CLIMATIC NORMALS AND EXTREME EVENTS AT PARBHANI

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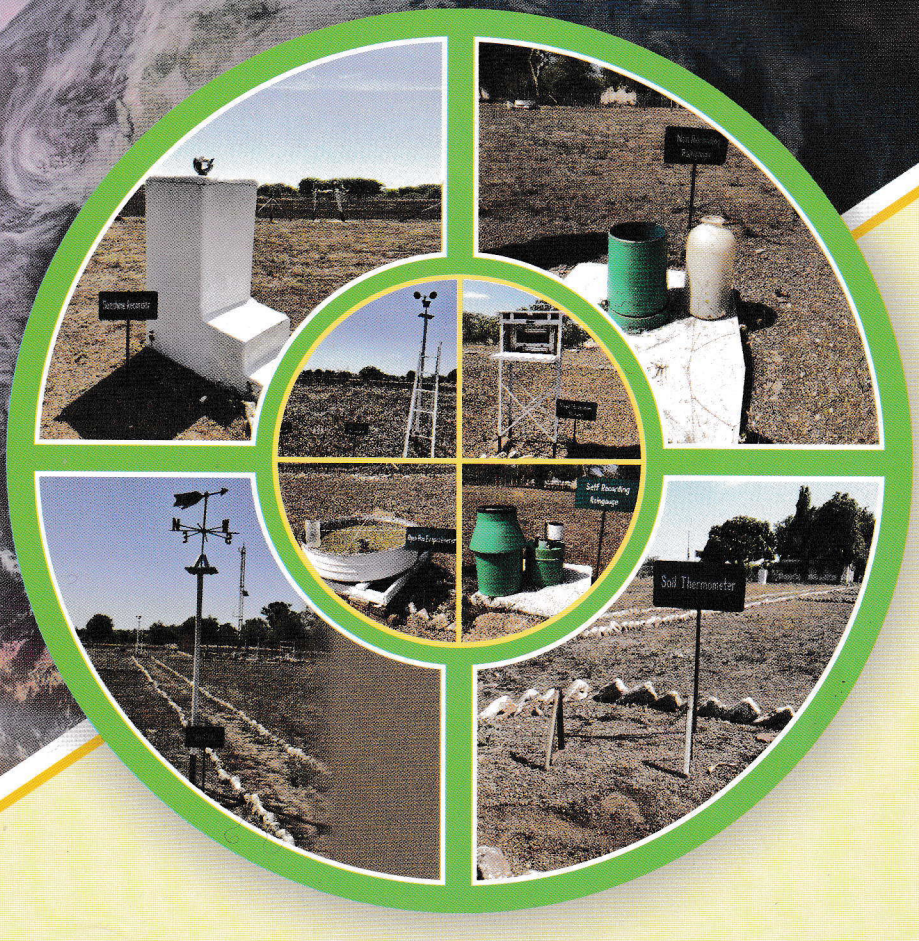

AICRP On Agrometeorology

Parbhani Center

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Parbhani-431 402 (Maharashtra)

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Climatic Normals and Extreme events at Parbhani

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PREFACE

Weather and climatic information is extremely important for many tactical (day-to-day) and strategical (long term) agricultural decisions. Tactical decisions include such farm management activities as sowing, cultivating, spraying, and irrigating. Strategical decisions include cropping intentions, management practice, and marketing. While daily rainfall, wind speed and temperature patterns have a direct influence on tactical decisions, favorable or unfavorable seasonal weather patterns (including long-term trends and variability) may force interventions in cropping patterns and management decisions. There are growing demands for timely and effective agricultural weather information for a wide variety of agricultural management decisions, ranging from crop's response to daily weather to the crop's adaptation to changing climate.

The bulletin on "**Climatic Normals and Extreme Events at Parbhani**" brought out by AICRP on Agrometeorology, VNMKV, Parbhani, gains significance in this context. Even though this publication is not all-pervasive, the ideas put forth will help in furthering our research programmers to deal with fluctuations in weather and climate. **Extreme events and climatic normals weather data** have taken their toll on the crop in recent years and identification of suitable management practices for such events is also indeed essential required. These bulletins can serve a vital role by providing to the Scientists and agricultural community relevant decision-making information.

The work on this aspect has been undertaken by the AICRP on Agrometeorology, VNMKV, Parbhani. The efforts of the team of All India Coordinated Research Project on Agrometeorology of VNMKV, Parbhani in bring out this bulletin on "**Climatic Normals and Extreme Events at Parbhani**" are really praise-worthy. I congratulate them and hope that this publication will be of immense use to scientists, farmers and planners.

(Ashok S. Dhawan)
Vice-Chancellor
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FOREWORD

It is a matter of great reckoning that till date weather related resources play most vital role in crop production. The knowledge of weather helps in understanding the interaction of different crops and varieties with the prevalent weather parameters and it is the resultant response of the crops/ varieties to the climate that ultimately their performance. Agrometeorology is an integrated approach where the laws and principle of the other major disciplines play a major role. In this bulletin, the authors have presented Climatic Normal's and Extreme events of climatic parameters in a very systematic manner which is easy to understand by agricultural manners, researchers and common farmers. The bulletin covers different aspects such as : General information of Agromet observatory and instruments, Terminology of climate Climatic normal's data. Some other important aspect included in the bulletin are extreme events , criteria of climate and probability of climatic parameters. Such information will of immense use for advance information of climate or weather for managements of agriculture in a sustainable manner.

The information on the normal climatic data and extreme event resultant to the start of growing season has wider implications on decision making at the farm. In this context, the first step is to analyze and document the climatic normals and extreme events which will then enable for scientific crop planning and risk mitigation. I am happy to note that the AICRP an Agrometeorology, VNMKV, Parbhani prepared the technical bulletin "**Climatic Normals and Extreme events at Parbhani**". The key to a bulletin's success is to deliver the right information to the right user at the right time. I am sure this publication will serve as a reference guide to different Agrometeorologist, Agronomist, extension personnel, agricultural community and all other Stakeholders. I congratulate the authors for their sincere and valuable efforts in bringing out this bulletin.

(D. P. Waskar)
Director of Research
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Normal Annual Weather Information at Parbhani

Location	:	Central Meteorological Observatory, VNMKV, Parbhani
Latitude	:	19^0 16'
Longitude	:	76^0 47'
Altitude	:	409 m MSL
Annual rainfall (mm)	:	938.7 mm
Annual rainy days	:	49
Range of T_{max}	:	28.7-42.1 ^{0}C (35.4 ^{0}C)
Range of T_{min}	:	9.0-26.5 ^{0}C (17.8 ^{0}C)
Range of RH-I	:	41-87 % (64 %)
Range of RH-II	:	15-71 % (43 %

Table 1: Month distribution in seaso

Seasons	Duration
Southwest Monsoon Season	June to September
Post Monsoon Season	October to January
Summer Season	February to May

Use of Agromet. Observatory and Criteria for site selection

The main use of the Agromet observatory is to study the influence of weather parameters on crop plants and biota.

The following points should be considered while selecting site of Agromet observatory.

1. The site should contain a flat rectangular plot with 55 meters (180 feet) in north-south direction and 36 meters (120 feet) in east-west direction (Fig. 1).
2. The site must be representative of climate, soils and agricultural (cropping) conditions of the area and should be located at the centre of the farm.
3. It should be well exposed to atmosphere.
4. There should not be large area of concrete or buildings or tree near the plot. The distance should be more than 2-3 times the height of the tallest object.
5. The site must be free from water logging and easily accessible throughout the year.
6. Site selected should be away from hills, buildings, streams and trees to avoid shade, shield or channel affects.
7. It should be away from steep slopes, water bodies and frequent irrigation.
8. The recommendable distance from the obstacles from the raingauge and other instruments are at least twice and 10 times the height of the obstructions, respectively.

Fencing

After the site selection, it should be wire fenced, normally to a height of about 1.5 meter with a gate locking arrangement to protect from theft, animals and rodents which may cause damage to and cables.

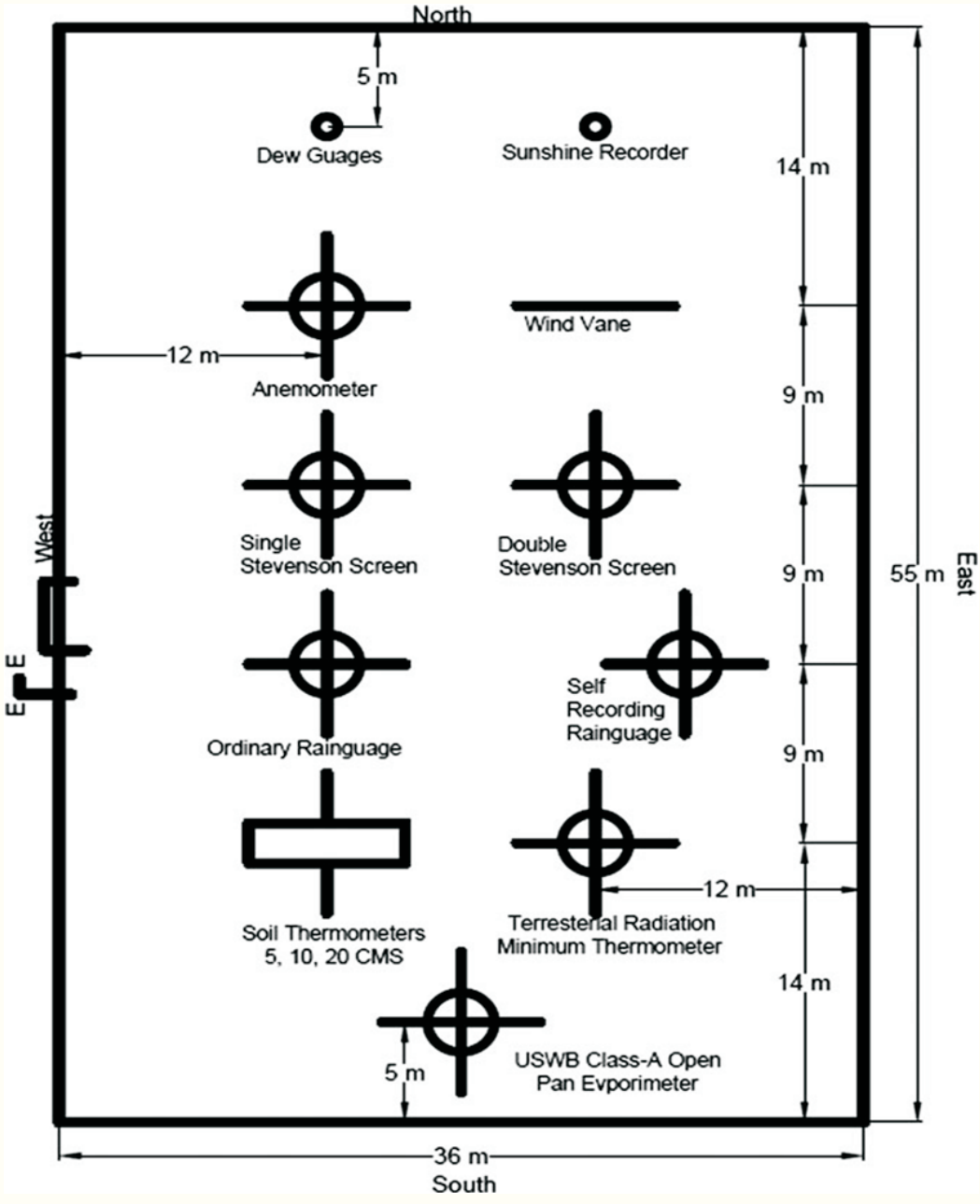


Fig No. 1. Layout of Agromet. Observatory

AUTOMATIC WEATHER STATION

PURPOSE FOR MEASUREMENT:

- A system, with which weather observations may be collected, i.e. observed and disseminated, on real time basis without human interference are known as AWS.
- The automatic weather station (AWS) records the weather data automatically and continuously at programmed time intervals of 15 minutes.

DETAILS OF THE INSTRUMENT:

- **AWS** comprise of three units- (i) Field units, (ii) communication link and (iii) Ground receiving, processing and disseminating system.
- Field unit consists of (i) sensors for meteorological parameters, (ii) conditioning subsystem, (iii) data conversion, storage and transmission system (DCSTS), (iv) antenna and (v) power supply system.

SENSORS:

TEMPERATURE SENSOR

- Temperature is sensed by thermistor, which is extremely sensitive and exhibits a large resistance change with small change in temperature.
- A probe, which is electrically identical to temperature probe, also measures soil temperature but physically more ragged.

RELATIVE HUMIDITY SENSOR

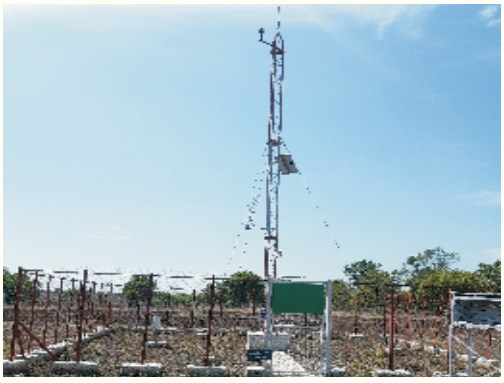
- This sensor contains RH and temperature probe and is housed in plate gill radiation shield with a 5 feet lead length.
- This shield helps to eliminate radiation loading the sensor.

WIND DIRECTION SENSOR

- The wind vane measure wind direction from 0-360 with a 5^0 accuracy. The sensor utilizes a potentiometer to vary the sensor resistance in relation to wind direction.

WIND SPEED SENSOR

- Anemometer measures with speed in the range of 0-45 m/s (0-160 km/hr).
- This sensor is a three cup wheel assembly utilizing a magnet activated reed switch whose frequency is proportional to wind speed.



RAINFALL SENSOR

- A tipping bucket rain gauge is attached to the probe.
- It measures rainfall at the rate of 50 mm per hour with an accuracy of 1.1%.
- It is designed such that one alternate tip of the bucket occurs for each 0 to 25 mm of rainfall. Each tip actuates a magnetic switch.
- The rain gauge is mounted on a level ground and at least 30 cm above the ground surface.

RADIATION SENSOR

- This sensor is designed for field measurement of sun and sky radiation.
- The silicon pyranometer puts out a current, which is dependent upon the solar radiation incident upon the sensor.
- There are vapour pressure, soil temperature, soil moisture, leaf wetness

STORAGE MODULE:

- The storage module provides the user with a method of transporting data from the field to the computer.

STEVENSON SCREEN

PURPOSE OF STEVENSON SCREEN:

- Stevenson screen is a wooden box specifically designed for housing four thermometers which record the surface air temperature in ^{0}C.
- These four thermometers are maximum, minimum, dry and wet bulb thermometers.
- Thomas Stevenson designed this screen in 1866.

DETAILS OF EQUIPMENT:

- A Stevenson screen is a rectangular wooden box of dimension length 56 cm, width 30 cm and height 40 cm.
- Double roof-side walls are louvered providing free movement of air to the thermometers bulb.
- The air space between the double roof and white painting prevent direct heating from the intensity of sunlight.
- Stevenson screen is painted white and is mounted on four wooden supports, the • bottom of the screen being at 1.22 m (4 ft) above the ground.
- The screen is set up with its door facing north side (opening downward) so that minimum sunlight would enter while the observer is reading the instruments.
- The use of the screen is to protect the thermometers from direct heating from ground and neighboring objects and from losing heat by radiation at night.
- Stevenson screen also protect instruments from rain and snow and allows free air circulation.
- The maximum and minimum thermometers are laid in horizontal positions on the upper and lower wooden brackets, respectively and rest at an angle of 2^{0} to horizontal.
- The dry and wet bulb thermometers are kept vertical on the wooden bracket in the left and right hand sides, respectively.

MAXIMUM AND MINIMUM THERMOMETERS

MAXIMUM THERMOMETER:

PURPOSE OF MEASUREMENT:

- The maximum air temperature during 24 hrs duration is measured by using a maximum thermometer.

UNIT

- Degree Celsius (^{0}C)

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- Maximum thermometer is a mercury-in-glass thermometer provided with a constriction in the capillary of the glass tube below the lowest graduation of the scale.
- Maximum thermometer ranging from -35 ^{0}C to +55 ^{0}C.

PRINCIPLE:

- The Constriction allows the mercury to be forced by rising temperature but restricts it being drawn back with falling temperature.
- It stands at the level in the capillary, so that we can note the maximum temperature at a later time.

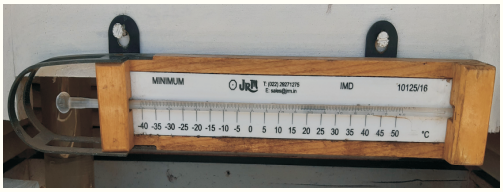
SETTING OF INSTRUMENT:

- The thermometer is to be set at 07:23 hrs.
- Giving mechanical jerks holding by hand, sets the thermometer.
- The reading of the maximum thermometer after setting should agree with that of dry bulb thermometer within 0.3 ^{0}C.

MINIMUM TEMPERATURE:

PURPOSE OF MEASUREMENT:

- The minimum or the lowest temperature of air during last 24 hrs. is measured with the help of a minimum thermometer.



UNIT

- Degree Celsius (^{0}C)

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- Minimum thermometer is a spirit or alcohol-in-glass thermometer ranging from -40 ^{0}C to +50 ^{0}C, having a light narrow index in the stem.
- This index is kept inside the spirit column by surface tension of the meniscus.
- Reading is taken from the end of the index, which is farthest from the bulb.

PRINCIPLE:

- As the temperature falls, the alcohol contracts and end of alcohol column in stem moves onwards the bulb dragging the index along with it by the surface tension of liquid.If subsequently temperature increases, the alcohol flows freely past the index without displacing it.
- Thus, the position of the end of the index farthest from the bulb indicates the lowest temperature reached since the thermometer was set.

SETTING OF INSTRUMENT:

- Minimum thermometer is set at 14:23 hrs by tilting the bulb upwards (jerking is not given).
- After setting, the reading of the minimum thermometer should agree with that of dry bulb thermometer within ±0.6 ^{0}C.

DRY BULB AND WET BULB THERMOMETERS

DRY BULB THERMOMETER

PURPOSE OF MEASUREMENT:

- Air temperature at the time of observation is measured by means of a mercury-in-glass thermometer called the dry bulb thermometer.

UNIT OF DRY BULB TEMPERATURE:

- Degree Celsius (^{0}C)

LEAST COUNT:

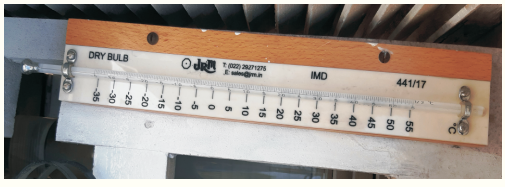
- The least count of thermometer is 0.5 ^{0}C, but reading is recorded up to ^{0}C.

