

# Drip Irrigation

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# System Basics

- Require planning
- Irrigation response varies by crop

# Advantages

- Low pressure + Low volume = Low energy
- Small or large fields
- Water in root zone

# Components

- Source
- Backflow prevention
- Pressure regulator
- Filter
- Header
- Drip tape

# Components

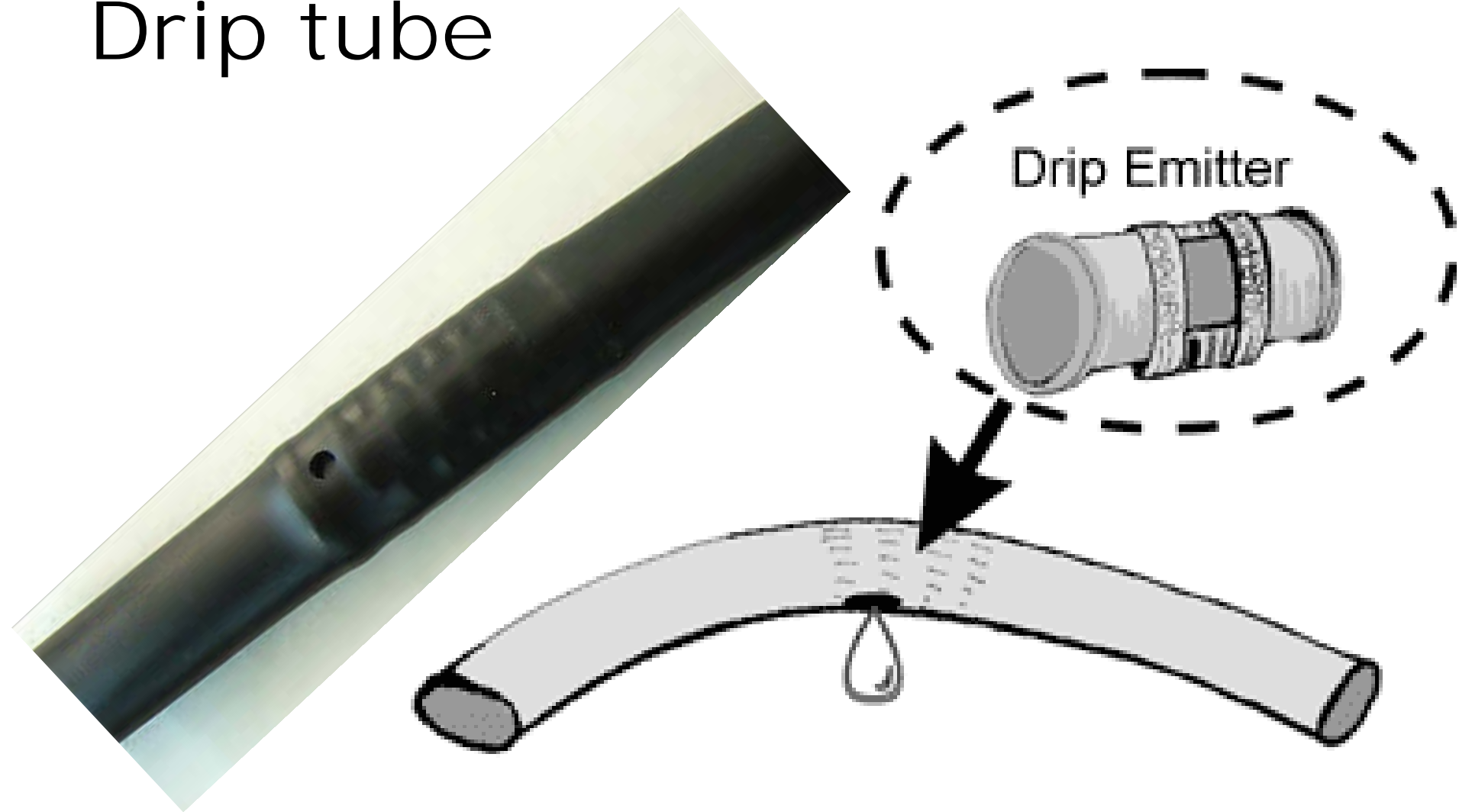
