# Irrigation Training Toolbox
# Irrigation System Evaluation

## Lesson Plan
## Evaluation of Subirrigation Systems

National Employee Development Center
Natural Resources Conservation Service
Fort Worth, Texas
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**COURSE:** Irrigation System Evaluation

**LESSON:** Evaluation of Subirrigation Systems

**OBJECTIVES:** Upon completion of this training, student will be able to:

1. Evaluate spacing and locations of mains, laterals, and structures for water table control.
2. Determine whether deep percolation loss or irrigation tailwater exceeds 10 percent (FOTG IV-A CODE 444)

**REFERENCES:** None

**TRAINING AIDS:** Slides and field trip with evaluation equipment and appropriate forms.

**TIME:** Overview (no field) - 2 hours; With field evaluation and data analysis - 2 days

**DEVELOPED BY:** Florida

# Evaluation of Subirrigation Systems

## Introduction

Evaluations should be performed on a mature crop during conditions of high Evapotranspiration (ET). This is when the crop's ET demands will create significant water table fluctuations. The evaluation should be performed without a rainfall induced water table (no rainfall within the preceding 3 days).

When we've finished, you should be able to:

1. Evaluate spacing and locations of mains, laterals, and structures for water table control and
2. Determine if deep percolation or irrigation tailwater exceeds 10 percent.

We will cover both general evaluation and detailed evaluations.

## Body

A. Procedure - General Evaluation (see Engineering Technical Note FL-18)
   1. Equipment needed
      a. Flow measurement equipment. A totaling flow meter can be effective.
   2. Field Procedure
      a. Rough estimation (i.e. Excessive, moderate, insignificant).
      b. May lead to a detailed evaluation.
      c. Management zones are submains that are operated simultaneously. One of the selected furrows should be one with the maximum row length.
      d Tailwater should not occur for more than two hours continuously. Check uniformity of tailwater loss. (VISUAL)
      e. Look for ponding or sedimentation.
      f. Check locations of maximum row length slope and/or length.
      g. Check locations where overfall occurs into ditches.
      h. Use flow meter to determine gpm/acre if possible.
   3. Analysis of Field Data.
      a. See Florida Irrigation Guide, Chapter 4. Note: 0.2 in/day Peak Consumptive Use Rate equals 3.8 gpm/acre.
      b. Use two hour rule (two hours equals 10%). Check for uniformity of irrigation supply (gpm/acre).
      c. Schedule engineering assistance.

4. Recommendations.
    a. If larger irrigation streams are not possible, system may be valved to isolate areas that are similar.
    b. Show upflux curves to reinforce the need the carefully manage the water table. Remember upflux is continuous, where ET occurs only during the day.
    c. Calibrate irrigation streams.
    d. Be careful in deepening irrigation laterals. They may reduce upflux too much.
    e. Wells work. Use top of the bed as a reference point.

B. Procedure - Detailed Evaluation
    A. When to Perform.
        1. Detailed evaluations should be performed when accurate determination of irrigation efficiency or tailwater loss is needed.
    B. Equipment
        1. Plasti-Fab Trapezoidal flumes with Stevens Type F water level recorder and Stevens Type A/F Logger. Approximately $10,000 worth of equipment is required to perform a detailed evaluation (based on a flow-through system evaluation).
        2. Installed evaluation equipment (flumes, wells, and flow meters) require two staff-days.
    C. Field Procedure
        1. Tailwater losses may be more easily determined by calculating losses from representative areas and adjusting them to obtain losses for the entire field.
        2. Specific site data will allow comparison of analysis to other similar systems.
    D. Analysis of Field Data.
        1. Although you may be able to quantify the system efficiency or tailwater losses, the evaluation is just a snap-shot of the system operation.
        2. Weather data and crop maturity will influence the system efficiency and tailwater losses substantially.
    E. Recommendations

## Summary