

# **Sprinkler Application Rate & Maintenance of Microirrigation**

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# Sprinkler Application Rate



REDUCING RUNOFF FROM IRRIGATED LANDS

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## 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 2. Sprinkler discharge rates (gpm) for various nozzle sizes (in) and pressures (psi)

Pressure (psi)	Nozzle size (in)											
	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4
20	1.17	1.60	1.99	2.65	3.26	3.82	4.60	5.51	6.37	7.30	8.34	
25	1.31	1.78	2.24	2.96	3.64	4.38	5.25	6.14	7.13	8.19	9.32	
30	1.44	1.95	2.50	3.26	4.01	4.83	5.75	6.80	7.86	8.97	10.21	
35	1.55	2.11	2.77	3.58	4.31	5.18	6.21	7.30	8.43	9.69	11.03	
40	1.66	2.26	2.96	3.74	4.51	5.54	6.64	7.80	9.02	10.35	11.79	
45	1.76	2.39	3.13	3.99	4.81	5.81	7.00	8.30	9.69	11.19	12.50	
50	1.85	2.52	3.30	4.18	5.05	6.09	7.41	8.71	10.19	11.58	13.18	
55	1.94	2.64	3.46	4.37	5.29	6.48	7.77	9.12	10.50	12.15	13.82	
60	2.03	2.76	3.63	4.58	5.65	6.80	8.17	9.54	11.05	12.68	14.44	
65	2.11	2.88	3.77	4.76	5.87	7.06	8.45	9.92	11.45	13.21	15.03	
70	2.19	2.99	3.91	4.96	6.10	7.34	8.78	10.32	11.95	13.70	15.59	
75	2.27	3.09	4.05	5.13	6.30	7.58	9.06	10.64	12.32	14.19	16.14	

Note: Metric conversions: 1 gal = 3.785 l; 1 in = 2.54 cm; 1 psi = 6.89 kPa.

# Sprinkler Application Rate



**Determining Pressure**



# Sprinkler application rate:

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# Sprinkler Application Rate



# **Microirrigation Application Rate**

## **Orchard Irrigation**

### **Determining the Application Rate & Uniformity of a Microirrigation System**

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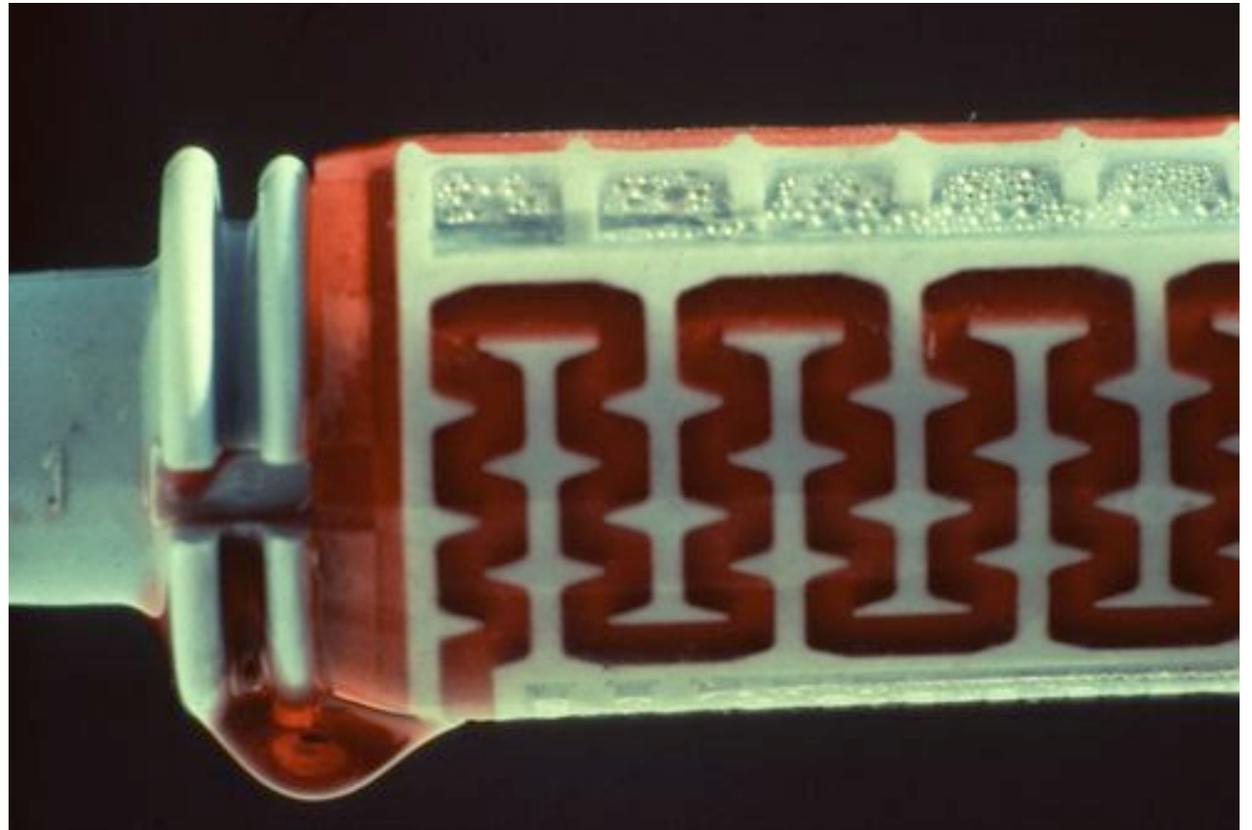
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# Maintenance of Microirrigation