- Example 1
  
- Example 2

# Drip Tape

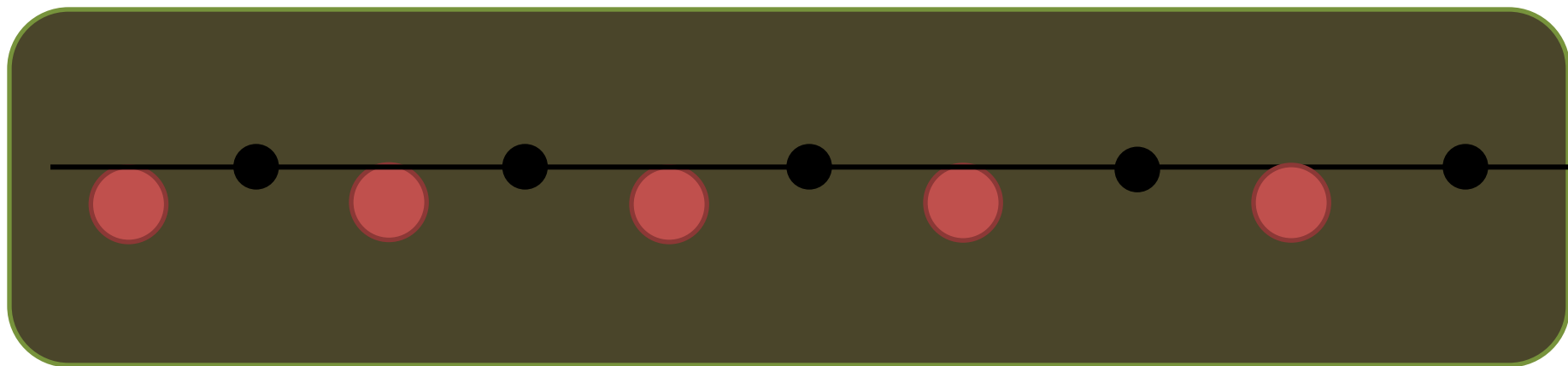
- Tape



# Drip tube

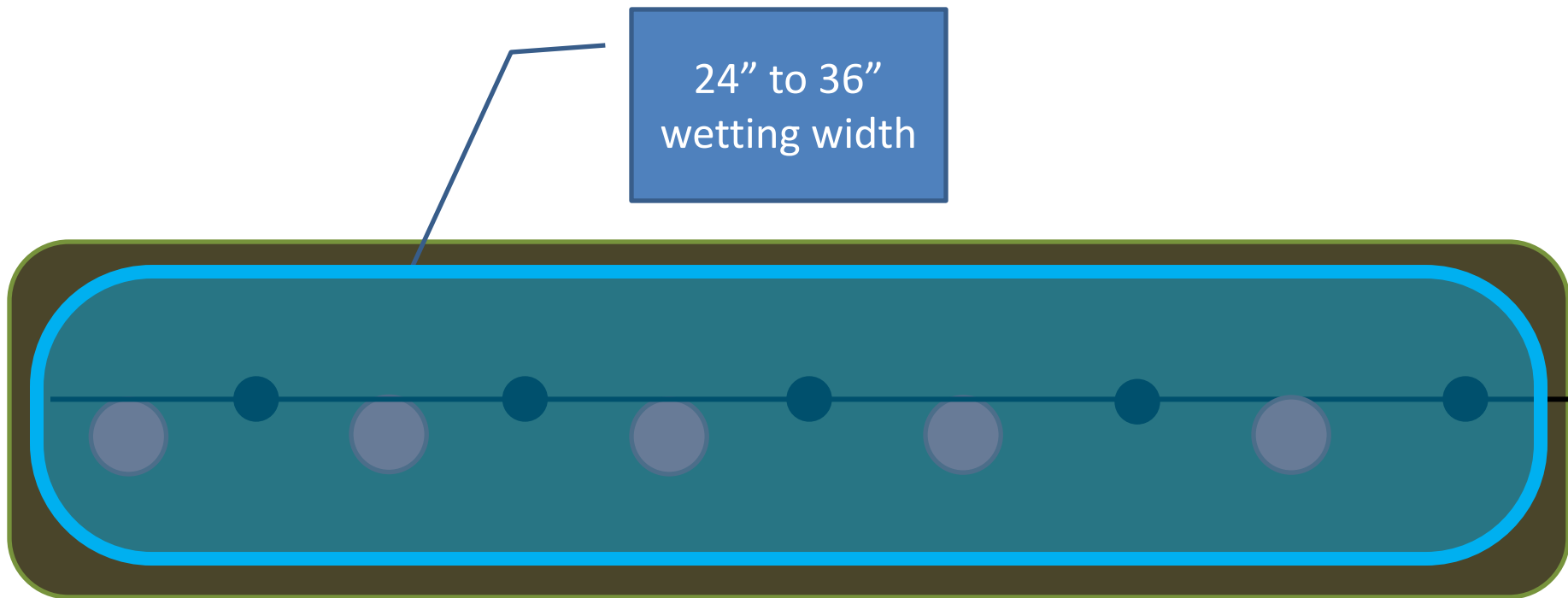


# Drip Tape

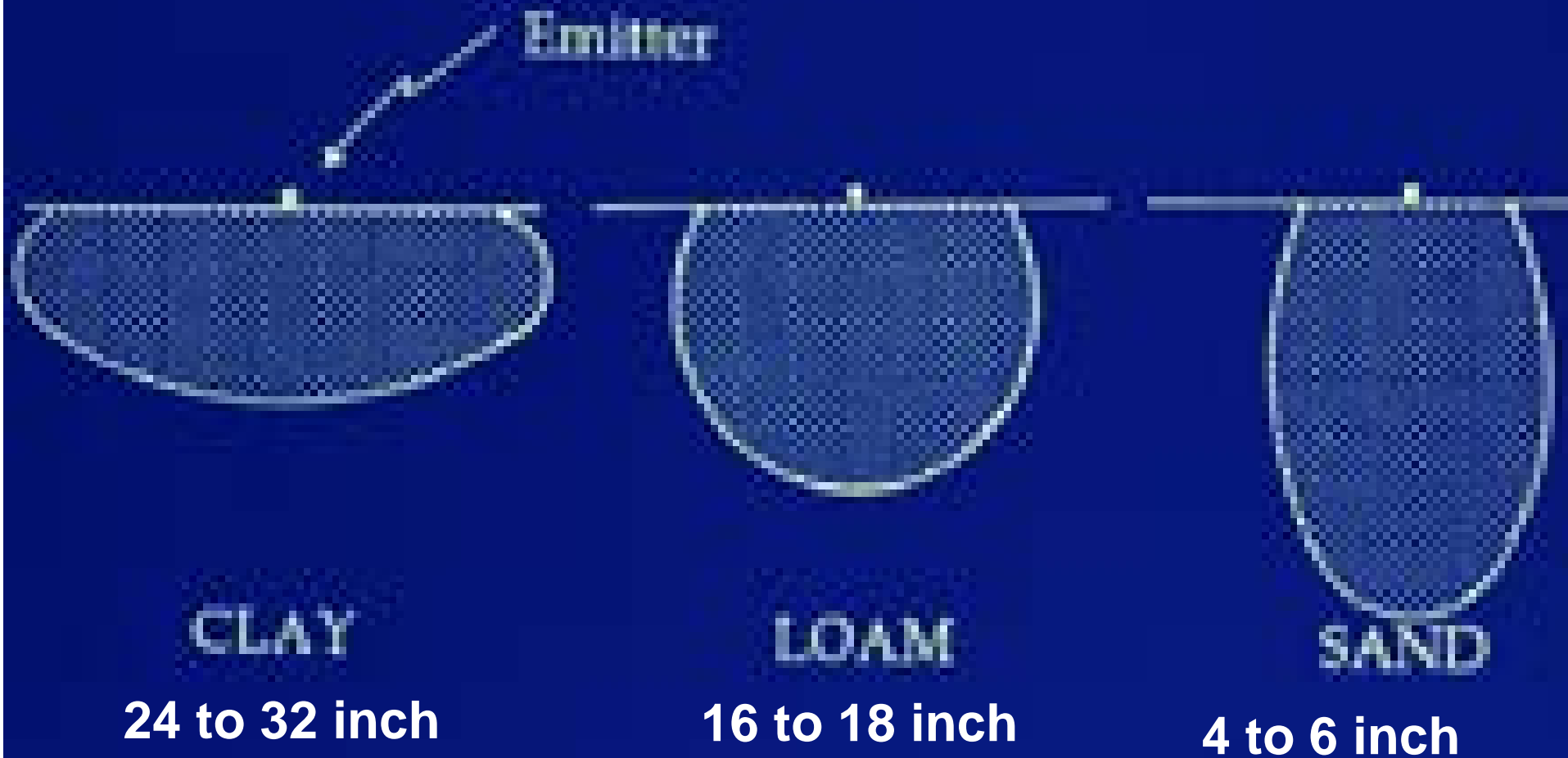




# Drip Tape



# Wetted Radius



Wetted radius from emitter line source

# Emitter spacing

- 6 inch
- 12 inch
- 18 inch
- 24 inch



# Emitter spacing

- 6 inch - 12 inch
  - Leafy greens
  - Onions
  - Beats
  - Brassicas



# Emitter spacing

- 18 inch - 24 inch
  - Solanaceous
  - Cucurbits
  - Brassicas



# Emitter Spacing

## 12 inch spacing

- 100 ft x 0.5 gph x 1 hour
  - $100 \times 0.5 \times 1 = 50$  gallons

## 24 inch spacing

- 100 ft x 0.5 gph x 1 hour
  - $50 \times 0.5 \times 1 = 25$  gallons
- 100 ft x 0.5 gph x 2 hour
  - $50 \times 0.5 \times 2 = 50$  gallons

