

Use of PGRs to reduce preharvest fruit drop

By Brandon Page

The effects of HLB on the Florida citrus industry are widely known and well understood by those who depend on the citrus industry for their livelihood. It has been over a decade since the real impact of HLB was recognized. The first indication of HLB I recall seeing was a significant loss of foliage and unprecedented fruit drop in the later part of 2012 in many groves in Central Florida.

I did not know it at the time, but the fruit drop and foliage loss I was seeing would become universal in the industry and something every grower would have to address. Indeed, a recent report from the U.S. Department of Agriculture National Agricultural Statistics Service, shows that the estimated fruit drop in 2022–23 was as high as 76% for early oranges and 70% for Valencia oranges.

GROWER EXPERIMENTS BEAR FRUIT

Several experimental therapies have been implemented to address preharvest fruit drop, many of which provided little to no impact. But, in the past three years, several growers began experimenting with exogenous applications of plant hormones, products commonly known as plant growth regulators (PGRs). There is a lengthy list of plant hormones which can be bought and applied,

but most growers have focused on the use of gibberellic acid and synthetic auxin. Reports from numerous growers indicated successful treatments that resulted in a reduction in preharvest fruit drop.

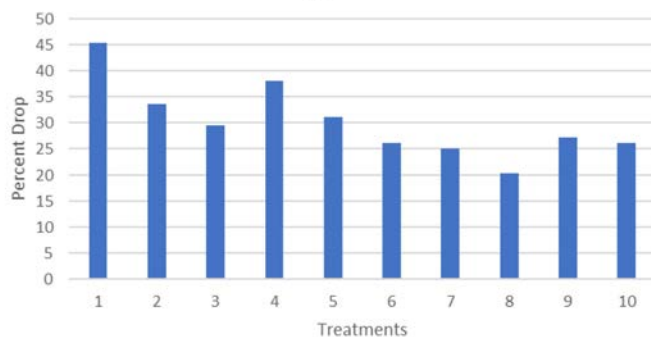
CRDF PROJECT DETAILS

At the direction of the Citrus Research and Development Foundation (CRDF) board of directors and Research Management Committee (RMC), CRDF staff reached out to several of these growers to design a research project which would help identify the best use of the PGRs. Several commonalities began to appear in their various PGR programs. Consequently, a list of nine treatments was formulated that would be evaluated against an untreated control (see Treatments Tested sidebar, page 12).

In 2022, the CRDF board and RMC settled on evaluating the PGR treatments at six sites (three Hamlin and three Valencia) spread throughout the three primary ecoregions (Ridge, Southwest and East Coast) of the Florida citrus industry. A complete scope of work was developed and put out to bid for public and private researchers.

All spray applications were applied with a Rears Pak-Blast air blast sprayer. The spray volume for all treatments was 200 gallons per treated acre. The rate for the 435 spray oil was 2% v/v, and the rate

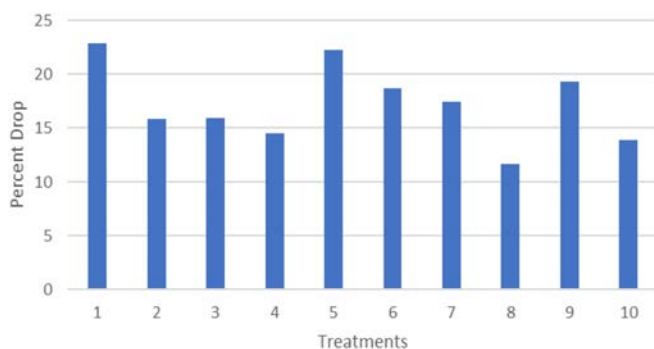
Percent Fruit Drop, Southwest Hamlin



Treatment	Percent Fruit Drop, Southwest Hamlin
1	45.48 A
2	33.64 BC
3	29.54 CD
4	38.11 AB
5	31.17 BCD
6	26.16 CDE
7	25.08 DE
8	20.48 E
9	27.11 CDE
10	26.07 CDE

Means followed by the same letter within a column do not significantly differ.

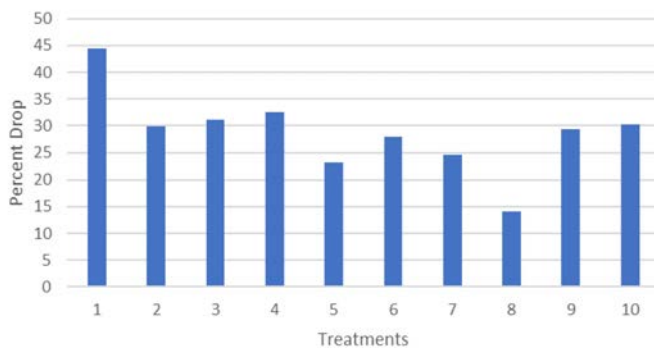
Percent Fruit Drop, Southwest Valencia



Treatment	Percent Fruit Drop, Southwest Valencia
1	22.85 A
2	15.82 ABC
3	15.91 ABC
4	14.48 BC
5	22.23 AB
6	18.66 ABC
7	17.45 ABC
8	11.66 C
9	19.28 ABC
10	13.89 C

Means followed by the same letter within a column do not significantly differ.

