Training Opportunities in Drip Irrigation for Agents

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2025 Precision Ag and Irrigation Agent Training

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UGA Southeast Georgia Research and Education Center

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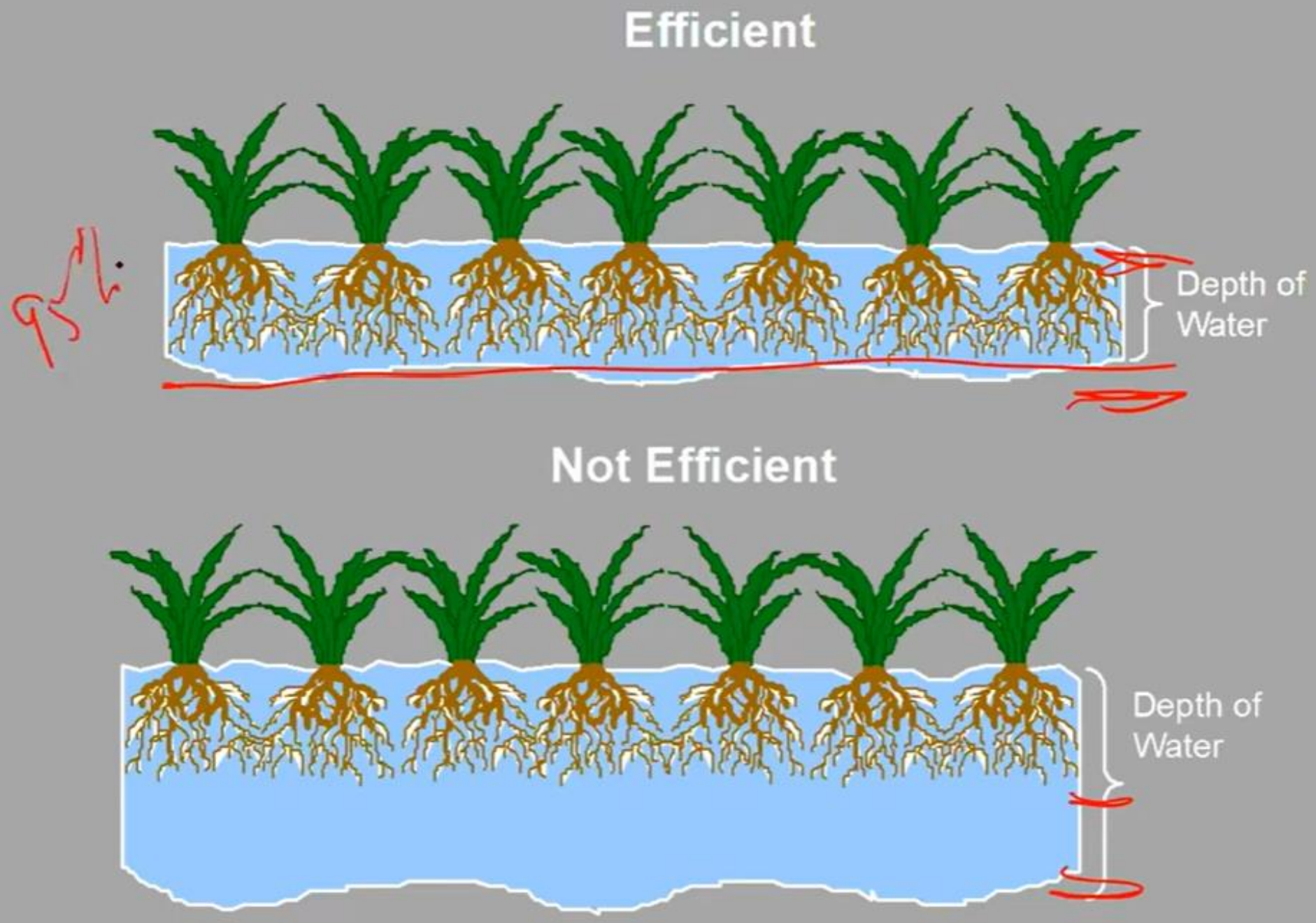
Irrigation Efficiency

Irrigation Efficiency:
Measures how much of the water applied is beneficially used by the crop.

