	38.4	27.3	119.6	27.5
Highest	38.6	22.0	30.3	85	57	71	11.7	9.3	120.7	293.3
Lowest	28.3	12.0	20.1	67	22	45	4.0	3.6	0.0	115.9

Monthly Mean Weather Data during 2016

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmph ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
Jan	30.1	11.8	21.0	73	29	51	3.8	8.1	0.0	142.3
Feb	33.9	15.4	24.6	67	27	47	4.7	8.5	0.2	185.1
Mar	36.6	18.5	27.5	60	20	40	6.1	8.1	0.6	272.3
Apr	39.5	22.2	30.9	52	21	36	5.7	9.1	3.8	343.0
May	38.9	23.3	31.1	60	25	43	N.A.	9.1	16.0	345.9
Jun	32.8	22.7	27.8	80	53	67	N.A.	3.7	121.6	196.3
Jul	29.3	21.8	25.5	88	68	78	N.A.	1.5	49.2	113.5
Aug	30.1	21.4	25.7	84	59	72	N.A.	4.5	39.6	157.0
Sep	29.5	20.5	25.0	88	62	75	N.A.	3.3	211.0	124.8
Oct	30.9	18.9	24.9	85	43	64	3.4	7.2	48.2	146.1
Nov	30.2	12.9	21.5	70	30	50	3.5	8.9	0.0	132.1
Dec	29.6	11.9	20.7	77	34	56	3.5	7.2	0.8	113.5
Total	391.5	221.1	306.3	883	471	677	N.A.	79.2	491.0	2271.6
Mean	32.6	18.4	25.5	74	39	56	N.A.	6.6	40.9	189.3
S.D.	3.8	4.3	3.4	12.3	17.1	14.3	N.A.	2.6	64.5	84.8
C.V.%	11.5	23.6	13.5	16.6	43.6	25.4	N.A.	39.8	157.7	44.8
Highest	39.5	23.3	31.1	88	68	78	N.A.	9.1	211.0	345.9
Lowest	29.3	11.8	20.7	52	20	36	N.A.	1.5	0.0	113.5

Monthly Mean Weather Data during 2017

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmph ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
Jan	29.3	11.5	20.4	76	30	53	3.9	7.8	0.0	128.9
Feb	32.9	14.2	23.6	65	21	43	4.6	9.8	0.0	173.7
Mar	35.7	16.9	26.3	60	18	39	5.4	8.9	0.0	250.3
Apr	39.1	19.4	29.3	62	16	39	7.6	9.5	0.0	326.7
May	39.0	23.2	31.1	65	27	46	10.2	8.7	1.8	339.1
Jun	33.0	22.8	27.9	87	59	73	9.0	5.3	182.1	169.7
Jul	30.5	22.0	26.3	85	61	73	12.3	3.5	49.2	176.5
Aug	30.4	21.3	25.8	89	62	75	10.5	4.0	108.5	145.9
Sep	31.1	21.5	26.2	92	58	75	7.0	5.3	306.0	115.0
Oct	32.3	20.5	26.4	90	46	68	5.3	6.7	109.4	142.8
Nov	30.6	15.6	23.1	82	36	59	5.0	8.1	2.8	142.2
Dec	29.1	13.7	21.4	84	37	61	5.4	7.1	0.0	126.4
Total	393.1	222.6	307.8	937	472	704	86.1	84.6	759.8	2237.2
Mean	32.8	18.5	25.6	78	39	59	7.2	7.1	63.3	186.4
S.D.	3.5	4.0	3.1	12.0	17.4	14.4	2.7	2.1	97.6	76.9
C.V.%	10.6	21.5	12.1	15.4	44.4	24.5	38.0	30.1	154.2	41.3
Highest	39.1	23.2	31.1	92	62	75	12.3	9.8	306.0	339.1
Lowest	29.1	11.5	20.4	60	16	39	3.9	3.5	0.0	115.0

