Microirrigation Systems

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Presentation available at http://ucanr.edu/schwankl
Microirrigation Systems

- Choosing drip or microsprinkler system.
- Microirrigation system management.
- Maintenance of microirrigation systems.
Microirrigation Systems

Which is better?
• Surface drip, subsurface drip, or microsprinklers?
• One lateral line or two?
Surface drip:

Advantages:
- Usually the least expensive
- Less weed growth than microsprinklers
- Easier to monitor than subsurface drip
Surface drip:

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- Usually the least expensive
- Less weed growth than microsprinklers
- Easier to monitor than subsurface drip

Disadvantages:

- Doesn’t wet a very large area
- Can clog more easily than microsprinklers
Drip: One lateral vs. two laterals

Two lateral line systems:

- Wets a larger area - appropriate for soils which don’t wet laterally well.
- Increases the application rate so reduces the set time.
- Increases the cost.
Subsurface drip:

Advantages:

• Protected from damage by above-ground sources
• Little weed growth
• Can irrigate just about anytime
Subsurface drip:

Advantages:
- Protected from damage by above-ground sources
- Little weed growth
- Can irrigate just about anytime

Disadvantages:
- Can’t inspect by observation
- Root intrusion & varmit damage
- Single line doesn’t wet a large area
- Costs more if use herbicide-protected product
Microsprinklers:

Advantages:

- Wets a larger area
- Easy visual inspection
- Larger orifice openings—may clog less
- Higher application rate
Microsprinklers:

Advantages:
- Wets a larger area
- Easy visual inspection
- Larger orifice openings—may clog less
- Higher application rate

Disadvantages:
- Insects, etc. can clog orifices
- More weed growth
- Wind & evap. effects
- Cost
Cost of Microirrigation Systems:

- About 2/3 of the system cost is in filters, pipelines, etc. The size of these is dependent on the flow rate (gpm/acre).
  - Lower flow rate = longer irrigation times
  - Higher flow rate = shorter irrigation times
Irrigation Water Management

- Determining the Application Rate.
- How often to irrigate?
How much water are you applying?

Application rate:

- Tree water use (ET) given in inches/day
- Emitter discharge in gallons/hr
Tree Water Use

Convert tree water use (in/day to gal/day):

Water use by the tree = Tree spacing \times Tree water use \times 0.623
(gal/day) \quad (ft^2) \quad (in/day)

Example: Tree spacing = 20 ft. \times 20 ft. = 400 ft^2
Tree water use = 0.3 in./day

Water use by:
the tree = 400 ft^2 \times 0.3 \text{ in/day} \times 0.623
(gal/day)

= 75 \text{ gal/day}
How Often to Irrigate?
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May be controlled by the capacity of your irrigation system, especially at peak water use periods.
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- Soil conditions (soil water-holding capacity, lateral wetting) may also be a factor.
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- Soil conditions (soil water-holding capacity, lateral wetting) may also be a factor.
- At peak ET:
  - Most drip systems will require daily irrigation.
  - Microsprinklers - typical would be an irrigation interval of 3 days or more.
Maintenance of Microirrigation Systems
Microirrigation:

Clogging is the greatest “threat” to emitters.
Clogging of Microirrigation Systems

Source: Physical Clogging - Particulates
Clogging of Microirrigation Systems

Source: Physical Clogging - Particulates

Solution: Filtration
Filters:

Screen, disk, and sand media filters are all available.

They all filter to the same degree

BUT

they req. different frequency of cleaning.
Filters:

- Prefilters - sand separators
- Sand media filters
- Screen filters
- Disk filters

- These filters take out suspended particles, not things in solution.
Sand Separators:
Screen Filters:
Screen Filters:

- Advantages:
  - Cost
  - Simple

- Disadvantages:
  - Quickly clogged if have organic contaminants
Disk Filters
Disk Filters

- Advantages:
  - Increased filtration area over screens
  - Simple

- Disadvantages
  - Cost - more expensive than screens.
  - Quickly clogs if have organic contaminants.
  - Cleaning - automatic backwash are available.
Disk Filters
Sand Media Filters:
Sand Media Filters:

- Screen, disk, and sand media filters can all filter to the same degree.
- The difference is in how often you need to clean them.
  - If you have high organic content in your water, sand media filters are recommended.
Sand Media Filters:

**Filtering Process**
- Incoming water (via manifold)
- Backwash valve
- Contaminants suspended off media sand bed
- Flow dispersion assembly
- Filter tank
- Media sand
- LAKOS lateral/underdrain assembly
- To system
- Backwash flow (from other filter tanks)

**Backwash Process**
- To backwash disposal
Clogging of Microirrigation Systems

Source: Chemical Precipitates

- Lime (calcium carbonate) and iron are the most common problems.
Chemical Precipitate Clogging of Microirrigation Systems

Water quality levels of concern:

- Calcium: pH > 7.5 and 2.0 meq/l (120 ppm) of bicarbonate
Chemical Precipitate Clogging of Microirrigation Systems

Source: Lime

Solution: pH Control (Acidification) + filtration

Acidification to a pH of 6 or 6.5 will take care of most lime precipitate problems.
Chemical Precipitate Clogging of Microirrigation Systems

Water quality levels of concern:

- Iron: pH > 4.0 and 0.5 ppm iron
Dealing with Iron Precipitation:

1. Precipitate iron in a pond / reservoir

2. Chemicals (e.g. phosphonic acid or phosponates) may keep iron in solution or interfere with the crystal formation.
Clogging of Microirrigation Systems

Source: Biological Sources
Clogging of Microirrigation Systems

Source: Biological Sources

Solution: Filtration (usually media filters) + Biocide
Biological Clogging

Acid may deter but not eliminate biocide chlorine copper
Chlorine

- **Sources:**
  - Liquid - sodium hypochlorite
  - Solid - calcium hypochlorite
  - Gas chlorine
## Chlorine as a Biocide

<table>
<thead>
<tr>
<th>Description</th>
<th>Free Chlorine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent growth</td>
<td>1 - 2 ppm</td>
</tr>
<tr>
<td>Periodic injection</td>
<td>10 - 20</td>
</tr>
<tr>
<td>Super chlorination (reclamation)</td>
<td>500 - 1000</td>
</tr>
</tbody>
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Test for chlorine using a pool/spa test kit
Flushing of microirrigation systems:

- Silts and clay particles pass through even the best filters.
Flushing

- Silts and clay particles pass through even the best filters.

- Need to flush the system - mainlines, submains, and laterals (in that order).
  - Flush laterals by hand or use automatic flushing end caps.
Stay on Top of Your Maintenance
Questions?

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