

# SOIL MOISTURE AND PLANT RELATIONSHIP

## Soil Moisture:

- Water held in the voids of the soil above the water table is called as "Soil Moisture"
- Water holding capacity of the soil
- water holding capacity of the soil mainly depends on

(i) Porosity of soil  $n =$

$$n = \frac{V_v}{V} \rightarrow \text{Which is physical property of soil}$$

(ii) Size of voids: Moisture holding capacity of the soil largely depends on size of the voids.

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- Size of the voids can be divided into 2 groups

## Capillary Voids :

- Small Voids
- They hold water due to capillarity and prevent it from getting drained of under gravity
- It induces greater water holding capacity
- Ex: clay

## Non – Capillary Voids:-

- Large Voids
- They don't hold water tightly hence large part of water held at saturation is drained off under gravity
- It induces better drainage and accretion
- Ex:- Sand

- **Note: Ideal soil, for irrigation is that which has nearly equal distribution of small voids and large voids. Such that small voids provides adequate water holding capacity whereas large void provides better aeration & easy extraction of water from the soil Ex:- Loam soil, i.e mixture of sand & clay**

## Classification of Soil Water

**Water in the voids of the soil can be divided into 3 parts;**

### **1. Gravity Water**

- → It is that water which is not held by the soil but drain out under the action of gravity
- → it remains in the soil for a short time period (1 to 3 days) till the time it is required to drain out
- → it prevents circulation of air in the soil hence it is harmful to the crops if present for longer duration

## Classification of Soil Water

### 2. Capillary Water

- → It is that part of water which is retained in the soil after gravity water is drained off and it can be absorbed by the plant roots.
- → This water held in the soil by surface tension between the soil particles plant roots gradually absorb capillary water hence it is main source of water for plant growth, therefore it is also called as 'Available water'

## Classification of Soil Water

### 3. Hygroscopic Water

- → Hygroscopic water is that water which is absorbed by the soil particles from the atmosphere and it is held very tightly by the soil particles, therefore it cannot be extracted by plant roots.

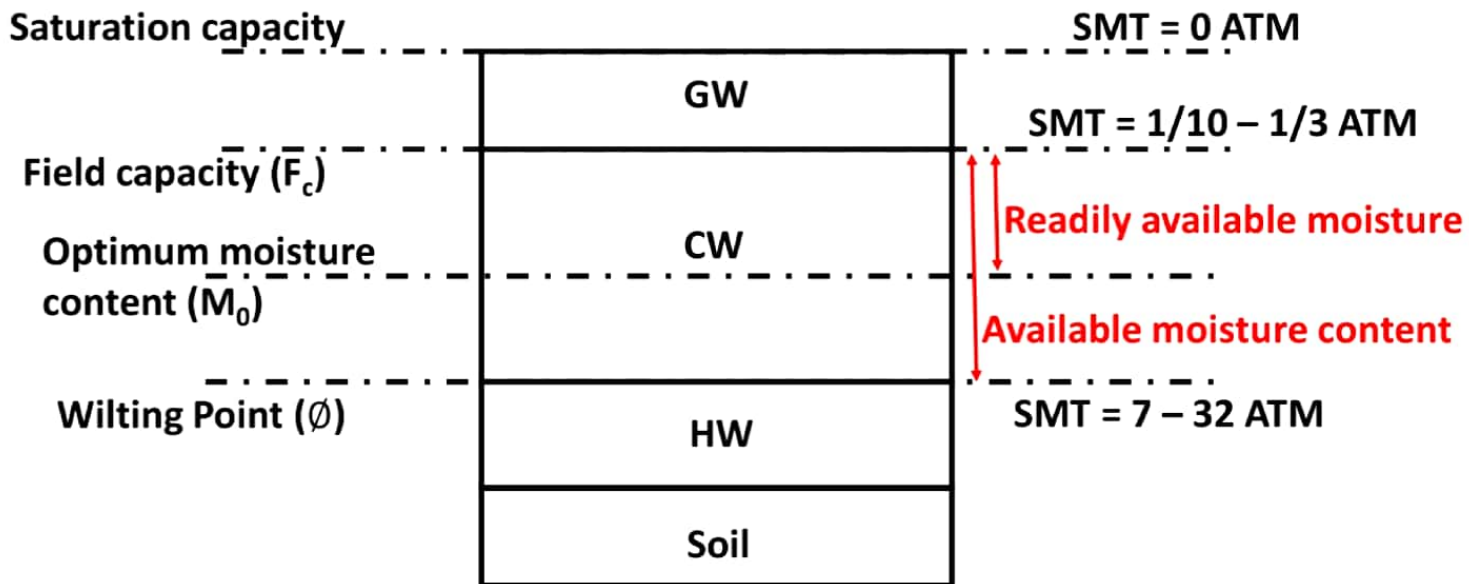
# Soil Moisture Tension & Soil Moisture Stress

- → Soil moisture tension is defined as force per unit area that must be exerted in order to extract water from the soil.
- → Soil moisture tension is usually expressed in terms of Atmosphere (i.g. pressure)

- $Soil\ moisture\ tension \propto \frac{1}{moisture\ content}$

- For a given soil, soil moisture tension SMT is inversely proportional to moisture content
- If we know, SMT at various moisture content then we can determine how much water is available for plants and what amount of water must be added to the soil for the purpose of irrigation
- Soil Moisture Stress is sum of soil moisture tension (SMT) & osmotic pressure
- Soil moisture tension (SMT) at field capacity ranges between 1/10 ATM (sand) to 1/3 ATM (clay)

# Soil moisture Constants and Soil moisture Contents





# Soil moisture Constants and Soil moisture Contents

## 1. Saturation Capacity

- It is defined as total water content of a soil when all the voids of the soil are filled with water.
- This is also called as ' Maximum Water holding capacity
- At saturation capacity soil moisture tension is zero