# Emitter flow rate

- <.25 gph
- 0.25 gph
- 0.34 gph
- 0.50 gph
- 0.75 gph





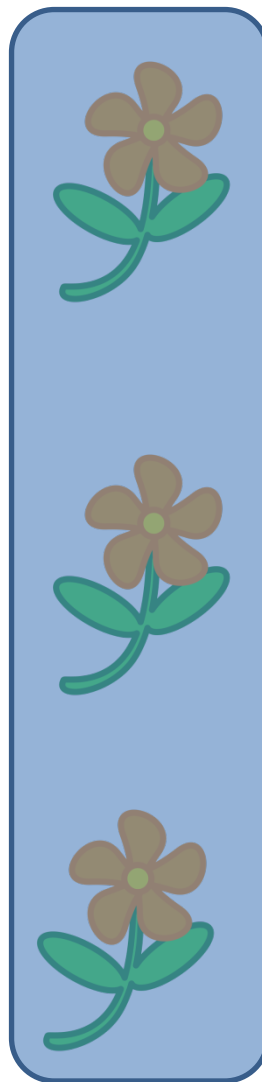
# Zoning





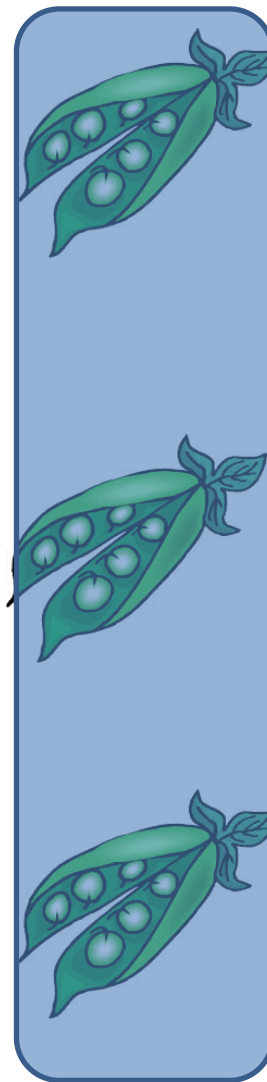
# Zoning

1



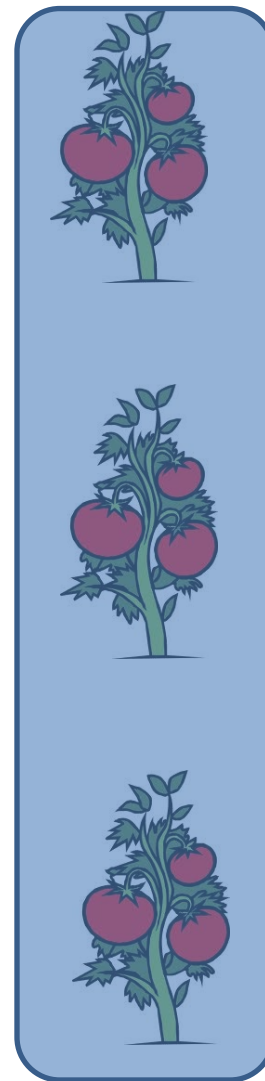
# Zoning

2



# Zoning

3



# Pull it all together

## Example 1

- 30x90 ft high tunnel
  - 6 rows
- 12 inch emitter spacing
- 0.75 gph emitter
  
- $90 \times 6 \times 0.75 = 405$  gph

## Example 2

- 30 x 90 ft high tunnel
  - 6 rows
- 18 inch emitter spacing
- 0.25 gph emitter
  
- $60 \times 6 \times 0.25 = 90$  gph

# Scheduling

- When to turn on pump?
- How long to run pump?
  - (volume of water to apply)

# When Do I irrigate?

- Plant appearance = poor
  - See curling of leaves, wilting
- Soil appearance = better
- Soil moisture meters = good
  - Watermarks
  - Tensiometers

