Irrigation Water Management
(show me the numbers!)

Ben Burgoa
W-SARE Cross Training
April 2, 2015
Terms and Units

- Total amount of water used (Acre-Ft or AF)
- Pump flow rate (gpm, gallons per minute)
- Irrigation application rate (inches/hr)
- Pressure (psi, pounds per square inch)
- Area (Ac, acres; or 43,560 square feet)
To manage irrigation and/or nutrient application:

We need to know

1) Amount of water applied per irrigation
2) Total amount of water applied
How to use irrigation system information to determine application rate (in/hr) and total flow rate pumped (gpm)

Why is this important?
1) Check the flow meter at the pump
2) Check the information provided by the grower
3) Determine the number of inches of water applied to compare with crop ETc
What information do you need?

• Under these conditions:
  – Crop: Strawberries and vegetables
  – One pump per block
• Bed width (W)
• Flow rate of the drip irrigation (X gpm/100ft)
• Number of drip lines per bed (Y)
• Size of the irrigated block
• Hours of irrigation
Strawberries
Strawberries

- Bed width = 4 ft
- Irrigation system
  - Drip, 2 lines per bed
  - 0.67 gpm/100ft at 8 psi
- Block size = 5 Ac
- Irrigation time = 2 hrs
## 5/8"
16 mm

Available Wall Thickness:
4 mil, 6 mil, 8 mil, 10 mil, 12 mil, & 15 mil

<table>
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<tr>
<th>Outlet Spacing</th>
<th>0.13 GPH Emitter</th>
<th>0.20 GPH Emitter</th>
<th>0.27 GPH Emitter</th>
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*Q-100 GPM @ 8 PSI*
0.67 gpm/100 ft

4ft
Strawberries

- Bed width = 4 ft
- Drip, 2 lines per bed @ Toro 0.67 gpm/100ft
- Block size = 5 Ac
- Irrigation time = 2 hrs

Block Flow Rate (gpm) = ( # drip lines) x [(drip flow rate, gpm/100ft)/ (bed width, ft)] x (block area, ft^2)

Block Flow Rate = ( 2 lines) x [0.67 gpm/ (100ft x 4ft)] x (5 Ac x 43,560 ft^2/Ac)
Strawberries – Flow Rate

- Bed width = 4 ft
- Drip, 2 lines per bed @ Toro 0.67 gpm/100ft
- Block size = 5 Ac
- Irrigation time = 2 hrs

Block Flow Rate = (2 lines) x [(0.67 gpm/ (100 ft x 4ft)) x (5 Ac x 43,560 ft²/Ac)]

Block Flow Rate = 730 gpm

or
Flow Rate = 146 gpm/Ac
What is the flow meter reading?

• Depends on the flow meter
  – Installation
  – Maintenance
  – Age

• Depends on the irrigation system
  – Leaks
  – Pressure variation

Block Flow Rate= 730 gpm
Strawberries – Application Rate

• Bed width = 4 ft
• Drip, 2 lines per bed @ Toro 0.67 gpm/100ft
• Block size = 5 Ac
• Irrigation time = 2 hrs

Application Rate (in/hr) = $96.3 \times \frac{\text{flow rate, gpm}}{\text{area, } ft^2}$

Application Rate = $96.3 \times \frac{2 \times 0.67 \text{ gpm}}{400 \text{ ft}^2}$

Application Rate = 0.32 in/hr
Strawberries – Total Applied

- Bed width = 4 ft
- Drip, 2 lines per bed @ Toro 0.67 gpm/100ft
- Block size = 5 Ac
- Irrigation time = 2 hrs

Total Depth Applied = (application rate) x (time)

Total Depth Applied = (0.32 in/hr) x (2 hrs)

Total Depth Applied = 0.64 in

Total Depth Applied = 0.64 Ac-in/Ac
Aqua-Traxx® PERFORMANCE CHARTS

5/8"

Emitter Flow Rate 0.27 GPH @ 8 psi

EA5XX0867

LENGTH OF RUN IN FEET

.67 gpm PER 100 FEET @ 8 psi

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Aqua-Traxx® PERFORMANCE CHARTS

5/8"

Emitter Flow Rate 0.27 GPH @ 8 psi

EA5XX0867 LENGTH OF RUN IN FEET

.67 gpm PER 100 FEET @ 8 psi

2% UP

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Romaine Lettuce
Vegetables

• Bed width = 40 inch
• Irrigation system
  – Drip, 1 line per bed
  – 0.34 gpm/100ft at 8 psi
• Block size = 5 Ac
• Irrigation time = 5 hrs
Vegetables

- Bed width = 40 inch = 3.3 ft
- Drip, 1 line per bed @ 0.34 gpm/100ft at 8 psi
- Block size = 5 Ac; Irrigation time = 5 hrs

Block Flow Rate (gpm) = ( # drip lines) x (drip flow rate/bed width) x (block area)

Block Flow Rate = (1 line) x [(0.34 gpm/(100 ft x 3.3 ft))] x (5 Ac x 43,560 ft²/Ac)

Block Flow Rate = 224 gpm

or

Block Flow Rate = 45 gpm/Ac
Vegetables

- Bed width = 40 inch = 3.3 ft
- Drip, 1 line per bed @ 0.34 gpm/100ft at 8 psi
- Block size = 5 Ac; Irrigation time = 5 hrs

Application Rate (in/hr) = \[ 96.3 \times \frac{\text{flow rate, gpm}}{\text{area, ft}^2} \]

Application Rate = \[ 96.3 \times \frac{0.34 \text{ gpm}}{330 \text{ ft}^2} \]

Application Rate = 0.1 in/hr
Vegetables

- Bed width = 40 inch = 3.3 ft
- Drip, 1 line per bed @ 0.34 gpm/100ft at 8 psi
- Block size = 5 Ac; Irrigation time = 5 hrs

Total Depth Applied = (application time) x (time)

Total Depth Applied = (0.1 in/hr) x (5 hrs)

Total Depth Applied = 0.5 Ac-in/Ac
THANKS

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