

EVALUATING AUTOMATED DRAIN TILE SYSTEM IN SUBIRRIGATED VEGETABLE PRODUCTION AREAS

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Most of vegetable production in Florida is subirrigated using seepage (SEP) which has low irrigation efficiency requiring large volumes of groundwater to raise the water table level (WTL). Alternatively, drain-tile (SDT) offers a more precise WTL control and uniformity of soil moisture in the rootzone. Proper management of the WTL is still a determinant factor for achieving benefits to water conservation expected from SDT. Automation of the SDT can optimize the WTL management, increasing water conservation. This study aimed to identify a suitable irrigation/drainage strategy for WTL control using automated SDT to optimize soil moisture (SW) in the rootzone and minimize nutrient leaching compared to SEP (benchmark). A field study was established at the UF/IFAS-Hastings Agricultural Extension Center in a sandy soil under SDT and SEP side-by-side. SDT was equipped with an automated (open/close) irrigation/drainage valve remotely monitored and managed using Smart Drainage Website (AgriDrain Corp.); while irrigation/drainage in SEP was conventionally controlled. Irrigation schedule was adjusted to crop stages using desired WTL and SW. WTL and SW were remotely monitored and weather data was recorded onsite. Volume of irrigation/drainage were measured using flowmeters. Nitrate+nitrite, ortho-phosphorus, and total-phosphorus were determined in water samples collected in two main ditches and in ten observation across the field. Data was analyzed using descriptive statistics. In 2023, the averages of total yield ranged from 33-39 Mg.ha⁻¹ and 33-43 Mg.ha⁻¹ in SEP and SDT, respectively. The concentration of N and P in the drainage water were similar between irrigation systems. However, the total irrigation volume in SEP exceeded SDT by 35%; while the irrigation water productivity was 7.9 and 12.6 kg.m⁻³ for SEP and SDT, respectively. The total drainage volume in SEP was 27% higher than in SDT. Preliminary results indicated automated SDT reduced irrigation needs by enhancing drainage control during crop growth.

PRESENTER BIO: Judyson Oliveira holds a Ph.D. in Agronomy and is currently pursuing a second Ph.D. in Horticultural Sciences. He specializes in the modeling of soil physical-hydrologic processes to enhance water conservation. Through his research projects, he aims to ensure that contemporary farming practices are sustainable, efficient, and environmentally friendly.