



Deficit irrigation effect in Natal orange orchard in State of São Paulo, Brazil

Regina C.M. Pires, Gláucia Cristina Pavão, José Rodrigues Magalhães Filho, Rafael Vasconcelos Ribeiro, André Luiz Barros de Oliveira Silva, and Augusto Yukitaka Pessinatti Ohashi

Instituto Agronômico de Campinas, Campinas, Brazil

The reasons for increasing irrigated citrus area in Brazil include gain and ensuring yield, as a safety factor and the need to substitute the Rangpur Lime rootstock for others due to diseases and pests of the crop. Besides, the adopted rootstocks nowadays are sensitive to water deficit. In this context the main focus is to improve fruit quality and yield by efficient use of water and nutrients. In Brazil, most of the area irrigated with citrus are adopting drip irrigation for promoting water economics among other factors. This involves different cultural practices, such as the use of deficit irrigation. In perennial plants it is needed to evaluate their effect in some years, because they may affect the growth and productivity of plants years later. Based on this, the aim of this study was to evaluate the effect of deficit irrigation in plant size, plant water status, root system, yield and fruit quality of Natal orange grafted onto Citrumelo Swingle. The experiment was carried out in an orchard in the north region of the State of São Paulo, Brazil between 2011 and 2015. The plant spacing adopted was 7 x 4 m (357 plants per hectare). A drip irrigation system was used. The experiment was installed in randomized blocks with 5 treatments and 4 replications, totaling 20 plots with three plant lines. Each plant lines contained 12 trees, but the measurements were done from the 10 plants middle of the plot. The treatments consisted of different irrigation depths: T1 –100% of crop evapotranspiration (ET_c), T2 - 80% of ET_c, T3 - 60% of ET_c, T4 - 40% of ET_c and, T5 – no irrigated (rainfed). The results were submitted to variance analysis (F test). There was more root concentration at the upper soil layers in irrigated treatments (T1 and T3) in comparison to rainfed treatment (T5) especially up to 0.3 m. Below 0.6 m, the root concentration was similar to all evaluated treatments. It was verified that more than 80 % of root system was observed up to 0.4 m depth for irrigated plants and up to 0.5 m depth for rainfed plants. The plants in rainfed treatment presented the lowest canopy volume and the differences increased over time when compare with the irrigated plants. The leaf water potential in irrigated treatments was higher than the rainfed one (T5) both during the citrus rest period and after restarting irrigation. The improvement of yield and quality attributes presented variation considering different crop cycles, especially associated to the rain distribution. In three out of four production years the irrigation favored the yield. After four production years a higher fruit yield and soluble solids content were observed when irrigation depth was 100% and 80% of ET_c. However, all deficit irrigation treatments reached higher yield than those in rainfed cultivation. The results showed the potential use of deficit irrigation to achieve yield and quality especially adopting 80% of ET_c.

Key words: citrus, water management, drip irrigation.