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—Scientific Note—

Water Use Assessment for Citrus Trees Affected by Huanglongbing in Florida

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Proper irrigation scheduling and water management efficiency are keys to achieving higher yields in citrus. As the human population increases, water allocated to citrus production may decrease. Therefore, efficiency of citrus irrigation systems should be improved to better manage irrigation water without compromising yield. The soils in central Florida, like Entisols, and those of south Florida flatwoods like Spodosols and Alfisols are characterized by rapid infiltration of rain and irrigation water, since they constitute > 83% sand, as well as low water and nutrient retention capacities. Thus, when irrigation water, rich in nutrients, is lost by deep percolation due to the low water holding capacity of the soil, it may end up in the groundwater, which may have detrimental consequences on the environment. In order to minimize or prevent the above mentioned scenario from occurring, water supply should meet the plant's water requirement. Citrus trees affected by huanglongbing (HLB) tend to lose more than 40% of their root systems, which may affect the tree's water use at a given time.

A greenhouse experiment was conducted in Oct. 2019 at the Citrus Research and Education Center in Lake Alfred, FL, to assess water use dynamics in 2- to 4-year-old HLB-affected 'Valencia' orange (*Citrus sinensis*) trees grown on 'Kuharske citrange' rootstock (*Citrus sinensis* × *Poncirus trifoliata*).

Four treatments comprising of trees receiving 100% evapotranspiration (ET) and 80% ET, on HLB- and non HLB-affected (NHLB) trees were applied on a randomized complete-block design with five replicates.

We used a drip irrigation system and a timer was used to schedule irrigation events. All trees received equal amount of fertilizer and soil surfaces were covered with mulch to minimize surface evaporation. Stem water potential, sap flow, root length, root diameter, root area, and root volume were monitored and compared among all treatments.

For root length and diameter, non HLB trees that received 100% and 80% ET generally showed increased root diameter and length as compared to HLB trees that received 100% and 80% ET. However, between HLB-affected trees, no significant differences were observed showing that irrigation rate of HLB-affected trees could be lowered to 80% ET. Similar growth in terms of root area and volume was observed for HLB-affected trees at 100% and 80% ET. There was no significant water stress among HLB-affected trees at 100% and 80% ET (P = 0.6681). However, trees showed higher water stress in Spring than in Fall 2021. Comparable water consumption rates were observed between 100% ET and 80% ET for HLB and NHLB trees in Fall 2020.

For Spring 2021, HLB-affected trees irrigated at 100% ET showed higher water consumption than trees receiving 80% ET. In Summer 2021, HLB-affected trees at 80% ET had similar water use as HLB-affected trees at 100% ET. A correlation between water-use and stem water potential for the spring data was fairly weak (r = 0.568 and R^2 = 0.32).

In summary, HLB-affected trees that received 100% ET had comparable water use and similar stress level compared to trees that received 80% ET. Higher water use observed for healthy trees was manifested in more rapid root growth. Therefore, irrigating at 80% ET might be appropriate for HLB-affected trees, subject to field validation.

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