Formula:
Efficiency = (Water Beneficially Used) / (Total Water Applied)

Challenges to Measure Efficiency:
- It depends on the water that reaches the root zone or plant.
- Soil moisture sensors provide critical insights into root zone water availability.



Credit: Dr. Franklin Gaudi, Laurel Ag and Water

Beneficial Uses of Water

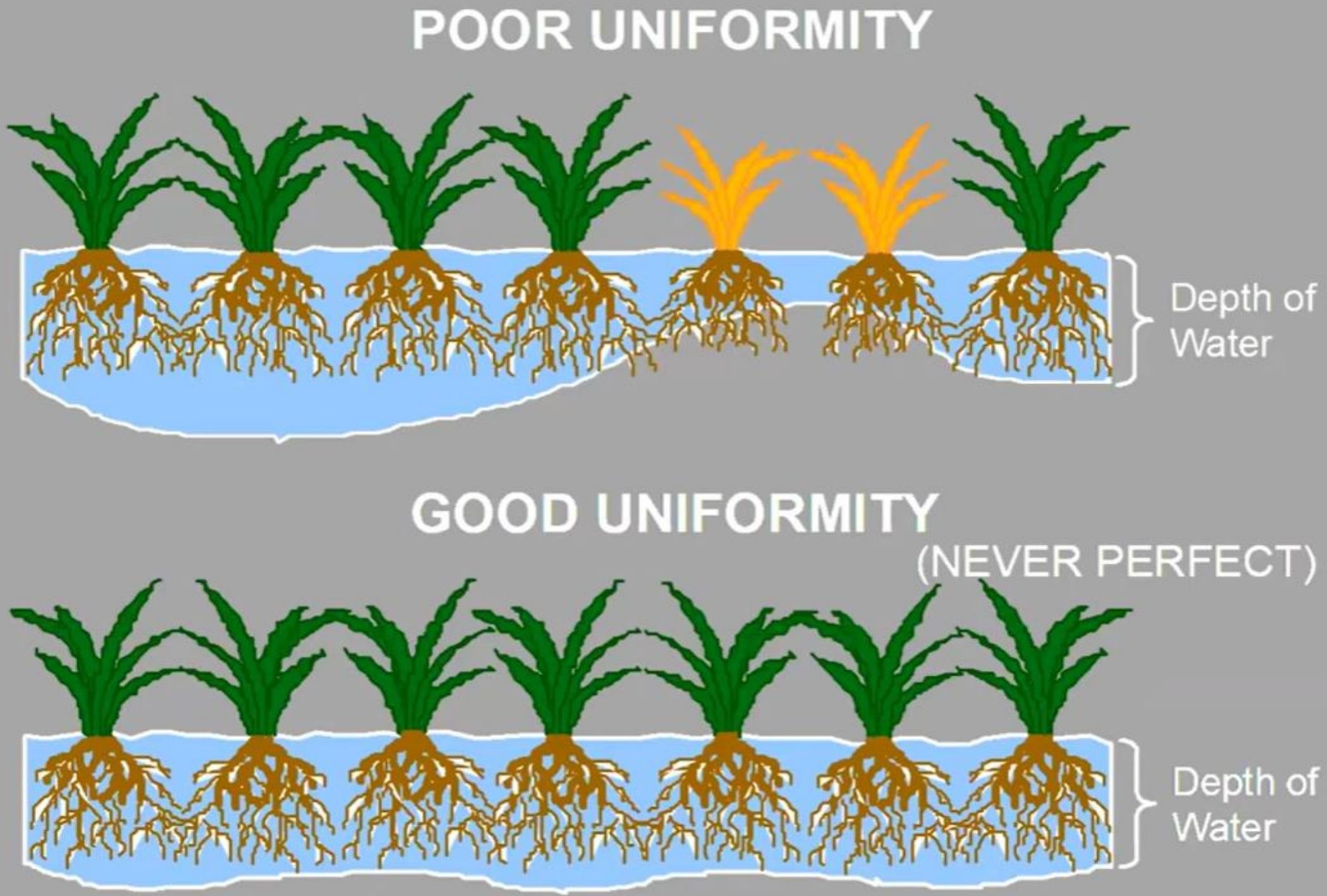
- **Primary Beneficial Use in the Southeast:** Meeting crop evapotranspiration (ET) – Ensures crops receive the water they need to grow effectively.
- **Other Beneficial Uses**: Climate Control. Cooling crops during high heat.
- **Weed Germination**: Watering weeds for management later.
- Unlike arid areas, water use for salt leaching is typically unnecessary in the Southeast

