

Use of Plant Growth Regulators for Improving Lemon Fruit Size - 2005¹

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Abstract

Lemons were treated with several plant growth regulators for the 2005-06 season, with the hope of improving fruit size. These PGR's included CropSet, Accel, Maxim, Messenger and MT350. Although there were some increases in yield, these were just trends, and were not statistically significant. Similarly, there was no improvement in fruit size with application of the treatments.

Introduction

The desert lemon industry is facing increasing competition from both foreign and domestic sources. Lemons from Argentina were considered to be quite a threat, until regulatory and disease issues prevent that fruit from being shipped to the US. In recent years, lemons from Chile have captured a large portion of the Japanese market; a market that is quite profitable for the desert lemon grower. Now we are seeing increasing competition from Mexican lemons. Lemons from Spain, South Africa, Australia and the Bahamas sometimes appear in the produce departments of US grocers.

From within the US, stored lemons from District 2 compete with desert fruit in the early part of the season. Use of gibberellins has allowed the Coastal California fruit to have a longer storage life when the market is at its highest. Meanwhile, the advent of lemons from District 1 can shrink profits later in the year.

What is a desert lemon grower to do? Although increasing market share is always desirable, the lemon producer has no influence on that. Fruit quality and size is the only way to command a higher price. Most growers can achieve good quality with appropriate insect and mite control, and fertilization. But fruit size is can sometimes be a problem. Figure 1 illustrates the fact that large fruit are more valuable in the market between September 1st and March 1st, when desert fruit is typical available.

In Spain, growers typically apply an auxin known as 3,5,6-TPA (Maxim, Dow Agrosiences) is typically applied to lemons following the "June drop" to size the fruit. Our lab experimented using this compound several years ago, and found that it can sometimes work, but it is not always consistent.

We have also done one year's work on Accel, a PGR formulation of auxin and gibberellin. This work needs to be continued to test its validity.

It is apparent that desert lemon growers require a PGR that is registered and consistent. Since 1999, several purported compounds have become available for use on citrus, and many claim to improve fruit size. These include synthetic auxins, compounds containing natural auxins, and other plant growth regulators. Our objective for this study is to test several of these compounds for their consistent efficacy in improving lemon size..

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Materials and Methods

This experiment was established in 2005 at the Yuma Mesa Agriculture Center, in blocks 8 and 9. Treatments are as follows:

- Untreated Control
- CropSet 8 oz per acre at golf ball stage – CropSet is a proprietary blend of saponins, fulvic acid other natural ingredients made by Impocrop, Lexington, KY.
- Maxim - 17.6 tablets per acre – Maxim is the trade name for the auxin 3,5,6 TPA, and is manufactured by Dow Agrosiences.
- Messenger Alpha @ 8 oz/acre – Messenger is a protein that stimulates the plant growth biochemical pathway and certain plant defense pathways, and is manufactured by Eden Biosciences, Bothell, WA.
- Accel 1.80% @ 44 oz/acre – Accel is a cytokinin product manufactured by Valent Inc.
- MT 350 @ 4 pts/acre 2 wk and 4 wk prior to harvest. MT 350 is a product derived from plant-based lipids that purports to increase fruit size.
- MT 350 @ 4 pts/acre 4 wk prior to harvest
- MT 350 @ 4 pts/acre 2 wk prior to harvest

For all treatments, spray volume was 100 GPA, and the materials were applied using an air-blast sprayer. NUFilm surfactant was used in all cases. Spray dates for the CropSet, Maxim and Messenger was 6-13-05, for the Accel, 6-29-05, and for the MT350, 8-18-05 and again on 9-2-05. Time of application was 6:30 AM, except for MT350, which was applied at 1:00 AM

Trial Design was Randomized Complete Block, with a plot size of eight trees per plot. There were five replications.

Irrigation is border flood, and normal cultural practices are used. Yield data was collected in its entirety on 10-4-05, and 2005-06 was the first harvest year for this trial. Yields for the entire 8-tree plot were harvested by commercial harvesters into bins. For each harvest date, about 90 lbs. of harvested fruit from each plot was passed through an automated electronic eye sorter (Autoline, Inc., Reedley, CA), which provides weight, color, exterior quality and size data for each fruit. Fruit packout data is reported on a percentage basis. There was no significant difference in packout, fruit shape or fruit color due to treatment.

