

A photograph of an agricultural field with rows of green crops in the foreground. In the background, there is a wooden building and a person standing near it. The sky is blue with some clouds.

# Agricultural-Meteorology

## Lecture-1

### Introduction of Agricultural-meteorology

# Contents

- Scope of Agricultural Meteorology
- Importance of Weather and Climate for agricultural Production
- Climate – Vegetation – Crops

## Cont. . .

➤ At the end of this chapter students will be answer the following question.

- ① What does agricultural meteorology refers and its scope?
- ② What is the main objective of agricultural meteorology?
- ③ Define climatology. How is it different from meteorology?
- ④ Explain the scope of climatology.

# Scope of Agricultural Meteorology

- Agricultural meteorology, puts the science of meteorology to the service of agriculture, in its various forms and facets, to help with
  - ☞ To the sensible use of land,
  - ☞ To accelerate the production of food,
  - ☞ To avoid the irreversible abuse of land resources,
  - ☞ To crop phenological monitoring,
  - ☞ To crop-water balance and rainfall estimation to yield prediction and
  - ☞ To monitoring and/or prediction of pest outbreaks.

# Cont. . .

- Agro-meteorology is also defined as the science investigating the meteorological, climatological, and hydrological conditions.
  - ✓ That are significant to agriculture due to their interaction with the objects and processes of agriculture production.
- Its objective is to discover and define such effects, and thus to apply knowledge of the atmosphere to practical agricultural use.

# Cont. . .

- Agro-meteorology is an interdisciplinary science in which the main scientific disciplines involved are atmospheric sciences and soil sciences,
  - ✓ Which are concerned with the physical environment, and plant sciences and animal sciences (including their pathology, entomology, and parasitology, etc.), which deal with the contents of the biosphere.

# The aims of Agricultural meteorology are:

- ☞ To extend and fully utilize our knowledge of atmospheric and related processes to optimizing agricultural production,
  - ✓ With maximal use of weather resources and with minimal damage to the environment.
- ☞ Conservation of natural resources and production of the environment from harmful usage.
  - ✓ Land use planning and the application of technology are climate dependent.
- ☞ To predict the effect of climate change, including variability on agricultural production.

# Importance of Weather and Climate for agricultural

- Weather refers the state of the atmosphere at a given point in time at a given place.
- Weather is dynamic and has the elements of: air temperature, pressure, humidity, clouds, precipitation, visibility and wind.
- If we measure and observe these weather elements over a specified period of time, we would obtain the average weather or the climate of a particular place.
- Climate is therefore the accumulation of daily and seasonal weather events of a given location over a period of 30-35 years.



# Cont. . .

- The concept of climate is more than the average weather condition,
  - ✓ It also includes weather events, considerations of variability, extreme conditions, and the probabilities of frequencies of occurrences of given weather conditions.
  
- In summary,
  - ✓ Weather deals with the specific while climate deals with a generalization of weather events.

# Cont. . .

- ✓ Weather and climate play a major role in our lives.
- ✓ Weather for example, often dictates the type of clothing we wear, while climate determines what types of crops can be planted and when to plant the crops.
- ✓ Weather determines if these same crops will grow to maturity.

# Weather and Climate can be summarized as follows:

- ☞ The activities of man are influenced by the weather;
- ☞ Weather is the state of the atmosphere at a given time and place;
- ☞ Climate is the average weather situation of a place over a period of 30-35 years;
- ☞ Climatology is the scientific study of climate;
- ☞ Meteorology is the study of the atmosphere and its phenomena;
- ☞ Climatology has a wide scope and can be subdivided into regional, synoptic, physical, dynamic, applied and historical climatology among others

## Cont. . .

- Crop productivity is closely linked to the growing season's weather due to both direct factors (e.g. those which affect crop physiology) and indirect factors (e.g. those which contribute to disease intensity or crop management).
- Increase in extreme weather events due to changes in climate variability and climate change are the concern for future crop productivity and food production.

## Cont. . .

- From the various weather elements that influence crop growth, sunshine and rainfall are the most important.
- Abundant sunshine promotes rank growth of plant, wherever the moisture and fertility conditions of the soil are favorable.
- Rainfall also has a like influence on plant growth.
  - ✓ It is the primary source of water for agriculture. Crops depend upon rains for supply of moisture primarily.

## Cont. . .

- The rivers, tanks and wells, which supply irrigation water, also depend upon the rains for supply of water to crops, whether directly or indirectly.
- Temperature influences the growth of plants and the activity of micro-organisms in the soil.
- There is an optimum range of temperature, which is most favorable for plants and micro-organisms and deviations from this range affect the growth as well as yield of the crop.

## Cont. . .

- High humidity of the atmosphere reduces transpiration in plants and evaporation of soil moisture.
- Low humidity on the other hand increases the water requirements of plants and crop growth is maintained with difficulty with expensive irrigation.
- Wind helps the pollination of crops, keeps down the atmospheric temperature and aids farm operations like lifting of water from wells and windmills.

## Cont. . .

- Climate is a key influence on the agriculture in any region.
- Crop productivity varies from year to year according to available water and radiation.
- The lack of resources for irrigation and fertilization of cropland in any location makes production there particularly vulnerable to climate variability.
- The forecasting of weather and climate using global and regional meteorological models provides an opportunity to predict the impacts of climate variability and aid the planning of food supplies.



# Cont. . .

- Just as with shorter-range predictions, forecasts of future climates can be used to estimate food production.
  - ✓ These estimates can be used to direct long-term economic and agricultural planning.
- Climate affects all agricultural operations and their correct timing leads to increased production.
- Climate is beyond the control of the farmer, but a knowledge of how climate affects the irrigation requirements assists in the adoption of suitable cultural practices.

# Climate – Vegetation – Crops

- The distribution of natural vegetation depends on
  - ☞ Environment,
  - ☞ Plant response,
  - ☞ Plant migrations, and
  - ☞ The evolution of floras and climax vegetation.
- Climate exerts a major influence on natural vegetation through its effect on soil development.

## Cont. . .

- Natural vegetation progresses through successional stages in performance with the development of the soil.
- If climatic elements or the parent material are adverse to either the physical or the biological processes of soil formation, there can be no progress to more advanced stages.
- Climate is also a primary controlling factor in the growth of crops.

# Cont. . .

- Insufficient or excessive moisture may be compensated for by irrigation or drainage.
- Low fertility may be overcome through the application of fertilizers.
- In greenhouse production practically all climatic influences can be modified.
  - ✓ But fertilization, irrigation, and other cultural practices can be used only to the extent that they yields sufficient return to the grower.
  - ✓ It is expensive to modify natural climatic influences.