5.1 Drip/Micro-Irrigation System

Applicability

There are numerous variations of types of drip or micro-irrigation, and each type has its limitations in application to production of agriculture. In general, this BMP is applicable to agricultural producers of crops which have been proven to be irrigable using drip or micro-irrigation in the geographic region of the producer and when the producer has available a water supply of sufficient quality to make drip or micro-irrigation feasible.

Description

Drip or micro-irrigation is a generic term for a family of irrigation equipment that provides for distribution of water directly to the plant root zone by means of surface or sub-surface applicators or emitters. TWDB's 2001 "Surveys of Irrigation in Texas" reported approximately 77,000 acres of micro-irrigated land within Texas for 2000. This amounts to approximately 1.2 percent of the total of 6.4 million acres irrigated in 2000. The three most common types of micro-irrigation used in Texas are:

1. Micro-spray or bubblers
2. Sub-Surface (buried) Drip
3. Orchard Surface Drip or Microspray Irrigation

Micro-irrigation is typically used on high value crops (vegetables, orchard, and nursery). Recently, sub-surface drip irrigation has begun to be used on cotton, chile, and other row crops.

Implementation

The system shall be designed to uniformly apply water directly to the plant root zone to maintain soil moisture without excessive water loss, erosion and reduction in water quality or salt accumulation. The depth of application shall be sufficient to replace water used by the plant in peak use periods without depleting soil moisture in the root zone and to maintain a steady state salt balance.

Schedule

Typical design and construction of a drip irrigation system takes approximately 3 to 6 months for large fields (40 acres or greater) and less time for small applications. Typically, it takes one year from planning to operation of a system.

Scope

Considerations must be made for situations where natural precipitation or stored soil water is not sufficient for germination and systems must have the ability to provide enough water to properly germinate the seed. The amount of dissolved salts, suspended solids, and particulate (typically sand from irrigation wells or surface water) in the irrigation water must be tested to

determine whether a micro-irrigation system is feasible. The following maintenance and monitoring issues must be addressed by the system manager on a nearly daily basis:

1. Cleaning and backflushing of filters;
2. Flushing lateral lines;
3. Measurement of applicator discharge and replacement of applicators as necessary;
4. Monitoring of operating pressures;
5. Injection of chemicals to prevent biological growth; and
6. Injection of chemicals to prevent precipitation of salts.

Documentation

To document this BMP the agricultural water user shall document and maintain one or more of the following records:

1. Copies of the design drawings and specifications for the irrigation system;
2. Photographs of micro-irrigation pumping and filtration plant; or
3. Receipts or other documentation of purchase and installation of system.

Determination of Water Savings

Micro-irrigation can be the most efficient form of irrigation and typically requires the most capital expense per acre of irrigated land. It is the preferred irrigation method for high value crops, including many nursery trees, small fruit trees, grapes, melons, and other vine plants. Determination of the water saved by conversion from surface irrigation to drip irrigation depends on many parameters. The primary reasons for converting from conventional irrigation to drip irrigation is for crop yield and crop quality reasons rather than reduction in water use.

Cost-Effectiveness Considerations

Micro-irrigation is typically the most capital expensive type of irrigation. Installation costs for subsurface drip irrigation range from $800 to $1,200 per acre. The operation and maintenance costs vary depending on the value of the crop being irrigated and the quality of the irrigation water supply. The high capital and operational cost for micro-irrigation is the primary reason that micro-irrigation is limited to only 1.2 percent of the irrigated land within Texas.

References for Additional Information

1. *Irrigation System, Micro Irrigation*, Natural Resources Conservation Service, United States Department of Agriculture, National Conservation Practice Standards No. 441.