SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore – 35

Accredited by NBA – AICTE and Accredited by NACC – UGC with 'A++ Grade
Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AGRICULTURAL ENGINEERING

19AGB303 – IRRIGATION AND DRAINAGE ENGINEERING

III – YEAR VI SEMESTER

UNIT 1 – SOIL WATER TENSION AND MEASUREMENT OF SOIL WATER

TOPIC 2 – SOIL WATER POTENTIAL CONCEPT, TOTAL, AND GRAVITATIONAL POTENTIAL

SOIL WATER POTENTIAL

➢It is defined as the potential energy of pure water, with no external forces acting on it, at a reference pressure (atmospheric), reference temperature, and reference elevation.

➢Soil water potential is then determined as potential energy per unit quantity of water, relative to the reference potential of zero.

Soil water potential can be expressed in three different units

Potential per unit mass (μ) : μ = potential/mass = gl (Nm/kg)

Potential per unit volume (ψ) : ψ = potential/volume = $\rho_w Vgl / V = \rho_w gl$ (N/m^2, water pressure units)

Potential per unit weight (h) : h = potential/weight = mgl / mg = l (m, head unit) = equivalent height of water

Soil water potential

$$\Psi_T = \Psi_z + \Psi_s + \Psi_m + \Psi_p$$

Where Ψ_p = total potential
Ψ_z = gravimetric potential
Ψ_s = solute or osmotic potential
Ψ_m = matric adsorption force
Ψ_p = pressure due to external forces.

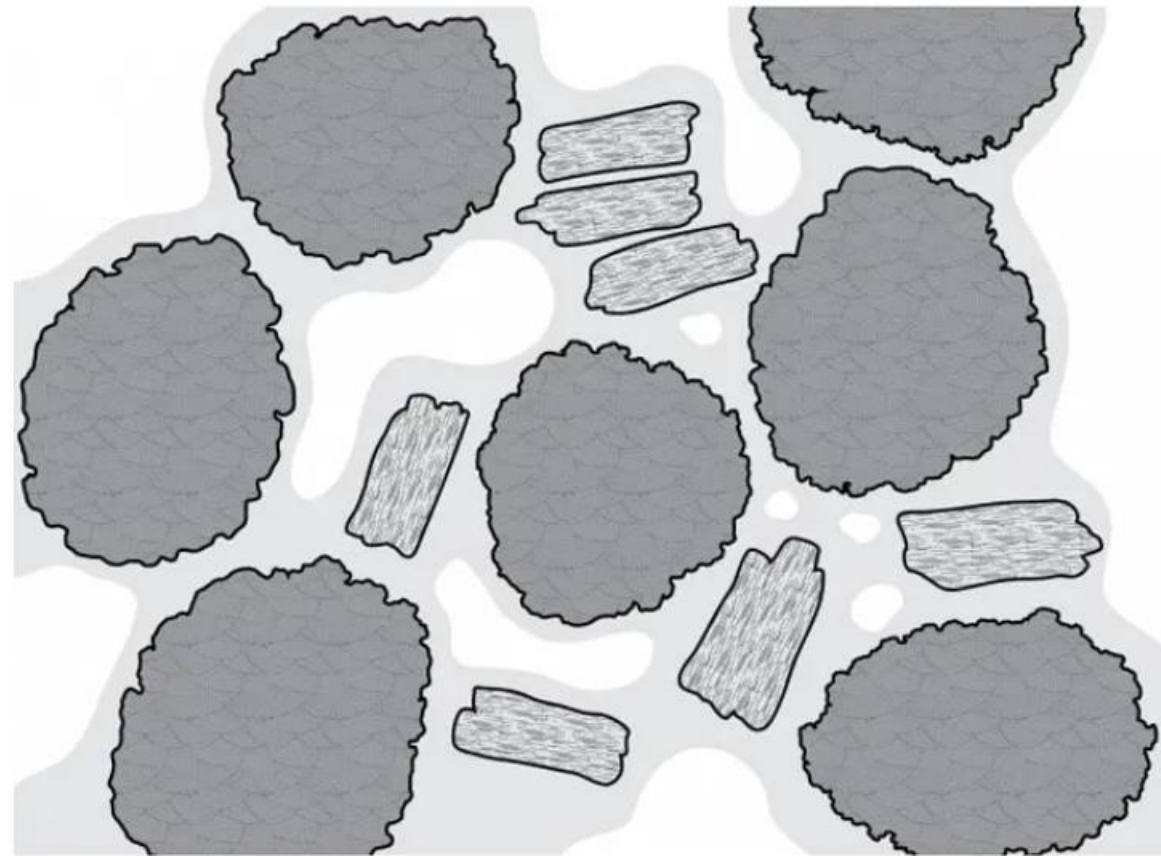# WATER POTENTIAL COMPONENTS!!!!

MATRIC

OSMOTIC

GRAVITATIONAL

PRESSURE

MATRIC POTENTIAL!!!!

As the soil absorbs water, it creates a water film that clings to the soil particles. The matric potential is what creates the water film

OSMOTIC POTENTIAL!!!!

❖ Describes the dilution and binding of water by solutes that are dissolved in the water.
❖ This potential is always negative
Can be calculated using

$$\Psi_0 = C\Phi VRT$$

GRAVITATIONAL POTENTIAL!!!!

❖ Arises because of water's location in gravitational field
❖ This potential can be positive or negative
Can be calculated using

$$\Psi_G = GH$$

PRESSURE POTENTIAL!!!!

❖ It is hydrostatic or pneumatic pressure being applied to or pulled on the water
❖ This is more macroscopic effect acting throughout a larger region of the system
It can be calculated using a

$$\Psi_P = P/P_w$$

Reference Videos

https://www.youtube.com/watch?v=sL3AfZ37Kf4

See You at Next Class!!!!