**Course: Water Management in Horticultural Crops 2(1+1),**

**Class: 1st year, 2nd semester**

**Topic: Theories of Water Availability**

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**Theories of Water Availability & Types of Water Movement**

The amount of water present in the soil between field capacity and permanent wilting point is called available water. There are three theories of water availability.

(1)**Veihmeyer and Hendrickson (1927, 1949, 1950):** They proposed that water is available to plants with equal ease throughout the available. As per this theory , plants suffer due to moisture stress only when soil moisture is depleted below permanent wilting point.

(2) **Richards & Wadleigh (1952):** According to this theory soil water availability to plants actually decreases with decreasing soil moisture. Plants suffer water stress and reduction in growth ocuurs even before wilting point is reached.

(3) **Modern Theory:** Recent evidence indicated that yield of several crops do not reduce if the soil moisture is depleted upto 25 per cent of available moisture, but further decrease in soil moisture decreases the yield. In other words, water is freely available upto certain point in the available range and subsequently its availability is decreased with decrease in soil moisture. Most of the scientists believe in this theory.

**TYPES OF WATER MOVEMENT IN THE SOIL**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Particulars** | **Saturated Flow** | **Unsaturated Flow** | **Vapour Movement** |
| 1. | **Major Force** | Gravitational | Metric | Vapour Pressure |
| 2. | **Form of Water** | Liquid | Liquid | Vapour |
| 3 | **Major Direction of Flow** | Downward | Lateral | All directions |
| 4. | **Pores Type** | All pores filled with water | Micropores filled with water | All pores are empty |
| 5. | **Water Flow Rate** | Fast (1cm-100 cm/day) | Slow (0.01 cm to 0.00001 cm/day) | Negligible |
| 6. | **Volume of water movement** | Large quantities about 3.75 Lakh kg/ha in 15 cm depth | Small quantities about 1.00 Lakh kg/ha in 15 cm depth | Negligible  (about 15 kg/ha in 15 cm depth) |

**Different Types of Water Flow:**

1. **Infiltration:** It is a process of water entry into the soil generally through the soil surface and vertically downward.
2. **Infiltration Rate:** It is the rate of water entry into the soil when the flow is nondivergent.
3. **Seepage:** The slow movement of water through small cracks, pores, interstices etc. in the surface of unsaturated material.
4. **Leaching:** Downward movement of nutrients and salts from the root zone with the water is called Leaching.
5. **Percolation:** Vertical movement of water in the soil due to gravitational force under saturated condition.