Microirrigation Systems

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Microirrigation Systems
Choosing your emission device

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:

Advantages:
- 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
- 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 can clog orifices
- More weed growth
- 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
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:
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)
- Media sand
- Flow dispersion assembly
- LAKOS lateral/underdrain assembly
- To system
- Backwash valve
- Contaminants suspended off media sand bed

Backwash Process:
- To backwash disposal
- Backwash flow (from other filter tanks)
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 phosphonates) 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

- Prevent growth: 1 - 2 ppm
- Periodic injection: 10 - 20
- Super chlorination (reclamation): 500 - 1000

Test for chlorine using a pool/spa test kit
Irrigation Water Management
Good irrigation management:

1. Know how much water the trees need.
2. Know how much water you’re applying.
3. Apply the water evenly (uniformly) across the field.
How much water are you applying?

Application rate:

- Tree water use given in inches/day
- Emitter discharge in gallons/hr
Step 1:

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

Water use by the tree = Tree spacing x Tree water use x 0.623

(gal/day) (ft²) (in/day)

Example: Tree spacing = 20 ft. x 20 ft. = 400 ft²
Tree water use = 0.3 in./day

Water use by:
the tree = 400 ft² x 0.3 in/day x 0.623
(gal/day)
= 75 gal/day
Table 1. Tree water use (gallons/day) for various plant spacing and tree water use (in/day).

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<th>0.1</th>
<th>0.15</th>
<th>ET (in/day)</th>
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Tree spacing (ft^2) = row spacing (ft) x tree spacing with the row (ft)
**Step 2:**

**Determine irrigation system application rate:**

\[
\text{Application rate (gal/hr)} = \text{Number of emission devices} \times \text{Discharge rate per emission device (gal/hr/Emitter)}
\]

Example: Drip emitters: 4 drip emitters per tree
Discharge rate per emitter: 1 gal/hr

Application rate (gal/hr.): = 4 emitters/tree x 1 gal/hr per emitter
\[= 4 \text{ gal/hr.}\]

Example: Microsprinklers: 1 microsprinkler per tree
Discharge rate per microsprinkler: 12 gal/hr.

Application rate (gal/hr): = 1 microsprinkler/tree x 12 gal/hr per microsprinkler
\[= 12 \text{ gal/hr.}\]
Step 3:

Determine hrs. of operation/day:

Hours of operation per day = \( \frac{\text{Tree water use (gal/day)}}{\text{Application rate (gal/hr)}} \)

Example:

Drip emitters: Tree water use (gal/day) = 75 gal/day (Step 1)
Application rate (gal/hr) = 4 gal/hr (Step 2)
Hours of operation per day = \( \frac{75 \text{ gal/day}}{4 \text{ gal/hr}} \)
= 18.8 hrs/day

Microsprinklers: Tree water use (gal/day) = 75 gal/day
Application rate (gal/hr) = 12 gal/hr
Hours of operation per day = \( \frac{75 \text{ gal/day}}{12 \text{ gal/hr}} \)
= 6.3 hrs/day
How Often to Irrigate?
How often to irrigate?

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) may also be a factor.
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- At peak ET:
  - Most drip systems will require daily irrigation.
  - Microsprinklers - typical would be an irrigation interval of 3 days or more.
Questions?

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