Effect of rainy season, irrigation method and fertigation frequency on citrus root length density, P and K distribution on a Florida Spodosol

D. Kadyampakeni[1], K.T. Morgan[2], A.W. Schumann[3], P. Nkedi-Kizza[1], T.A. Obreza[1]

[1]*Soil and Water Science Department, University of Florida, 2169 McCarty Hall, P.O. Box 110290, Gainesville, FL32611, USA.*

[2]*Soil and Water Science Department, University of Florida, Southwest Florida Research and Education Center, 2686 SR 29N, Immokalee, FL 34142, USA.*

[3]*Soil and Water Science Department, Citrus Research and Education Center, University of Florida, 700 Experiment Station Road, Lake Alfred, FL 33850, USA.*

Citrus production in Florida accounts for 80% of the citrus in the US. with a total commercial area of 303,000 ha. Use of microsprinkler irrigation in Florida citrus production is a common practice but due to sandy soils, use of drip is not well documented. The use of the Open Hydroponic System (OHS) is critical to achieving increased tree growth and yield. A study on 3 year-old citrus trees was conducted to determine the effect of rainy season, irrigation method, and fertigation frequency on patterns of root length density (RLD), P and K distribution as a function of soil depth and distance from the tree. Treatments were as follows: 1) Conventional microsprinkler practice –irrigated one to many times weekly and fertigated monthly; (2) Drip OHS – irrigated and fertigated daily in small pulses; (3) Microsprinkler OHS – irrigated daily and fertigated weekly. Drip OHS significantly increased Mehlich 1 K and P (K and P) in the irrigated root zone over conventional practice. P was significantly lower under microsprinkler OHS compared with conventional practice in the irrigated zone. In the irrigated zone under both drip and microsprinkler OHS, K was higher than conventional practice. K, P and RLD decreased with depth and distance away from the tree. Prior to and after the 2009 summer rainy season, RLD observed under drip OHS was higher than conventional practice in the non-irrigated and irrigated zones respectively. Thus, trees optimized nutrient uptake in the 0-30 cm horizon where about 70% of the roots are concentrated.

Key words: Citrus, drip, fertigation, microsprinkler, Spodosol