

Searching for Low Use of Water and Fertilizers in Soilless-greenhouse-grown Peppers in Florida

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Managing quantity and timing of delivery of water and nutrients in soilless-greenhouse-grown peppers (*Capsicum annuum*) not only affects fruit yield and fruit quality but also directly affects cost of production and sustainability of 'drain-to-waste' irrigation systems. In a 250-day fall to summer crop, pepper plants grown in peat mix, pine bark, or perlite were irrigated with irrigation frequencies (9, 12, 16, 26 and 62 events/day) determined by a range of solar radiation integrals. At each irrigation event, plants were given different volumes of nutrient solutions: a) 74 mL of a complete nutrient solution, b) 74 mL of half the nutrient concentration, or c) half the volume (37 mL) of the complete nutrient solution. Fertigation treatments led to ranges of total amounts of water and fertilizer of 87-1016 L/plant and 240-2944 g/plant, respectively. High frequencies of irrigation events led to fruit yields of 9 kg·m⁻², but at low numbers of irrigation events/day these fruit yields were obtained only when delivering 74 mL/event. In plants with 37 mL/event, fruit yields decreased from 9.0 to 3.7 kg·m⁻² and stem lengths from 2.1 m to 1.1 m when number of events/day decreased from 62 to 9. There were high efficiencies in water and fertilizer used per kg of fruit produced with 74 mL/event with half the nutrient solution concentration at 12 and 16 events/day, where total deliveries were 297 and 396 g/plant of fertilizer, respectively, and 214 and 282 L/plant of water, respectively. High volumes of water applied per day increased fruit cracking and greater volumes per irrigation event reduced blossom-end rot particularly when plants were grown in pine bark and perlite. With 74 mL and half the nutrient solution concentration and 12 or 16 events/day, similar fruit yields were obtained regardless of media used. The cost of pine bark represented at least 1/5 of the cost of perlite or peat mix. It was possible to identify fertigation practices which would lead to reduced fertilizer and water use in low-cost soilless media greenhouse-grown peppers.