Reduced Fertigation of Soilless-greenhouse-grown Peppers Improves Fruit Yield and Quality

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In Florida, USA, high quality bell pepper fruits are produced in plants grown in soilless media irrigated with a complete nutrient solution inside passive-ventilated greenhouses. Quantity and timing of delivery of water and nutrients affect the water availability to the plants and salinity levels in the media and, thus, directly affect fruit yield, production costs, and environment in drain-to-waste irrigation systems. In a fall to summer crop, plants grown in peat mix, pine bark, or perlite were irrigated with five irrigation schedules and given different volumes of nutrient solutions per irrigation event. Irrigation frequency, controlled by settings of solar radiation integrals, averaged 9, 12, 16, 26 and 62 irrigation events per day in the 250-day crop. At each irrigation event, plants received either 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. Plants that received 74 mL per irrigation event, irrespective of irrigation frequency or nutrient concentration, had similar marketable fruit yields (8.9 kg·m⁻²). By contrast, in plants with 37 mL per event, fruit yields decreased from 9.0 to 3.7 kg·m⁻² when number of irrigation events decreased from 62 to 9. With half the nutrient solution concentration and 74 mL per irrigation event at 12 and 16 events per day, plants yielded 9 kg·m⁻² of marketable fruit with half the amount of fertilizer (297 and 396 g per plant, respectively, at a cost of 0.42 and 0.55 $/plant, respectively) and water (214 and 282 L/plant, respectively) than those delivered with a complete nutrient solution. With these same irrigation schedules, disorders such as cracking and blossom-end rot were reduced, and plants in peat mix, pine bark, and perlite had similar fruit yields. However, media costs differed significantly (in $/m³, peat mix: 70, pine bark: 8, and perlite: 40). It was possible to identify fertigation practices which would lead to reduced fertilizer and water use in low-cost soilless media greenhouse-grown peppers.