



Figure 1. Brassinosteroid application showed positive effects on 2-year-old Valencia trees. Notice the denser and compact canopy and the abundance of new flushes in homobrassinolide (HBr)-treated trees.

Update on brassinosteroids for HLB management

By Fernando Alferez, Christopher Vincent and Tripti Vashisth

Brassinosteroids (BR), a relatively newly discovered class of plant hormone, regulate several developmental and physiological processes in fruit crops such as grapes, pears and cherries and in some non-edible plants. BR also induce disease resistance against different pathogens in a great number of crop plants.

A form of BR (epibrassinolide) was shown to reduce bacterial titer and alleviate symptoms of greening in HLB-affected 2-year-old citrus trees in a study performed in Cuba. In response to these findings, a University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) research project was initiated in December 2017 to assess effects of homobrassinolide (HBr), a form of BR, on 6- to 8-year-old HLB-affected Valencia trees on Swingle rootstock.

Treatments performed biweekly

Homobrassinolide effects included an earlier blooming date by 10 days, acceleration of fruit maturation and higher fruit yield.

were: water (control), 0.01 micrometer (μM) HBr (low concentration, 18.6 milliliters/100 gallons) and 1 μM HBr (high concentration, 186 milliliters/100 gallons). The experiment was performed in the central and southern Florida citrus-producing regions to ensure that results were applicable statewide. After 10 months, no reduction in bacteria population was found. However, some interesting physiological effects were found that are indicative of better tree health after HBr treatments. These effects included an earlier blooming date by 10 days,

acceleration of fruit maturation and higher fruit yield.

To assess whether these effects can be sustained over time or be enhanced, treatments in the same plots have continued. Two-year-old trees with the same HBr concentrations and water (control) are also being treated on a biweekly basis. Younger trees are being treated now because the study performed in Cuba was on 2-year-old trees, and younger trees could not be included in the 2017 study. Tree age may play some role in the effect of HBr. A summary of

findings during the second season of research are as follows:

NO BACTERIA REDUCTION

In mature trees, assessment of HLB bacteria population has continued every three months by cycle threshold (Ct) method using quantitative real-time polymerase chain reaction assay. This method is approved by the U.S. Department of Agriculture Animal and Plant Health Inspection Service. To date, all trees remain HLB positive, with readings in the lower 20s for Ct values. No significant differences in bacteria between control trees and trees that received HBr were observed.

ACCELERATED BLOOM, REDUCED HLB SYMPTOMS

Like last year, both HBr treatments advanced bloom in mature trees by 10 days as compared to the non-treated trees. In addition, flowering was more intense and uniform than in non-treated trees. In 2-year-old trees, these effects were enhanced, and HBr-treated trees bloomed even earlier. First open flowers were observed in high HBr-treated trees 14 days before the non-treated trees.

In both locations, mature trees treated with HBr looked noticeably healthier. Canopies were denser, and leaves were larger with a darker-green color. Canopy volume measurements in mature trees showed significant differences when compared to control trees. At the lower HBr dose, there was an 18 percent increase in canopy area. The higher dosage increased canopy area by 7 percent.

In 2-year-old HBr-treated trees, no leaf symptoms (blotchy mottle or yellow leaf veins) of HLB were found. Also, in younger trees, canopies were denser than in controls, and treated trees had more new flushes and more upright, water-sprout-type new branches, which are indicative of vigorous growth (Figure 1, page 16). Similar to what was observed last season, chlorophyll content was higher in both mature trees and 2-year-old trees.

LESS FRUIT DROP

Fruit detachment force (FDF) was measured before (December), during (early March) and after (late March) blooming. Like last season,

Citrus: More Than a Business



By Rick Dantzler, CRDF chief operating officer

I recently attended the induction ceremonies for the three newest members of the Florida Citrus Hall of Fame, Peter McClure, Tim Hurner and Richard Kinney. It was a wonderful trip down memory lane.

When we remember citrus leaders and think about current industry struggles it is easy to get wistful. Production is down, certainly, but looking at the industry purely statistically would be a mistake since it is so much more than simply a business.

As one who grew up in the heart of the industry, I was always hoeing milkweed, firing groves or moving irrigation pipes from one block to the next, and citrus wasn't even the main source of income for our family. I spent one summer planting trees, receiving a nickel a tree. If we planted more than a certain number, it was a "tree day," and we received a \$10 bonus.

I fondly remember driving through groves with my father, soaking in all he had to say about citrus. Often, we used small gray counters to count trees. He'd drive down the middle and count the trees two rows to the left, and I'd count trees two rows to the right. Now that he's gone, I cherish those times.

The groves weren't just a place for work, either. We had some fun there, too.