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- Dry Bulb thermometer is ordinary mercury-in-glass thermometer ranging from -35 ^{0}C to +55 ^{0}C.
- **DB** thermometer has a capillary stem of which one end is a bulb containing mercury and other end sealed after removing air from the same.
- The stem is graduated for reading the value of temperature.
- Mercury levels in the stem changes with the changes in air temperature.
- The dry bulb thermometer is kept vertical on the wooden bracket in the left side in Stevenson screen.



WET BULB THERMOMETER:

PURPOSE OF MEASUREMENT:

- A wet-bulb thermometer indicates a temperature close to the true (thermodynamic) wet-bulb temperature.
- The wet-bulb temperature is the lowest temperature that can be reached under current ambient conditions by the evaporation of water only.

UNIT OF WET BULB TEMPERATURE:

- Degree Celsius (^{0}C)

LEAST COUNT:

- The least count of thermometer is 0.5 ^{0}C, but reading is recorded up to ^{0}C.

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- The temperature of cool air is measured with the help of a wet bulb thermometer, which is same as dry bulb thermometer, but in DB the bulb of the thermometer acts as evaporating surface.
- The bulb of DB thermometer is covered by a muslin cloth and is kept continuously wet by providing water by means of four strands of cotton thread dipped in to a small water container with distilled water.
- Under the saturated condition, both the dry and wet bulb thermometer readings would be same.
- But when the air becomes dry, the difference between them would increase. The difference is known as **wet bulb depression.**
- The dry and wet bulb temperatures are used for calculating the dew point, vapour pressure and humidity.

PRINCIPLE:

- Evaporation causes cooling. When water evaporates from the wet bulb surface, the latent heat required is drawn from the bulb of the thermometer and so the mercury column comes down indicating a reduction of temperature.

ORDINARY RAIN GAUGE

RAIN:

- **Rain** is precipitation of liquid water particles either in the form of drops having diameter greater than 0.5 mm or in the form of smaller widely scattered drops.

PURPOSE OF MEASUREMENT AND ITS PRINCIPLE:

- Rainfall recorded on 08:30 hrs is the amount of rainfall for last 24 hrs, i.e. the amount of rainfall for that particular day.
- The principle of rainfall measurement is to obtain the depth of the layer of water that has fallen.
- For example, 1 millimeters rainfall means every 1 mm^2 area is filled with the water of height 1 mm.

UNIT:

- Milimeter (mm)

LEAST COUNT:

- 0.2 mm

TIME OF OBSERVATIONS:

- 08:30 hrs & 14:23 hrs as and when there is rain.
- However, at times of heavy rainfall, two or three intermediate readings may be taken and their sum reported as rainfall for the past 24 hrs.

DETAILS OF EQUIPMENT:

- Ordinary rain gauge (ORG) is an instrument used for measuring the amount of rainfall.
- It consists of five parts- (1) funnel, (2) receiver, (3) body, (4) base and (5) measuring cylinder.
- The funnel is provided with a brass rim, which is circular and exactly 16.0 cm in diameter.
- The rim of the rain gauge is 30 cm above the ground level.
- The rainwater collected in receiver is measured with the help of a standard measuring cylinder.
- The 20 cm capacity rain gauge with 200 cm^2 collector and 4-liter bottle is widely used and is sufficient to measure 24 hrs. Rainfall of most of Indian observatories.
- The 40 and 100 cm capacity rain gauges are used at few places with high rainfall.
- A measuring cylinder calibrated in mm, graduated in 20 mm is used to measure the rainfall.

SELF RECORDING RAIN GAUGE

PURPOSE OF MEASUREMENT:

- Self-recording rain gauge (SRRG) is an automatic device used to record a continuous rainfall for 24 hrs on a daily chart, if rain occurs.
- The characteristics of rainfall events viz. onset and cessation of rainfall, duration of rainfall, intensity of rainfall and the total amount of rainfall in mm can be obtained from the rainfall chart.

UNIT:

- Milimeter (mm)

LEAST COUNT:

- 0.5 mm

TIME OF OBSERVATIONS:

- Continuous observations on the chart every day at 08:30 hrs as and when there is rain.

DETAILS OF EQUIPMENT:

- It is a **float type rain recorder** in which the rain is led into a float chamber containing a light, hollow float.
- The rain gauge is installed on a level ground and fixed on a masonry foundation of 60 × 60 × 60 cm^3 sunk into ground.
- Base of the gauge is cemented into the foundation so that the rim of the gauge is exactly 75 cm above the case of self-recording rain gauge.
- If the height of the rim were more, the rainwater collected would decrease because of the change in wind speed near the ground.
- Rainwater is entering the receiver through an 20.4 cm diameter funnel.
- The receiver is consisting of float and siphon chamber.

MEASURING PROCEDURE:

- A pen is mounted on the stem of the float and as the level of water rises in the receiver, the float rises and the pen records on a chart
- placed on a rotating drum with clockwork arrangement, the amount of water in a receiver continuously.
- The clock work drum revolves once in 24 hrs.
- Siphoning starts automatically when the pen reaches the maximum point of the chart.
- If the rain continues, the pen rises again from the zero line on the chart.
- If there is no rain, the pen traces the horizontal line from where the rain stopped.

SOIL THERMOMETERS

SOIL:

- The upper layer of earth wherein plants grow, a black or dark brown material typically consisting of a mixture of organic remains clay and rock particles.

PURPOSE OF MEASUREMENT:

- **Soil temperature** is one of the important environmental factors of plant growth and development.

UNIT:

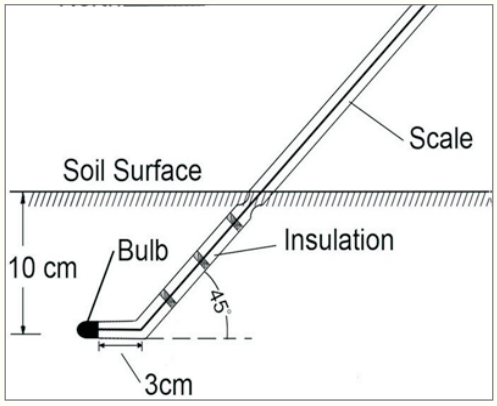
Degree Celsius (0C)

TIME OF OBSERVATIONS:

- 07:23 hrs & 14:23 hrs

DETAILS OF EQUIPMENT:

- For measuring soil temperature at depths of 5, 10 and 20 cm, the mercury-in-glass thermometers are used.
- These thermometers have a bend bulb of 120^0 and the rest of the stem is straight.
- The plot size is 180 cm × 120 cm wherein soil thermometers installed.
- These thermometers are held by the iron stands in inclined position making 60^0 angles with ground surface.



- Soil thermometers for 3 depths, i.e. 5 cm, 10 cm and 20 cm are placed 45 cm apart at an inclined depth of 5.8, 11.6 and 23.2 cm to ensure a vertical depth of 5, 10 and 20 cm, respectively.
- These thermometers with increasing depth are fixed from west to east, i.e. soil thermometer for 5 cm, depth is in the west followed by the thermometers of the depth of 10 cm, 20 cm.
- The range of soil thermometer is -20^0 C to $+60\ ^0$C.

CHARACTERISTICS OF SOIL TEMPERATURES:

- The diurnal range of soil temperature is highest at the surface and this range decreases rapidly with depths and becomes practically negligible at a depth of 30 cm.
- In the morning the temperature is lowest at 5 cm depth and in the afternoon it is highest at 5 cm depth.

DEW GAUGE

DEW:

- Dew is water in the form of droplets that appears on thin, exposed objects in the morning or evening due to condensation.
- Dew is formed if the ground temperature falls because of its continuous loss of heat by long wave radiation. The air in contact with earth's surface is chilled and when the temperature falls below the dew point temperature of the air, the water vapour in the air condenses on the ground as dew.

PURPOSE OF MEASUREMENT:

- Dew is an important source of soil moisture during non-rainy season especially in arid and semi-arid region.

UNIT OF DEW:

- Millimeter

LEAST COUNT:

- 0.025 mm

TIME OF OBSERVATIONS:

- In the morning before sunrise

PERIOD OF OBSERVATION:

- Dew is recorded only during winter season (except for the hill station where it forms round the year).
- Hence dew should be recorded during **September to March.**
- During summer season dew does not form due to higher temperatures.
- During the rainy season it cannot be distinguished from rain droplets, hence is not recorded.

MECHANISM:

- The bare soil cools more slowly than vegetation because of the upward flow of heat and the existence of thermal insulation by air within the crop canopy.
- Thus dew forms more on the vegetation than on the bare soil.
- Dew formation would be more on calm or light windy night when the mixing of air would be low.

DETAILS OF EQUIPMENT:

- The dew is measured by **DUV-Devani Dew Gauge and a dew album**.
- The dew gauge is exposed in the open on a stand at about sunset.
- There are rectangular wooden blocks of dimension 32 cm X 5 cm X 2.5 cm coated with red oxide which favours retention of dew deposits on it.
- These blocks are kept on a stand at specified heights like 5, 25, 50 and 100 cm from ground level.

MEASURING PROCEDURE:

- Deposited dew is now compared with a set of photographs contained in the dew album.
- Dew album having numbers of 1 to 10, out of which 1 to 8 refer to dew, 9 refer to dew and rain together and 10 refers to rain.
- By knowing the dew scale number, it is possible to measure dew.
- The drop of rain is of spreading nature whereas; the drop of dew is something like pearl shape.

FAVOURABLE CONDITIONS FOR DEW FORMATION:

- Clear night sky (to allow maximum loss of heat by long wave radiation).
- More moist air from sunset onwards (R.H. > 75%).
- Calm or light wind

OPEN PAN EVAPORIMETER

EVAPORATION:

- The physical process by which any liquid escape from the surface into the atmosphere in gaseous state is called **evaporation.**

PURPOSE OF MEASUREMENT:

- The standard United States Weather Bureau (USWB) Class-A open pan evaporimeter is most commonly used to measure **evaporation** from free water surface.

UNIT OF EVAPORATION:

- Millimeter

LEAST COUNT:

- mm

TIME OF OBSERVATIONS:

- 08:30 hrs & 14:23 hrs

DETAILS OF EQUIPMENT:

- It consists of a 120.7 cm diameter and 25.4 cm deep pan made of 20 gauge galvanized iron sheet with a stilling well of size 10 cm diameter and 30 cm height placed within the tank.
- A vertical pointer is provided in the stilling well to show the level of water maintained in the pan.
- Its purpose is to isolate a small portion of the water surface in the tank so that it is not disturbed by waves produced by wind.
- Three small holes are located at the bottom of the well to permit the flow of water in and out of the well.
- The pan is painted white and is placed on a wooden frame so that air may circulate beneath the pan.
- A measuring cylinder is used to measure the evaporation rate.
- The cross-sectional area of the measuring cylinder is exactly 1/100 of the area of evaporation pan.
- The scale from 0 to 20 cm is engraved inside it along the height and the graduation runs from top to bottom in ascending order.
- One full cylinder of water raises 2 mm height in the pan.

MEASURING PROCEDURE:

- When there is no rainfall, add measured amount of water into the tank by the measuring cylinder up to the tip of the fixed point of the gauge. Evaporation rate (mm) will be equal to water added (mm) to the evaporation pan.

E = Number of measuring cylinders of water added to the tank X 2

- On a rainy day, for example, if water added is 3 mm and rainfall is 5 mm, evaporation will be 8 mm

E = rainfall, i.e. 3 mm + water added, i.e. 5 mm

PRECAUTIONS:

- If the rainfall is heavy, water must be removed from the tank with measuring cylinder. Difference between the actual rainfall of the previous day and water removed from the tank gives the evaporation rate. For example, if rainfall is 20 mm and water removed is 10 mm then the rate of evaporation will be 10 mm.
- If there is very heavy rainfall, the tank overflows and evaporation value cannot be obtained. The message overflow or excess rainfall is written in the weather report

ANEMOMETER

PURPOSE OF MEASUREMENT:

- Wind speed is measured with the help of cup counter anemometer.
- Wind velocity is an important meteorological factor which affect agricultural operations in a several ways.
- Wind velocity increases crop water requirements by increasing evapotranspiration due to removal of accumulated humid air near the leaves.

UNIT OF WIND SPEED:

- km/hr

LEAST COUNT:

- The range of cyclometer is from 0 to 9999.
- The four black figures give whole km and the red figure to the right gives tenths of km.

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- Anemometer consists of 3 hemispherical cups fixed to the end of metal arms from a central point.
- The Anemometer is installed on a metal pipe, which is fixed on a masonry structure.
- The height from the centre of the anemometer cups is 10 ft above ground level.
- The cup wheel is pivoted at the centre to a vertical spindle passing through a brass tube attached to the anemometer box.
- The cups rotate in anti-clock direction.

PRINCIPLE:

- The cups are set in motion due to pressure difference occurring between convex and concave surfaces of the cups.
- The vertical spindle about which the cups rotate is connected to a mechanical counter called as cyclometer through a gear system from which the number of rotations are counted and converted into speed calibrated in km/hr.

MEASURING PROCEDURE:

- Note down the cyclometer reading at 07:23 hrs. and 14:23 hrs.
- Subtract the reading at 07:23 hrs of the previous day from that at 07:23 hrs of the observation day.
- Divide the difference by 24 to get the mean daily wind speed for the observation day.

MEASUREMENT OF INSTANTANEOUS WIND SPEED:

- Note down two readings from anemometer at an interval of three minutes.
- Multiply the difference by 20 to get wind speed at the time of observation in km/hr.

CARE AND MAINTENANCE:

- Every week put two to three drops of clock oil in the foot bearing and in the worm.
- Once in every two months fill the house of top bearing with grease.
- Once in every six months all the parts of the instrument should be examined and the bearing should be thoroughly washed, cleaned and lubricated.

WIND VANE

WIND:

- Some of the solar energy reaching near the earth surface is transformed into kinetic energy of the gases of the atmosphere.
- As a result, their molecules are in continuous motion.
- Wind is air in horizontal motion, caused due to difference in atmospheric pressure.
- Wind is a vector; hence it is to be expressed in direction and speed both.

PURPOSE OF MEASUREMENT:

- Wind has an important role in determining crop water use.
- Wind influences the crop physically and physiologically. Hence, has to be measured for crop growth studies.
- An instrument generally measures the wind direction is known as **Wind Vane.**

UNIT OF WIND DIRECTION:

- There are two ways of expressing wind direction:
- By Direction like N, E, S, W, etc.
- By degrees (from north, measured in clockwise) like N= 360^0, 0^0; E=90^0; S=180^0, W=270^0

LEAST COUNT:

- 0^0=N

TIME OF OBSERVATION:

- 07:23 hrs and 14:23 hrs

DETAILS OF EQUIPMENT:

- Wind Vane is of the shape of a penchant.
- There is an arrow head installed on a metal frame free to rotate the horizontal plane with the direction of the arrow pointing towards the direction of wind.
- Below this indicator, a frame indicating 8 points of compass is fixed to facilitate the estimation of the direction.
- The height between the pointer and ground level is exactly 10 ft (3.05 m).
- The north indicator should be set to true north and not to the magnetic north.
- The axis of the wind vane should be exactly vertical.

MEASURING PROCEDURE:

- Wind vane is read by standing exactly in the line of the arrow of the instrument.

SUNSHINE RECORDER

BRIGHT SUNSHINE DURATION:

- Sunshine duration is a climatological indicator, measuring duration of sunshine in a given period for a given location.

PURPOSE OF MEASUREMENT:

- Crops convert solar energy into chemical energy during the process of photosynthesis and transpiration. These processes required much energy.
- Since, the recording of solar radiation required sophisticated and advanced costly instruments such as pyrenometer and potentiometric recorder etc.
- Solar radiation can be estimated by using the bright sunshine duration data.

UNIT OF BRIGHT SUNSHINE:

- Hours

LEAST COUNT:

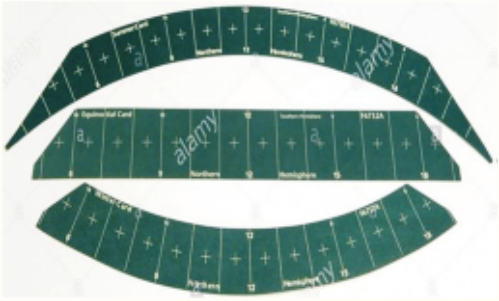
- hour or 6 minutes

TIME OF OBSERVATIONS:

- Remove the burnt card in the evening after sunset.
- Insert the new card in the appropriate groove before sunrise or after sunset.

DETAILS OF EQUIPMENT:

- The name of instrument is Campbell Stokes sunshine recorder.
- The instrument consists of a glass sphere of 10 cm diameter, mounted concentrically in a section of a spherical bowl.
- Three overlapping pairs of grooves are provided in the bowl to take cards suitable for different seasons of the year.
- Short curve cards are inserted on the upper groove in winter season from 13th October to end of February.
- Long curve cards are inserted on the lower groove in summer season from 13th April to 2nd September.
- Straight cards are inserted on the middle groove during equinoxes from 3rd September to 12th October and 1st March to 12th April.



INSTALLATION:

- The instrument is installed on a masonry pillar of 10 ft (3.04 m) above ground.
- The sphere is supported on the bowl according to the latitude of the station.

PRINCIPLE:

- The action of the recorder depends upon the burning of the card due to heat of the sun, which are focused on the card through the glass sphere.
- The cards burn linearly because some chemical treatment is given to the cards.
- The total length of the burn is measured with the help of a time scale to obtain the duration of sunshine.

GRASS MINIMUM THERMOMETER

PURPOSE OF MEASUREMENT:

- Grass minimum thermometer or terrestrial radiation thermometer is used to measure the actual minimum temperature experienced by the plants near the ground surface.
- The information on Grass minimum temperature is required to have an idea about **ground frosts** which are very crucial from the point of view of agriculture.
- When the instrument records temperature below 0 ^{0}C, a **ground frost** is likely to occur.

UNIT OF GRASS MINIMUM TEMPERATURE:

- Degree Celsius (^{0}C)

LEAST COUNT:

- 0.5 ^{0}C

TIME OF OBSERVATION:

- The reading of grass minimum thermometer is noted down **before sunrise in the morning**.

DETAILS OF EQUIPMENT:

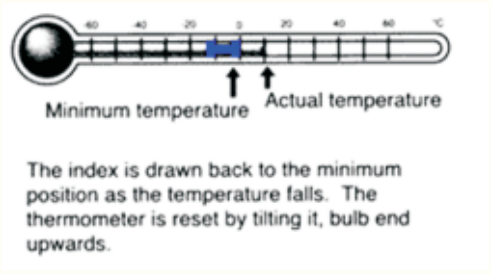
- The grass minimum thermometer is a glass thermometer filled with spirit or alcohol with a small index just like in case of minimum thermometer.
- The thermometer is exposed on short grass about one inch above ground surface on its support over the grass plot on a Y-shaped stand, so that bulb just touches the grasses.
- Its construction and working is similar to that of minimum thermometer except that its bulb is spherical and the stem is encased in a glass jacket in order to protect seal marks on the stem from dew, rain.
- The grass minimum temperature is lower than the air temperature at screen level.

