Study Guide for the Soil and Water Conservation Section of the Oklahoma CCA Exam

01/2011

Soil water dynamics and Irrigation:

- Understand the difference among various irrigations system options including: furrow irrigation, drip irrigation (Subsurface and surface), Low energy precision application (LEPA), Low elevation spray application (LESA), Mid-elevation spray application (MESA), Low Pressure in-canopy(LPIC), and impact irrigation.
- Understand crop water use for major crops in Oklahoma including: cotton, corn, sorghum wheat, and alfalfa; and how growth stage influence water demand and drought stress.
- Understand basic metrics commonly used for irrigation and know how they are used to calculate water use, pumping rates, and irrigation timing.
- Understand the implications and management of saline irrigation water.
- Understand how crop management and soil characteristics influence the soil water balance and the availability of water for crop production.

Resources:

Reclaiming Slick-Spots and Salty Soils

Crop Water Use and Growth Stages

Soil, Water, and Plant Relationships

Fate of Precipitation Falling on Oklahoma Cropland

Center Pivot Irrigation

Classification of Irrigation Water Quality

Water Measurement Units and Conversion Factors

Irrigation Water Measurements

Drip (Trickle) Irrigation Systems

Soil Erosion

- Understand the processes of wind erosion
- Understand the components of the Revised Universal Soil Loss Equation (RUSLE2) and what the estimated soil loss provided by this equation represents.
- Understand management options available to control wind erosion, including windbreaks, residue management, control of surface roughness, ext.
- Understand management options available to control water erosion, terraces, contour farming, conservation tillage, and residue management.
- Understand the soil characteristics that impact a soils susceptibility to water erosion.

- Understand the adverse impacts of soil erosion on crop productivity

Resources:

USDA-NRCS Guide Universal Soil Loss Equations (RUSLE2)

NRCS Conservation Practice Standard for Contour Farming

NRCS Factsheet on Terraces

Controlling Soil Erosion from Wind

Estimating Crop Residue Cover

Soil quality and organic matter

- Understand the soil and environmental conditions that impact soil organic matter content
- Understand how management impacts soil organic matter content
- Understand how soil organic matter impacts important soil characteristics and crop productivity
- Understand the concept of soil quality
- Understand how the Soil Condition Index is used to assess soil quality and potential for organic matter accumulation.

Resources:

Soil Quality Monitoring: A Practical Guide

NRCS Soil Quality Factsheet

NRCS Factsheet on Managing Soil Organic Matter

Guide to Using the Soil Condition Index

Basic soil properties and Land Classification

- Understand basic physical, chemical and biological properties of soil including texture, structure, depth, and slope; and how these characteristics impact productivity.
- Understand the 5 soil forming factors and 4 soil forming processes
- Understand basic soil profile horizonation.
- Understand the basic differences among the 8 land capability classes

Resources:

Soil Compaction and Crusts

Chapter 1 in the Oklahoma Soil Fertility Handbook

Land Capability Classes (I-VIII):

Land suitable for cultivation and other uses:

- Class I - Soils that have few limitations restricting their use.

- Class II - Soils that have some limitations, reducing the choice of plants or requiring moderate conservation practices.
- Class III - Soils that have severe limitations that reduce the choice of plants or require special conservation practices, or both.
- Class IV - Soils that have very severe limitations that restrict the choice of plants, require very careful management or both.

Land generally not suitable for cultivation (without major treatment).

- Class V - Soils that have little or no erosion hazard, but that have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.
- Class VI - Soils that have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.
- Class VII - Soils that have very severe limitations that make them unsuited to cultivation and that restricts their use largely to grazing, woodland, or wildlife.
- Class VIII - Soils and landforms that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or aesthetic purposes.