Monthly Mean Weather Data during 2018

Std. Met. Week No.	Temperature (°C)			Rel. Humidity (%)			Wind Speed (Kmph ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
Jan	29.8	12.6	21.2	82	30	56	4.4	8.3	0.0	136.6
Feb	31.9	14.1	23.0	74	26	50	4.6	8.7	0.0	153.5
Mar	35.8	18.4	27.1	67	21	44	5.6	7.9	0.0	242.9
Apr	38.4	20.5	29.4	60	20	40	6.4	9.0	14.8	294.9
May	39.6	23.3	31.5	64	21	43	10.4	8.3	9.0	353.9
Jun	32.9	22.9	27.9	82	57	70	11.4	3.2	143.6	188.5
Jul	29.4	22.0	25.7	86	69	77	12.3	2.1	32.6	152.1
Aug	29.5	21.4	25.4	86	69	78	13.8	2.5	20.5	141.2
Sep	32.1	20.3	26.2	87	51	69	8.6	6.6	36.4	179.8
Oct	33.1	19.5	26.3	79	36	58	5.1	8.2	80.8	179.5
Nov	31.4	16.6	24.0	79	40	59	4.2	8.0	13.3	134.6
Dec	29.2	13.0	21.1	78	35	57	4.2	7.6	0.2	125.6
Total	392.9	224.5	308.7	925	475	700	90.9	80.3	351.2	2283.1
Mean	32.7	18.7	25.7	77	40	58	7.6	6.7	29.3	190.3
S.D.	3.5	3.8	3.1	9.0	18.0	12.9	3.5	2.5	42.8	71.4
C.V.%	10.7	20.4	12.1	11.7	45.3	22.2	46.7	37.9	146.3	37.5
Highest	39.6	23.3	31.5	87	69	78	13.8	9.0	143.6	353.9
Lowest	29.2	12.6	21.1	60	20	40	4.2	2.1	0.0	125.6

Monthly Mean Soil Temperature Data at 0700 hrs LMT

Month	Soil Temperature (°C) at 5 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	17.4	18.8	18.9	18.8	19.3	18.6
Feb	16.8	20.7	22.7	21.6	20.0	20.4
Mar	21.5	24.1	26.2	24.9	25.6	24.4
Apr	23.1	27.4	30.2	28.3	27.9	27.4
May	25.2	28.4	30.9	31.4	30.2	29.2
Jun	27.2	26.1	26.5	26.1	26.5	26.5
Jul	23.9	26.7	25.6	25.1	25.4	25.3
Aug	24.5	26.9	26.2	24.9	25.8	25.6
Sep	23.8	25.4	24.8	24.0	25.9	24.8
Oct	24.7	26.2	24.7	24.0	24.1	24.7
Nov	21.7	23.9	20.9	22.2	22.8	22.3
Dec	18.0	21.2	19.2	20.1	19.4	19.6
Mean	22.3	24.7	24.7	24.3	24.4	24.1

Month	Soil Temperature (°C) at 10 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	19.8	21.5	21.8	21.4	22.1	21.3
Feb	19.6	23.7	25.4	24.3	22.8	23.2
Mar	23.8	26.3	28.7	27.3	28.1	26.8
Apr	24.9	29.8	32.1	30.4	29.5	29.3
May	26.9	30.8	32.7	32.9	32.5	31.2
Jun	25.3	27.9	27.5	27.3	28.1	27.2
Jul	26.1	28.5	26.0	26.1	26.6	26.7
Aug	25.0	27.8	27.1	25.9	26.6	26.5
Sep	25.4	27.6	26.0	25.4	27.3	26.4
Oct	26.0	26.7	26.2	25.7	26.5	26.2
Nov	24.0	25.3	23.0	24.5	25.3	24.4
Dec	20.5	24.0	21.6	22.5	22.2	22.2
Mean	23.9	26.7	26.5	26.1	26.5	25.9