What is Distribution Uniformity (DU)?

- Measures evenness of water application across a field.
- Ideal DU: 90% or greater
- Assessed using the **catch can method**:

Why It Matters:

- Uniform crop growth & yield
- Efficient water and fertilizer usage
- Early detection of clogs, leaks, or system design flaws



Credit: Dr. Franklin Gaudi, Laurel Ag and Water

What Affects DU in Drip Systems?

Emitter Manufacturing Quality

- The **Coefficient of Variation (CV)** indicates how consistently emitters are produced (flow rate variation).
- Lower CV = more consistent flow rates = higher DU.

Why CV Matters

- Understanding the manufacturer's CV helps you choose emitters that deliver more uniform water application.
- Even slight variations can compound over time, leading to under- or over-irrigation in different zones.

Cost vs. Benefit

- Achieving extremely high DU may increase upfront costs (premium emitters, advanced filters, etc.). So balance financial investment and benefits (crop yield, water savings, etc.)

Measuring DU with Catch Cans

Setup

- Place identical containers under selected emitters (start, midpoint, end)
- Run system under normal operating pressure for a set time
- Collect Data
- Measure water volume in each container
- Sort volumes (smallest to largest)
- **Calculate DU:** DU = (Average of lowest 25% of volumes / Average of all volumes) × 100%

Credit: Government of Western Australia Department of Primary Industries and Regional Development.

Why Flushing Drip Irrigation Is Important

- Removes Debris: Clears sediment, algae, and mineral buildup from lines
- Prevents Emitter Clogging: Regular flushes minimize partial blockages
- Extends System Life: Reduces stress on drip tape and fittings
- Preserves Uniformity: Maintains consistent flow and pressure across lines

Checking Drip Tape Pressure

- In-line gauge or portable pressure-test kit
- Where to Measure: Start, middle, and end of each lateral
- Recommended Range: Typically 8–15 psi (check manufacturer specs)

Interpretation

- Too Low → Possible blockages, leaks, or undersized pump
- Too High → Use pressure regulators or adjust pump settings