# Soil Moisture Tools



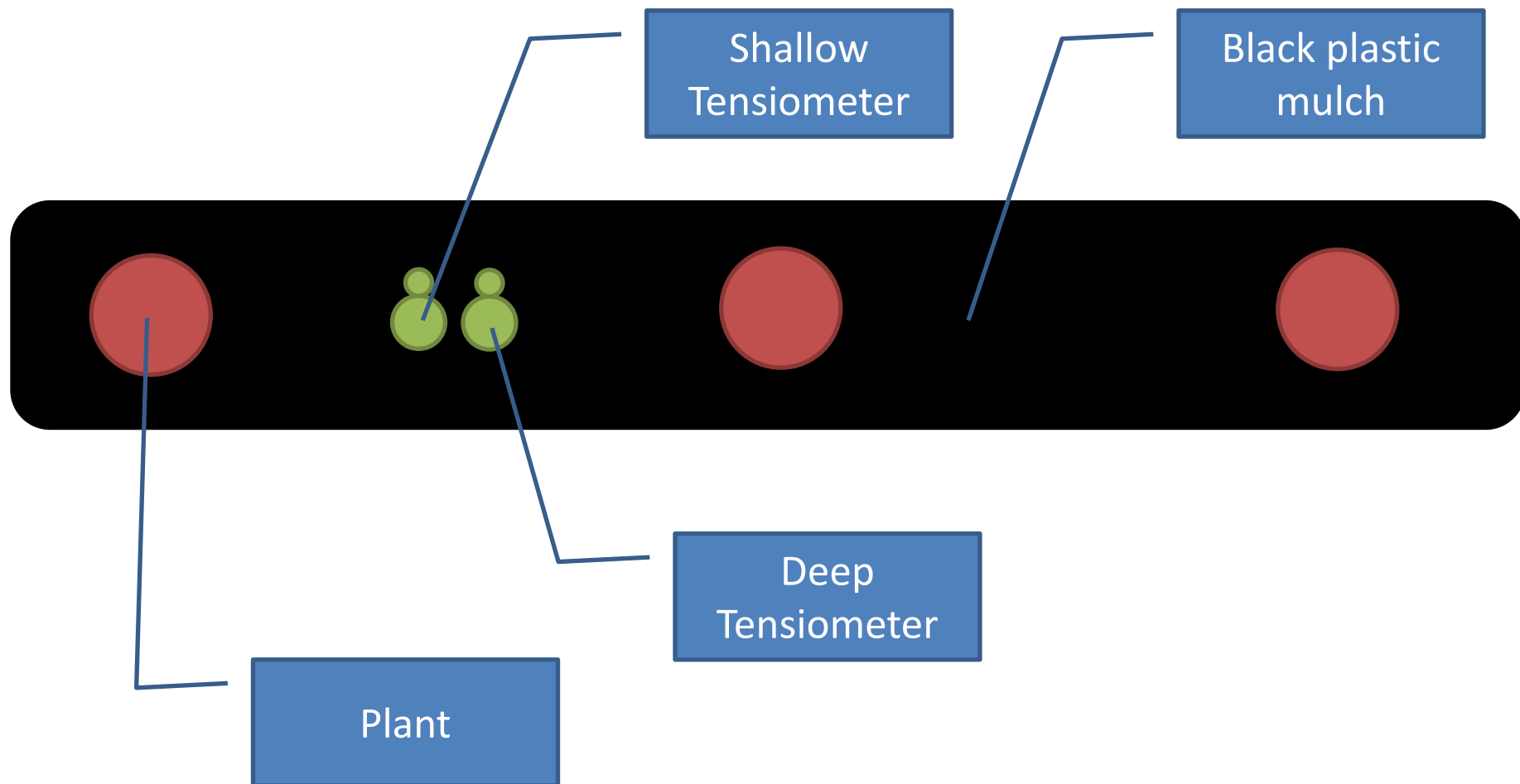
**Watermark**



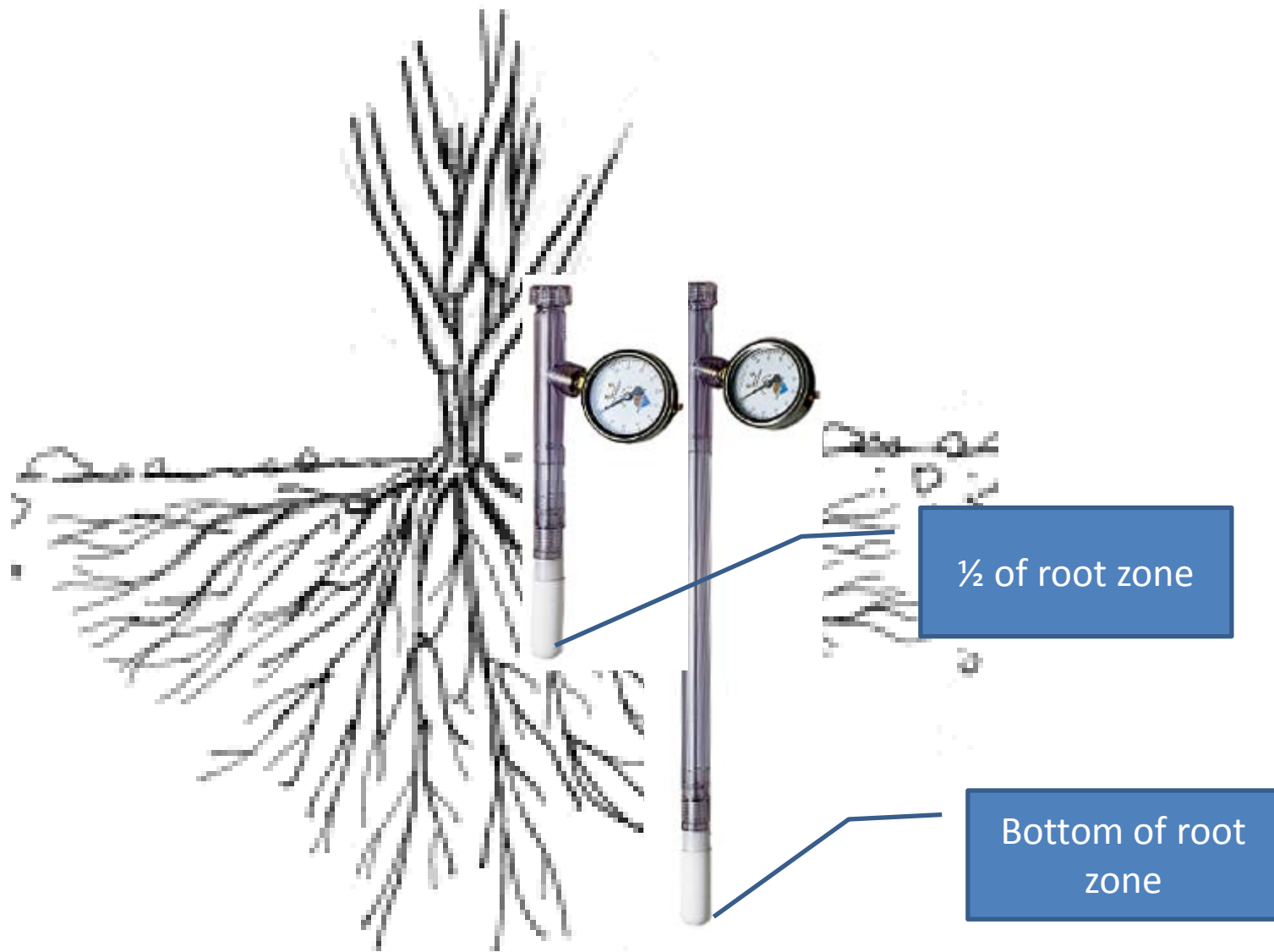
## Tensiometer



# Tensiometer Placement







# Tensiometer Set Points (cbars)

<b><u>Soil Texture</u></b>	<b><u>Field Capacity</u>*</b>	<b><u>25% Depletion</u>*</b>
<b>Sandy loam</b>	<b>5 - 10</b>	<b>10 - 15</b>
<b>Loams</b>	<b>10 - 15</b>	<b>20 - 30</b>
<b>Silt loams</b>	<b>15 - 20</b>	<b>25 - 35</b>
<b>Clay loams</b>	<b>25 - 40</b>	<b>40 - 50</b>

