

# JOB ROLE – FLORICULTURIST (PROTECTED CULTIVATION)

Sector – Agriculture

(Qualification Pack Code: AGR/Q0702)



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# **UNIT 5: GREENHOUSE OPERATIONS**

## **Session 1: Equipment for Environmental Parameters Monitoring**

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# Session Objectives

The student will be able to

- Explained the equipment used for monitoring environmental parameters inside a protected structure

# Introduction

A greenhouse environment for achieving the required level of precision and efficiency is bound to be complex and dynamic. To be able to dynamically control the environmental parameters of the micro climate inside a greenhouse.

The environmental operations and their regulations (Temperature, light intensity, relative humidity, pH and EC, carbon dioxide and ventilation) are essential for effective production under greenhouses.

# Factors Responsible for Greenhouse Operations

## Temperature

- It is the **intensity of heat** present in a substance or object or greenhouse is called temperature.
- **Maximum and minimum thermometer** is used to measure the temperature inside the greenhouse

# Temperature in the greenhouse has great influence on

- nutrient uptake
  - plant growth
  - pollination
  - fruit set
  - fruit cracking
  - Discolouration
  - flower size
  - stem length, etc.
- Optimum temperature for flower cultivation 18-26 °C

## Light intensity

- The term light intensity means the strength or amount of light produced by a specific lamp source.



Courtesy: <https://bit.ly/2Y4J9zS>

- It influences the manufacture of plant food, stem length, leaf colour and flowering.
- Favourable light intensity in greenhouse is from **50,000 – 60,000 lux**
- Light intensity is measured by **Lux meter**

## Relative Humidity

- The amount of **water vapour present in air** expressed as a percentage of the amount needed for saturation at the same temperature.
- Favourable humidity range for flower cultivation is about 60 – 80 per cent

- If the levels of humidity are above and below the desired level, it results higher **incidence of pests and diseases**
- **Hygrometer or humidity meter** is used to measures the inside humidity of greenhouse

# pH

- pH is a measure of hydrogen ion concentration
- Expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid and higher values more alkaline.
- pH value of media/soil or irrigation water should be **6.5 – 7.5**, It is measured by *pH meter*

## Electrical conductivity of media

- Electrical conductivity of media/soil or irrigation water should be about 1.0 dS/m

## Carbon Dioxide (CO<sub>2</sub>)

- A colourless, odourless gas produced by burning carbon and organic compounds and by respiration.
- It is naturally present in air and is absorbed by plants and use photosynthesis.

- Favourable value carbon dioxide in greenhouse is about 1000 ppm
- Concentration of carbon dioxide is measured by portable **CO<sub>2</sub> Meter**

## **Aeration/Ventilation**

- the provision of fresh air to a greenhouse is called ventilation

➤ All above mentioned factors can be managed either manually or mechanically for achieving favourable levels inside the structure, thus provides positive micro climate for the crop

# Equipment for Environmental Parameters Monitoring

## Thermometer

- A device that measures the temperature
- Thermometer is located at the centre of greenhouse and at the plant level, not facing the sun

A minimum/ maximum thermometer must for greenhouse grower.



**Figure: Minimum/ maximum thermometer**



**Figure: Infrared Thermometer**

# Humidity meter:

- Instrument or device that used to measured the amount of water vapour present in air or atmosphere is called Humidity meter or Hygrometer
- These meters are used to adjust the desired level of relative humidity in greenhouses



Figure: Hygrometer

## pH meter:

A pH meter is a scientific instrument that measures acidity or alkalinity in water-based solutions expressed as pH.



Figure: pH meter

# Electrical conductivity meter

- An instrument that measures the electrical conductivity in a solution is called as electrical conductivity meter.
- It helps in knowing the electrical conductivity of water before mixing the fertiliser



Digital Electrical Conductivity (EC) meter

Courtesy: <https://bit.ly/2Du0qci>

## Lux meter

- A device that measures the overall intensity of light or brightness
- The term lux refers to the number of lumens per square meter of surface area.
- Lumen is the metric unit of light intensity



Figure: Lux meter

## Carbon Dioxide (CO<sub>2</sub>) meter

- Portable carbon dioxide meters are available to monitor carbon dioxide concentration
- Operation of side curtains in naturally ventilated greenhouses helps in the replacement of reduced carbon dioxide levels naturally

# Summary

In this session you have learnt about the equipments used for monitoring environmental parameters inside a protected structure

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