All data was analyzed using SPSS 11.0 for Windows (SPSS Inc., Chicago, Illinois).

Results and Discussion

Yields from the trial are shown in Figure 2. Although MT350 at 2 and 4 weeks prior to harvest had about 20% more yield than the untreated control, variability among the plots precluded statistical significance. All the other treatments were similar to the untreated control. Similarly, there were no significant differences in packout among the treatments. Hopefully, we will see an improvement in the next season.

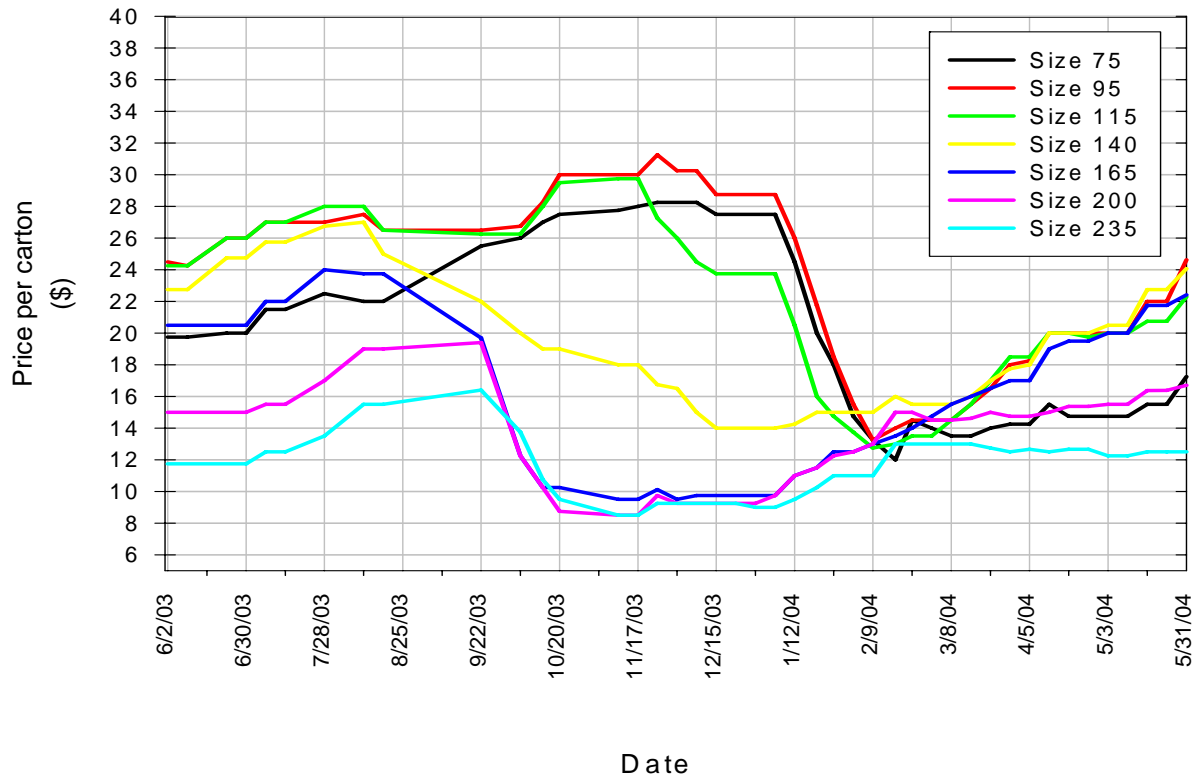


Figure 1. 2003-04 Los Angeles terminal market prices for fancy grade lemons.

