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Can High Application Rates of Reclaimed Water Provide Adequate Nutrition for Citrus Trees?

Reclaimed water (highly treated wastewater) contains some essential plant nutrients. In theory, irrigation with reclaimed water at high application rates could provide sufficient N, K, and other elements to meet mature citrus tree crop needs. Tests were set up on Hamlin orange trees at the Water Conserv II research site near Orlando, FL. Irrigation treatments included 16" of well water, 16" of reclaimed water, and two treatments of 100" of reclaimed water. The 100" rate provided 230 and 345 kg/ha of N and K respectively. If all this N and K were taken up by the trees, it would meet annual fertilizer requirements. We tested nutrient availability of the reclaimed water by eliminating fertilizer in year 1 in one of the 100" treatments. In the first year, there was no significant yield loss in this no-fertilizer treatment, but a noticeable yield decrease occurred in years 2 and 3. Because of the yield decline, fertilizer at half the recommended N rate was applied in years 2 and 3 and at the full N rate in year 4. Yield recovered in year 4. This reclaimed water maintained optimum or high levels of leaf P, K, Ca, Mg, and B at the 16 or 100-inch irrigation rates, but leaf N and Mn were low or deficient. The 100-inch irrigation rate is more than double the normal citrus ET rate in Florida. Trees were grown in a highly permeable sandy soil. At the 100-inch rate, much of the reclaimed water may have moved below the main root zone. Even at high application rates, trees cannot take up sufficient N from reclaimed water to maintain good yields. Supplemental N fertilizer was needed to maintain good fruit production.

Author: Larry Parsons

University Affiliation: University of Florida

Co-Author(s): T. Adair Wheaton