\* No irrigation required

\* Of the AWC in effective root zone

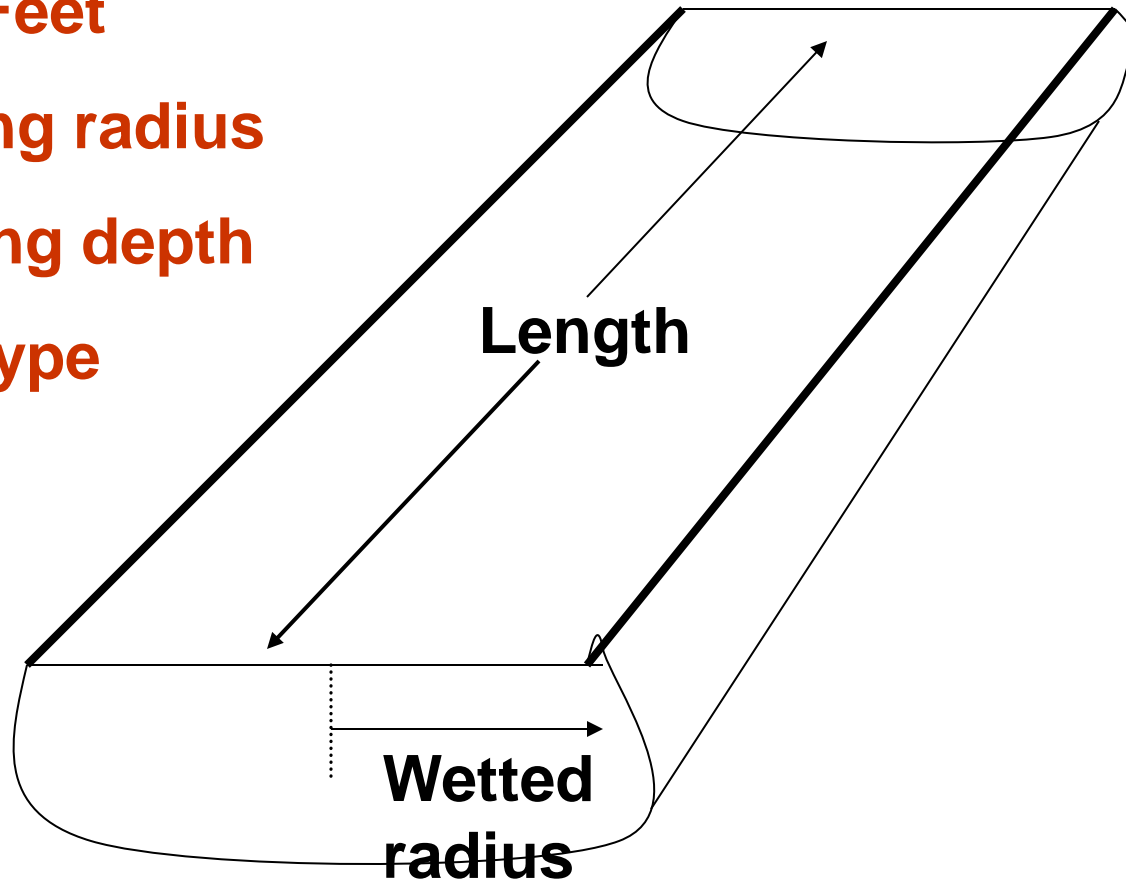
# Bath Tub Approach

Row Feet

Wetting radius

Rooting depth

Soil Type



## Crop Wetted Volume

# Crop Rooting Depth

<u>Shallow</u> (6-12")	<u>Moderate</u> (18-24")	<u>Deep</u> (> 36")
Broccoli Greens Onion Snap beans Pepper	Cabbage Cucumber Muskmelon Eggplant Potato Tomato	Asparagus Lima Bean Watermelon (seeded)

# Soil Water Holding Capacity

<b><u>Soil Texture</u></b>	<b><u>Inches/foot</u></b>
<b>Sands</b>	<b>0.5 – 1.0</b>
<b>Sandy loam</b>	<b>1.0 – 1.5</b>
<b>Loams</b>	<b>2.0 – 2.5</b>
<b>Silt loams</b>	<b>2.5</b>
<b>Clay loams</b>	<b>2.0 – 2.5</b>

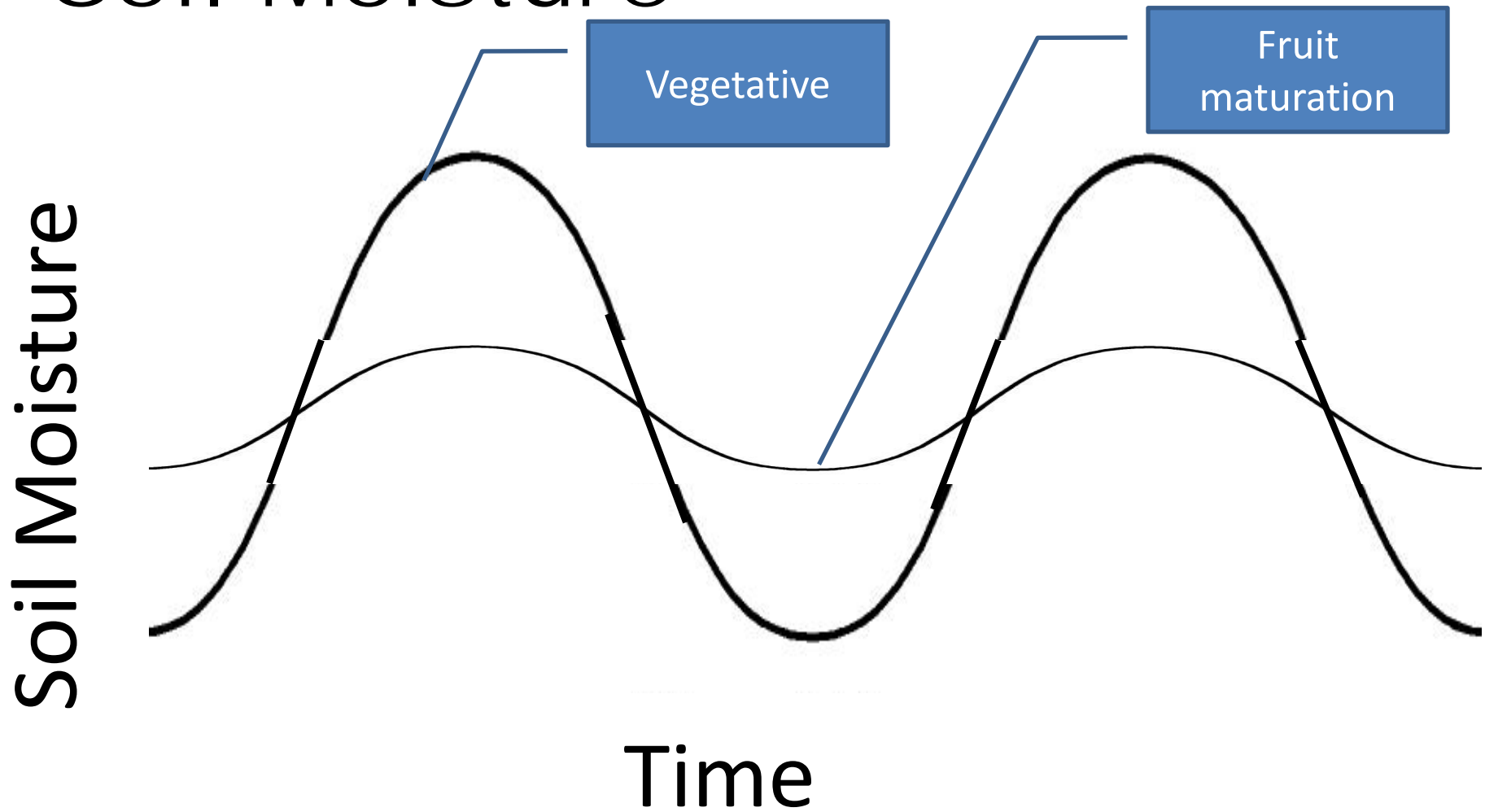
WHC at  
field  
capacity.

