Supplemental Data for:

Evaluating Irrigation Strategies of Tomato Under Drip Systems in High Tunnel – Implications for Urban Farms

2025 ePLUS Report

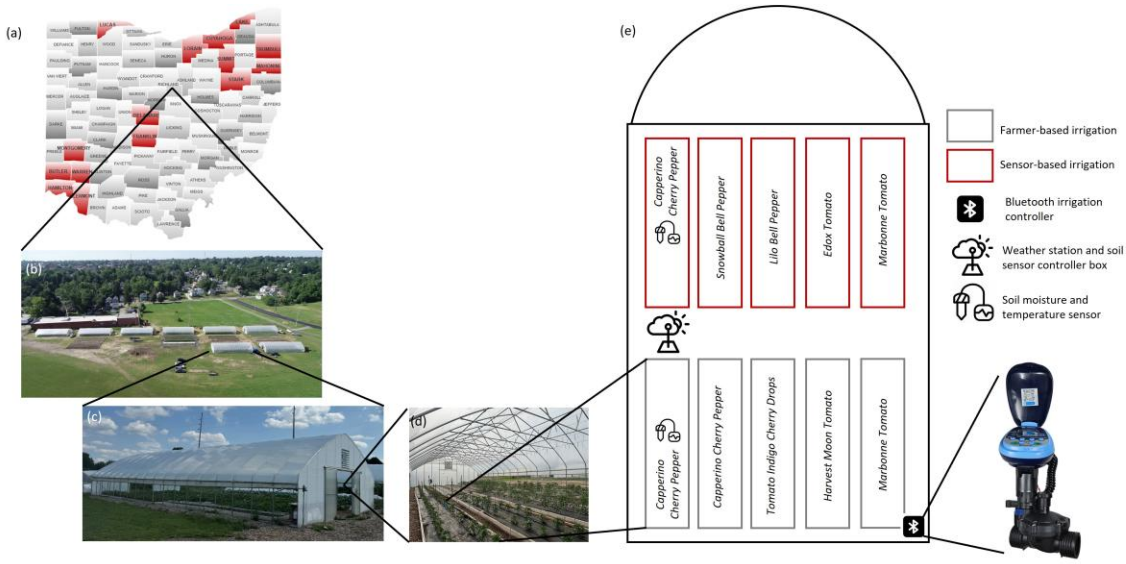

Figure 1. (a) Map of Ohio major areas of urban influence (red) and on-farm trial participating in this project. (b) Aerial view of Microfarms part of The Richland Gro-Op. (c and d) High tunnel included in the irrigation scheduling trial. (e) On-farm treatment plots with farmer-based irrigation versus sensor-based irrigation. Farmer-based irrigation refers to the business-as-usual, or the standard irrigation routines based on farmer's specific decision-making process. Sensor-based irrigation refers to the maintenance of soil moisture between field capacity and the point of allowable depletion based on readings from calibrated soil moisture sensors installed at 6" soil depth.

Results/Summary:

- Sensor-based irrigation increased both yields and water-use efficiency in tomato (Figures 3, 4 and Table 1)

- Precision irrigation technology demonstrated strong potential to optimize water management in high-tunnel vegetable production systems, enhancing sustainability for small and urban farms in Ohio (Table 2).

Table 1. Effect of irrigation strategies on total water consumption, total yield, and water use efficiency (WUE) for tomato.

Treatment	Total irrigation applied (m^3)	Total Yield (kg/m^2)	*p-value*	WUE (kg/m^3)	*p-value*
Farmer-based	11.55	16.14	0.0830 *	5.04	0.0320**
Sensor-based	8.92	19.40		11.62	

Table 2. Treatment water savings comparison among the largest cities in Ohio. Calculations for the different city scenarios were run based on the 2022 Ohio Sewer and Water Rate Survey.

City	Water Rate (USD/m^3)	Farmer-based (USD/m^3)	Sensor-based (USD/m^3)	Savings (USD/m^3)	Savings (%)
Cleveland	2.56	2.56	1.98	0.58	22.7%
Columbus	2.45	2.45	1.89	0.56	22.8%
Cincinnati	2.62	2.62	2.03	0.59	22.5%

