

# MONSOON

The term monsoon is derived from an Arabic word 'Mausim' which means season. The word monsoon is applied to such a circulation, which reverses its direction every six months i.e. from summer to winter and vice-versa. This periodic wind system recurs every year in the same period. Such periodic wind system is caused due to fluctuation or change in temperature and pressure over a large area. In winter when the land is cold and the surface pressures are high, outflow of air towards the ocean takes place. Similarly in summer the land is warm, surface pressure are lowered, and a tendency for an inflow of air from the ocean to land takes place.

These seasonal land and sea breeze is called the monsoons.

- Total amount of precipitation in country: 1194 mm
- Average rainy days in country: 130 days/year

Our Indian subcontinent has got two well-defined monsoons:

1. South West Monsoon (SWM)= June to September
2. North East Monsoon (NEM)= October to December

Indian is naturally well adapted with certain factors, which attribute for the formation of monsoons viz.,

i The subcontinent is surrounded by the terrestrial surface in the northern side and sea surface in the southern side.

ii The northern boundaries and western boundaries are strongly guarded by hills and mountains, which help to confine the monsoon wind within our subcontinent.

India has well developed regular monsoon system. 85 to 90% of total rainfall is from both the monsoons. In India, Nearly 73% of rainfall is received during SWM.

## **South West Monsoon:**

- In summer the sun's apparent path is vertically over the Tropic of Cancer resulting in high temperature and low pressure in Central Asia.
- The pressure is sufficiently high over Arabian Sea and Bay of Bengal. Hence winds flowed from Oceans flow towards landmass in summer.
- This air flow from sea to land bring heavy rainfall to the Indian subcontinent.

These monsoon winds over India has two branches:

1. Bay of Bengal branch moves to Assam

2. The Arabian Sea branch moves northward to Kerala coast.

### **North East Monsoon:**

- In winter the sun's apparent path is vertically over the Tropic of Capricorn.
- The north western part of India grows colder than Arabian Sea and Bay of Bengal and the flow of the monsoon is reversed.
- The basic idea behind Classical theory is similar to land and sea breeze formation except that in the case of monsoons the day and night are replaced by summer and winter.

NEM or Returning monsoon: October to December.

Onset in Tamil Nadu: End of September or First week of October.

Withdrawal: End of December.

India receives 13% of total rainfall is from NEM.

Tamilnadu receives 47% of total rainfall is from NEM.

### **Importance of monsoon in Indian agriculture:**

Rainfall is the primary source of water to earth surface. India is a monsoon country. Nearly 73% of rainfall is received during SWM and 13% during NEM season.

#### **I. Effect of amount of rainfall on crop production:**

- Selection of crop varieties and cropping system depend on the quantity of rainfall.
- Generally yield levels are determined by the amount of rainfall. Under rain fed condition, minimum of 250mm of rainfall is necessary for grain crops.
- Rainfall too excess of the optimum cause yield reduction .
- Very low rainfall / drought causes severe moisture stress in different growth stages resulted in poor growth.

#### **II. Intensity of rainfall on crop production**

High intensity results in run off and soil loss consequently resulting in poor soil fertility and productivity. Further it causes degradation of land becoming unsuitable for cultivation. High intensity at the time of flowering resulted in poor seed set.

#### **III. Distribution of rainfall on crop production**

The amount of rainfall received at periodical intervals like weeks, month, season etc., indicates the distribution. It is more important than total rainfall.

## **WEATHER HAZARDS**

**Drought:** Drought is the condition under which crops fail to mature because of insufficient supply of water through rains. It is the situation in which the amount of water required for transpiration and evaporation by crop plants in a defined area exceeds the amount of available moisture in the soil. It is a situation of no precipitation in a rainy season for more than 15 days continuously. Such length of non-rainy days can also be called as dry spells.

### **Classification of Drought:**

Droughts are broadly divided into 3 categories:

**i. Meteorological Drought:** If annual rainfall is 75 per cent short of the climatologically expected normal rainfall over a wide area, then the situation is called meteorological drought. This is the basis for planning the cropping pattern of that region or area.

**ii. Hydrological drought:** This is a situation in which the hydrological resources like streams, rivers, reservoirs, lakes, wells etc dry up because of marked depletion of surface water. The ground water table also depletes. If Meteorological drought is significantly prolonged, the hydrological drought sets in.

**iii. Agricultural Drought:** This is a situation, which is a result of inadequate rainfall and followed by soil moisture deficit. As a result, the soil moisture falls short to meet the demands of the crops during its growth. Since, the soil moisture available to a crops insufficient, it affects growth and finally results in the reduction of yield. This is further classified as early season drought, mid season drought and late season drought.

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**Floods:** Years in which actual rainfall is 'above' the normal by twice the mean deviation is defined as years of floods or excessive rainfall. Some of the flood years characterized based on the spatial damage due to high and intense rainfall in India are as follows:

India: 1878,1872,1917,1933,1942,1956,1959,1961,1970,1975,1983,1988.

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**Hurricane:** A severe tropical cyclone with wind speed exceeding 120 km per hour. The name hurricane is given to the tropical cyclones in the North Atlantic and the eastern North Pacific Ocean. The tropical cyclones of Hurricane force in the western North pacific are known as typhoons. In Australia this type of storm is given the name willy-willy, whereas in the Indian

Ocean they are called as Cyclones. Hurricanes are fueled by water vapour (i.e.) pushed up from the warm ocean surface, so they can last longer and sometimes move much further over water than over land. A combination of heat and moisture along with the right wind conditions can create a new hurricane.

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**Thunderstorms:** Storms produced by cumulonimbus clouds and are always accompanied by lightening and thunder are known as thunderstorms. They are usually of short duration, seldom over 2 hours. They are also accompanied by strong wind gusts, heavy rain and sometimes hail.

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**Tornadoes:** Defined as a violently rotating column of air attended by a funnel-shaped or tubular cloud extending downward from the base of cumulonimbus cloud. Tornadoes are the most violent storms of lower troposphere. They are very small in size and of short duration. They mostly occur during spring and early summer. They have been reported at widely scattered locations in the mid latitudes and tropics. Crop losses are heavy due to this event.

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**Waterspouts:** It is column of violently rotating air over water having a similarity to a dust devil of tornado. In other words, weak visible tornadoes occurring over water are called waterspouts. They are formed over tropical and subtropical oceans.

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**Heat Wave:** Heat wave is considered as the period of abnormally hot and dry weather or when it is uncomfortably hot due to humidity. To be termed heat wave, it should last atleast more than a day over the area. However, conventionally heat wave lasts for several days to several weeks depending on the prevailing weather conditions.

**Cold Wave:** A cold wave (known in some regions as a **cold snap** or **cold spell**) is a weather phenomenon that is distinguished by a cooling of the air. a cold wave is a rapid fall in temperature within a 24-hour period. The precise criterion for a cold wave is determined by the rate at which the temperature falls, and the minimum to which it falls.