They were full of quail and it was easy to get a half-dozen or so. We were bad to ground-shoot them back then. Why, I killed 25 before I found out they could fly, usually bagging more than one bird with a single shot. I'm not proud of it now, but it happened.

And rabbit hunting at night was the best way to harvest a brace of cottontails. My best friend and I would sit in the spare tire on the hood of his family's old Land Rover, he with a Q-Beam and I with my single-shot .410, our fathers driving us around. After cleaning the rabbits, we'd go to the Teddy Bear restaurant in Winter Haven for breakfast. Fun times.

Groves with young trees and millet planted in the middles made good dove fields, too. A crisp Saturday afternoon under a cobalt sky seated on a hunting stool listening to Otis Boggs, the voice of the Gators, on the radio announcing, "Touchdown Florida!" was splendid.

Changing horticultural practices and too much government have made much of this fun no longer possible, but my boyhood experiences are seared in my mind like they happened yesterday.

Why the nostalgia? To reinforce what Peter McClure said at his induction ceremony: Citrus is more than a business; it is a way of life. And it isn't going away. An orange is still on the license plate of nearly every Florida vehicle because it's our signature crop. I firmly believe there will come a time, hopefully soon, when HLB is in the rearview mirror, and the next generation will make its own memories — some of work and some of play — of time spent in the groves.




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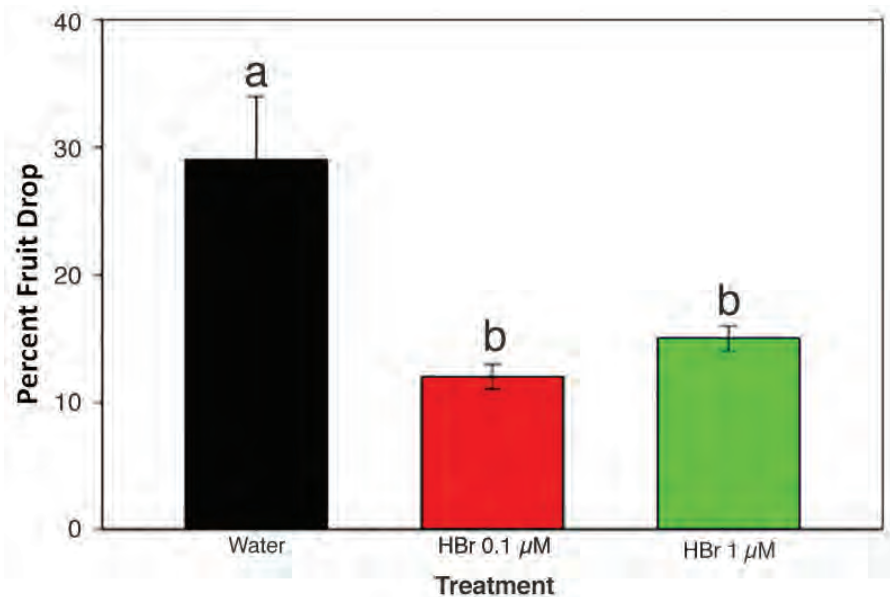


Figure 2. Preharvest fruit drop in 6-year-old Valencia trees was lower with homobrassinolide (HBR) treatments. The fruit drop count was made in March after bloom and fruit set. Bars represent average \pm standard error of 15 trees per treatment. Letters (a and b) indicate significant differences.

FDF was higher at higher HBr concentrations, and the natural decrease in FDF due to blooming was avoided by HBr treatment.

This year, fruit drop was counted when it became apparent after petal fall (late March). In both absolute (number of dropped fruit) and relative (percentage of dropped fruit from the total crop) measurements, non-treated control trees dropped more fruit than HBr-treated trees (Figure 2).

GREATER YIELD AND QUALITY

Like last year, an increase in yield after HBr treatment was found. The low rate of HBr resulted in a 21 percent yield increase, whereas the higher rate resulted in a 10 percent yield increase when compared to the untreated trees.

Internal fruit quality was greatly advanced. By mid-March, in non-treated controls, the soluble solids content/titratable acidity ratio was 9.53. In HBr-treated fruit, the ratio was 17.5 for the low rate and 17.5 for the high rate. These values are more typical during the late season (June) for Valencia. This opens the possibility of starting the harvesting season earlier, thus avoiding preharvest fruit drop.

CONCLUSION

In summary, for the second year, research has documented some positive

The low rate of homobrassinolide resulted in a 21 percent yield increase, whereas the higher rate resulted in a 10 percent yield increase when compared to the untreated trees.

effects of brassinosteroids on tree health and fruit quality of Valencia oranges. In addition, results have shown that brassinosteroids promote more vigorous growth in younger trees. 🍊

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