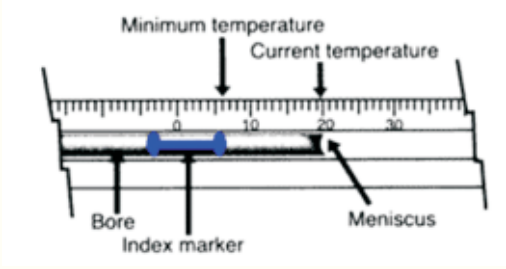
SETTING OF THE INSTRUMENT:

- Grass minimum thermometer is set at 14:23 hrs by tilting the bulb upwards (jerking is not given).

PRECAUTIONS:

- In order to avoid condensation of spirit, do not leave the instrument exposed in the daytime.
- After reading, the instrument is kept in doors to avoid direct exposure to solar radiation.





Instruments	Remarks
TIPPING BUCKET RAINGAUGE  Measurement of rainfall in Automatic Weather Station	➢ It consists of a pair of buckets and when one bucket is filled with 0.25 mm of rain water, it tips and empties into a cylinder placed below and other bucket comes in position. ➢ As long as precipitation continues, this operation is repeated and an electric pulse is generated each time a bucket tips ➢ Each tip is counted by the data logger and this is converted to amount of rainfall ➢ It is used in automatic weather station ➢ It consists of a cylindrical receiver of 30 cm diameter with afunnel inside

Thermograph (Bimetallic Type)

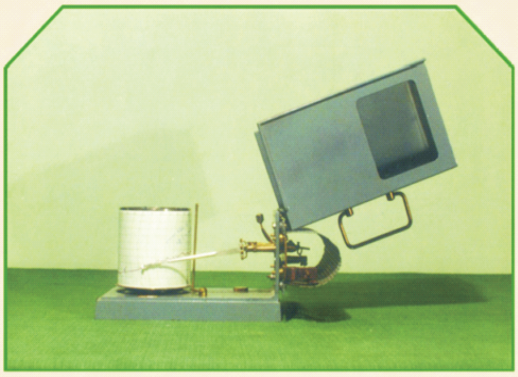
(IS : 5901 - 1970)

The Thermograph is designed for measuring and recording atmospheric temperature as a function of time on recording chart. An aged bimetallic helical coil is used as temperature Sensor. Variations in temperature cause deflection of the coil, resulting in rotating the spindle on which the coil is mounted. The spindle carries a pen arm which records all changes in temperature with respect to the time. The chart is driven by a quartz clock drum running on 1.5 V dry battery. Supplied with 100 Nos of Chart.

Specifications:

Range: -20° to 55°C.
Accuracy: ± 1°C.
Recording resolution: 0.5°C.
Housing Material: Aluminum / M.S. Powder Coated
Recording Mechanism:
Quartz Clock Mechanism.

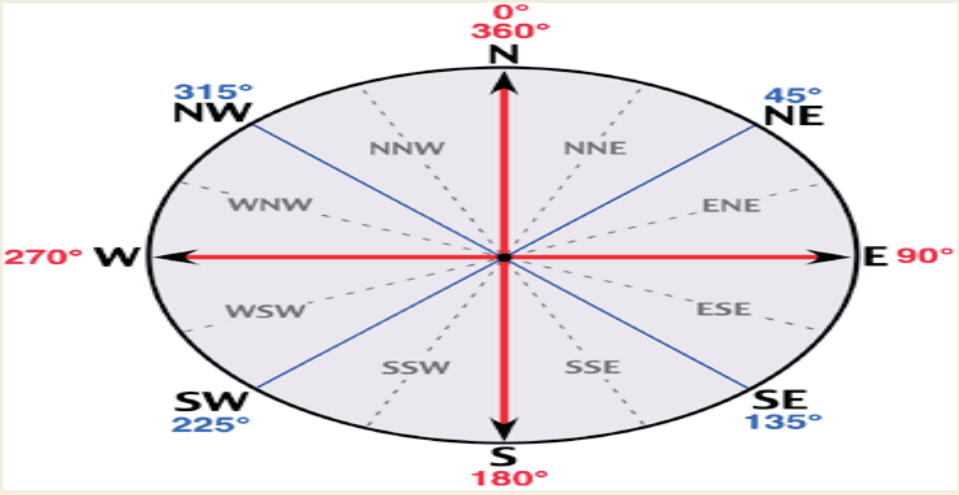
HYGROGRAPH



- It consists of a bundle of cleaned and de-oiled human hair which is humidity sensitive.
- The length of the hair increases with increases in relative humidity in a logarithmic manner.
- The changes in the length of hair are fed to a lever mechanism which magnifies the motion and this motion is recorded on a graph paper attached on the clock driven revolving drum.
- Hygrograph is always placed in double Stevenson screen.
- The circular drum rotates once in 24 hours or once in a week.

WHIRLING PSYCHROMETER

- Measurement of temperature and relative humidity in the open as well as inside crop at various heights.
- It consists of two mercury in glass thermometers (dry bulb and wet bulb thermometers) fixed inside a wooden frame provide with a handle
- Ventilation for the thermometer bulbs is provided by rotating the frame rapidly.
- The psychrometers should be rotated in shade towards the windward direction
- It should be given about 4 rotations per second to obtain desirable wind speed of about 5 meters per second.



Weather/Climate terminology

Agrometeorological instruments in Agromet. Observatory and its use

Sr. No.	Weather parameter	Units	Instruments	Time of observation
1	Rainfall	mm	Rain gauge	8.30 & 17.30 hr IST
2	Maximum temperature	^{0}C	Thermometer	7.00 & 14.00 hr IST
3	Minimum temperature	^{0}C		
4	Dry bulb temperature	^{0}C		
5	Wet bulb temperature	^{0}C		
6	Wind speed	Km/hr	Cup anemometer	8.30 & 17.30 hr IST
7	Wind direction	-	Wind vane	8.30 & 17.30 hr IST
8	Soil temperature	^{0}C	Soil Thermometer	7.00 & 14.00 hr IST
9	Dew	mm	Dew gauge	Before sunrise
10	Bright sunshine hours	Hrs	Sunshine recorder	24 hrs (hourly basis daily total
11	Evaporation	mm	Open pan evaporimeter	8.30 & 17.30 hr IST
12	Grass minimum temperature	^{0}C	Grass minimum thermometer	8.30 & 17.30 hr IST

Intensity of Rainfall

Descriptive Term used	Rainfall amount
No Rain	0.0
Very light Rain	0.1-2.4
Light Rain	2.5-7.5
Moderate Rain	7.6-35.5
Rather Heavy	35.6-64.4
Heavy Rain	64.5-124.4
Very Heavy Rain	124.5-244.4
Extremely Heavy Rain	>244.5
Exceptionally Heavy Rain	When the amount is a value near about the highest recorded rainfall at or near the station for the month or season. However, this term will be used only when the actual rainfall amount exceeds 12 cm.

Sky Conditions
Reported in terms of Octa wherein the sky is divided into 8 equal parts

Descriptive Term used	Cloud cover
Clear sky	0 Octa
Mainly clear	1-2 Octa of sky covered
Partly cloudy	3-4 Octa of sky covered
Generally cloudy	5-7 Octa of sky covered
Cloudy	> 7 Octa of sky covered

Dew condition
Reported in terms of dew wherein the dew scale

Dew scale number	Dew equivalent in mm
0	No dew
1	0.02
2	0.045
3	0.075
4	0.11
5	0.16
6	0.21
7	0.27
8	0.35
9	No observation

Types of sunshine card and duration

Sr. No.	Type of Card	Duration	Remarks
1	Long curved card (Summer card)	13th April to 2ndSeptember	Inserted in bottom slot
2	Short curved card (Winter card)	13th October to end of February	Inserted at top slot
3	Straight card (Equinoctial card)	1st March to 12th April & 3rd Sept. to 12th October	Inserted in middle slot

Spatial Distribution of Rainfall

Distribution	No. of Places	Description
Isolated	One or two Places	<25% of stations gets rainfall
Scattered	At a few Places	26–50 % of stations gets rainfall
Fairly Widespread	At many Places	51_75 % of stations gets rainfall
Wide spread	At Most place	76–100 % of stations gets rainfall
Dry	-	No station reported rainfall

Weekly/Seasonal Rainfall Distribution on regional scale

Excess :- Percentage departure of realised rainfall from normal rainfall is + 20% or more.

Normal :- Percentage departure of realised rainfall from normal rainfall is between - 19 % to + 19 %.

Deficient :- Percentage departure of realised rainfall from normal rainfall is between - 20 % to - 59 %.

Scanty :- Percentage departure of realised rainfall from normal rainfall is between – 60 % to - 99 %.

No rain :- Percentage departure of realised rainfall from normal rainfall is– 100 %

Description of 24 hrs temperature changes.

Maximum temperature

(a) When the normal maximum temperature of a station is 40º C or below.

Nomenclature Past 24 hours change

Little change	-1º C to 1º C
Rise	2º C
Appreciable rise	3º C to 4º C
Marked rise	5º C to 6º C
Large rise	7º C or more

(b) When the normal maximum temperature of a station is more than 40º C.

Nomenclature Past 24 hours change

Little change	-1 C to 1 C
Rise	2º C
Marked rise	3º C to 4º C
Large rise	5º C or more

Minimum temperature

(a) When the normal minimum temperature of a station is 10º C or more.

Nomenclature Past 24 hours change

Little change	1º C to -1º C
Fall	-2º C
Appreciable fall	-3º C to -4º C
Marked fall	-5º C to -6º C
Large fall	-7º C or less

(b) When the normal minimum temperature of a station is less than 10º C.

Nomenclature Past 24 hours change

Little change	1º C to -1º C
Fall	-2º C
Marked fall	-3º C to -4º C
Large fall	-5º C or less

Criteria for Heat Wave:

Heat wave need not be considered till maximum temperature of a station reaches at least 40º C for Plains and at least 30º C for Hilly regions.

a) When normal maximum temperature of a station is less than or equal to 40º C

Heat Wave Departure from normal is 5º C to 6º C

Severe Heat Wave Departure from normal is 7º C or more

b) When normal maximum temperature of a station is more than 40º C

Heat Wave Departure from normal is 4º C to 5º C

Severe Heat Wave Departure from normal is 6º C or more

c) When actual maximum temperature remains 45°C or more irrespective of normal maximum temperature, heat wave should be declared.

Criteria for Cold Wave

Wind chill factor plays an important role and brings down the actual minimum temperature depending upon the wind speed. The actual minimum temperature of a station should be reduced to "wind chill effective minimum temperature (WCTn)" based on wind chill factor
For declaring "Cold Wave" and "Cold Day" WCTn should only be used.

If WCTn is 10°C or less, then only the conditions for cold wave should be considered.

a) When normal minimum temperature is equal to 10°C or more.

Cold Wave Departure from normal is -5°C to -6°C.

Severe Cold Wave Departure from normal is -7°C or less

b) When normal minimum temperature is less than 10°C.

Cold Wave Departure from normal is -4°C to -5°C.

Severe Cold Wave Departure from normal is -6°C or less.

When WCTn is 0 °C or less, Cold Wave should be declared irrespective of normal minimum temperature of the station. However, this criteria is not applicable for those stations whose normal minimum temperature is below 0 °C.

Conversion of temperature

$K = C + 273$

$C = 5/9(F - 32)$

$F = 9/5\ (C + 32)$

Recorded Highest maximum temperature with normal during 1989 to 2019

Sr. No.	Years	Date	Actual Tmax (^{0}C)	Normal Tmax (^{0}C)
1	1989	21 & 22-May	45.6	41.1 & 41.3
2	1990	27-April	44.0	41.3
3	1991	17-April	44.6	40.4
4	1992	16-May	44.0	41.3
5	1993	08-May	45.5	41.6
6	1994	22 & 24-May	45.0	41.3 & 41.4
7	1995	30 & 31-May	43.5	40.8 & 40.8
8	1996	01-May	43.5	41.4
9	1997	26 & 27-May	43.0	41.4 & 41.0
10	1998	07-May	44.5	41.0
11	1999	06-May	44.0	41.1
12	2000	3, 4 & 5-May	44.0	41.6, 41.1 & 41.5
13	2001	06-May	44.5	41.1
14	2002	05-May	44.5	41.5
15	2003	17-May	44.8	41.9
16	2004	29-April	43.7	42.1
17	2005	22-May	44.5	41.3
18	2006	09-May	44.0	41.4
19	2007	13-May	43.5	41.2
20	2008	01-May	44.1	41.4
21	2009	02-May	45.0	41.8
22	2010	20 & 26-May	46.0	41.7 & 41.4
23	2011	19-May	43.2	41.9
24	2012	26-May	44.5	41.4
25	2013	23-May	44.9	41.3
26	2014	02-June	44.3	40.1
27	2015	20-May	45.5	41.7
28	2016	20-May	44.8	41.7
29	2017	17-April	43.7	40.4
30	2018	13-May	44.0	41.2
31	2019	29-April	45.6	42.1

Recorded lowest minimum temperature with normal during 1989 to 2019

Sr. No.	Years	Date	Actual Tmin (^{0}C)	Normal Tmin (^{0}C)
1	1989	16, 17 & 18-Jan	7.5	11.4, 11.5 & 11.2
2	1990	18-Jan	8.2	11.2
3	1991	04-Jan	4.5	10.8
4	1992	26-Dec	5.0	9.6
5	1993	20-Dec	5.5	9.6
6	1994	17-Jan	4.2	11.5
7	1995	01-Jan	4.8	11.1
8	1996	11-Dec	4.5	10.8
9	1997	23-Jan	5.0	11.2
10	1998	05-Dec	9.5	12.0
11	1999	11-Jan & 20-Dec	5.0	10.7 & 9.6
12	2000	08-Jan	4.5	10.0
13	2001	26 &28-Jan	6.8	11.3 & 11.4
14	2002	04-Jan	4.4	10.8
15	2003	17-Jan	2.8	11.5
16	2004	12-Dec	5.0	10.3
17	2005	19-Dec	5.0	9.0
18	2006	27-Jan	4.5	11.6
19	2007	07-Dec	6.5	11.5
20	2008	28-Jan	5.5	11.4
21	2009	24-Dec	5.0	9.4
22	2010	23-Jan	4.5	11.2
23	2011	07-Jan	3.9	10.7
24	2012	15-Jan	5.0	11.6
25	2013	14-Dec	6.5	11.0
26	2014	18-Dec	3.6	9.5
27	2015	10-Jan	4.4	10.4
28	2016	24, 25-Jan & 23-Dec	6.5	11.0, 11.3 & 9.9
29	2017	13-Jan	4.1	10.8
30	2018	29-Dec	3.0	9.4
31	2019	30-Jan	4.0	11.8

Recorded rainfall (mm) event from 1989 to 2019

Sr. No.	Years	Heavy Rain (64.5-124.4 mm)	Frequency	Very Heavy Rain (124.5-244.4 mm)	Frequency
1	1989	22-July-74.0; 17-Aug-108.0;	2	24-July-236.2; 31-Aug-151.0	2
2	1990	13-June-71.0;12-Aug-76.5 30-Aug-94.5;25-Sept-105.0 08-Oct-82.0; 25-Oct-100.0	6		-
3	1991	05-July-64.0	0		-
4	1992	02-Sept-71.4; 10-Oct-75.8	2	20-June-157.8;	1
5	1993	30-June-158.2	1		-
6	1994	12-Sept-110.0	1		-
7	1995	11-July-50.0	0		-
8	1996	16-Aug-80.0; 13-Sept-68.5	2		-
9	1997	07-Sept-86.2; 01-Oct-75.2	2		-
10	1998	25-July-64.8 ; 29-July-97.0; 30-July-82.0; 25-Aug-67.5; 07-Sept-95.0	5		-
11	1999	02-Aug-74.6; 02-Sept-90.0 07-Sept-71.4	3		-
12	2000	28-July-102.0; 11-Aug-77.2	2	24-July-125.0;	1
13	2001	05-Aug-82.4; 06-Aug-65.6 02-Oct-97.0	3	1-Oct-165.0;	1
14	2002	25-June-84.0; 25-Aug-79.4	2	26-June-135.0	1
15	2003	02-July-50.5	0		-
16	2004	17-May-54.4; 26-July-38.2; 09-Nov-52.4	0		-
17	2005	15-July-85.2; 21-Sept-80.3; 16-Oct-82.2	3	26-July-177.8; 27-July-242.9	2
18	2006			05-Aug-153.6; 06-Aug-234.0	2
19	2007	28-July-62.4	0		-
20	2008	21-Sept-82.0	1		-
21	2009	25-Aug-103.5; 04-Oct-82.2	2		-
22	2010	01-July-93.4; 02-July-68.0	2	07-Aug-136.6	1
23	2011	16-Sept-47.0	0		-
24	2012	18-July-64.0; 03-Sept-64.0	0		-
25	2013	16-Sept-55.5	0		-
26	2014	09-July-60.0	0		-

27	2015	18-Sept-57.4	0		-
28	2016	12-July-92.7; 16-Sept-69.2; 02-Oct-65.8	3		-
29	2017	07-June-87.4; 20-Aug-90.4; 09-Sept-73.4; 10-Oct-81.2	4		-
30	2018	17-July-72.0; 17-Aug-88.0; 21-Aug-85.2	3		-
31	2019	03-Aug-59.0; 07-Aug-44.2; 12-Sept-62.0; 20-Sept-63.0; 25-Oct-50.8; 19-Oct-107.6	1		-

Table No. Seasonal and Annual normal weather parameters at Parbhani

	Summer	Southwest	Post monsoon	Annual
Rainfall (mm)	48.7	773.0	117.0	938.7
Rainy days	4.8	38.0	5.7	48.5
Maximum temperature (^{0}C)	37.9	32.4	30.8	33.7
Minimum temperature (^{0}C)	19.5	22.6	13.6	18.5
Morning Relative Humidity (%)	55	81	75	71
Afternoon Relative Humidity (%)	21	57	36	38
BSS (Hrs/ day)	10.3	5.6	9.2	8.4
WS (Km/hr)	5.5	6.8	3.5	5.3
EVP (mm)	9.4	5.4	4.8	6.5

Table No. Monthly normal weather parameters at Parbhani

Months	Rainfall (mm)	Rainy days	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
			Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
Jan	6.3	0.5	29.9	11.1	74	31	9.6	3.5	4.6
Feb	4.2	0.7	32.9	13.5	66	25	10.1	4.0	6.0
March	15.7	1.5	36.8	17.4	56	21	10.3	4.6	8.0
April	10.4	0.9	40.1	21.5	48	18	10.5	5.2	10.8
May	18.4	1.7	41.4	25.0	49	20	10.2	8.0	12.5
June	160.0	7.9	35.8	23.9	73	45	6.9	8.6	7.9
July	229.3	11.1	31.8	22.6	83	61	4.5	7.5	4.9
Aug	225.8	10.9	30.5	22.2	85	65	4.5	6.4	4.2
Sept	157.9	8.1	31.6	21.6	84	59	6.7	4.7	4.7
Oct	85.1	3.7	32.6	18.5	78	44	8.6	3.8	5.3
Nov	17.3	1.2	31.1	14.3	75	37	9.2	3.6	4.8
Dec	8.2	0.3	29.5	10.6	75	32	9.3	3.2	4.3