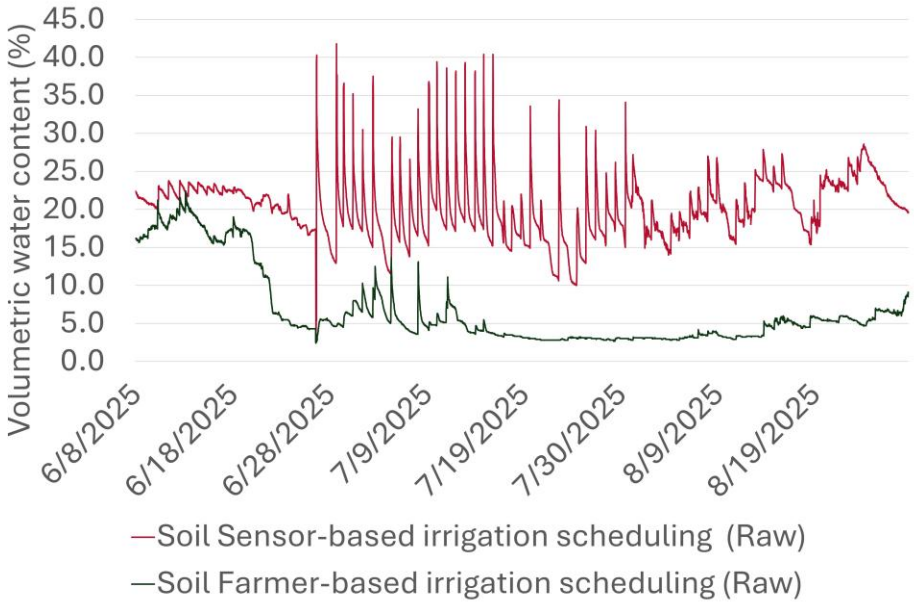

Figure 2. Effect of irrigation strategies on soil volumetric water content measured at 6" soil depth throughout the growing season.

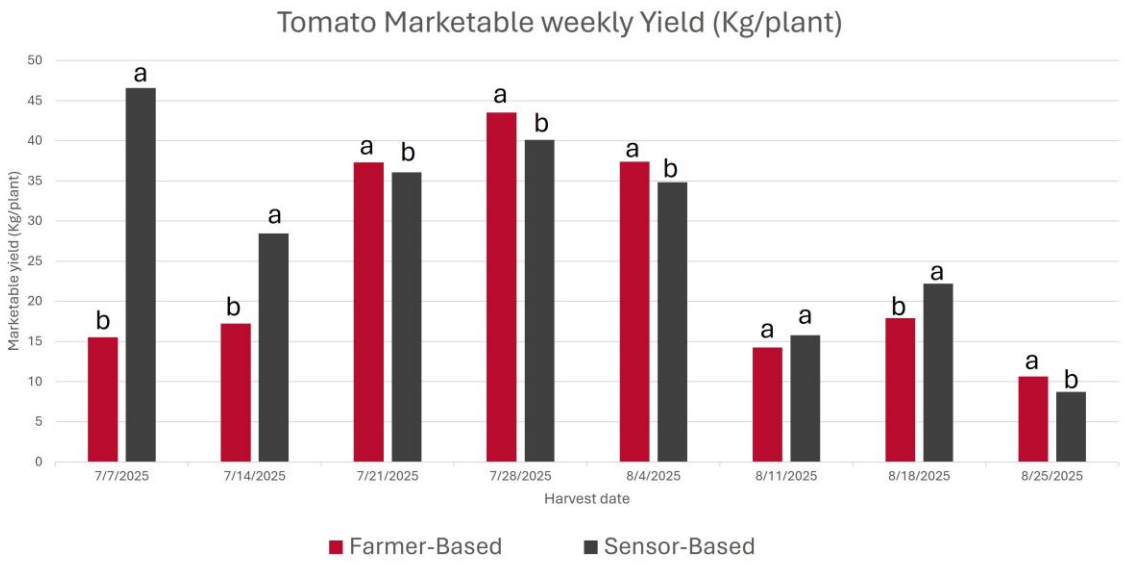

Figure 3. Effect of irrigation strategies on tomato marketable yield. *Plots having different superscripts differ significantly (P<0.05). Different letters placed next to bars indicate statistically significant differences ($p < 0.05$) between irrigation treatments.

Figure 4. (a) Field view of tomatoes on 25/07/2025. (b) Harvest process. (c) Urban Ag Field Day on June 25, 2025 to discuss project data and demonstration trial results.

Figure 5. QR code to project summary.

Acknowledgement:

Special thanks to members of the Urban Food Innovations team and farm crew (Josiah, Tim, Clayton, Gabe, and Mathew) for their invaluable help with fieldwork and the preparation of this trial. This project was supported by USDA NIFA 2024-70006-43574 & CFAES Immediate Needs Program.

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