Understanding Soil Moisture Constants

Soil moisture constants are key to managing water in soil. These constants guide agriculture, hydrology, and ecology by describing how water interacts with soil and plants.

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Field Capacity (FC)

Definition

Max water soil retains after gravity drainage, usually 2-3 days after saturation.

Influence

Varies by soil texture and structure, e.g., sandy soil around 10%, clay soil 40% FC.

Measurement

Expressed as volumetric water content percentage, crucial for water availability.

Permanent Wilting Point (PWP)

What is PWP?

Moisture level where plants cannot extract water, leading to permanent wilting.

Water Potential

Usually at -1500 kPa matric potential indicating plant water stress threshold.

Variations

Depends on plant type and soil; loamy soil around 10%, clay soil about 20%.

Available Water Content (AWC)

Definition

Water available to plants between field capacity and wilting point.

Calculation

AWC = Field Capacity minus Wilting Point (e.g., 30% - 10% = 20%)

Importance

Key for irrigation planning and selecting suitable crops based on soil water.

Soil Texture & Moisture Constants

Soil Type	Field Capacity	Wilting Point	Available Water
Sandy	Low	Low	Low
Silt Loam	Moderate	Moderate	Moderate
Clay	High	High	High
Organic Matter	Increases FC & AWC		

Soil Water Retention Curve (SWRC)

1

Definition

Shows water content relative to matric potential in soil.

2

Hysteresis

Distinct curves for wetting and drying phases affect water availability.

3

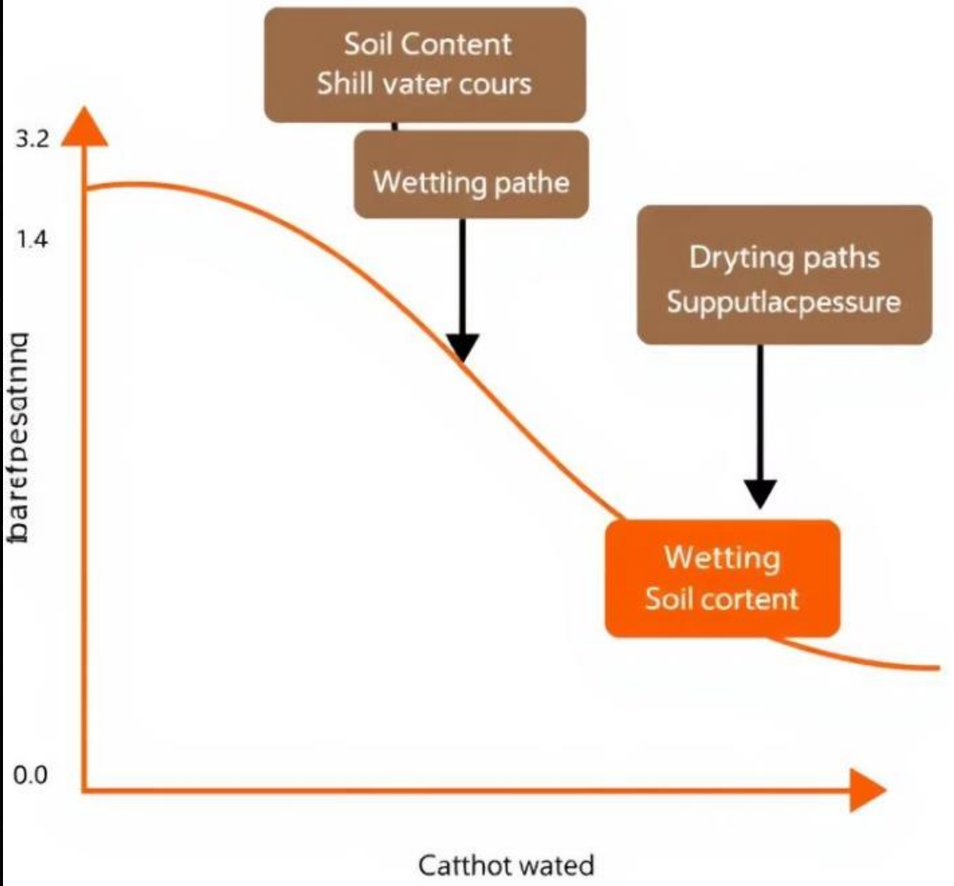
Usage

Model water holding capacity and estimate soil moisture at various depths.

4

Modeling

Commonly modeled with Van Genuchten equation for precision.



