7.26 P

Effect of Enhanced Zinc Nutrition on Mitigation of Huanglongbing (HLB)-affected Citrus

Li, S.L., Li, Z.G., and He, Z.L.

University of Florida, IFAS, Indian River REC, Fort Pierce, USA

The growth decline of huanglongbing (HLB)-affected citrus trees is considered to be associated with nutritional disorder, as typical symptoms of HLB such as stunted tree growth, chlorosis or blotchy mottle of leaves, resembles zinc (Zn), iron (Fe) and manganese (Mn) deficiencies, while lower Zn concentration has been consistently reported in the HLB affected compared to healthy plants. Hydroponic culture studies were conducted to evaluate the effects of enhanced Zn nutrition on the mitigation of HLB-affected grapefruit seedlings. Modified Hoagland nutrient solutions were used with three Zn^{2+} levels: 0, 1.0, and 1.5 times that of standard strength. Both HLB-affected and healthy grapefruit seedlings were subjected to the treatments for 49 days. During the growth period, photosynthesis of plant leaves was measured, and at day 49 of the culture, leaf tissues and cells were examined for structural changes using light and scanning electron microscopy. Enhanced Zn nutrition generally improved the growth of HLB plants with less symptom severity. Photosynthesis, in terms of leaf electron transfer rate and photochemical quantum yield, was enhanced. The wax layer and cuticle increased, and the epidermis cells became better organized, with a higher number of normal stomatal openings, compared to the control. In addition, enhanced Zn nutrition resulted in more developed xylem and phloem transport systems, resulting in reduced starch grains and polyphenol substances in the leaf cells. These results indicate that enhanced Zn nutrition can improve the structure of photosynthetic, transfusion and protective tissue systems, and thus promote photosynthesis, transport of photosynthates, and other related metabolism of HLB-infected citrus.