Month	Soil Temperature (°C) at 15 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	21.2	23.9	25.2	24.1	24.4	23.8
Feb	21.2	26.5	28.6	27.0	25.3	25.7
Mar	25.1	28.6	31.8	30.0	30.6	29.2
Apr	26.3	32.5	35.0	33.1	32.5	31.9
May	28.1	32.7	35.2	35.1	34.5	33.1
Jun	25.4	29.2	29.2	29.0	29.8	28.5
Jul	25.5	29.8	27.0	27.5	28.1	27.6
Aug	25.0	28.9	28.3	26.5	28.0	27.3
Sep	24.8	28.8	27.3	26.6	29.7	27.4
Oct	27.4	29.7	27.6	27.3	29.6	28.3
Nov	25.3	28.5	25.4	26.3	27.7	26.7
Dec	23.0	26.8	24.2	24.7	25.6	24.9
Mean	24.9	28.8	28.7	28.1	28.8	27.9

Monthly Mean Soil Temperature Data at 1400 hrs LMT

Month	Soil Temperature (°C) at 5 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	30.5	33.4	37.6	33.9	34.6	34.0
Feb	30.6	37.7	42.1	38.5	36.0	37.0
Mar	35.4	39.1	45.6	42.3	42.8	41.0
Apr	35.7	44.0	49.6	45.4	45.0	43.9
May	37.5	44.2	48.5	46.2	46.5	44.6
Jun	36.7	36.6	33.9	35.9	35.9	35.8
Jul	30.0	37.2	31.6	33.4	31.9	32.8
Aug	32.3	36.9	34.4	32.4	32.5	33.7
Sep	33.2	35.4	32.0	33.0	37.6	34.2
Oct	36.6	39.9	35.2	35.5	37.1	36.9
Nov	34.1	39.4	35.2	34.8	36.6	36.0
Dec	31.0	38.2	33.6	33.2	34.2	34.0
Mean	33.6	38.5	38.3	37.0	37.6	37.0

Month	Soil Temperature (°C) at 10 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	27.1	29.9	31.7	29.3	30.0	29.6
Feb	27.3	33.5	35.8	33.3	31.1	32.2
Mar	32.0	36.0	40.0	36.3	37.3	36.3
Apr	32.6	40.6	43.2	40.2	40.2	39.4
May	34.8	39.9	43.3	41.5	41.9	40.3
Jun	32.1	34.5	32.8	34.0	33.9	33.5
Jul	33.0	35.2	30.5	31.5	30.4	32.1
Aug	31.8	34.0	32.7	30.5	30.7	32.0
Sep	32.3	35.7	30.5	30.9	34.1	32.7
Oct	34.4	36.5	32.7	33.2	34.2	34.2
Nov	31.8	34.7	30.9	31.9	32.9	32.4
Dec	28.9	33.0	29.3	29.7	27.5	29.7
Mean	31.5	35.3	34.5	33.5	33.7	33.7

Month	Soil Temperature (°C) at 15 cm depth					
	2014	2015	2016	2017	2018	Mean
Jan	23.7	27.1	27.2	25.9	26.7	26.1
Feb	24.1	30.3	30.8	29.4	27.7	28.5
Mar	28.4	32.8	34.6	32.2	33.0	32.2
Apr	29.4	37.3	38.2	35.9	35.9	35.3
May	31.3	37.3	38.4	37.6	37.6	36.4
Jun	30.0	33.3	31.5	32.1	32.6	31.9
Jul	29.8	33.5	29.5	30.1	29.6	30.5
Aug	28.6	31.7	30.7	29.4	30.2	30.1
Sep	29.2	31.0	29.2	29.0	32.6	30.2
Oct	31.3	33.0	30.5	30.6	32.6	31.6
Nov	29.6	30.9	28.0	29.1	30.5	29.6
Dec	26.4	29.0	26.2	26.9	27.4	27.2
Mean	28.5	32.3	31.2	30.7	31.4	30.8

APPENDIX-III
Annual Weather Data

Mean Annual Weather data (2009- 2018)