Percent Fruit Drop, East Coast Valencia



Treatment	Percent Fruit Drop, East Coast Valencia
1	44.4 A
2	29.8 B
3	31.2 AB
4	32.5 AB
5	23.1 CB
6	27.9 CB
7	24.6 CB
8	14.1 C
9	29.4 B
10	30.3 AB

Means followed by the same letter within a column do not significantly differ.

for the Kinetic organosilicon surfactant was 0.05% v/v.

The timing of the spray application in Treatments 3, 4 and 5 was July, September and November for Hamlin sites. The same spray schedule was used for the Valencia sites with the addition of 0.7 ounces per acre applied in late December. The timing of the spray applications for Treatments 6, 7 and 8 was August and October for both the Hamlin and Valencia trial sites. Treatment 9 was applied at the first

sign of fruit color break for each scion. Treatment 10 was applied to the Hamlin sites in September and to Valencia sites in November. Treatments 1–8 were applied during daytime normal working hours. Treatments 9 and 10 were applied at night.

John Curtis of Better Crops LLC was selected to conduct the research for this project. Spray applications began in July 2022 and followed the predetermined treatments. The trial work concluded in April 2023.

Treatments Tested

- Untreated control**
- Label rate – 3.2 oz/acre Citrus Fix in a single application with no surfactant or spray oil**
Application to Hamlin was scheduled for October and in December for Valencia
- Citrus Fix split applications + water, no surfactant or spray oil**
Hamlin: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre (total Citrus Fix 2.5 oz/acre)
Valencia: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre, 0.7 oz/acre (total Citrus Fix 3.2 oz/acre)
- Citrus Fix split applications + water + Kinetic**
Hamlin: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre (total Citrus Fix 2.5 oz/acre)
Valencia: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre, 0.7 oz/acre (total Citrus Fix 3.2 oz/acre)
- Citrus Fix split applications + water + 435 spray oil**
Hamlin: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre (total Citrus Fix 2.5 oz/acre)
Valencia: 0.5 oz/acre, 1.5 oz/acre, 0.5 oz/acre, 0.7 oz/acre (total Citrus Fix 3.2 oz/acre)
- Two applications of Citrus Fix + water, no surfactant or spray oil**
Full label rate of 3.2 oz/acre for each application
- Two applications of Citrus Fix + water + Kinetic**
Full label rate of 3.2 oz/acre for each application
- Two applications of Citrus Fix + water + 435 spray oil**
Full label rate of 3.2 oz/acre for each application
- 20 oz/acre Pro Gibb LV + Kinetic**
One application at night
- 20 oz/acre Pro Gibb LV + 1 oz/acre Citrus Fix + Kinetic**
One application at night

Unfortunately, Hurricane Ian severely impacted the Hamlin Ridge and East Coast sites.

TRIAL RESULTS

This project focused on evaluating yield, fruit quality and fruit drop. There were significant differences identified at each trial site. The uniformity of data was better in the Valencia sites than in the Hamlin sites because of the negative impact of Hurricane Ian.

Treatment 8 produced the most

consistent reduction in fruit drop across all trial sites, regardless of hurricane impact. Treatment 8 is a mixture of Citrus Fix and 435 spray oil (2% v/v).

A key takeaway from this trial is the effect a surfactant or horticultural spray oil has on the efficacy of the PGRs. Data suggests enhanced efficacy with synthetic auxin PGR use by mixing it with 435 spray oil.

Fruit quality at the Valencia sites was uniform and conformed to current industry standards. The Hamlin fruit quality varied greatly. The Southwest Hamlin site produced excellent fruit quality data. The Ridge site generated fruit quality data that was in line with current industry averages for Hamlin. The East Coast Hamlin site was severely damaged by Hurricane Ian, and the fruit quality data, regardless of treatment, was well below industry standards.

Treatment 10 was unique in that the two PGRs utilized for this trial were tank-mixed and sprayed together. Some growers had expressed concern or had no experience with tank-mixing two PGRs. There are examples of mismanaged PGR applications causing negative impacts on plant health and flowering in several crops. In this trial, no adverse effects on tree health or function were observed.

RESEARCH CONTINUES

The CRDF board and RMC approved a continuation of this trial for a second year at their July meetings. The trial hopefully won't be impacted by a major storm. The same variables will be evaluated as in the first year, but a few modifications to the treatment list for the second year have been made. These modifications eliminated the least effective treatments identified in year one and expanded upon the tank-mix of gibberellic acid and synthetic auxin.

Year two of the study will have five sites, not six. The Hamlin site in Okeechobee was almost a complete loss due to Hurricane Ian and will not be a part of the second year of this study.

A comprehensive report on this research can be found at tinyurl.com/mrem9f5e on the CRDF website. 🍊

Brandon Page is the field trials coordinator for CRDF.



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