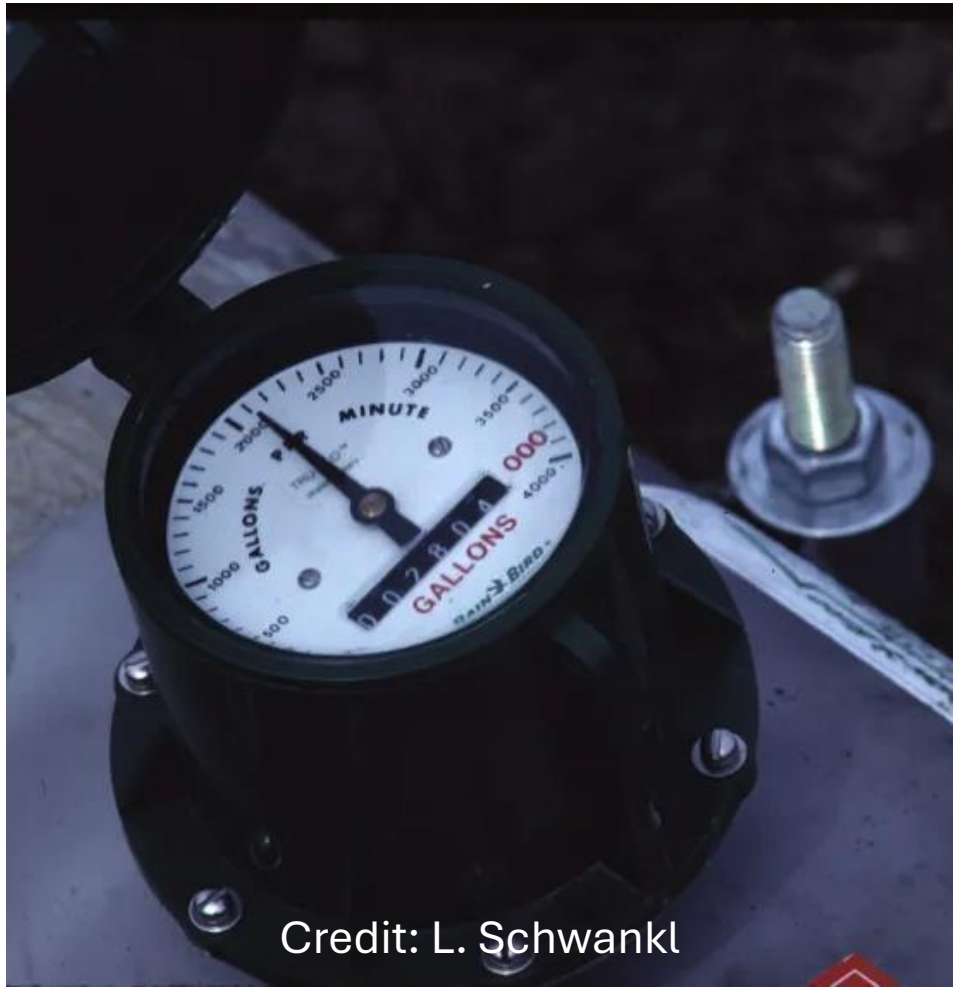
Why Flow Rate & Pressure Variation Matter

Identifying Leaks and clogs

- High flow + Low pressure often indicates a leak or damaged tape
- Low flow + High pressure suggests partial blockages or emitter clogging

Track Baseline

- Know your normal flow rate & pressure to quickly detect changes
- Early detection saves time, water, and protects yields



Credit: L. Schwankl

Example: Watermelon Irrigation Runtime and Frequency

Irrigation Duration

- For drip tape at 0.4 gal/100 ft/min, limit each irrigation event to 1–1.5 hours.
- Longer run times push water (and nutrients) below the 12–15 inch root zone.

Irrigation Frequency

- Replace single long events (e.g., 3–4 hours) with **two or three shorter events** per day.
- Improves water availability in the root zone and reduces nutrient leaching.

Adjusting for Different Flow Rates

- Lower flow tapes (0.22–0.25 gal/100 ft/min) require longer run times.
- Match irrigation runtime to drip tape output.

Correct Irrigation

- **Soil moisture sensors** can help confirm moisture reaches 12–15 inches (full root zone).
- **Blue dye** can reveal how deep irrigation water is percolating visually, helping to fine-tune run times. Useful extension demo.

Soil Moisture Sensor Use

Water Efficiency Improvements:

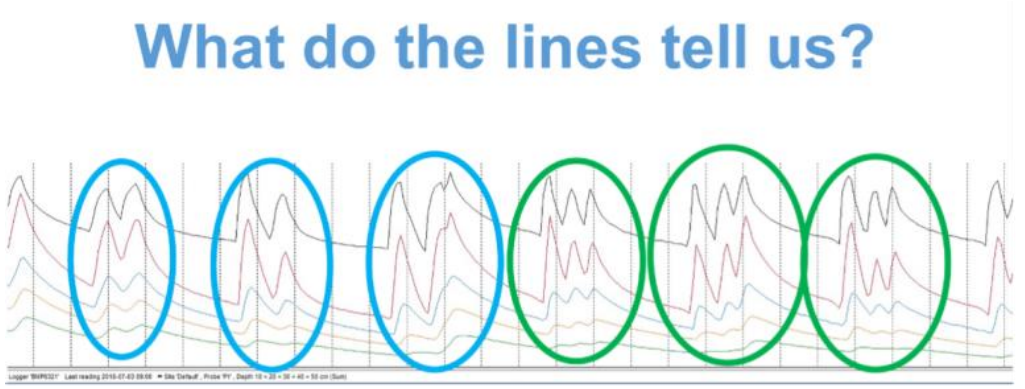
- Adoption of optimal irrigation schedules reducing water waste.
- Increased water retention within the root zone, enhancing crop health.