Weekly normal weather parameters at Parbhani

Weeks	Rainfall (mm)	Rainy days	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
			Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
1	0.6	0.1	29.1	10.8	77	33	9.2	3.4	4.3
2	4.3	0.2	29.3	10.6	75	31	9.6	3.4	4.4
3	0.7	0.1	30.1	11.3	73	31	9.7	3.4	4.7
4	0.4	0.0	30.7	11.3	73	28	9.9	3.5	4.9
5	0.5	0.1	31.4	12.1	70	28	9.9	3.5	5.3
6	1.5	0.1	32.0	13.0	69	26	9.8	4.0	5.5
7	0.8	0.1	33.0	13.9	66	26	10.1	4.2	6.0
8	0.9	0.4	33.8	13.8	64	24	10.3	4.2	6.6
9	3.0	0.4	35.0	15.1	62	22	10.2	4.3	7.0
10	7.3	0.4	35.7	16.1	59	23	10.3	4.6	7.5
11	3.9	0.2	36.2	17.5	59	23	10.1	4.6	7.7
12	1.0	0.4	38.0	18.3	52	19	10.3	4.7	8.5
13	1.3	0.2	38.4	19.0	51	18	10.4	4.6	9.1
14	1.5	0.2	39.1	20.2	50	18	10.5	5.1	9.9
15	3.5	0.3	39.5	21.1	50	19	10.3	4.8	10.2
16	3.2	0.2	40.5	22.2	47	18	10.6	5.5	11.1
17	0.9	0.1	41.3	22.8	45	16	10.7	5.5	11.8
18	3.4	0.3	41.5	23.9	46	17	10.5	6.4	12.2
19	1.6	0.3	41.4	24.4	47	18	10.3	7.3	12.3
20	4.6	0.3	41.7	25.4	48	20	10.1	8.1	12.4
21	7.0	0.6	41.3	25.8	52	22	10.1	9.2	12.9
22	7.2	0.6	40.5	25.7	55	26	9.8	9.1	12.3
23	34.4	1.7	38.2	24.8	67	36	8.4	8.5	9.8
24	43.8	2.0	35.4	23.6	76	48	6.7	8.5	7.4
25	40.6	1.9	34.0	23.3	78	50	5.7	8.9	6.5
26	44.0	2.3	33.5	23.0	80	53	5.8	8.3	5.7
27	38.8	2.0	32.7	22.8	82	57	4.9	7.9	5.4
28	50.5	2.9	32.1	22.7	83	60	4.6	7.4	5.1
29	43.1	2.4	31.7	22.7	82	62	4.4	7.1	4.9
30	70.3	2.9	31.0	22.3	85	64	3.7	7.5	4.4
31	48.7	2.1	30.8	22.1	84	65	4.4	7.0	4.5
32	51.1	2.3	30.3	22.0	85	65	3.9	6.6	4.3

33	41.2	2.5	30.7	22.0	85	63	4.7	6.4	4.1
34	62.4	2.8	30.3	21.8	85	66	4.8	6.0	4.1
35	59.2	2.5	30.7	22.8	85	64	5.2	5.8	4.1
36	46.4	2.4	31.0	21.7	86	63	6.0	5.4	4.5
37	34.6	1.9	31.7	21.7	85	59	6.9	4.6	4.7
38	42.4	1.9	31.6	21.5	85	60	6.4	4.6	4.7
39	17.5	1.1	32.6	21.4	82	55	8.0	4.0	5.1
40	31.7	1.2	32.7	20.8	80	50	8.1	3.9	5.3
41	26.8	1.2	33.0	19.7	80	48	8.4	3.5	5.3
42	15.1	0.7	32.7	18.3	77	42	8.8	3.7	5.2
43	10.5	0.5	32.3	16.6	76	40	8.9	3.9	5.2
44	4.4	0.2	31.5	15.4	74	38	9.2	4.1	5.2
45	4.7	0.2	31.6	14.9	73	37	9.4	3.7	5.0
46	3.1	0.3	31.1	14.4	75	38	9.0	3.7	4.8
47	5.3	0.4	30.5	14.2	77	38	9.1	3.4	4.6
48	3.7	0.1	30.7	12.7	74	34	9.5	3.1	4.6
49	3.9	0.1	30.0	11.7	75	34	9.1	3.3	4.4
50	0.1	0.0	29.7	10.7	76	31	9.5	3.1	4.3
51	0.8	0.0	29.2	9.6	74	31	9.6	3.2	4.3
52	0.5	0.1	29.0	10.1	74	32	9.2	3.2	4.3

Daily normal weather parameters at Parbhani

1. January

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Jan	0.1	29.1	11.1	78	36	8.7	3.6	4.2
02-Jan	0.3	28.7	11.0	77	36	8.7	3.5	4.2
03-Jan	0.1	28.7	10.8	75	33	8.9	3.4	4.2
04-Jan	0.0	29.0	10.8	76	32	9.6	3.2	4.3
05-Jan	0.0	29.3	10.5	76	31	9.6	3.2	4.3
06-Jan	0.1	29.5	10.8	76	33	9.3	3.3	4.4
07-Jan	0.1	29.4	10.7	78	32	9.5	3.6	4.3
08-Jan	2.7	29.1	10.0	78	31	9.8	3.7	4.3
09-Jan	0.0	28.8	10.3	75	32	9.7	3.5	4.5
10-Jan	0.0	29.1	10.4	73	32	9.5	3.3	4.3
11-Jan	0.2	29.2	10.7	73	31	9.9	3.5	4.4
12-Jan	0.1	29.4	11.0	75	33	9.6	3.4	4.5
13-Jan	0.9	29.6	10.8	75	30	9.5	3.3	4.4
14-Jan	0.5	29.8	10.7	76	31	9.5	3.2	4.5
15-Jan	0.1	30.1	11.6	74	32	9.4	3.0	4.5
16-Jan	0.5	30.3	11.4	73	31	9.4	3.7	4.8
17-Jan	0.0	30.1	11.5	72	30	9.7	3.1	4.6
18-Jan	0.0	30.1	11.2	74	30	9.8	3.1	4.7
19-Jan	0.0	30.2	11.3	74	31	9.9	3.6	4.8
20-Jan	0.2	30.0	11.1	74	30	10.2	3.4	4.7
21-Jan	0.0	30.0	10.9	74	30	9.9	3.9	4.8
22-Jan	0.0	30.3	11.0	74	29	10.0	3.4	4.8
23-Jan	0.0	30.8	11.2	73	29	9.9	3.2	4.7
24-Jan	0.0	30.6	11.0	74	28	10.0	3.4	4.8
25-Jan	0.0	30.6	11.3	71	27	10.0	3.6	5.0
26-Jan	0.0	30.9	11.3	75	27	9.8	4.0	4.9
27-Jan	0.3	31.0	11.6	70	29	9.9	3.5	4.9
28-Jan	0.0	30.8	11.4	73	28	9.8	3.7	5.1
29-Jan	0.0	30.9	12.0	71	29	9.7	3.6	5.1
30-Jan	0.0	31.4	11.8	73	31	9.8	3.6	5.1
31-Jan	0.3	31.1	11.8	73	29	9.6	3.7	5.3

2.February

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Feb	0.1	31.2	11.9	71	29	9.9	3.2	5.2
02-Feb	0.0	31.7	12.3	69	26	10.1	3.5	5.4
03-Feb	0.0	31.6	12.5	69	27	10.0	3.6	5.3
04-Feb	0.2	31.8	12.4	68	27	10.0	3.5	5.4
05-Feb	0.0	32.1	12.6	68	27	10.0	3.4	5.4
06-Feb	0.0	32.2	12.9	67	27	9.8	3.6	5.4
07-Feb	0.9	32.2	13.1	73	27	9.9	3.8	5.5
08-Feb	0.2	31.7	13.1	70	26	9.7	3.9	5.5
09-Feb	0.0	31.8	13.3	68	26	9.9	4.3	5.5
10-Feb	0.0	32.0	13.4	69	26	9.2	4.3	5.6
11-Feb	0.3	32.3	12.9	68	26	9.8	4.5	5.7
12-Feb	0.0	32.3	13.5	65	27	10.0	4.4	5.9
13-Feb	0.1	32.4	13.5	67	26	10.1	4.0	5.9
14-Feb	0.0	33.0	14.2	66	28	10.2	4.3	6.0
15-Feb	0.0	33.1	14.7	65	28	10.1	4.1	6.1
16-Feb	0.6	33.3	14.3	66	26	9.9	3.7	6.1
17-Feb	0.1	33.4	13.5	66	25	10.2	4.1	6.0
18-Feb	0.0	33.2	13.4	67	24	10.4	4.5	6.3
19-Feb	0.0	33.4	13.3	63	25	10.5	4.2	6.5
20-Feb	0.0	33.4	13.6	64	24	10.3	4.3	6.4
21-Feb	0.0	33.6	13.6	65	24	10.4	4.1	6.4
22-Feb	0.0	33.7	14.1	64	24	10.5	4.1	6.5
23-Feb	0.1	33.7	13.6	66	24	10.1	4.3	6.7
24-Feb	0.7	34.5	13.9	63	22	10.3	3.8	6.6
25-Feb	0.1	34.5	14.2	63	23	10.3	4.4	6.9
26-Feb	0.0	34.5	14.3	63	21	10.2	4.4	7.0
27-Feb	0.5	34.5	14.7	61	23	10.3	3.7	6.8
28-Feb	0.3	34.9	15.2	63	22	10.0	4.0	6.9
29-Feb	0.0	35.1	15.1	56	21	9.7	3.8	6.6

3. March

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Mar	0.7	35.2	15.0	63	24	10.3	4.3	7.2
02-Mar	0.8	35.0	15.6	63	23	10.2	4.4	7.0
03-Mar	0.1	35.4	15.7	60	22	10.2	4.7	7.1
04-Mar	0.6	35.5	15.3	61	22	10.4	4.6	7.2
05-Mar	0.2	35.5	15.8	57	20	10.6	4.3	7.3
06-Mar	0.2	35.6	16.5	57	21	10.3	4.4	7.5
07-Mar	0.2	35.9	15.8	58	22	10.4	4.6	7.5
08-Mar	0.2	35.5	15.5	60	21	10.3	4.5	7.6
09-Mar	2.4	35.8	16.2	60	23	10.3	4.5	7.5
10-Mar	2.9	35.9	16.7	61	25	10.2	5.0	7.5
11-Mar	1.1	35.3	16.6	62	26	9.7	4.8	7.5
12-Mar	0.0	35.7	17.3	61	24	10.1	4.7	7.6
13-Mar	1.0	36.4	17.6	61	23	10.3	4.9	7.6
14-Mar	1.5	35.9	17.2	62	22	10.3	4.7	7.7
15-Mar	0.0	36.1	17.4	58	24	9.7	4.7	7.8
16-Mar	0.3	36.4	17.5	59	26	10.2	4.5	7.7
17-Mar	1.1	36.3	17.0	58	21	10.1	4.5	7.6
18-Mar	0.0	36.8	18.2	56	20	10.0	4.2	7.8
19-Mar	0.1	37.6	18.2	56	20	10.2	4.2	7.9
20-Mar	0.0	37.8	18.3	52	17	10.3	5.9	8.1
21-Mar	0.0	38.4	19.0	52	18	10.4	4.1	8.4
22-Mar	0.1	38.0	18.7	51	18	10.5	4.6	8.7
23-Mar	0.2	38.2	18.1	50	19	10.4	4.6	8.7
24-Mar	0.3	37.9	18.0	51	19	10.2	4.8	8.8
25-Mar	0.3	37.9	18.1	52	19	10.4	4.7	8.9
26-Mar	0.2	38.0	18.7	53	20	10.2	5.2	8.9
27-Mar	0.9	38.2	18.3	54	19	10.2	4.7	8.8
28-Mar	0.1	38.1	19.0	53	19	10.5	4.5	9.0
29-Mar	0.1	38.6	19.3	52	18	10.5	4.4	9.0
30-Mar	0.0	38.6	19.5	51	18	10.1	4.1	9.1
31-Mar	0.0	38.8	19.3	48	18	10.4	4.6	9.3

4. April

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Apr	0.0	38.9	18.6	49	17	10.7	4.9	9.6
02-Apr	0.0	39.1	19.4	49	16	11.0	4.9	9.8
03-Apr	0.0	39.0	19.5	48	17	10.5	4.5	9.9
04-Apr	0.3	39.5	20.2	49	18	10.7	4.9	10.1
05-Apr	0.5	39.0	20.1	51	16	10.4	5.4	10.0
06-Apr	0.0	39.2	20.7	51	19	10.3	5.2	10.2
07-Apr	0.7	39.2	20.9	54	19	10.2	5.5	9.7
08-Apr	0.1	39.0	20.5	51	18	10.2	5.1	9.9
09-Apr	0.1	39.4	20.3	50	19	10.3	5.1	9.8
10-Apr	0.5	39.2	20.3	48	20	10.2	4.5	9.8
11-Apr	1.0	39.5	20.8	49	18	10.1	5.0	10.0
12-Apr	0.3	39.6	21.3	50	21	10.4	5.1	10.0
13-Apr	1.3	39.4	21.3	50	19	10.1	4.6	9.8
14-Apr	0.3	39.9	21.2	51	19	10.5	4.6	10.0
15-Apr	0.0	39.9	22.3	49	18	10.5	4.7	11.9
16-Apr	2.2	40.2	22.2	51	18	10.6	5.2	10.9
17-Apr	0.2	40.4	22.0	49	19	10.7	5.4	11.0
18-Apr	0.1	40.2	22.2	46	16	10.7	5.2	10.9
19-Apr	0.2	40.7	22.6	46	17	10.7	6.0	11.1
20-Apr	0.4	40.7	21.9	46	18	10.7	5.5	11.4
21-Apr	0.0	40.5	21.8	48	17	10.5	5.2	11.3
22-Apr	0.0	40.5	22.4	46	18	10.6	6.0	11.3
23-Apr	0.0	40.6	22.1	48	17	10.7	5.6	11.4
24-Apr	0.2	41.0	22.6	46	17	10.7	5.6	11.7
25-Apr	0.1	40.9	22.1	47	17	11.0	5.9	11.9
26-Apr	0.4	41.1	22.4	46	16	10.9	5.4	11.7
27-Apr	0.0	41.3	23.0	43	15	10.6	4.7	11.5
28-Apr	0.1	41.9	23.7	43	15	10.5	5.5	12.1
29-Apr	0.1	42.1	23.9	41	15	10.8	5.6	12.6
30-Apr	1.4	41.9	23.8	45	17	10.6	6.3	12.5

5. May

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-May	0.2	41.4	24.2	46	16	10.1	6.3	11.7
02-May	0.4	41.8	23.6	48	16	10.5	6.5	12.4
03-May	0.0	41.6	23.6	46	17	10.7	6.3	12.2
04-May	0.2	41.1	23.8	46	18	10.4	6.8	12.0
05-May	0.0	41.5	23.7	46	18	10.7	6.1	12.3
06-May	1.1	41.1	24.4	46	19	10.6	6.5	12.3
07-May	0.4	41.0	24.8	46	18	10.0	7.3	12.1
08-May	0.0	41.6	24.6	46	18	10.4	7.0	12.4
09-May	0.2	41.4	24.4	47	18	10.4	7.2	12.3
10-May	0.2	41.6	24.4	46	19	10.2	7.4	12.1
11-May	0.1	41.4	24.0	48	18	10.3	7.7	12.2
12-May	0.2	41.7	24.0	48	20	10.4	7.4	12.4
13-May	0.5	41.2	24.2	48	19	10.2	7.2	12.4
14-May	0.1	41.7	24.9	47	20	10.2	7.9	12.3
15-May	0.2	41.4	25.4	47	21	10.1	8.0	12.1
16-May	1.3	41.3	25.7	47	20	9.8	7.4	12.2
17-May	2.1	41.9	25.3	48	20	10.3	8.1	11.9
18-May	0.3	41.8	25.7	48	21	9.9	8.4	12.8
19-May	0.2	41.9	25.5	50	20	10.1	8.6	12.5
20-May	0.5	41.7	25.2	49	21	10.0	8.4	13.0
21-May	0.6	41.4	25.4	50	22	10.2	9.1	12.9
22-May	0.9	41.3	25.9	52	22	10.6	9.0	12.8
23-May	0.2	41.3	26.2	50	22	10.1	8.9	13.0
24-May	0.7	41.4	26.1	51	22	10.3	9.2	12.9
25-May	3.2	41.5	25.6	52	22	10.4	9.1	13.2
26-May	0.8	41.4	25.4	52	22	9.9	9.4	13.0
27-May	0.8	41.0	25.6	54	25	9.5	9.7	12.8
28-May	0.3	40.7	25.0	54	23	10.0	9.4	12.6
29-May	1.1	41.1	25.9	53	24	10.1	9.4	12.8
30-May	1.6	40.8	26.0	53	25	10.4	9.0	12.6
31-May	0.2	40.8	26.4	51	25	10.4	9.3	12.6

6. June

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Jun	1.4	40.7	26.5	53	25	9.9	9.1	12.4
02-Jun	1.7	40.1	25.4	60	29	9.4	9.2	12.2
03-Jun	0.9	39.2	25.0	58	27	8.3	8.0	10.7
04-Jun	3.7	39.9	24.8	65	31	9.1	8.6	10.9
05-Jun	3.1	38.7	25.4	63	31	8.2	8.1	10.4
06-Jun	4.5	38.9	24.8	66	38	8.6	8.7	10.3
07-Jun	7.8	37.5	25.0	67	36	8.6	8.4	9.7
08-Jun	2.9	37.6	24.8	69	37	8.3	8.5	9.4
09-Jun	6.5	37.8	24.3	69	40	8.2	8.4	8.9
10-Jun	6.0	37.2	24.4	71	40	7.6	8.6	8.9
11-Jun	7.4	36.4	24.1	75	43	7.4	8.7	8.6
12-Jun	5.8	36.7	23.7	74	45	7.5	8.6	8.0
13-Jun	7.4	35.8	23.8	75	49	6.7	8.1	7.6
14-Jun	7.0	35.5	23.4	76	51	6.1	8.0	7.3
15-Jun	6.4	34.4	23.5	79	48	6.2	8.2	6.8
16-Jun	6.5	34.8	23.3	79	48	6.4	8.7	6.7
17-Jun	3.3	34.1	23.3	77	53	6.7	9.2	7.1
18-Jun	4.1	34.2	23.0	80	52	6.6	9.2	6.9
19-Jun	7.6	34.1	23.5	80	51	5.7	9.0	6.2
20-Jun	7.2	34.3	23.3	76	49	5.3	8.9	6.6
21-Jun	6.2	33.9	23.2	77	51	4.9	8.8	6.7
22-Jun	0.9	33.4	23.6	75	46	5.9	8.5	6.4
23-Jun	7.8	34.4	23.1	78	52	5.6	8.9	6.5
24-Jun	6.8	34.0	23.3	76	51	5.9	8.8	6.1
25-Jun	7.3	33.5	23.1	78	52	6.2	8.5	6.1
26-Jun	8.9	33.8	22.8	79	50	6.2	8.9	5.8
27-Jun	3.3	33.5	23.2	80	51	5.3	8.6	6.2
28-Jun	5.0	33.9	23.0	78	56	6.3	8.6	5.9
29-Jun	7.0	33.4	22.8	83	53	4.9	7.7	5.3
30-Jun	5.9	33.2	22.9	82	55	5.4	7.8	5.3

