Sprinkler Application Rate & Maintenance of Microirrigation

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Sprinkler Application Rate

Soil Intake Rates and Application Rates in Sprinkler-Irrigated Orchards

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Sprinkler application rate:

$$i \text{ (in/hr)} = \frac{96.3 \times (\text{nozzle discharge - gpm})}{\text{Spacing along lateral (ft.)} \times \text{Spacing between laterals (ft.)}}$$
### Sprinkler Application Rate:

<table>
<thead>
<tr>
<th>Pressure (psi)</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>7%</th>
<th>8%</th>
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<th>10%</th>
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<td>10.66</td>
<td>12.32</td>
<td>14.19</td>
<td>16.14</td>
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Note: Metric conversion: 1 gal = 3.785 l; 1 in = 2.54 cm; 1 psi = 6.89 kPa.
Sprinkler Application Rate

Determining Pressure
Sprinkler application rate:

\[
i \text{ (in/hr)} = \frac{96.3 \times (\text{nozzle discharge - gpm})}{\text{Spacing along lateral (ft.) \times Spacing between laterals (ft.)}}
\]
Sprinkler Application Rate
Microirrigation Application Rate

Orchard Irrigation
Determining the Application Rate & Uniformity of a Microirrigation System

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Maintenance of 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 can all filter to the same degree BUT they req. different frequency of cleaning.
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

- Iron: pH > 4.0 and 0.5 ppm iron
Clogging of Microirrigation Systems

Source: Lime

Solution: pH Control (Acidification) + filtration
Dealing with Iron Precipitation:

1. Precipitate iron in a pond / reservoir
Dealing with Iron Precipitation:

1. Precipitate iron in a pond / reservoir

2. Chemicals (e.g. phosphonic acid, phosphonate) may keep iron in solution
   - Maintenance, not clean-up products
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

Free Chlorine

prevent growth 1 - 2 ppm
periodic injection 10 - 20
super chlorination 500 - 1000
(reclamation)

Test for chlorine using a pool / spa test kit
Chlorine: Injection Rates

- Sodium hypochlorite (liquid)
  - Example: household bleach w/ 5.25% active chlorine.

\[
\text{Chlorine injection = System flow \times Desired Cl \times 0.006 ÷ Strength of Cl soln (ppm)}
\]

- Calcium hypochlorite (solid)
  - 65-70% available chlorine.
  - 12.8 lbs. of calcium hypochlorite added to 100 gallons of water forms a 1% solution.
  - Use above formula.
Flushing of microirrigation systems:

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

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- Need to flush the system - mainlines, submains, and laterals (in that order).
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.
Questions?

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For Powerpoint presentation go to:

http://schwankl.uckac.edu