Year	Temperature (°C)			Rel. Humidity (%)			Wind Speed (K _{mh} r ⁻¹)	Sunshine (Hrs)	Rain (mm)	Evaporation (mm)
	Max	Min	Mean	Max	Min	Mean				
2009	34.3	18.0	26.2	75	N.A.	N.A.	N.A.	N.A.	1144.7	1600.7
2010	33.2	18.8	26.0	76	N.A.	N.A.	N.A.	N.A.	947.5	1623.6
2011	32.1	17.5	24.8	77	N.A.	N.A.	N.A.	N.A.	469.4	2090.2
2012	33.3	19.2	26.3	78	31	55	11.9	N.A.	289.2	2210.4
2013	32.4	19.5	26.0	79	35	57	9.6	N.A.	523.0	2289.0
2014	31.7	18.4	25.1	81	42	62	7.2	6.7	760.1	2054.1
2015	32.8	18.5	25.7	78	39	59	6.9	6.9	387.2	2253.4
2016	32.6	18.4	25.5	74	39	57	N.A.	6.6	491.0	2272.7
2017	32.7	18.6	25.7	78	39	59	7.2	7.0	759.8	2237.2
2018	32.7	18.7	25.7	77	40	59	7.6	6.7	351.2	2283.1
Total	327.8	185.6	256.7	773	265	405	57.4	33.9	6123.1	20914.4
Mean	32.8	18.6	25.7	77	38	58	8.2	6.8	612.3	2091.4
S.D.	0.7	0.6	0.5	2.0	3.7	2.2	1.9	0.2	280.0	264.9
C.V.%	2.2	3.0	1.8	2.6	9.7	3.8	22.9	2.4	45.7	12.7
Highest	34.3	19.5	26.3	81	42	62	11.9	7.0	1144.7	2289.0
Lowest	31.7	17.5	24.8	74	31	55	6.9	6.6	289.2	1623.6

Standard Meteorological Weeks

Week No.	Dates	Week No.	Dates
1	01 Jan - 07 Jan	27	02 Jul - 08 Jul
2	08 Jan - 14 Jan	28	09 Jul - 15 Jul
3	15 Jan - 21 Jan	29	16 Jul - 22 Jul
4	22 Jan - 28 Jan	30	23 Jul - 29 Jul
5	29 Jan - 04 Feb	31	30 Jul - 05 Aug
6	05 Feb - 11 Feb	32	06 Aug - 12 Aug
7	12 Feb - 18 Feb	33	13 Aug - 19 Aug
8	19 Feb - 25 Feb	34	20 Aug - 26 Aug
9*	26 Feb - 04 Mar	35	27 Aug - 02 Sep
10	05 Mar - 11 Mar	36	03 Sep - 09 Sep
11	12 Mar - 18 Mar	37	10 Sep - 16 Sep
12	19 Mar - 25 Mar	38	17 Sep - 23 Sep
13	26 Mar - 01 Apr	39	24 Sep - 30 Sep
14	02 Apr - 08 Apr	40	01 Oct - 07 Oct
15	09 Apr - 15 Apr	41	08 Oct - 14 Oct
16	16 Apr - 22 Apr	42	15 Oct - 21 Oct
17	23 Apr - 29 Apr	43	22 Oct - 28 Oct
18	30 Apr - 06 May	44	29 Oct - 04 Nov
19	07 May - 13 May	45	05 Nov - 11 Nov
20	14 May - 20 May	46	12 Nov - 18 Nov
21	21 May - 27 May	47	19 Nov - 25 Nov
22	28 May - 03 Jun	48	26 Nov - 02 Dec
23	04 Jun - 10 Jun	49	03 Dec - 09 Dec
24	11 Jun - 17 Jun	50	10 Dec - 16 Dec
25	18 Jun - 24 Jun	51	17 Dec - 23 Dec
26	25 Jun - 01 Jul	52**	24 Dec - 31 Dec

* Week No. 9 will have 8 days during leap year

** Week No. 52 will always have 8 days



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