7. July

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-July	6.7	33.2	23.1	80	54	5.9	8.1	5.3
02-July	6.2	33.1	23.0	81	52	4.9	8.2	5.3
03-July	6.1	33.2	22.7	83	56	4.8	8.2	5.5
04-July	4.5	32.4	22.8	80	58	4.9	7.9	5.2
05-July	7.6	32.2	22.6	80	55	5.3	7.6	5.5
06-July	3.5	32.7	23.0	80	57	6.0	7.6	5.5
07-July	5.5	32.9	23.0	84	61	4.7	7.9	5.5
08-July	5.4	32.1	22.7	84	61	3.5	7.6	5.1
09-July	8.9	31.9	22.6	84	61	4.3	7.4	4.8
10-July	6.3	31.9	22.6	83	59	5.0	7.5	4.9
11-July	9.3	32.5	22.5	84	61	4.7	7.5	5.4
12-July	9.4	31.6	22.9	83	54	3.8	7.0	5.5
13-July	2.4	32.1	23.1	82	62	5.2	7.4	5.4
14-July	5.6	32.5	22.8	83	62	4.6	7.6	5.3
15-July	8.7	32.5	22.7	84	65	4.4	7.5	4.9
16-July	6.8	32.0	22.8	80	62	4.8	7.6	5.2
17-July	11.6	31.6	22.8	83	58	4.5	7.1	4.9
18-July	6.8	32.0	22.5	82	62	5.4	6.8	4.9
19-July	2.7	31.5	22.6	83	64	4.7	7.1	4.8
20-July	4.1	31.3	22.7	82	63	4.1	6.8	4.7
21-July	5.0	31.8	22.8	82	62	3.4	6.9	4.8
22-July	6.1	31.5	22.4	83	65	4.1	7.5	4.8
23-July	5.3	31.2	22.3	83	62	3.3	7.6	4.6
24-July	14.5	31.4	22.3	83	64	3.7	7.3	4.3
25-July	6.7	30.8	22.5	86	64	3.9	7.7	4.2
26-July	12.1	31.3	22.3	85	63	4.1	7.8	4.7
27-July	12.0	30.6	22.3	85	66	3.0	7.6	4.6
28-July	12.4	30.5	22.3	86	65	3.6	7.3	4.3
29-July	7.2	31.1	22.0	84	64	4.6	7.6	4.5
30-July	13.0	30.9	22.0	85	67	4.1	7.7	4.6
31-July	6.8	30.7	21.9	83	62	5.1	6.8	4.3

8. August

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Aug	3.3	31.3	22.2	82	62	5.1	7.2	4.9
02-Aug	8.0	31.0	22.1	84	63	4.4	6.8	4.5
03-Aug	3.0	30.7	22.2	83	63	4.2	6.9	4.5
04-Aug	3.0	30.9	22.3	84	69	4.2	6.9	4.5
05-Aug	11.5	30.2	22.1	84	68	3.6	6.9	4.4
06-Aug	11.5	29.6	22.2	86	71	3.3	6.7	4.5
07-Aug	10.9	29.9	21.8	86	67	2.6	7.1	4.6
08-Aug	3.1	29.7	22.0	85	62	3.3	6.8	4.1
09-Aug	4.3	30.5	22.1	85	64	3.8	6.7	4.3
10-Aug	5.8	30.5	22.1	85	63	4.0	6.4	4.2
11-Aug	9.9	30.7	22.0	83	63	5.0	6.3	4.1
12-Aug	5.7	30.9	22.0	84	66	5.3	6.0	4.4
13-Aug	6.5	30.8	21.8	86	66	4.0	6.5	3.8
14-Aug	4.1	29.9	22.0	84	64	3.9	6.1	3.9
15-Aug	3.2	30.6	22.0	84	61	4.0	6.5	4.2
16-Aug	8.4	30.6	22.1	85	64	4.1	6.5	4.3
17-Aug	10.3	30.8	21.8	84	60	5.8	6.6	4.1
18-Aug	4.2	31.0	21.9	84	63	6.1	6.5	4.4
19-Aug	4.6	30.9	22.0	85	63	4.8	6.3	4.2
20-Aug	7.2	30.8	22.0	87	70	4.1	6.2	4.4
21-Aug	12.1	29.4	21.8	86	66	3.5	6.0	3.8
22-Aug	5.4	30.3	21.7	85	64	4.2	6.0	4.2
23-Aug	5.8	30.5	21.8	86	64	4.6	6.0	4.1
24-Aug	10.0	30.1	22.0	84	64	5.0	6.1	4.1
25-Aug	15.5	30.8	21.8	85	67	6.1	5.7	3.9
26-Aug	6.5	30.5	21.7	85	65	5.8	5.7	4.2
27-Aug	6.6	30.8	21.8	84	64	5.6	5.8	4.2
28-Aug	8.9	30.6	22.1	86	64	5.2	5.5	4.1
29-Aug	4.3	30.6	28.5	84	64	5.3	6.2	4.4
30-Aug	12.3	31.2	21.8	86	66	4.6	6.1	4.2
31-Aug	10.1	30.6	22.3	87	65	4.8	6.2	4.1

9. September

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Sep	3.5	30.4	21.5	84	63	5.0	5.8	4.3
02-Sep	13.5	30.6	21.7	85	64	5.9	5.4	3.9
03-Sep	6.8	31.0	21.9	85	62	6.1	5.7	4.2
04-Sep	1.7	31.1	21.9	85	60	6.3	5.5	4.6
05-Sep	4.7	31.1	21.8	87	64	6.1	5.4	4.6
06-Sep	7.8	30.7	21.6	87	63	6.2	5.8	4.5
07-Sep	8.9	30.9	21.7	84	66	5.5	5.5	4.6
08-Sep	7.8	31.1	21.7	85	63	5.4	5.3	4.4
09-Sep	8.8	30.9	21.5	87	60	6.7	5.0	4.6
10-Sep	1.2	31.4	21.7	86	61	6.9	4.7	4.4
11-Sep	3.8	31.6	21.7	83	58	7.2	4.5	4.7
12-Sep	6.7	31.7	21.6	85	59	7.3	5.0	4.8
13-Sep	8.1	31.8	21.6	85	58	6.7	4.3	4.7
14-Sep	2.1	31.9	21.8	82	58	7.6	4.2	4.8
15-Sep	1.7	31.9	21.9	85	62	6.7	4.7	5.0
16-Sep	11.1	31.6	21.5	87	59	5.8	4.9	4.8
17-Sep	6.3	31.4	21.7	85	67	5.9	4.9	4.7
18-Sep	5.3	31.4	21.6	85	59	5.7	5.1	4.5
19-Sep	3.9	31.7	21.6	83	61	5.7	4.9	4.8
20-Sep	4.9	31.7	21.4	87	59	6.5	4.4	4.8
21-Sep	12.1	31.9	21.1	85	62	6.9	4.5	4.7
22-Sep	5.8	31.4	21.6	85	57	6.5	4.4	4.8
23-Sep	4.0	32.1	21.3	84	54	7.5	4.1	4.9
24-Sep	3.8	32.6	21.5	82	59	7.3	3.8	5.1
25-Sep	6.1	32.1	21.7	84	56	6.9	4.1	4.9
26-Sep	2.9	32.5	21.7	83	52	7.7	3.9	5.0
27-Sep	1.0	32.5	21.4	81	55	8.7	4.1	5.2
28-Sep	0.6	32.6	21.5	82	53	7.9	3.9	5.3
29-Sep	1.3	32.9	21.2	81	55	8.7	4.2	5.1
30-Sep	1.9	32.9	21.0	83	53	8.6	3.9	5.2

10. October

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Oct	7.6	32.7	20.8	81	54	8.5	4.9	5.1
02-Oct	8.5	32.6	20.8	82	53	8.1	3.7	5.6
03-Oct	5.5	32.4	21.0	82	55	7.2	3.7	5.2
04-Oct	4.6	32.4	20.8	81	50	7.9	3.7	4.8
05-Oct	1.3	32.9	20.8	81	45	8.5	3.6	5.2
06-Oct	1.3	33.1	20.6	77	47	8.7	3.9	5.6
07-Oct	2.9	33.0	20.5	78	49	8.3	4.0	5.6
08-Oct	5.7	33.0	20.2	82	49	8.8	4.0	5.3
09-Oct	2.9	33.0	19.9	82	50	8.0	3.7	5.4
10-Oct	6.6	32.7	19.7	81	50	8.2	3.5	5.2
11-Oct	4.6	33.0	19.9	79	47	8.7	3.6	5.4
12-Oct	1.5	33.0	20.1	78	46	9.1	3.4	5.6
13-Oct	4.1	33.1	19.3	80	49	7.9	3.2	5.2
14-Oct	1.4	33.0	19.0	78	44	8.5	3.0	5.4
15-Oct	5.2	33.2	18.8	80	44	8.7	3.8	5.2
16-Oct	4.7	32.6	18.8	78	43	8.6	3.6	5.2
17-Oct	1.5	32.6	18.8	77	45	8.6	3.7	5.1
18-Oct	0.5	32.2	18.3	77	43	8.5	3.9	5.1
19-Oct	0.1	32.5	18.1	76	41	8.3	4.1	5.3
20-Oct	2.1	32.9	18.0	79	42	9.2	3.7	5.2
21-Oct	0.9	32.7	17.2	76	38	9.5	3.4	5.2
22-Oct	1.6	32.8	17.5	77	40	8.8	3.6	5.4
23-Oct	1.8	32.3	17.3	77	42	8.2	4.0	5.1
24-Oct	0.6	32.0	16.7	76	41	8.8	3.8	5.1
25-Oct	3.7	32.4	16.9	75	40	9.3	4.0	5.1
26-Oct	0.9	32.2	16.3	76	40	9.0	3.9	5.2
27-Oct	1.8	32.1	15.9	74	37	9.0	4.0	5.1
28-Oct	0.0	32.2	15.5	73	38	9.0	3.7	5.3
29-Oct	1.1	32.2	15.1	73	35	9.5	4.2	5.3
30-Oct	0.0	31.8	15.5	72	35	8.9	3.9	5.4
31-Oct	0.0	31.6	15.7	74	37	9.1	4.2	5.4

11.November

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Nov	3.1	31.5	15.5	74	38	9.2	4.5	5.2
02-Nov	0.1	31.1	15.3	74	39	9.2	4.2	5.1
03-Nov	0.1	31.4	15.3	73	41	9.4	4.2	5.1
04-Nov	0.0	31.2	15.2	76	39	9.2	3.8	5.1
05-Nov	1.2	31.7	15.0	74	35	9.6	3.5	5.3
06-Nov	0.0	31.9	14.8	73	35	9.9	3.4	5.1
07-Nov	0.0	31.9	14.4	72	34	9.7	3.2	5.2
08-Nov	0.0	31.7	15.1	74	39	9.5	4.0	5.2
09-Nov	3.0	31.5	14.8	74	40	9.2	4.3	4.8
10-Nov	0.2	31.2	15.3	72	39	9.1	3.8	5.0
11-Nov	0.4	31.6	15.0	75	37	8.5	3.9	4.7
12-Nov	0.3	31.2	14.6	74	38	8.8	3.7	4.8
13-Nov	0.3	31.3	14.1	74	39	9.3	3.2	4.7
14-Nov	0.5	31.0	14.4	75	37	8.9	3.2	4.8
15-Nov	0.8	31.4	14.6	74	38	9.2	3.6	4.9
16-Nov	0.2	31.2	14.5	75	36	8.8	3.9	4.9
17-Nov	0.3	31.0	14.1	77	40	9.0	4.1	5.0
18-Nov	0.8	30.7	14.3	76	40	8.8	4.1	4.8
19-Nov	1.6	30.7	14.4	76	39	8.5	3.9	4.8
20-Nov	1.9	30.7	13.6	78	39	9.1	3.4	4.7
21-Nov	1.0	30.3	13.4	79	38	9.1	3.4	4.7
22-Nov	0.4	30.3	13.4	78	38	9.3	3.4	4.6
23-Nov	0.1	30.5	18.1	75	38	9.3	3.4	4.6
24-Nov	0.4	30.4	13.7	76	39	9.3	3.1	4.5
25-Nov	0.1	30.4	12.8	76	36	8.8	3.3	4.5
26-Nov	0.0	30.7	12.5	75	33	9.5	3.1	4.6
27-Nov	0.0	31.0	12.5	73	32	9.8	3.0	4.6
28-Nov	0.2	31.1	12.6	73	34	9.4	3.1	4.7
29-Nov	0.0	30.7	13.1	75	34	9.2	3.2	4.7
30-Nov	0.7	30.8	12.5	75	34	9.4	3.2	4.6

12. December

Date	Rainfall (mm)	Temperature		Relative Humidity		BSS (Hrs/day)	WS (Km/hr)	EVP (mm)
		Tmax (^{0}C)	Tmin (^{0}C)	RH-I (%)	RH-II (%)			
01-Dec	2.6	30.6	12.5	75	35	9.4	3.1	4.5
02-Dec	0.3	30.3	13.0	74	35	9.5	2.9	4.4
03-Dec	0.9	30.5	12.9	75	35	9.3	3.0	4.4
04-Dec	0.0	30.1	12.4	72	35	9.2	3.4	4.5
05-Dec	0.0	30.2	12.0	75	35	9.1	3.3	4.4
06-Dec	1.7	29.8	11.1	75	34	9.2	3.5	4.6
07-Dec	0.1	29.6	11.5	75	35	8.5	3.4	4.5
08-Dec	0.0	29.8	11.0	76	35	9.1	3.3	4.3
09-Dec	1.3	29.6	11.2	77	31	9.2	3.3	4.1
10-Dec	0.0	30.2	11.0	77	30	9.8	2.9	4.3
11-Dec	0.0	29.8	10.8	77	31	9.5	3.0	4.2
12-Dec	0.0	29.9	10.3	75	32	9.7	3.0	4.3
13-Dec	0.1	29.7	10.7	76	30	9.2	3.1	4.4
14-Dec	0.0	29.5	11.0	75	33	9.3	3.1	4.3
15-Dec	0.0	29.2	10.9	76	33	9.2	3.3	4.4
16-Dec	0.0	29.4	10.1	76	30	9.5	3.3	4.3
17-Dec	0.8	29.4	9.9	73	34	9.5	3.2	4.4
18-Dec	0.0	28.9	9.5	76	32	9.0	3.7	4.4
19-Dec	0.0	28.8	9.0	76	30	9.7	3.3	4.3
20-Dec	0.0	29.2	9.6	74	30	9.8	3.2	4.4
21-Dec	0.0	29.3	9.7	73	31	9.7	3.1	4.3
22-Dec	0.0	29.5	9.8	74	29	9.7	2.9	4.2
23-Dec	0.0	29.7	9.9	73	31	9.6	2.9	4.2
24-Dec	0.0	29.4	9.4	73	30	9.4	3.0	4.3
25-Dec	0.0	29.4	9.6	72	30	9.3	3.0	4.3
26-Dec	0.0	29.0	9.6	74	30	9.0	2.9	4.4
27-Dec	0.0	28.7	9.7	75	30	9.6	3.4	4.2
28-Dec	0.0	28.7	9.7	75	33	9.4	3.3	4.2
29-Dec	0.3	28.8	9.4	75	32	9.3	3.1	4.2
30-Dec	0.1	29.3	11.0	74	34	9.2	3.8	4.3
31-Dec	0.1	29.4	11.5	75	35	8.7	3.0	4.3

Mean weekly rainfall (mm) decadal, 30 years and 42 years at Parbhani station

SMW	1977 to 1986	1987 to 1996	1997 to 2006	2007 to 201 8	Mean 1989 to 2018	Mean 1977 to 2018
1	0.1	0.0	0.7	1.0	0.6	0.5
2	3.4	5.0	7.1	0.7	4.3	3.9
3	6.0	2.1	0.2	0.0	0.7	2.0
4	1.1	1.3	1.1	0.0	0.4	0.8
5	0.1	0.0	1.6	0.0	0.5	0.4
6	4.7	0.3	4.2	0.0	1.5	2.2
7	2.7	0.0	0.0	2.0	0.8	1.2
8	2.4	0.6	1.4	1.0	0.9	1.3
9	0.1	0.3	1.9	5.7	3.0	2.2
10	2.0	6.2	7.5	7.3	7.3	5.8
11	2.6	7.8	0.0	3.3	3.9	3.4
12	0.6	1.5	0.6	0.8	1.0	0.9
13	1.9	3.3	0.4	0.1	1.3	1.3
14	1.4	1.0	1.4	1.7	1.5	1.4
15	1.5	1.8	4.6	3.8	3.5	3.0
16	0.2	1.3	0.0	7.2	3.2	2.4
17	2.6	1.1	0.4	1.0	0.9	1.3
18	1.8	3.7	1.8	3.9	3.4	2.9
19	2.0	2.8	1.1	0.8	1.6	1.6
20	3.0	1.2	11.6	1.6	4.6	4.2
21	1.2	12.6	7.0	1.4	7.0	5.4
22	11.6	5.9	10.8	4.2	7.2	7.9
23	27.8	42.5	13.1	43.6	34.4	32.3
24	37.7	57.3	44.9	35.1	43.8	43.3
25	36.5	69.0	28.4	34.5	40.6	41.7
26	25.6	39.8	49.8	36.7	44.0	37.9
27	42.2	27.5	41.1	45.3	38.8	39.3
28	35.5	48.5	50.7	48.6	50.5	46.0
29	34.9	62.8	30.1	44.7	43.1	43.2
30	74.7	62.7	104.5	46.9	70.3	71.0
31	52.3	46.5	76.0	33.4	48.7	51.2
32	53.6	50.4	87.0	24.7	51.1	52.6

