A Report Regarding the Application of Bluestim to Minneola Tangelos for the 2006-07 Season

Dr. Glenn C. Wright
Citrus Specialist
University of Arizona

Introduction:

This experiment was initiated for the purpose of determining whether the application of Bluestim to Minneola tangelos would reduce the detrimental effects of heat stress, and thus increase yield, fruit size or fruit quality parameters.

Methodology:

The experiment was conducted on Minneola tangelo (*Citrus reticulata*) and was laid out on 7 July, 2006 at the University of Arizona Citrus Agriculture Center (CAC) at Waddell, AZ, in Field 4. This field consisted of 17-year old 'trees on either rough lemon, volkameriana, Troyer citrange, Carrizo citrange, or sour orange rootstock. Only trees on rough lemon, volkameriana or sour orange rootstocks were used in this experiment. Trees spacing was 30 x 30 feet, and there were 16 treated trees in a row. The Minneola variety exhibits alternate bearing, and the 2006-07 harvest season was generally an "off" or low crop year.

There were two treatments, sprayed and untreated control, applied on 7/7/06, with an additional treatment on 11/20/06. A treatment unit consisted of two adjacent trees, and experimental design was randomized complete block, with eight blocks. Therefore, there were a total of 16 treatment units, (32 trees) included in the experiment.

Applications were made with a hand sprayer @ 100 psi, complete coverage to runoff. The sprayer was calibrated using a stopwatch; each tree received an equivalent amount of spray based on the same time spent spraying. All treatments were applied with 2.0 gallons per tree, corresponding to 100 gallons of water per acre. A non-ionic surfactant was also added to the tank.

Fruit were harvested on 2/9/07. Fruit from each tree was harvested by hand using professional pickers from a local packinghouse. Fruit from each tree was harvested into plastic tubs, each holding approximately 30 lbs. Fruit from the tubs was optically sorted using a completely automated photographic sorter (Autoline, Inc., Reedley, CA). This sorter is trailer-mounted so that it can be towed to the citrus orchard study site. Each fruit that passes through the sorter was photographed and weighed. Weight, color, exterior quality (% blemish), fruit shape and fruit diameter data was collected for each fruit. Fruit were not physically sorted, but the data collected was stored in a laptop computer that is an integral part of the sorter. Data collected from the sorter were later analyzed and the percentage of fruit from the nine fruit sizes and fruit grades (fancy, choice and juice) were determined. Also, on 2/09/07, ten fruit were collected from each tree, to determine fruit quality, including juice percent, juice pH, total soluble solids (TSS), total acids (TA), solid:acid ratio (TSS:TA), and peel thickness. Data collection and laboratory analysis was finished in early March 2004.

Data was analyzed statistically using analysis of variance.

Results and Discussion:

Yield: Yield for the trees treated with Bluestim averaged 82.2 kg., while yield for the untreated trees was only 57.3 kg; a 43% increase in yield. Variability among the trees was high, but the yield difference was moderately significant with a P-value of 0.086.

Packout (Fruit Size): We did not note any significant difference in packout due to the treatments. Because of the relatively low yield, fruit size was rather large. Fruit of the largest size (Ultra colossal)

comprised 54 to 55 % of the total, fruit of the next largest size (super colossal) comprised 17 to 19% of the total, and that of the third largest size (colossal) comprised 14 to 16% of the total. All the smaller sizes comprised less than 15% of the total.

Fruit Grade, Color and Shape: We did not note any significant difference in fruit color, shape or grade (exterior quality) due to the treatments. In general, exterior fruit quality ranged from 86 to 87% fancy, about 9% choice, and 3 to 4% juice.

Interior Fruit Quality: .For the fruit quality measurements, we found no significant difference between the treated and the untreated treatments. For both treatments, juice content was about 51%, juice pH was 3.5 to 3.6, solids were about 12%, and acids were about 1%, leading to a solid:acid ratio of 12. Peel thickness for both treatments were about 3.5 to 4.0 mm.

Conclusions: The degree to which Bluestim led to improved yields suggests that it may very well allow the tree to overcome stress. Minneola appears to be particularly sensitive to stress, which may explain why this variety is characterized by alternate-bearing. While one year's worth of positive data is promising, additional years of data collection may be necessary. It may also be important to apply the product at different stages of fruit sizing, or at more than one stage, so as to find the most effective application timing.