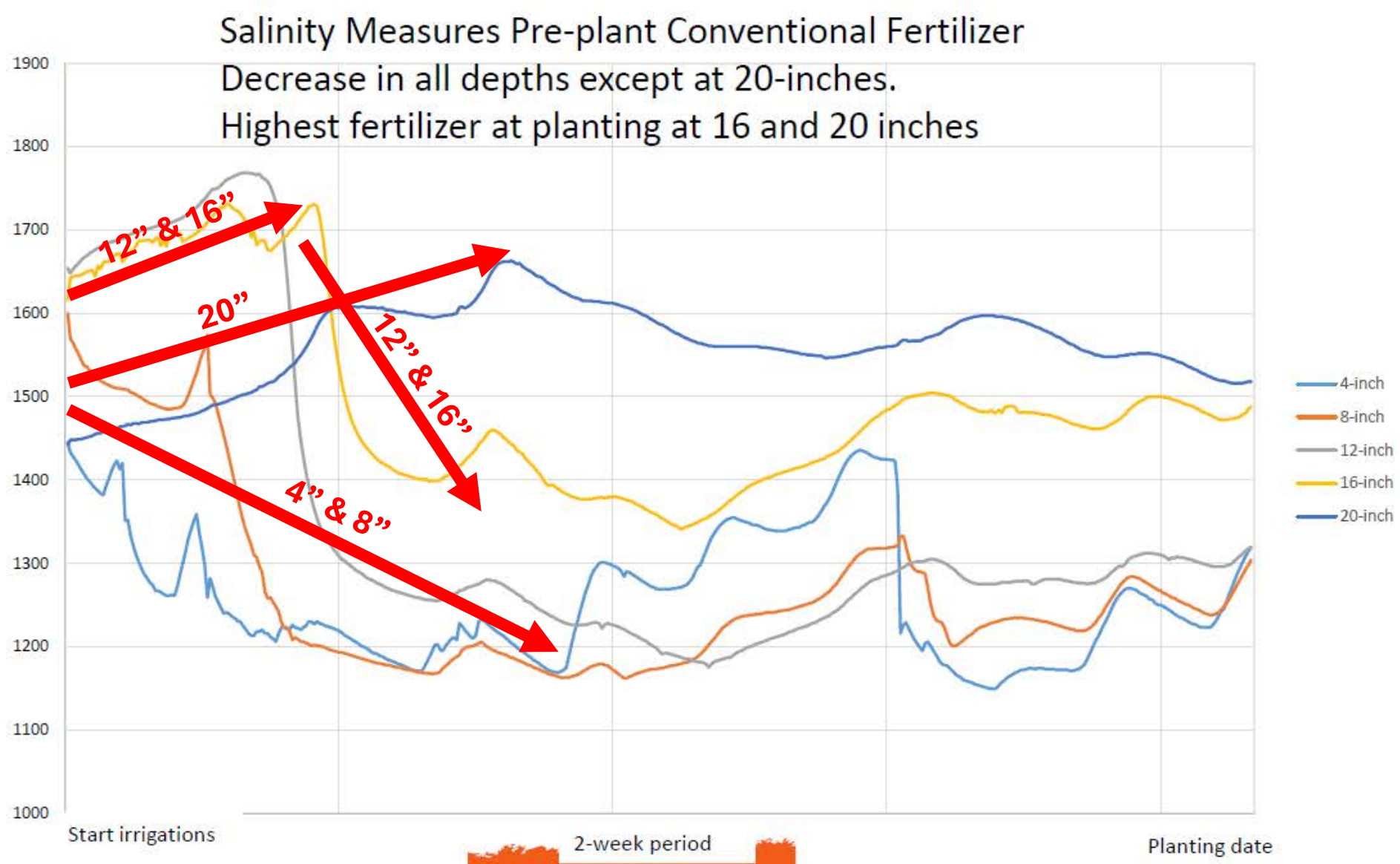
Nutrient Management:

- Minimization of nutrient leaching, preserving soil fertility and reducing environmental impact.