33	36.6	73.5	19.5	41.6	41.2	42.7
34	17.9	62.8	68.9	67.5	62.4	54.9
35	23.5	88.5	46.9	51.1	59.2	52.4
36	30.4	44.5	56.7	42.9	46.4	43.6
37	46.9	38.6	14.0	45.5	34.6	36.7
38	26.7	24.0	45.5	57.9	42.4	39.4
39	52.9	24.9	16.2	18.4	17.5	27.6
40	40.1	27.0	41.6	29.9	31.7	34.4
41	8.8	25.9	25.5	25.1	26.8	21.5
42	0.6	12.4	33.1	2.1	15.1	11.6
43	5.2	18.5	10.4	2.2	10.5	8.7
44	1.4	2.4	8.7	1.7	4.4	3.5
45	4.8	0.6	8.2	5.0	4.7	4.6
46	0.7	7.0	1.5	3.7	3.1	3.2
47	4.1	5.7	3.0	6.8	5.3	5.0
48	8.6	0.0	10.1	0.8	3.7	4.7
49	0.0	5.3	3.8	2.2	3.9	2.8
50	0.3	0.3	0.4	0.0	0.1	0.2
51	4.6	0.0	2.4	0.1	0.8	1.7

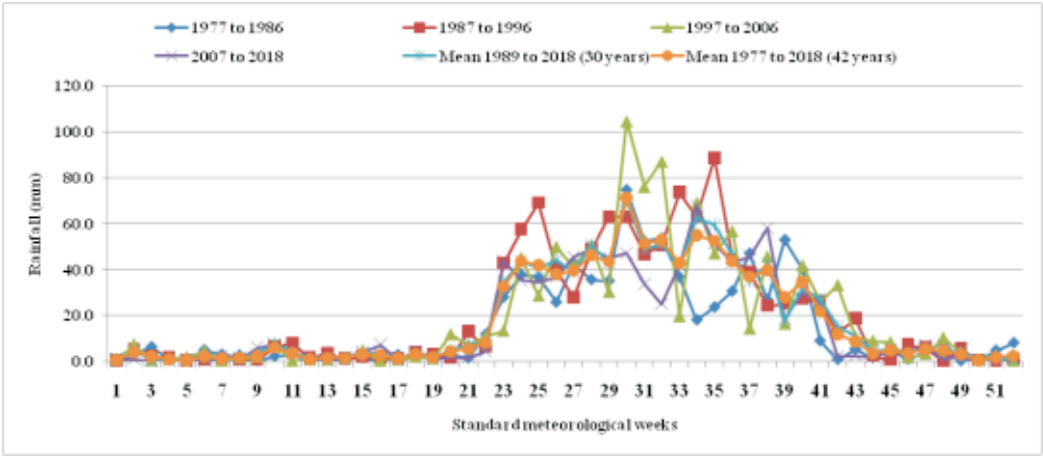
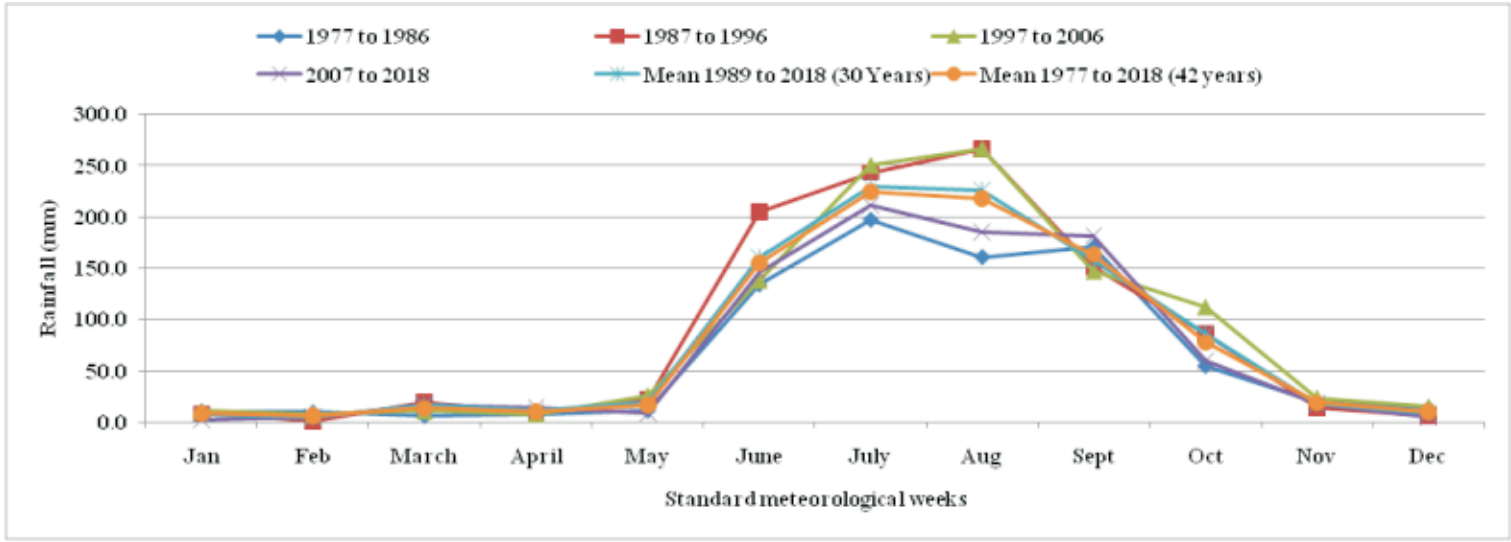


Fig. Mean weekly rainfall (mm) decadal, 30 years and 42 years at Parbhani station

Mean monthly rainfall (mm) decadal, 30 years and 42 years at Parbhani station

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1977 to 1986	10.6	9.5	6.1	7.2	11.3	134.2	197.1	160.8	171.0	54.9	19.1	13.7	795.5
1987 to 1996	8.4	0.8	19.1	8.4	21.7	204.7	243.4	266.4	151.0	86.0	13.4	6.3	1029.6
1997 to 2006	10.0	6.6	10.1	7.1	25.3	137.6	249.6	265.8	146.3	111.6	22.8	14.2	1007.1
2007 to 2018	1.7	4.7	15.5	13.9	7.8	145.4	210.9	184.5	181.3	59.2	17.3	3.8	845.9
Mean 1989 to 2018	6.3	4.2	15.7	10.4	18.4	160.0	229.3	225.8	157.9	85.1	17.3	8.2	938.7
Mean 1977 to 2018	7.4	5.4	12.8	9.4	16.1	155.0	224.6	217.7	163.3	77.0	18.1	9.2	916.0



Monthly normal soil temperature of different depth at Parbhani

Months	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
January	18.0	35.2	20.1	29.6	23.2	24.4
Feb	20.4	39.4	22.9	33.2	25.0	27.2
March	23.7	43.3	26.3	36.8	28.5	29.6
April	27.8	48.0	30.2	41.1	32.2	33.3
May	31.8	48.9	33.5	42.5	34.7	35.8
June	28.3	41.8	30.1	38.2	33.5	33.0
July	26.5	34.9	27.4	32.8	29.4	29.8
August	25.6	35.6	27.1	32.2	28.3	28.9
September	25.7	37.7	26.9	34.3	29.0	31.0
October	24.9	39.4	26.0	35.6	28.6	29.7
November	21.1	91.9	22.9	32.2	26.1	27.3
December	17.9	34.3	20.4	29.6	22.8	24.9

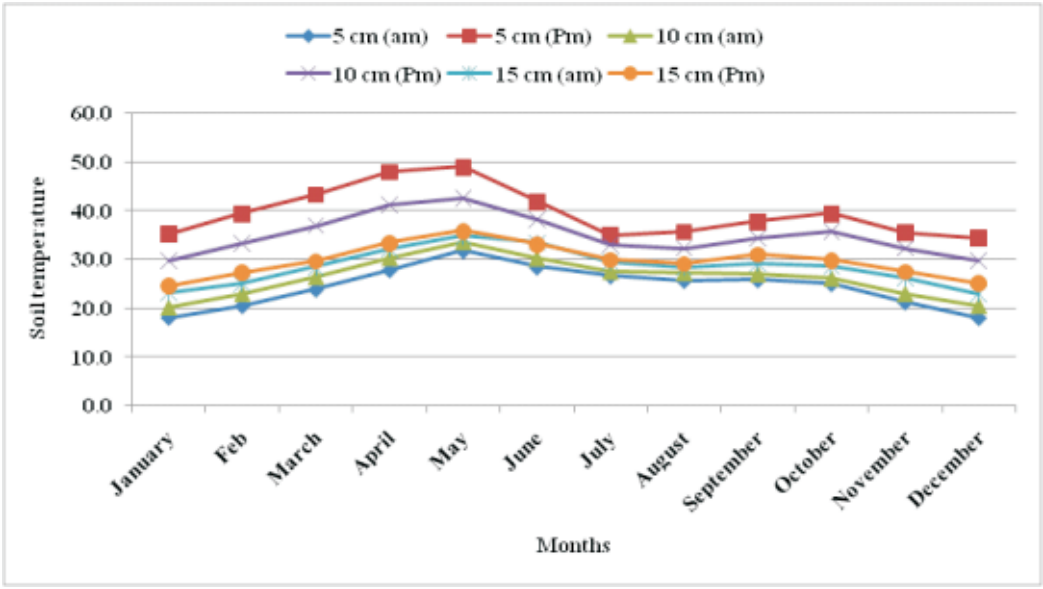


Fig. Monthly normal soil temperature of different depth at Parbhani

Weekly normal soil temperature of different depth at Parbhani

SMW	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1	17.7	35.6	19.9	28.9	23.2	24.5
2	17.4	34.4	19.3	29.1	22.6	23.8
3	17.9	35.1	19.8	29.8	23.0	24.4
4	18.4	35.5	20.6	30.2	23.4	24.5
5	19.2	36.9	21.4	31.3	24.1	25.4
6	19.7	37.7	21.8	31.9	24.3	29.1
7	20.3	39.3	23.8	33.0	24.8	26.1
8	21.1	40.9	23.3	34.5	25.7	27.1
9	20.3	41.8	23.4	35.9	26.1	28.4
10	22.6	42.0	24.7	35.4	27.3	28.2
11	23.6	42.5	25.7	36.3	28.6	29.6
12	24.7	44.2	27.0	38.1	29.0	30.5
13	25.5	45.6	29.3	39.0	30.0	31.4
14	26.5	49.1	30.1	40.1	30.7	32.2
15	27.2	47.0	29.4	40.8	31.8	32.7
16	28.3	47.5	30.2	41.6	32.6	33.5
17	29.2	48.3	31.3	42.2	33.5	34.6
18	30.0	48.8	35.7	42.6	34.0	35.0
19	32.1	48.3	32.3	42.4	34.5	35.5
20	30.8	51.2	32.8	42.7	35.0	36.3
21	34.3	47.9	33.1	42.2	35.1	36.2
22	30.9	49.6	32.9	41.7	34.7	35.7
23	29.2	46.0	31.3	39.0	33.2	34.1
24	28.2	41.0	29.8	42.6	37.7	33.0
25	27.6	38.4	29.2	35.1	31.3	32.1
26	27.1	37.2	28.5	34.4	31.1	31.8
27	26.7	36.2	28.0	33.4	29.9	30.2
28	26.1	34.7	27.3	32.5	28.9	29.4
29	26.2	34.4	27.3	32.0	29.4	29.8
30	27.2	34.1	26.8	33.5	29.3	29.8
31	25.7	33.8	27.0	31.8	28.8	29.5
32	25.5	34.6	27.0	31.8	28.4	28.9
33	25.8	35.5	26.9	32.6	28.5	29.2
34	25.4	38.7	26.3	32.3	27.8	28.5
35	25.5	35.2	28.1	32.9	28.1	28.9
36	25.4	38.8	26.7	34.2	28.7	29.9
37	25.9	37.3	26.9	34.4	28.9	33.9
38	25.8	36.4	26.7	33.3	28.8	29.7
39	25.9	38.8	27.4	35.5	29.8	30.9
40	25.9	40.8	26.9	35.2	29.5	30.5
41	26.1	38.7	26.8	35.2	29.1	30.2

42	24.8	41.3	26.0	39.3	28.5	29.8
43	23.7	37.8	25.1	33.7	27.9	29.1
44	22.2	36.6	23.9	32.8	26.9	28.2
45	21.8	275.9	23.3	32.4	27.0	28.3
46	21.5	35.9	22.7	33.5	25.8	27.0
47	20.2	35.7	22.4	31.4	25.8	26.7
48	20.1	35.6	23.5	30.9	25.1	26.3
49	19.0	35.2	21.2	30.0	23.9	25.0
50	18.2	34.4	20.1	29.4	22.6	23.9
51	17.0	33.8	19.6	28.8	22.5	23.8
52	16.9	33.9	19.2	30.1	22.1	26.6

Daily normal soil temperature of different depth at Parbhani

1.January

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Jan	17.9	33.7	20.2	29.0	23.4	24.4
2-Jan	17.8	33.8	20.0	28.8	23.3	24.6
3-Jan	17.9	33.9	19.9	28.8	22.7	24.2
4-Jan	17.9	34.3	20.0	29.0	23.3	24.5
5-Jan	17.7	34.3	19.8	29.1	23.5	24.7
6-Jan	17.5	33.5	19.8	29.1	23.4	24.7
7-Jan	17.5	45.6	19.9	28.4	22.9	24.3
8-Jan	17.0	33.5	19.6	28.7	22.4	23.5
9-Jan	17.1	34.0	19.4	29.0	21.9	23.4
10-Jan	17.3	34.6	19.3	29.2	22.5	23.9
11-Jan	17.0	34.5	19.0	29.0	22.6	23.9
12-Jan	17.7	34.5	19.0	29.0	22.8	23 .9
13-Jan	17.9	34.6	19.6	29.2	23.2	24.0
14-Jan	17.7	35.0	19.4	29.8	23.2	24.1
15-Jan	18.3	35.0	19.7	29.8	23.2	24.2
16-Jan	18.1	35.4	19.7	29.9	23.3	24.4
17-Jan	18.0	35.4	19.9	30.0	23.3	24.3
18-Jan	17.9	35.0	20.1	29.5	23.0	24.4
19-Jan	18.0	34.8	19.9	30 .1	23.3	24.7
20-Jan	17.3	35.0	19.6	29.6	23.0	24.4
21-Jan	17.4	34.9	19.6	29.4	22.3	24.1
22-Jan	17.4	35.1	19.8	29.9	22.5	24.0
23-Jan	18.1	35.3	20.3	29.8	23.4	24.0
24-Jan	18.3	35.4	20.5	30.1	23.1	24.2
25-Jan	18.5	35.3	20.9	30.2	23.6	25.1
26-Jan	18.7	35 .7	20.7	30.4	23.5	24.7
27-Jan	18.9	35.8	21.0	30.7	24.1	25.0
28-Jan	18.7	35.7	20.8	30.5	23.8	24.7
29-Jan	18.9	36.0	21.0	30.6	24.0	24.8
30-Jan	19.3	35.9	21.6	30.8	24.1	25.0
31-Jan	19.2	36.5	21.4	31.2	24.1	25.3

2.February

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Feb	19.0	37.0	21.5	31.4	23.9	25.8
2-Feb	19.2	37.6	21.3	31.5	24.0	25.2
3-Feb	19.5	37.5	21.1	31.6	24.1	25.7
4-Feb	19.3	38.0	21.6	31.7	24.1	25.7
5-Feb	19.3	37.8	21.5	32.0	24.3	25.3
6-Feb	20.0	37.7	22.1	31.9	24.9	26.1
7-Feb	19.9	37.3	22.0	32.0	24.9	25.9
8-Feb	19.3	37.3	21.7	31.6	24.6	26.2
9-Feb	20.1	37.8	21.8	32.1	24.2	49.8
10 -Feb	19.8	37.7	21.8	32.2	23.8	25.5
11 -Feb	19.4	37.9	21.8	31.8	23.5	25.3
12 -Feb	19.9	38.7	22.1	32.4	24.2	25.4
13 -Feb	20.3	38.9	22.5	32.3	24.6	25.9
14 -Feb	20.1	39.2	22.2	32.9	24.6	25.8
15 -Feb	20.9	39.5	23.0	33.4	25.4	26.4
16 -Feb	20.5	39.7	31.9	32.9	25.2	26.5
17 -Feb	20.2	39.1	22.2	33.1	24.5	26.1
18 -Feb	20.3	40.1	22.5	33.9	25.0	26.5
19 -Feb	20.5	40.0	22.5	33.8	25.0	26.2
20 -Feb	20.9	40.7	22.9	34.2	25.4	26.9
21 -Feb	20.9	40.9	23.0	34.3	25.4	27.0
22 -Feb	20.3	40.8	23.2	34.3	25.5	27.1
23 -Feb	21.5	41.4	23.7	35.0	26.1	27.3
24 -Feb	21.6	41.2	23.8	35.0	26.3	27.6
25 -Feb	21.8	41.5	23.9	35.0	26.4	27.4
26 -Feb	21.8	41.6	23.9	35.1	26.3	27.3
27 -Feb	22.0	41.9	23.9	35.0	26.2	27.1
28 -Feb	22.2	41.1	24.3	35.2	26.6	27.8
29 F eb	20.6	42.6	23.1	35.3	25.0	26.6

3. March

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Mar	21.9	41.7	24.1	35.0	26.7	27.9
2-Mar	21.8	41.9	23.7	35.0	27.0	27.8
3-Mar	21.8	41.8	23.9	34.9	26.9	27.7
4-Mar	21.7	42.0	23.6	35.5	27.1	27.9
5-Mar	22.0	42.1	24.2	35.2	27.4	28.0
6-Mar	22.9	42.2	24.9	35.7	27.4	27.9
7-Mar	22.3	42.1	24.6	35.4	27.0	27.9
8-Mar	22.3	42.0	24.8	35.3	27.3	28.2
9-Mar	23.0	42.0	24.9	35.0	27.2	28.2
10 -Mar	23.0	41.4	24.8	35.0	27.0	28.3
11 -Mar	22.9	42.4	24.9	36.0	27.9	29.3
12 -Mar	23.7	42.8	25.5	36.3	28.4	29.1
13 -Mar	23.3	42.4	25.3	35.9	28.6	29.6
14 -Mar	23.1	42.1	25.2	35.8	28.3	29.5
15 -Mar	23.5	42.3	25.7	36.4	28.8	29.9
16 -Mar	24.0	41.9	26.0	35.8	28.4	29.5
17 -Mar	23.8	42.6	26.1	36.5	28.8	29 .8
18 -Mar	23.9	43.1	26.3	37.2	28.8	30.0
19 -Mar	24.3	43.5	26.5	37.5	28.9	30.3
20 -Mar	24.8	44.0	27.1	38.2	29.3	30.2
21 -Mar	24.6	44.0	27.2	38.4	29.0	30.5
22 -Mar	24.8	44.2	27.3	38.4	29.1	30.4
23 -Mar	24.6	44.3	27.2	38.0	28.9	30.6
24 -Mar	24.9	44.3	26.9	37 .7	29.2	30.5
25 -Mar	24.7	45.0	27.0	38.7	28.8	30.7
26 -Mar	25.2	44.7	27.6	38.5	29.8	31.0
27 -Mar	25.3	45.1	27.6	38.9	29.6	30.8
28 -Mar	25.3	45.5	27.7	39.1	30.1	31.2
29 -Mar	25.6	45.2	38.8	38.7	30.3	32.0
30 -Mar	25.6	45.8	27.1	39.0	30.3	31.3
31 -Mar	25.6	46 .4	27.9	39.5	30.0	31.4

