Citrus under protective screen (CUPS) is an approach to producing fresh market citrus by growing trees in an enclosed space covered with fine mesh screen. The screen excludes the Asian citrus psyllid \([Diaphorina citri\) (Hemiptera: Liviidae)], the vector of huanglongbing. This enables production of high yields of fruit with better internal and external quality. The two fungal pathogens greasy spot \([Zasmidium citri-griseum\) and melanose \([Diaporthe citri\) are important problems in CUPS.

Neutral electrolyzed water (NEW) is a short-lived surface sterilant that is made on-site by passing an electric current through a salt solution to produce hypochlorous acid. Our goal is to develop NEW for use in CUPS. If successful it provides growers another tool for disease management with a different mode of action than current products. However, high rates of NEW are phytotoxic. The goal is to understand the balance between these two effects.

‘Ray Ruby’ grapefruit \([Citrus \times paradisi\) were sprayed to runoff once per week with NEW water produced using sodium chloride. Plots of three plants were sprayed with 0, 25, 50, or 100 ppm chloride once per week. Treatments started either 29 July or 2 Sept. and ended 9 Dec. in time for harvest on 14 Dec. 2020. We used a handgun sprayer at 100 psi to treat 3-plant experimental plots with four or five replicates/treatment. Trees were spaced on 1.5 m centers with 3.05 m row centers equaling a density of 2152 trees/hectare (871/acre), and an application rate of 679 L·ha\(^{-1}\) (72.59 gallons/acre).

This two-factor experimental design was recast by calculating a total dose that was the sum of the applied dose over the number of weeks (19 or 14 weeks): 100 ppm applied for 19 weeks gives a total dose of 1900. All NEW treatments were in addition to a commercial disease management program. Statistical analyses were done in SAS running under SAS Enterprise Guide, and R running under RStudio. Evaluation was made using yield, external fruit quality, internal fruit quality, and tree growth.

There was no significant effect of NEW on fruit diameter, fruit weight, boxes per tree, or percent juice. Fruit quality was assessed photographically for both color and disease. CIE L*\(a\)*\(b\)* color was used but only the a* showed a significant difference where a* declined with increasing total dose \((F > F = 0.002, r^2 = 0.32\) for a*\(=13.0 – 0.0028 \times \) total dose). However, all fruit had a* values above zero and were therefore marketable (Fig. 1A). Fruit damage was caused by greasy spot and melanose. The combined damage was reduced by NEW, though the effect was marginally significant (Fig. 1B). There was also a significant reduction in Brix from 7.75 to 7.25 (not shown). With no significant change in acid, the ratio and BrimA values declined. There was no effect of NEW on internal color. Research continues to better minimize the adverse effects while maintaining efficacy.

NEW continues to show promise as an approach to reducing disease on grapefruit. This should improve the fruit value. However, NEW treated fruits were slightly greener. While still marketable, this may cause problems if other factors also inhibit color break. Further research is needed for this to become a functional tool for pest management in citrus.

**Fig. 1.** (A) decline in a* color scale values on grapefruit \([Citrus \times paradisi\) with increasing total dose of neutral electrolyzed water (NEW). (B) The overall disease on fruits was reduced by NEW, though just shy of achieving statistical significance. Dots are the plot average (ten fruits per plot). Only the control and high rates are presented.