# Math Time!

- Need to know
  - Row feet
  - Wetting radius
  - Rooting depth
  - Soil type
  
  - 27,000 gals / acre inch
  - 43560 sq ft / acre



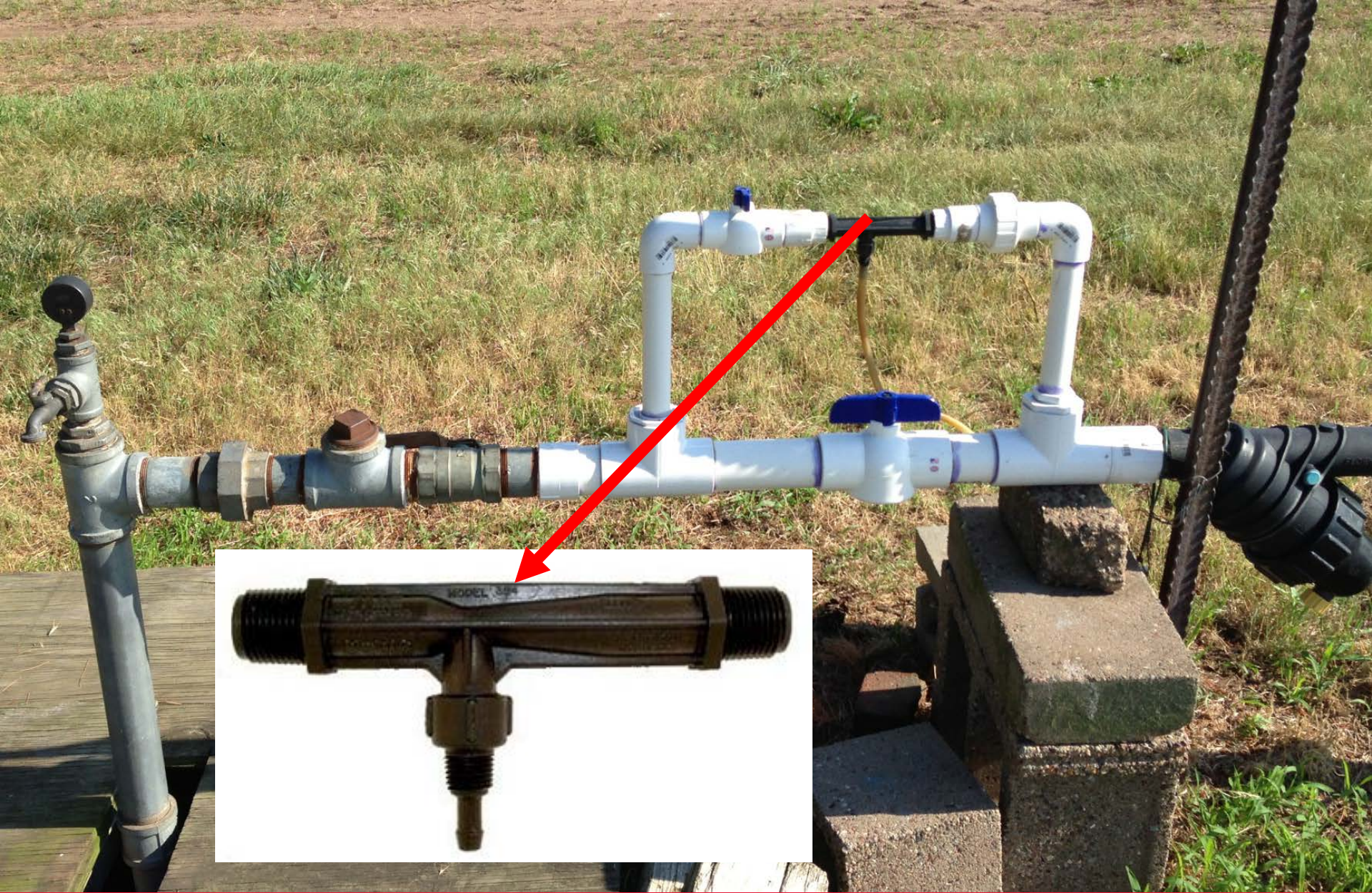
# Soil Moisture



# Fertigation







# Summary

- Low flow, low pressure system
- Plan/zone your system
- Scheduling
- Fertigation

# Questions?



# Questions?