Economic Benefits:

- Reduced water usage leading to lower operational costs for farmers.
- Improved crop yields and quality due to better irrigation practices.





Credit: B. Hochmuth, M. Warren, V. Sharma, M. Morrow,

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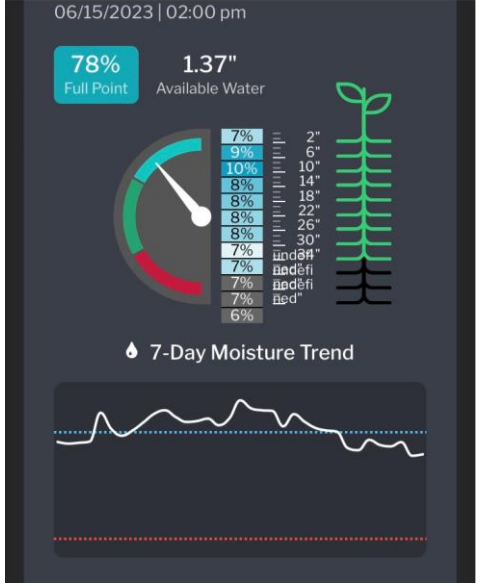
Soil Moisture Sensor (SMS) Adoption



High Adoption Rate

- Nearly **80%** of Suwannee Valley watermelon producers use soil moisture probes.

Collaboration

- Many Suwannee Valley farmers share probe login credentials with Extension agents for support and troubleshooting

Right Irrigation: Soil Moisture Sensor Network

Loaner Soil Moisture Sensors:

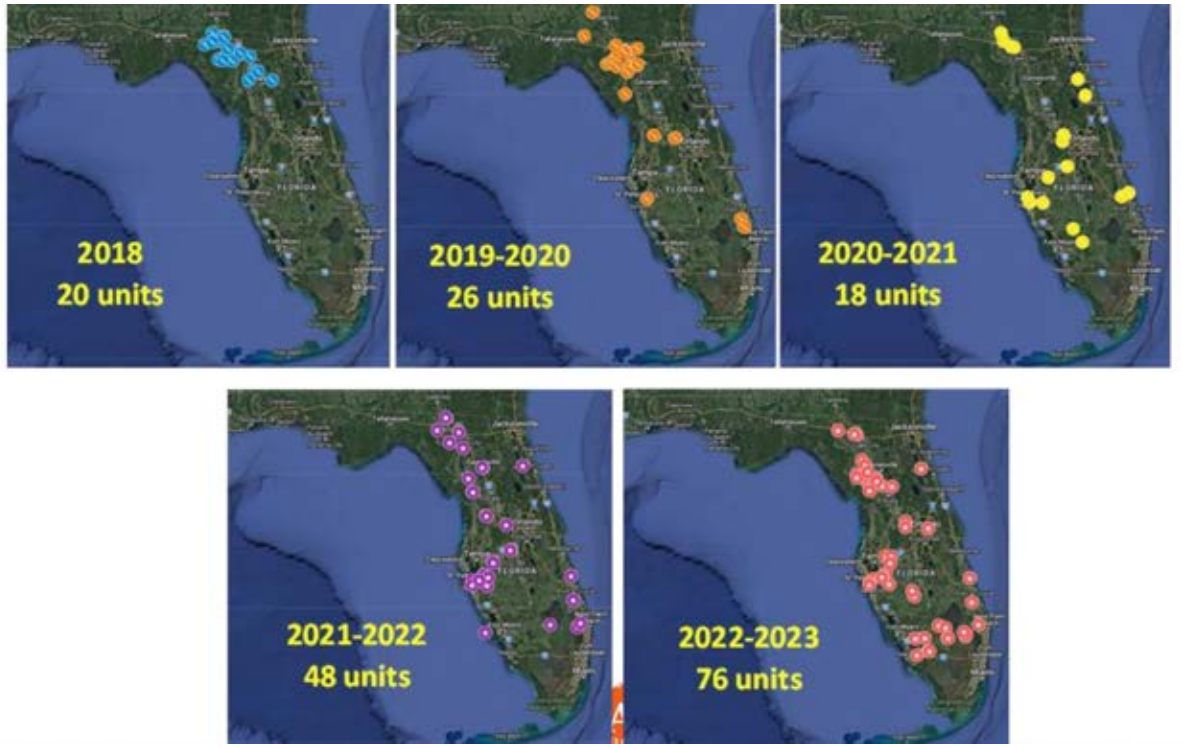
- About 80 Soil Moisture Sensor units deployed throughout Florida on various commodities
- In 2023 these probes assisted in irrigation scheduling across 300,000 acres across Florida

