

SOIL - WATER - PLANT RELATIONSHIPS

Introduction

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- Soil-water-plant relationships concern those physical properties of soil and plants that affect the movement, retention, and use of water for the design and operation of conservation irrigation systems.
- Trainers should modify the Toolbox material as necessary to achieve the planned skill level for the trainees.
- Trainers are encouraged to include locally developed training materials to complement and/or supplement Toolbox material.
- As new training materials are developed, trainers are encouraged to furnish good quality, reproducible, copies to the National Employee Development Center (NEDC) for inclusion in future versions of the Toolbox.

Suggested Objectives

1. List the basic physical properties of soils and describe the roles they play in irrigation water management.
2. Explain how water moves through soil.
3. Describe how plants respond to and use soil-water throughout their growing season.
4. Describe the processes needed to determine crop evapo-transpiration and irrigation water requirements.

Suggested Outline

- I. Introduction
- II. Body
 - A. Soil Physical Properties
 1. Texture
 2. Structure
 3. Porosity
 4. Compaction
 - B. Water Movement Through Soil

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- C. Soil - Water
 - 1. Plant available water
 - 2. Infiltration
 - 3. Percolation
 - 4. Types of soil water
 - a. Gravity
 - b. Capillary
 - c. Hygroscopic or absorbed
 - 5. Plant rooting depth and moisture extraction patterns
 - D. Methods for Determining Evapotranspiration (Crop Consumptive Use)
 - E. Crop Response to Fertilization
- III. Summary

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Reference Material

- Irrigation Guide, Chapters 2 and 3.
- National Engineering Handbook, Section 15, Chapter 1.

Toolbox Material

- Publication "The Surface Irrigation Manual", Chapter 1, Cal-Poly
- Lesson Plan "Soil-Water Relationship", NRCS
- Lesson Plan "Water Intake", NRCS
- Lesson Plan "Plant-Water-Soil Relationships", NRCS
- Lesson Plan "Drainage Primer", NRCS
- Lesson Plan "Water Movement Through Soils", NRCS
- Videos "Plant Soil-Water Relationships", Certified Irrigation Designers Step 2 Study Guide, Volume 2, Cal-Poly
- Video "How Water Moves Through Soil", University of Arizona/NRCS

Facilitation Options

- Self-paced learning.
- Facilitator guided.
- Formal classroom training.

Evaluation

- Each state should develop an evaluation procedure which addresses the level of competence desired before and after training.

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Contents of Toolbox Packets

- Publication "The Surface Irrigation Manual", Chapter 1, Cal-Poly
- Lesson Plan "Soil-Water Relationship", NRCS
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