Shallow drip considerations

Timothy Coolong
UGA Dept. of Horticulture
Subsurface drip irrigation

• SDI has been used throughout the Midwest for decades
  • Kansas State University has an excellent resource for SDI https://www.ksre.k-state.edu/sdi/

• Usually these are permanent installations
  • 12-24-inches deep
  • Thick walled drip tubing (15 mil)
  • On heavier soils that allow capillary movement of water

Traditional SDI continued.

• Typically are using 1 dripline between 2 rows of agronomic crops
• Used widely in California – in long term rotations including processing tomatoes
• Generally agreed to limit weed growth and utilize water more efficiently

Image: *Subsurface drip irrigation in Kansas: An overview*
Shallow subsurface drip irrigation (SSDI)

• Only mean for a one year or one season use
• Utilize a thinner wall drip tubing
• Buried shallow for vegetables – typically with 1 line per row of vegetables
Installation
SDI trials fall squash
Reduced surface wetting
Results

• The SSDI used less water than surface drip to maintain the same soil moisture levels (6-inches deep) in 1 year, in year 2 no difference.
• In year 1 the SSDI had superior yields, in year 2 was no different
  • Year 2 was much hotter and drier during plant establishment*
• After one season flow rates did not differ per plot
  • No root intrusion was observed – either year
Recent research in Georgia
Evaluating SSDI in conjunction with cultivation regime in organic crops

• Looking at sweet corn and broccoli
• Overhead vs. SSDI – 4.5 inches deep on average
  • SSDI is about 3-4 inches offset from each row
• 4 methods of weed control
  • Hand weed
  • No weed
  • Low input cultivation (using a tine weeder only)
  • High input cultivation (using tine and finger weeders)
Sweet corn
What are we seeing?

• Using SSDI gives us equivalent yields when using a low input cultivation system as the high input system with overhead irrigation
  • We are effectively reducing between row weeds with the SSDI system
• We are maintaining soil moisture levels as good or better than overhead irrigation putting out equivalent amounts of water (1-inch per week)
• We are maintaining or improving yields
SSDI and weed growth

Weed biomass *non weeded control*

- **Between Row**
- **Within Row**

Corn yield biomass – non weeded control

- **Overhead**
- **SSDI**

Legend:
- Overhead
- SSDI

Images:
- Corn and soil samples
Fall broccoli

- Planted on 22-inch double rows
- Late August planting
- Emerald Crown
- Harvested in late Oct.
Fall broccoli – Planted
Yield

• Significant interaction between cultivation and irrigation

• Essentially the SSDI system allowed you to “get away” with a lower input cultivation system
Soil water content

• Avg of 10 HS Soil Moisture (inserted vertically to measure top 10 cm in the middle of the row)
• Placed in no weed control and hand weed control and averaged
• Overhead Avg: 18% VWC
• Drip Avg: 21% VWC
SSDI

• Pros:
  • On *heavier* soil (piedmont) it has worked to germinate large seeded crops (4 inch depth 3-5 inch offset from row).
  • Has worked well with transplants in fall in the piedmont.
  • Can reduce weed pressure in both conventional and organic settings.
  • Easily allows for cultivation.
  • Other research has shown it can use nutrients more effectively.

• Cons:
  • Questions remain on SSDI performance in sandier soils.
  • Not adequate for germination of small seeded crops.