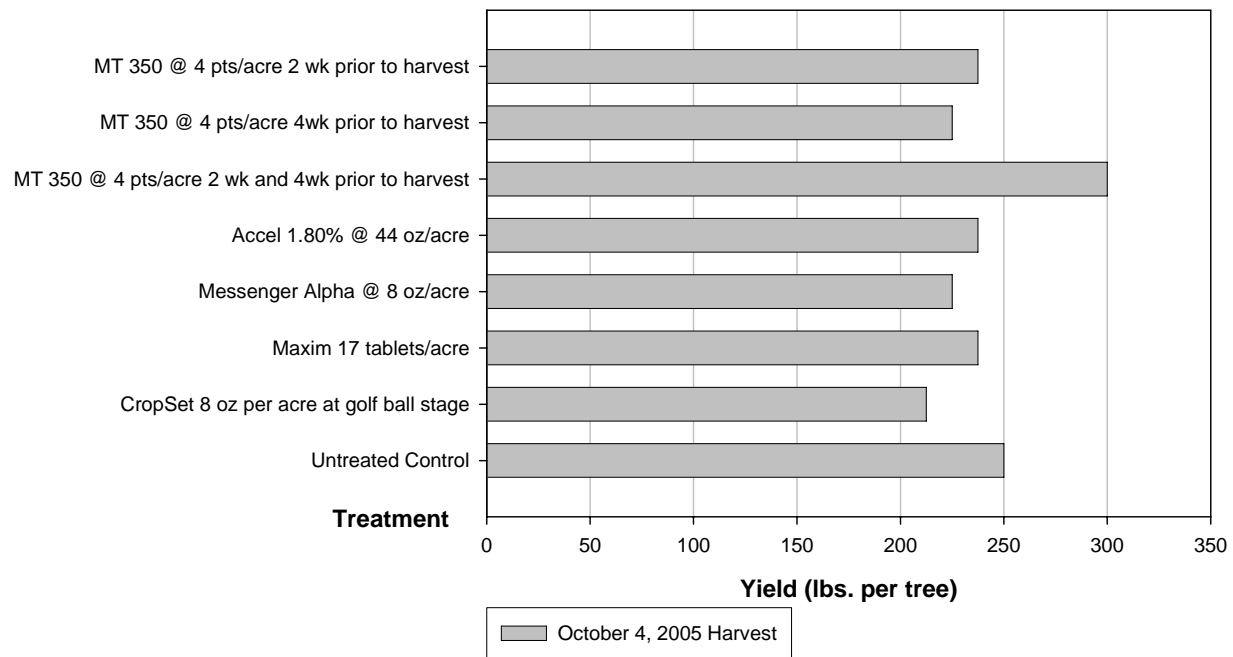
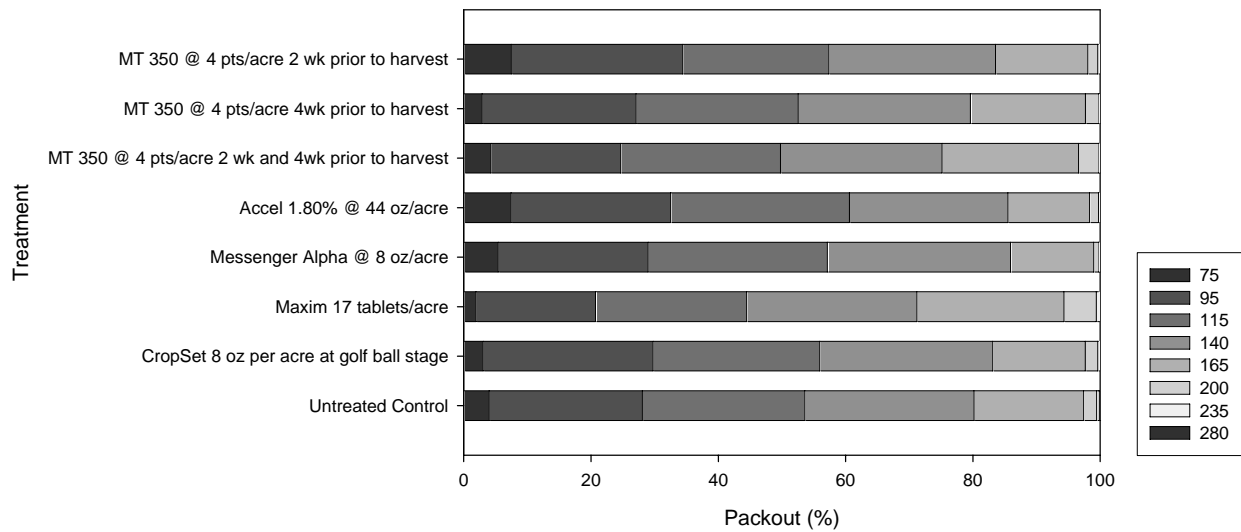


Figure 2. Yields of lemons treated with various plant growth regulators for the 2005-06 season. There was no significant difference between the treatments.



There were no significant differences between the treatments.

Figure 3. Packout of lemons treated with various plant growth regulators for the 2005-06 season. There was no significant difference between the treatments.