**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.**



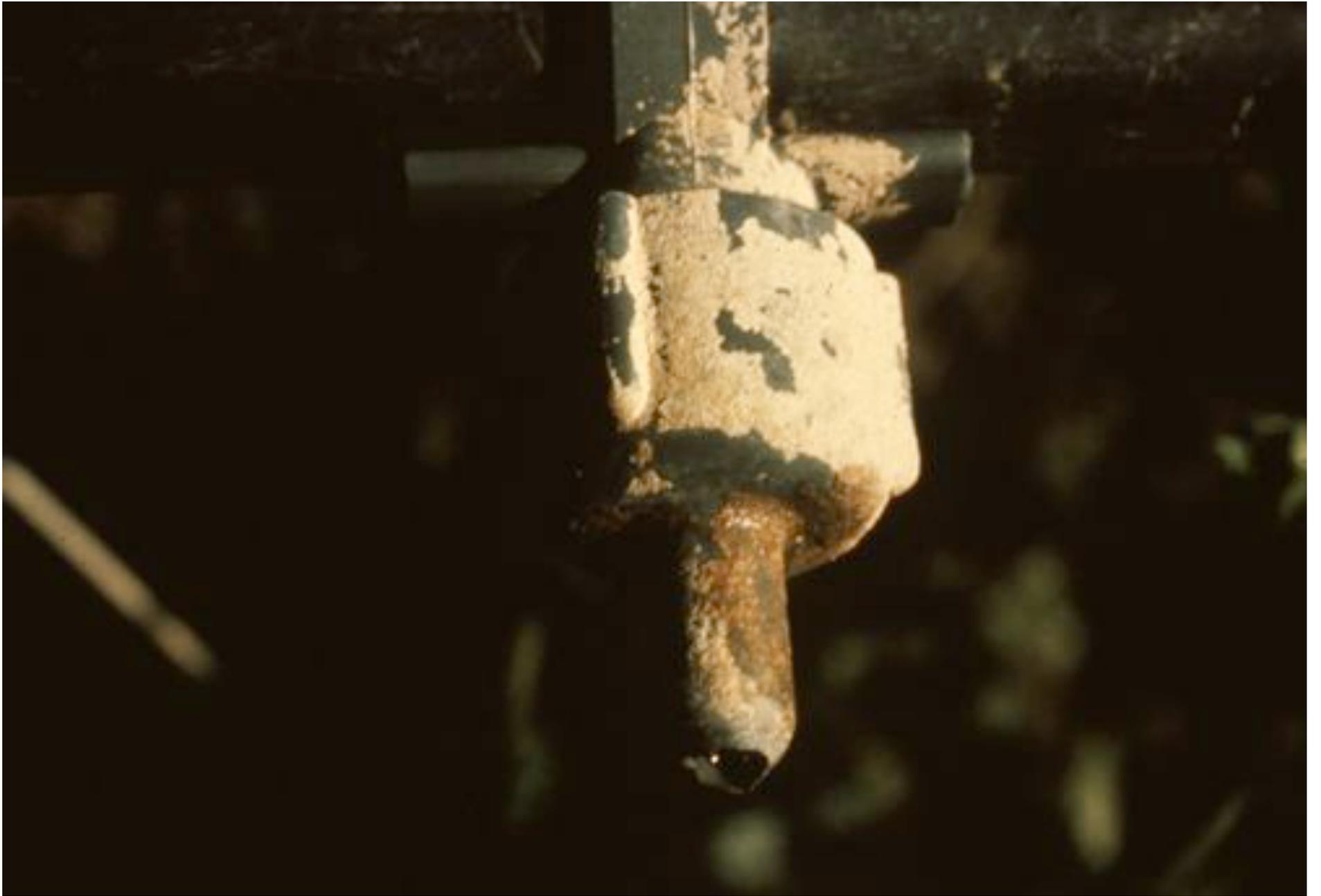




# **Clogging of Microirrigation Systems**

## **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

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## ■ 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 (reclamation)	500 - 1000

**Test for chlorine using a pool / spa test kit**

# Chlorine: Injection Rates

## ■ Sodium hypochlorite (liquid)

- Example: household bleach w/ 5.25% active chlorine.

$$\text{Chlorine injection rate (gal/hr)} = \frac{\text{System flow rate (gpm)} \times \text{Desired Cl Conc. (ppm)} \times 0.006}{\text{Strength of Cl soln (\%)}}$$

## ■ 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

- Silts and clay particles pass through even the best filters.
- **Need to flush the system - mainlines, submains, and laterals (in that order).**

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- 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:

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