

Penang Sangam High School
P.O. Box 44, Rakiraki
Year 13 Agriculture Lesson Notes Week 11

Strand	AS 13.3 Agronomy
Sub-Strand	AS 13.3.1: Soils
Content Learning Outcome	AS 13.3.1.1 Demonstrate the assessment methods in determining the chemical properties of the soil.

Lesson 6: Soil Moisture Potential

Lesson Outcome: At the end of this lesson student should be able to

- 1. discuss soil moisture potential and characteristics of soil**
- 2. describe the relationship of soil texture and the available water in the soil**

1. Soil moisture potential - amount of water available to plants

The more negative this value becomes, the more work a plant must do to remove water from soil pores.

2. Moisture characteristic - relationship between water content and available water

3. Soil water - this is the amount of water present in the soil and available to plants.

4. Osmotic effects - is the measure of the work that is required to pull water molecules away from hydrated ions.

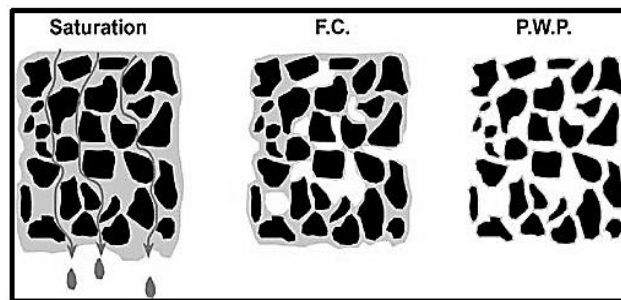
5. Wilting point - when plants lose water faster than it can be absorbed and temporarily wilts but plants can recover when the conditions improve.

6. Permanent wilting point – condition of the soil becomes too dry for the plant to access any water and the plants will not recover even if the conditions improve.

Forces retaining water in the soil are in two categories – physical forces of cohesion and adhesion, which arise because of particle shape and arrangement; and chemical forces arising from the osmotic effects of bore water, fertilizer and water table.

Soil Moisture Potential and Characteristic

The classification of soil water potential is based on availability of water to plants in soil environment.



Saturation - all soil pores are filled with water. At this point soil is said to be at its maximum retentive capacity.

Field Capacity (FC) - the amount of water that is held in soil after it has been fully wetted and all gravitational water has been drained away.

Field capacity is reached about one to two days after heavy rainfall or irrigation ceases.

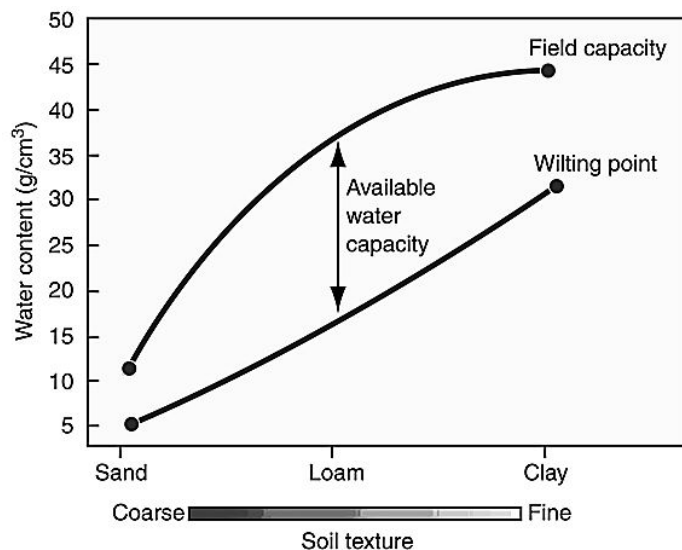
Field capacity will be reached much faster in a coarse textured soil (e.g. loamy sand) than in a fine-textured soil profile (e.g. heavy clay).

Permanent Wilting Point (PWP) - the minimum soil moisture at which a plant wilts and can no longer recover its turgidity. The soil will appear dusty and dry.

Although clay rich soil can hold much more water than sandy soil, it is also capable of retaining water more strongly as well.

Available Water Content (AWC)

The amount of water held between FC and PWP is termed the “Available Water Content” (AWC), and it is a measure of the amount of water in the soil that is “potentially” available to plant



Measuring Water Content of Soil: (Weight Basis)

$$\text{Water content} = \frac{\text{moist weight} - \text{dry weight}}{\text{dry weight}}$$

Ref: Year 2020 – MC No. 10

Student Activity

1. With reference to the graph, why sandy soil will be the first to require irrigation in a short drought?

2. Explain how texture of soil affects the amount of water available for plant growth.