Technology Transfer:

- Agents join the network, learn the technology, and recruit farmers
- Agents, specialists, and farmers discuss and apply sensor data in real-time to modify irrigation
- Outcomes include Increased knowledge and skills, technology adoption, improved water use efficiency, and enhanced water quality

Facilitate Agricultural Cost Share Adoption:

- Cost-share opportunities available through local water management districts ranging from 75 – 90%



Credit: Dr. Vivek Sharma, University of Florida

Integrating DU and Efficiency with Soil Moisture Sensor Use

- Soil moisture sensors can be used to assess water reaching the root zone.
- **Accurate Placement**: Sensors must be located in representative field areas to reflect overall irrigation effectiveness.
- **Impact of Poor DU**: Placing sensors in areas with poor DU can provide misleading data, affecting irrigation scheduling and decisions.

Blue Dye Demonstrations

Automated Irrigation Systems

- Manually turning on and off irrigation valves on multiple fields was identified as a time consuming logistics problem for farmers.
- Automated irrigation equipment adopted on approximately 2000 acres of watermelons approximately 25% of the total Suwannee Valley Watermelon Acreage.

Credit: Tyler Pittman, UF/IFAS Gilchrist County

Automated Irrigation Systems

Remote Control & Monitoring

- Turn systems on/off from anywhere
- Receive alerts on flow rate or pressure issues

Labor & Cost Savings

- Less fuel/time driving to fields

Improved Water Use and Energy efficiency

- Only run irrigation as needed (e.g., rain shut-off)
- Potential for considerable water savings compared to traditional methods
- Reduced pump run times

Scalable Technology

- Multiple communication options (cellular, Wi-Fi, LoRa, etc.)
- Add sensors (flow meters, pressure gauges, soil moisture) as desired

Drip Irrigation EC Flush Tests

- Irrigation System Flush Tests
- Impacts of system design on fertigation efficiency
- Reduces excess water use
- Helps eliminate fertilizer leaching because of improper system operation

Credit: Mark Warren, UF/IFAS Levy County Extension

Conclusion

Importance of DU

- DU foundational building block of reducing input costs, allowing for more efficiency management, and increasing profitability.

Correct Irrigation Practices

- Matching duration and frequency to crop needs (rootzone depth) is key to preventing over- or under-irrigation.

Technology Aids Precision

- **Soil moisture sensors** or **blue dye** confirm water is reaching the intended root depth.
- **Automated irrigation** saves growers time by remotely turning systems on/off and monitoring flow.

Extension & Industry Partnerships

- Extension programs support growers with training and field demonstrations.
- Industry innovations continue to improve and market cutting-edge irrigation technologies.

UF/IFAS Extension Suwannee Valley Watermelon Agents

Raymond Balaguer – Suwannee County Extension

Jay Capasso, RSA-Water Resource

Emily Beach, – Lafayette County Extension

Tyler Pittman, Gilchrist County Extension

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