4. April

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Apr	25.7	46.8	28.0	39.4	29.9	32.1
2-Apr	25.7	46.6	28.1	39.6	29.9	32.0
3-Apr	26.0	46.4	37.8	39.9	30.1	31.7
4-Apr	26.0	46.1	28.5	40.3	30.4	31.8
5-Apr	26.7	65.6	28.7	40.5	30.8	32.4
6-Apr	26.9	46.2	28.7	39.8	30.6	32.2
7-Apr	26.6	46.5	28.9	40.2	31.0	32.6
8-Apr	27.5	46.6	29.6	40.5	31.7	32.6
9-Apr	27.1	46.7	29.5	40.7	31.5	32.4
10-Apr	27.3	46.5	29.5	40.5	31.7	32.6
11-Apr	26.8	47.3	29.0	40.8	31.7	32.5
12-Apr	26.8	47.0	29.3	40.7	31.8	32.5
13-Apr	27.1	47.4	29.5	40.9	31.7	33.0
14-Apr	27.4	47.0	29.6	40.9	32.0	33.1
15-Apr	27.8	47.4	29.8	41.2	32.4	33.0
16-Apr	27.8	47.6	29.8	41.7	32.5	33.3
17-Apr	27.8	47.0	29.7	41.3	32.5	33.6
18-Apr	27.5	47.8	29.8	41.6	32.4	33.3
19-Apr	28.1	47.8	30.2	41.4	32.3	33.3
20-Apr	28.5	46.8	30.4	41.9	32.8	33.6
21-Apr	28.8	47.2	30.5	41.5	32.6	33.6
22-Apr	29.2	48.2	31.0	41.9	33.1	34.0
23-Apr	28.6	47.6	30.8	41.5	32.7	33.6
24-Apr	28.9	47.1	30.9	41.5	33.4	34.2
25-Apr	29.2	48.2	30.8	42.0	33.4	34.6
26-Apr	28.7	48.5	30.8	42.5	33.3	34.2
27-Apr	29.3	48.5	31.7	42.6	33.7	34.9
28-Apr	29.8	49.1	31.9	42.8	34.1	35.1
29-Apr	29.8	49.0	32.0	42.4	34.2	35.5
30-Apr	29.7	48.0	31.9	42.0	34.2	35.5

5. May

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-May	29.8	49.1	32.0	42 .8	34.1	35.6
2-May	29.9	49.1	31.9	42.9	33.8	34.9
3-May	30.2	48.6	32.0	42.7	34.0	34.6
4-May	30.1	49.0	31.9	43.0	33.7	34.7
5-May	30.0	49.2	58.1	43.0	33.8	34.6
6-May	30.2	48.6	32.0	42.2	34.2	35.3
7-May	30.3	49.0	32.1	42.9	34.6	35.7
8-May	30.4	48.5	32.2	42.0	34.0	34.9
9-May	30.3	48.7	32.2	42.3	34.0	35.1
10 -May	30.5	48.3	32.4	42.5	34.4	35.6
11 -May	30.4	48.8	32.6	42.6	34.4	35.6
12 -May	42.2	46.9	32.5	42.0	35.0	35.8
13 -May	30.3	47.8	32.5	42.6	35.2	36.1
14 -May	30.4	48.5	32.7	42.7	35.4	36.4
15 -May	30.6	68.0	32.7	43.1	35.1	36.2
16 -May	30.8	49.0	32.9	43.3	35.7	36.8
17 -May	30.7	48.7	32.4	43.0	34.8	36.5
18 -May	31.0	48.0	32.9	42.5	35.3	36.7
19 -May	31.2	47.8	33.1	42.1	34.8	36.1
20 -May	30.7	48.1	32.7	42.5	34.2	35.5
21 -May	31.1	48.7	32.9	43.1	34.7	36.3
22 -May	31.4	49.2	33.3	42.2	35.3	36.0
23 -May	31.5	47.9	33.5	42.0	35.7	36.8
24 -May	31.3	47.7	33.4	42.4	35.3	36.6
25 -May	42.5	48.1	33.2	42.5	35.0	36.4
26 -May	42.2	47.0	32.7	41.4	35.1	35.9
27 -May	30.4	46.9	32.8	41.5	34.8	35.7
28 -May	30.7	48.0	33.0	42.1	35. 3	36.6
29 -May	30.8	47.9	32.9	42.1	35.1	36.5
30 -May	31.1	48.1	32.9	42.5	34.5	35.8
31 -May	31.2	48.1	33.2	42.5	35.2	35.9

6. June

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Jun	31.1	46.2	33.1	41.5	34.3	35.7
2-Jun	31.1	62.3	33.2	40.3	34.4	34.9
3-Jun	30.3	46.4	32.2	40.8	33.9	34.9
4-Jun	29.6	44.8	31.6	39.9	33.4	34.4
5-Jun	29.5	44.3	32.0	40.7	33.7	34.5
6-Jun	29.2	43.4	31.2	39.3	33.9	34.8
7-Jun	29.1	42.2	30.7	38.0	33.2	34.1
8-Jun	29.1	62.9	31.6	38.2	33.3	33.9
9-Jun	28.8	42.1	31.2	38.0	32.2	33.4
10-Jun	28.8	42.4	30.8	38.9	32.4	33.5
11-Jun	28.5	41.8	30.9	38.3	31.6	33.2
12-Jun	28.4	41.2	30.7	37.9	32.6	33.6
13-Jun	28.6	42.2	30.1	62.6	32.5	33.5
14-Jun	28.3	40.8	29.7	36.4	32.8	33.6
15-Jun	28.0	40.1	29.2	35.9	32.4	33.1
16-Jun	27.8	40.4	28.9	51.1	70.2	32. 2
17-Jun	27.9	40.4	29.4	36.2	31.6	32.2
18-Jun	28.1	38.5	29.2	34.9	31.8	32.4
19-Jun	28.0	39.0	29.3	35.3	32.0	33.1
20-Jun	27.3	37.8	29.1	35.2	31.7	32.4
21-Jun	27.3	38.5	29.1	35.3	30.6	31.7
22-Jun	27.5	39.1	29.4	35.8	31.0	31.8
23-Jun	27.4	38.2	29.4	35. 1	30.8	31.4
24-Jun	27.6	37.6	29.0	34.1	31.3	31.7
25-Jun	27.4	37.0	28.8	34.0	31.3	32.0
26-Jun	27.4	36.3	28.8	33.8	31.9	32.4
27-Jun	27.3	38.0	28.5	35.2	30.9	32.0
28-Jun	26.9	36.5	28.6	34.2	30.9	31.6
29-Jun	27.1	37.1	28.5	34.2	31.1	31.6
30-Jun	27.0	37. 4	28.3	34.4	30.5	31.6

7. July

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Jul	27.0	37.9	28.4	34.8	30.9	31.8
2-Jul	26.8	37.5	28.4	34.8	30.7	31.4
3-Jul	27.0	36.9	28.3	33.5	30.9	31.1
4-Jul	26.9	37.3	28.2	33.8	30.8	31.6
5-Jul	26.5	36.1	27.9	33.6	30.6	30.3
6-Jul	26.6	36.3	28.0	33.5	29.5	29.7
7-Jul	26.7	34.6	27.9	32.4	28.7	28.6
8-Jul	26.3	34.7	27.3	32.3	28.0	28.5
9-Jul	26.0	34.5	27.2	32.7	28.6	29.0
10-Jul	26.1	35.5	27.1	33.0	28.8	29.4
11-Jul	26.1	34.1	27.3	32.3	29.1	29.6
12-Jul	25.9	35.1	27.0	32.6	28. 9	29.3
13-Jul	26.4	35.4	27.6	32.6	28.9	29.0
14-Jul	26.4	34.8	27.6	32.7	28.7	29.4
15-Jul	26.2	33.8	27.5	32.0	29.2	29.9
16-Jul	26.4	34.2	27.3	32.6	29.5	29.7
17-Jul	26.4	35.2	27.5	32.7	29.3	29.6
18-Jul	26.1	34.8	27.4	31.8	29.4	29.6
19-Jul	26.1	34.0	27. 2	31.4	29.2	29.7
20-Jul	26.2	34.2	27.3	32.0	29.5	30.0
21-Jul	26.1	35.1	27.3	32.3	29.3	29.9
22-Jul	26.0	33.5	27.1	31.0	29.6	30.0
23-Jul	25.6	34.0	26.6	31.2	29.7	30.4
24-Jul	36.0	34.2	26.8	43.7	29.4	29.8
25-Jul	25.6	34.6	26.7	32.4	29.0	29.5
26-Jul	25. 9	34.6	27.1	32.5	29.0	29.7
27-Jul	25.6	33.1	26.9	31.3	29.3	29.9
28-Jul	25.7	33.9	26.8	31.6	29.6	30.0
29-Jul	25.8	34.5	27.0	31.9	29.1	29.6
30-Jul	25.9	34.6	27.0	31.7	29.1	29.6
31-Jul	25.7	33.7	26.6	31.6	28.9	29.3

8. August

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Aug	25.6	34.6	26.9	31.7	28.8	29.5
2-Aug	25.9	34.1	27.2	31.8	28.5	29.3
3-Aug	25.8	34.0	27.2	32.2	28.7	29.6
4-Aug	25.9	32.9	27.3	31.7	28.8	29.4
5-Aug	25.2	32.9	26.7	31.7	29.0	29.8
6-Aug	25.6	33.3	27.1	31.1	29.3	29.7
7-Aug	25.6	34.0	27. 1	31.8	29.1	29.7
8-Aug	25.6	35.0	27.1	31.9	28.7	28.8
9-Aug	25.6	34.7	27.2	31.7	28.0	28.5
10-Aug	25.4	34.7	26.9	31.6	27.9	28.5
11-Aug	25.5	35.2	27.1	32.3	28.1	29.0
12-Aug	25.5	35.2	26.7	32.1	27.9	28.3
13-Aug	25.6	34.0	26.8	31.6	28.2	28.6
14-Aug	25.5	34.8	26.8	31.7	28.3	29.0
15-Aug	25.5	35.6	27.0	32.8	28.8	29.8
16-Aug	25.6	35.8	26.8	33.0	28.4	28.9
17-Aug	25.7	37.1	26.7	33.7	28.4	29.4
18-Aug	26.4	35.7	27.2	32.9	28.9	29.5
19-Aug	26.4	35.8	26.9	32.6	28.1	29.3
20-Aug	25.7	34.5	26.4	32.4	27.7	28.4
21-Aug	25.5	33.5	26.6	31.9	27.4	27.9
22-Aug	25.3	62.0	26.1	31.8	27.9	28.6
23-Aug	25.3	35.0	26.3	32.4	27.6	28.5
24-Aug	25.5	35.8	26.4	32.3	28.4	29.1
25-Aug	25.2	35.4	26.1	32.7	28.2	28.6
26-Aug	25.3	34.3	26.4	32.5	27.7	28.6
27-Aug	25.2	33.9	26.2	31.9	27. 7	28.3
28-Aug	25.2	34.2	36.7	32.0	27.4	28.1
29-Aug	25.6	34.5	26.6	32.6	27.7	28.5
30-Aug	25.6	35.4	26.8	33.4	27.9	28.9
31-Aug	25.6	35.3	26.8	32.9	28.5	29.3

9. September

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Sep	25.4	36.4	26.7	33.9	28.5	29.6
2-Sep	25.3	36.5	26.7	33.7	28.7	29.6
3-Sep	25.4	36.3	26.7	34.6	28.7	30.2
4-Sep	25.5	53.1	26.8	34.6	29.0	30.3
5-Sep	25.6	35.9	26.9	34.4	29.0	30.1
6-Sep	25.1	36.4	26.6	34.5	29.0	30.2
7-Sep	25.2	36.0	26.7	34.5	28.7	29.6
8-Sep	25.4	36.3	26.9	33.2	28.6	29.4
9-Sep	25.4	37.5	26.4	33.7	28.2	29.3
10-Sep	25.7	36.5	26.9	33.6	28.5	29.6
11-Sep	25.6	36.7	27.0	34.3	28.8	29.8
12-Sep	25.8	38.5	27.2	35.3	29.0	30.5
13-Sep	25.8	38.6	26.8	35.3	29.1	30.1
14-Sep	26.2	37.8	27.1	34.8	29.2	30.2
15-Sep	26.1	36.4	26.8	33.5	29.0	57.1
16-Sep	25.9	36.8	26.7	33.7	28.6	29.6
17-Sep	26.0	35.3	26.8	32.8	28.6	29.9
18-Sep	26.0	35.8	27.0	33.2	29.0	29.9
19-Sep	26.1	35.9	26.9	32.9	29.0	29.6
20-Sep	25.7	36.5	26.6	33.2	28.8	29.6
21-Sep	25.6	36.0	26.4	32.6	28.8	29.3
22-Sep	25.5	36.9	26.4	34.0	28.5	29.3
23-Sep	25.7	38.2	26.9	34.7	29.2	30.4
24-Sep	26.0	37.8	27.5	34.5	29.7	30.9
25-Sep	25.8	38.4	27.4	35.3	29.4	30.8
26-Sep	25.9	39.3	27.3	35.9	30.1	31.1
27-Sep	25.7	39.3	27.2	35.9	29.9	31.1
28-Sep	26.1	39.6	27.5	36.3	30.0	31.0
29-Sep	25.9	38.5	27.3	35.3	29.9	30.9
30-Sep	26.2	38.7	27.4	35.3	29.7	30.7

10. October

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Oct	26.6	56.0	27.1	35.1	30.2	31.5
2-Oct	26.0	38.3	27.1	35.1	30.1	31.0
3-Oct	25.7	37.6	26.7	35.4	29.6	30.5
4-Oct	25.7	37.7	26.8	34. 7	29.3	30.3
5-Oct	25.6	38.8	26.8	35.1	29.1	29.9
6-Oct	25.7	38.0	26.8	35.1	29.2	30.0
7-Oct	25.8	39.4	27.2	35.6	29.4	30.4
8-Oct	25.9	39.1	27.2	35.5	28.9	30.3
9-Oct	27.4	38.8	26.8	35.5	28.9	30.3
10 -Oct	25.7	38.4	27.2	35.2	29.0	30.4
11 -Oct	27.5	39.2	26. 9	34.8	29.2	30.0
12 -Oct	25.7	38.3	26.9	36.2	29.5	30.3
13 -Oct	25.2	38.2	26.1	34.6	28.8	30.1
14 -Oct	25.5	38.7	26.5	34.8	29.1	29.9
15 -Oct	25.4	38.5	26.4	35.2	28.9	29.9
16 -Oct	25.1	52.7	26.2	34.6	28.8	29.9
17 -Oct	25.1	38.7	26.1	34.5	29.1	30.3
18 -Oct	24. 3	39.5	25.5	35.3	28.2	29.7
19 -Oct	24.6	40.2	25.7	65.6	28.4	29.6
20 -Oct	24.8	40.1	26.3	35.1	28.3	29.6
21 -Oct	24.7	39.4	25.9	34.8	27.9	29.3
22 -Oct	24.6	39.2	25.9	34.3	28.4	29.9
23 -Oct	24.3	38.7	25.8	34.0	28.4	29.1
24 -Oct	23.8	38.9	25.1	33.9	28.1	29.2
25 -Oct	24.7	37.2	25.1	33.7	27.4	28.8
26 -Oct	23.0	35.9	24.8	33.5	27.6	29.0
27 -Oct	22.9	37.1	24.7	33.7	27.6	28.8
28 -Oct	22.8	37.3	24.5	33.2	28.0	29.1
29 -Oct	22.3	35.9	23.9	33.3	27.3	28.4
30 -Oct	22.3	36.8	24.0	33.0	27.0	28.1
31 -Oct	22.7	37.4	24.1	33.0	26.9	28.1

11.November

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Nov	22.2	36.0	23.9	32.4	26.7	27.9
2-Nov	21.9	36.5	23.7	32.3	26.7	27.7
3-Nov	22.0	36.7	24.0	32.9	27.1	28.5
4-Nov	21.9	37.0	24.0	32.9	27.0	28.6
5-Nov	22.4	37.4	23.7	33.1	27.2	28.4
6-Nov	22.1	37.8	23.8	32.7	27.2	28.3
7-Nov	21.7	37.7	23.9	32.8	27.3	28.7
8-Nov	21.9	36.9	23.4	32.6	27.4	28.9
9-Nov	21.0	36.3	22.8	32.5	26.9	28.3
10-Nov	22.1	17.8	23.1	32.0	26.8	28.1
11-Nov	21.5	35.5	22.7	31.0	26.2	27.3
12-Nov	21.4	36.4	23.2	31.7	26.5	27.6
13-Nov	21.4	35.9	22.9	43.8	25.8	27.2
14-Nov	21.5	36.6	22.5	32.1	25.5	26.8
15-Nov	22.0	35.8	23.1	31.4	25.7	27.3
16-Nov	21.7	35.6	22.6	31.7	25.6	26.7
17-Nov	21.7	35.3	22.4	31.5	25.5	26.4
18-Nov	21.0	35.7	22.4	31.9	25.8	26.8
19-Nov	20.6	35.6	22.6	31.8	25 .8	26.7
20-Nov	19.8	35.5	21.9	31.1	25.7	26.7
21-Nov	19.6	35.8	21.7	31.4	25.5	26.7
22-Nov	19.7	35.6	21.7	31.3	25.4	26.3
23-Nov	20.4	36.2	23.0	31.7	25.9	26.9
24-Nov	20.8	35.8	23.5	31.2	26.3	27.1
25-Nov	20.3	35.7	22.6	31.5	26.1	26.7
26-Nov	20.0	36.2	22 .5	31.9	26.2	27.4
27-Nov	20.4	36.1	22.5	31.5	25.9	27.1
28-Nov	20.1	36.2	21.7	30.8	25.4	26.3
29-Nov	20.2	35.7	22.6	30.3	24.4	26.1
30-Nov	20.2	35.3	22.5	30.6	24.6	25.9