Measuring Soil Moisture Constants

Field Methods

Tensiometers, Time Domain Reflectometry (TDR) for real-time moisture.

Lab Techniques

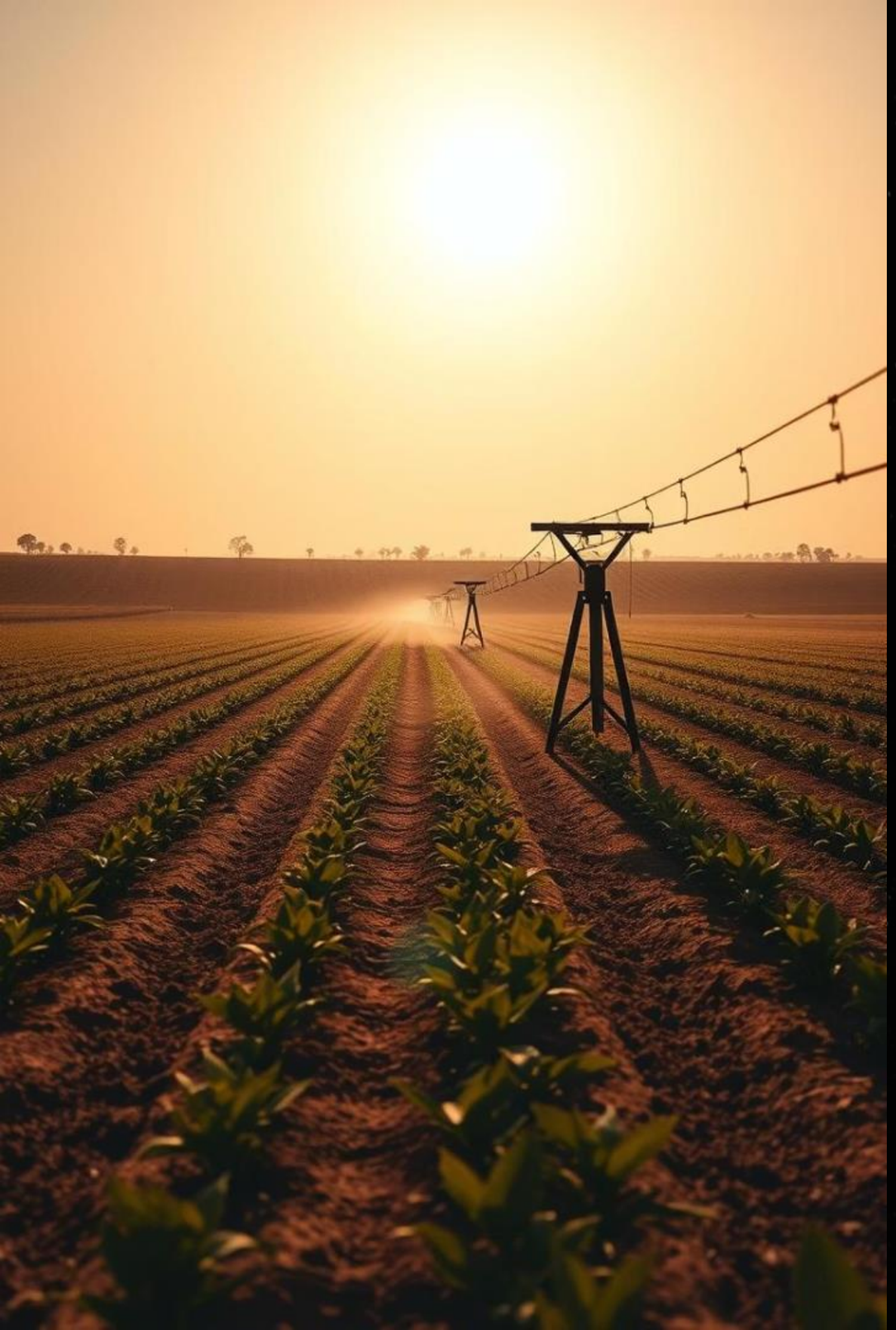
Pressure plates in controlled setups to find retention points.

Remote Sensing

Satellites like SMAP estimate surface soil moisture globally.

Data Loggers

Automated devices provide continuous moisture monitoring.



Applications and Conclusion

Irrigation Management

Optimizes water use, saving resources and improving yields.

Drought Monitoring

Assists in early detection of water stress for proactive action.

Land Management

Prevents soil degradation by maintaining optimal moisture levels.

Summary

Soil moisture constants are essential for sustainable agriculture and ecology.