12. December

Dates	5 cm		10 cm		20 cm	
	Am	Pm	Am	Pm	Am	Pm
1-Dec	20.1	35.1	30.5	30.4	24.7	26.2
2-Dec	19.9	34.4	22.3	30.5	24.3	25.2
3-Dec	19.8	35.2	22.0	30.1	24.3	25.3
4-Dec	19.7	35.4	22.1	30.2	23.9	25.1
5-Dec	19.3	35.2	21.9	30.0	23.9	25.0
6-Dec	19.1	35.0	21.6	30.0	24.3	25.2
7-Dec	18.6	35.2	20.7	30.1	24.0	25.0
8-Dec	17.9	35.5	20.1	29.8	23.4	24.8
9-Dec	18.2	35.0	20.3	29.5	23.4	24.6
10-Dec	18.5	35.5	20.4	30.2	23.1	24.5
11-Dec	18.2	35.3	20.3	29.8	22.4	23.7
12-Dec	18.1	34.3	20.1	29.2	22.6	23.9
13-Dec	18.1	33.2	20.1	29.2	22.5	24.1
14-Dec	18.3	34.5	20.0	29.0	22.3	23.8
15-Dec	18.2	34.2	20.0	29.4	22.6	23.8
16-Dec	17.9	33.9	19.7	28.8	22.6	23.8
17-Dec	17.6	33.4	19.8	28.4	22.4	23.8
18-Dec	16.7	33.2	18.9	28.3	22.8	23.8
19-Dec	16.4	34.0	19.0	28.8	22.4	23.6
20-Dec	16.6	33.9	19.6	28.9	21.8	23.6
21-Dec	17.4	33.8	20.1	29.2	22.6	23.8
22-Dec	17.0	34.3	20.0	29.3	22.8	24.3
23-Dec	17.1	34.0	19.9	28.7	22.8	23.9
24-Dec	17.1	34.2	19.6	40.5	22.5	24.6
25-Dec	17.0	34.2	19.6	29.2	22.2	23.9
26-Dec	16.4	33.5	19.3	28.6	21.9	23.4
27-Dec	16.9	33.5	19.2	28.5	21.8	23.4
28-Dec	16.3	33.7	19.3	28.7	22.1	46.5
29-Dec	16.3	33.4	18.4	28.1	21.9	23.7
30-Dec	16.9	34.1	18.9	28.4	21.7	23.0
31-Dec	18.0	34.5	19.6	28.7	22.5	23.9

Normal weekly normal evapotranspiration at Parbhani

SMW	ET_0 (FAO modified penman-monteith method)
1	2.5
2	2.7
3	2.8
4	2.9
5	3.1
6	3.2
7	3.5
8	3.6
9	3.8
10	4.0
11	4.2
12	4.2
13	4.4
14	4.6
15	4.7
16	4.8
17	4.9
18	5.0
19	4.8
20	4.8
21	4.9
22	4.8
23	4.5
24	3.6
25	3.4
26	3.4
27	2.9
28	2.8
29	2.6
30	2.4
31	2.7
32	2.4
33	2.8
34	2.9
35	3.0
36	3.3
37	3.6

28	2.8
29	2.6
30	2.4
31	2.7
32	2.4
33	2.8
34	2.9
35	3.0
36	3.3
37	3.6
38	3.6
39	4.1
40	3.9
41	3.9
42	3.7
43	3.5
44	3.3
45	3.2
46	2.9
47	2.9
48	2.8
49	2.6
50	2.5
51	2.5
52	2.5

Monthly and seasonal average normal evapotranspiration at Parbhani

Month & season	ET_0 (FAO modified penman-monteith method)
January	2.8
Feb	3.4
March	4.1
April	4.8
May	4.9
June	3.8
July	2.7
August	2.7
September	3.6
October	3.7
November	3.0
December	2.5
Summer	4.3
SW monsoon	3.2
Post monsoon	3.0
Annual	3.5

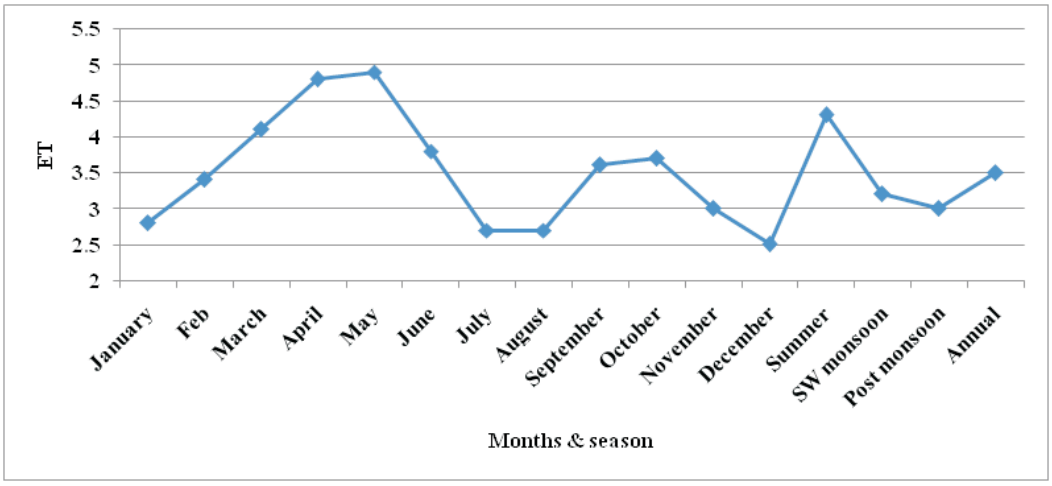


Fig. Monthly and seasonal normal Evapotranspiration at Parbhani

Weekly probability (%) analysis for 20 mm rainfall in Parbhani during *monsoon* and *post-monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
***Monsoon* season**			
22	6.7	33.3	3.7
23	33.3	100.0	28.6
24	76.7	80.0	75.0
25	60.0	56.5	71.4
26	53.3	50.0	58.3
27	56.7	56.3	57.1
28	60.0	76.5	38.5
29	40.0	55.6	16.7
30	73.3	83.3	66.7
31	63.3	59.1	75.0
32	60.0	52.6	72.7
33	63.3	66.7	58.3
34	70.0	79.0	54.6
35	70.0	81.0	44.4
36	73.3	66.7	88.9
37	53.3	59.1	37.5
38	63.3	81.3	42.9
39	40.0	47.4	27.3
***Post-monsoon* season**			
40	40.0	58.3	27.8
41	26.7	41.7	16.7
42	30.0	12.5	36.4
43	10.0	11.1	9.5
44	10.0	33.3	7.4
45	13.3	0.0	14.8
46	10.0	0.0	11.5
47	16.7	0.0	18.5
48	3.3	20.0	0.0

Weekly probability (%) analysis for 40 mm rainfall in Parbhani during *monsoon* and *post -monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
***Monsoon* season**			
22	6.7	100.0	3.5
23	23.3	100.0	17.9
24	46.7	71.4	39.1
25	40.0	42.9	37.5
26	36.7	50.0	27.8
27	46.7	45.5	47.4
28	40.0	57.1	25.0
29	33.3	41.7	27.8
30	56.7	70.0	50.0
31	46.7	58.8	30.8
32	30.0	42.9	18.8
33	36.7	66.7	23.8
34	53.3	54.6	52.6
35	53.3	56.3	50.0
36	46.7	50.0	42.9
37	33.3	42.9	25.0
38	46.7	60.0	40.0
39	23.3	35.7	12.5
Post-*monsoon* season			
40	23.3	14.3	26.1
41	23.3	42.9	17.4
42	13.3	14.3	13.0
43	10.0	25.0	7.7
44	0.0	0.0	0.0
45	10.0	0.0	10.0
46	0.0	0.0	0.0
47	10.0	0.0	10.0
48	3.3	0.0	3.7

Weekly probability (%) analysis for 60 mm rainfall in Parbhani during *monsoon* and *post -monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
		***Monsoon* season**	
22	3.3	0.0	3.5
23	16.7	100.0	13.8
24	26.7	20.0	28.0
25	16.7	37.5	9.1
26	26.7	20.0	28.0
27	36.7	50.0	31.8
28	30.0	54.6	15.8
29	23.3	33.3	19.1
30	53.3	57.1	52.2
31	33.3	37.5	28.6
32	30.0	30.0	30.0
33	26.7	55.6	14.3
34	46.7	62.5	40.9
35	43.3	50.0	37.5
36	33.3	23.1	41.2
37	20.0	20.0	20.0
38	40.0	66.7	33.3
39	13.3	16.7	11.1
		***Post-monsoon* season**	
40	16.7	25.0	15.4
41	16.7	0.0	20.0
42	10.0	20.0	8.0
43	10.0	0.0	11.1
44	0.0	0.0	0.0
45	0.0	0.0	0.0
46	0.0	0.0	0.0
47	3.3	0.0	3.3
48	3.3	0.0	3.5

Weekly probability (%) analysis for 80 mm rainfall in Parbhani during *monsoon* and *post -monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
***Monsoon* season**			
22	6.7	100.0	3.5
23	23.3	100.0	17.9
24	46.7	71.4	39.1
25	40.0	42.9	37.5
26	36.7	50.0	27.8
27	46.7	45.5	47.4
28	40.0	57.1	25.0
29	33.3	41.7	27.8
30	56.7	70.0	50.0
31	46.7	58.8	30.8
32	30.0	42.9	18.8
33	36.7	66.7	23.8
34	53.3	54.6	52.6
35	53.3	56.3	50.0
36	46.7	50.0	42.9
37	33.3	42.9	25.0
38	46.7	60.0	40.0
39	23.3	35.7	12.5
Post-*monsoon* season			
40	23.3	14.3	26.1
41	23.3	42.9	17.4
42	13.3	14.3	13.0
43	10.0	25.0	7.7
44	0.0	0.0	0.0
45	10.0	0.0	10.0
46	0.0	0.0	0.0
47	10.0	0.0	10.0
48	3.3	0.0	3.7

Weekly probability (%) analysis for 60 mm rainfall in Parbhani during *monsoon* and *post monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
***Monsoon* season**			
22	3.3	0.0	3.5
23	16.7	100.0	13.8
24	26.7	20.0	28.0
25	16.7	37.5	9.1
26	26.7	20.0	28.0
27	36.7	50.0	31.8
28	30.0	54.6	15.8
29	23.3	33.3	19.1
30	53.3	57.1	52.2
31	33.3	37.5	28.6
32	30.0	30.0	30.0
33	26.7	55.6	14.3
34	46.7	62.5	40.9
35	43.3	50.0	37.5
36	33.3	23.1	41.2
37	20.0	20.0	20.0
38	40.0	66.7	33.3
39	13.3	16.7	11.1
***Post-monsoon* season**			
40	16.7	25.0	15.4
41	16.7	0.0	20.0
42	10.0	20.0	8.0
43	10.0	0.0	11.1
44	0.0	0.0	0.0
45	0.0	0.0	0.0
46	0.0	0.0	0.0
47	3.3	0.0	3.3
48	3.3	0.0	3.5

Weekly probability (%) analysis for 80 mm rainfall in Parbhani during *monsoon* and *post monsoon* season

SMW	Initial rainfall probability (%) (W_x)	Conditional rainfall probability (%) (W/W_x)	Conditional rainfall probability (%) (W/D_x)
***Monsoon* season**			
22	3.3	0.0	3.5
23	13.3	10.0	10.3
24	16.7	2.5	15.4
25	6.7	2.0	4.0
26	16.7	0.0	17.9
27	23.3	4.0	20.0
28	16.7	5.7	4.4
29	16.7	4.0	12.0
30	36.7	4.0	36.0
31	26.7	2.7	26.3
32	30.0	3.8	27.3
33	26.7	5.6	14.3
34	23.3	2.5	22.7
35	30.0	4.3	26.1
36	23.3	2.2	23.8
37	16.7	1.4	17.4
38	26.7	6.0	20.0
39	10.0	2.5	4.6
***Post-monsoon* season**			
40	16.7	3.3	14.8
41	10.0	0.0	12.0
42	6.7	3.3	3.7
43	6.7	0.0	7.1
44	0.0	0.0	0.0
45	0.0	0.0	0.0
46	0.0	0.0	0.0
47	3.3	0.0	3.3
48	3.3	0.0	3.5

Incomplete gamma probability distribution for weekly rainfall at Parbhani

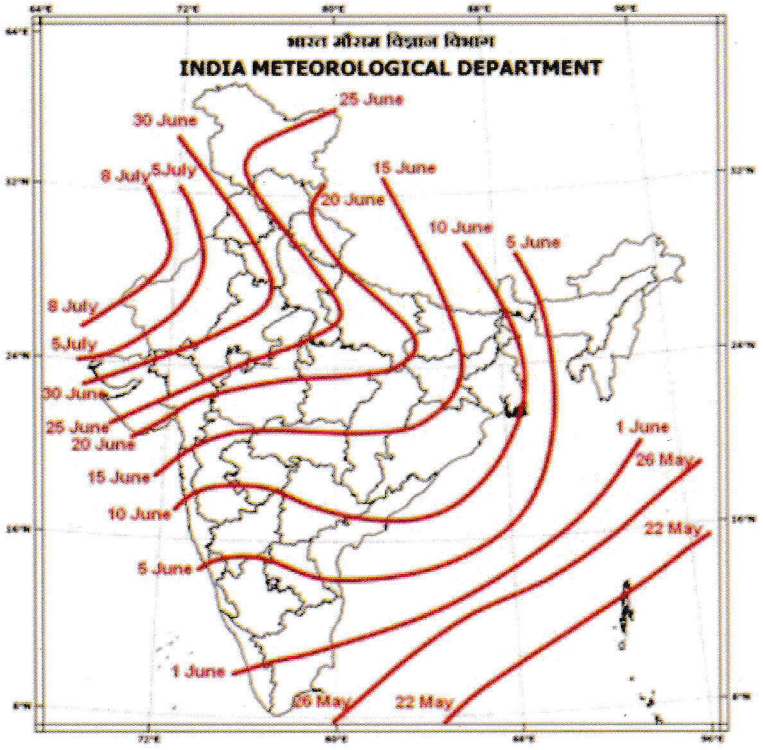
SMW	90%	75%	50%	25%	10%
1	0.5	0.8	1.4	2.2	3.1
2	0.2	0.8	2.8	7.2	13.7
3	0.4	0.7	1.3	2.2	3.2
4	0.2	0.6	1.5	3.0	4.9
5	0.4	0.7	1.3	2.1	3.0
6	0.0	0.0	1.5	6.3	9.8
7	0.0	0.0	0.8	4.1	6.3
8	0.0	0.0	0.7	3.7	5.5
9	0.2	0.7	2.0	4.4	7.9
10	0.1	0.7	2.9	7.7	15
11	0.1	0.6	2.4	6.5	12.7
12	0.4	0.8	1.5	2.4	3.5
13	0.3	0.7	1.5	2.6	4.1
14	0.3	0.8	1.8	3.3	5.3
15	0.2	0.8	2.6	6.2	11.4
16	0.2	0.7	2.4	5.8	10.8
17	0.6	0.9	1.3	1.9	2.5
18	0.2	0.8	2.4	5.3	9.5
19	0.4	0.9	1.7	2.9	4.4
20	0.1	0.7	2.9	7.7	15.1
21	0.2	1.2	4.2	11	21.0
22	0.2	0.9	3.7	10.2	20.3
23	0.6	3.4	14.6	41	82.5
24	7.0	16.3	34.8	64.4	102.0
25	3.6	10.7	27.5	57.5	98.0
26	3.2	10.7	30.1	66.5	117
27	2.3	8.9	27.7	64.9	118.1
28	2.2	8.7	27.4	65	119.1

29	2.4	8.7	26.3	60.4	108.9
30	7.1	21	54	112.6	191.7
31	2.7	10.4	32.3	75.5	137.4
32	3.2	11.6	34.8	79.7	143.3
33	3.6	11.3	30.5	65.4	113.3
34	5.9	16.7	41.5	84.5	141.9
35	2.9	11.4	36	85.3	156.2
36	5.4	14.5	34.6	68.6	113.4
37	1.2	5.6	19.6	49.4	93.7
38	3.0	10.6	31.3	70.9	126.7
39	0.8	4	14.5	37.3	71.3
40	0.5	3.6	16	46.8	96.0
41	0.3	1.9	9.6	29.8	63.0
42	0.2	1.3	7.2	23.3	50.2
43	0.1	0.7	4.2	14.4	32.1
44	0.2	0.9	3.0	7.5	14.2
45	0.1	0.8	3.4	9.6	19.1
46	0.2	0.8	2.6	6.3	11.7
47	0.2	1.0	4.8	14.1	29.0
48	0.1	0.5	2.2	6.5	13.3
49	0.1	0.6	2.4	6.6	13.3
50	0.6	0.8	1.2	1.6	2.1
51	0.3	0.6	1.3	2.5	4.0
52	0.4	0.7	1.2	1.9	2.8
Annual	641.6	782.1	961.2	1165.9	1372.9

Probability of two consecutive dry and wet weeks of Parbhani during monsoon and post-monsoon season

SMW	20mm		40mm		60mm		80mm	
	2D	2W	2D	2W	2D	2W	2D	2W
***Monsoon* season**								
22	0.7	0.1	76.7	6.7	83.3	3.3	86.7	3.3
23	0.2	0.3	46.7	16.7	60.0	3.3	73.3	3.3
24	0.1	0.4	33.3	20.0	66.7	10.0	80.0	3.3
25	0.2	0.3	43.3	20.0	60.0	3.3	76.7	0.0
26	0.2	0.3	33.3	16.7	50.0	13.3	66.7	6.7
27	0.3	0.4	40.0	26.7	53.3	20.0	73.3	13.3
28	0.3	0.3	43.3	16.7	56.7	10.0	73.3	6.7
29	0.2	0.3	33.3	23.3	36.7	13.3	53.3	6.7
30	0.1	0.4	30.0	33.3	33.3	20.0	46.7	10.0
31	0.1	0.3	43.3	20.0	46.7	10.0	53.3	10.0
32	0.2	0.4	53.3	20.0	60.0	16.7	60.0	16.7
33	0.2	0.5	30.0	20.0	43.3	16.7	56.7	6.7
34	0.2	0.6	23.3	30.0	33.3	23.3	56.7	10.0
35	0.0	0.5	26.7	26.7	33.3	10.0	53.3	6.7
36	0.2	0.4	40.0	20.0	53.3	6.7	63.3	3.3
37	0.3	0.4	40.0	20.0	53.3	13.3	66.7	10.0
38	0.3	0.3	46.7	16.7	53.3	6.7	70.0	6.7
39	0.4	0.2	56.7	3.3	73.3	3.3	76.7	3.3
Post -monsoon season								
40	0.5	0.2	63.3	10.0	66.7	0.0	73.3	0.0
41	0.5	0.0	66.7	3.3	76.7	3.3	86.7	3.3
42	0.6	0.0	80.0	3.3	80.0	0.0	86.7	0.0
43	0.8	0.0	90.0	0.0	90.0	0.0	93.3	0.0
44	0.8	0.0	90.0	0.0	100.0	0.0	100.0	0.0
45	0.8	0.0	90.0	0.0	100.0	0.0	100.0	0.0
46	0.7	0.0	90.0	0.0	96.7	0.0	96.7	0.0
47	0.8	0.0	86.7	0.0	93.3	0.0	93.3	0.0
48	0.9	0.0	93.3	0.0	96.7	0.0	96.7	0.0

Dates of Normal Monsoon Onset



Dates of Normal Monsoon Withdrawal