

Use of Plant Growth Regulators for Improving Lemon Fruit Size - 2006¹

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Abstract

Lemons were treated with several plant growth regulators for the 2006-07 season, with the hope of improving fruit size. These PGR's included Bluestim, Accel, Maxim and MT1350. 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
- Maxim - 17.6 tablets per acre – Maxim is the trade name for the auxin 3,5,6 TPA, and is manufactured by Dow Agrosiences.
- Bluestim - 4 lb. per acre - Bluestim is a glycine betaine product that is meant to help the plant resist stress, and is distributed for Monterey Ag. Resources.
- Accel 1.80% @ 44 oz/acre – Accel is a cytokinin product manufactured by Valent Inc.
- MT 1350 @ 4 pts/acre in late May and mid-June. MT 1350 is a product derived from plant-based lipids that purports to increase fruit size.
- MT 1350 @ 4 pts/acre in late June and mid-July
- MT 1350 @ 4 pts/acre in late July and mid-August.

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. The spray date for the Maxim was 6/15/06. For the Bluestim the first spray date was 7/20/06, and again on 8/23/06. The Accel was applied on 6-27-06. The MT1350 was applied on 5/30 and 6/14 for the late may and mid-June application, on 6/29 and 7/14 for the late June and mid-July application, and on 7/31 and 8/23 for the late July and mid-August applications. Time of applications was 6:30 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 9-29-06, and 2006-07 was the second 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 MT1350 at late July and mid-August (about 8 and 6 weeks before harvest) had about 17% more yield than the untreated control, variability among the plots precluded statistical significance. This result was similar to our results for the 2 and 4 week prior to harvest application for 2005-06, which led to a 20% increase in yield, but was non-significant. All the other treatments were similar to the untreated control. Similarly, there were no significant differences in packout among the treatments (Figure 2). Hopefully, we will see an improvement in the third season.

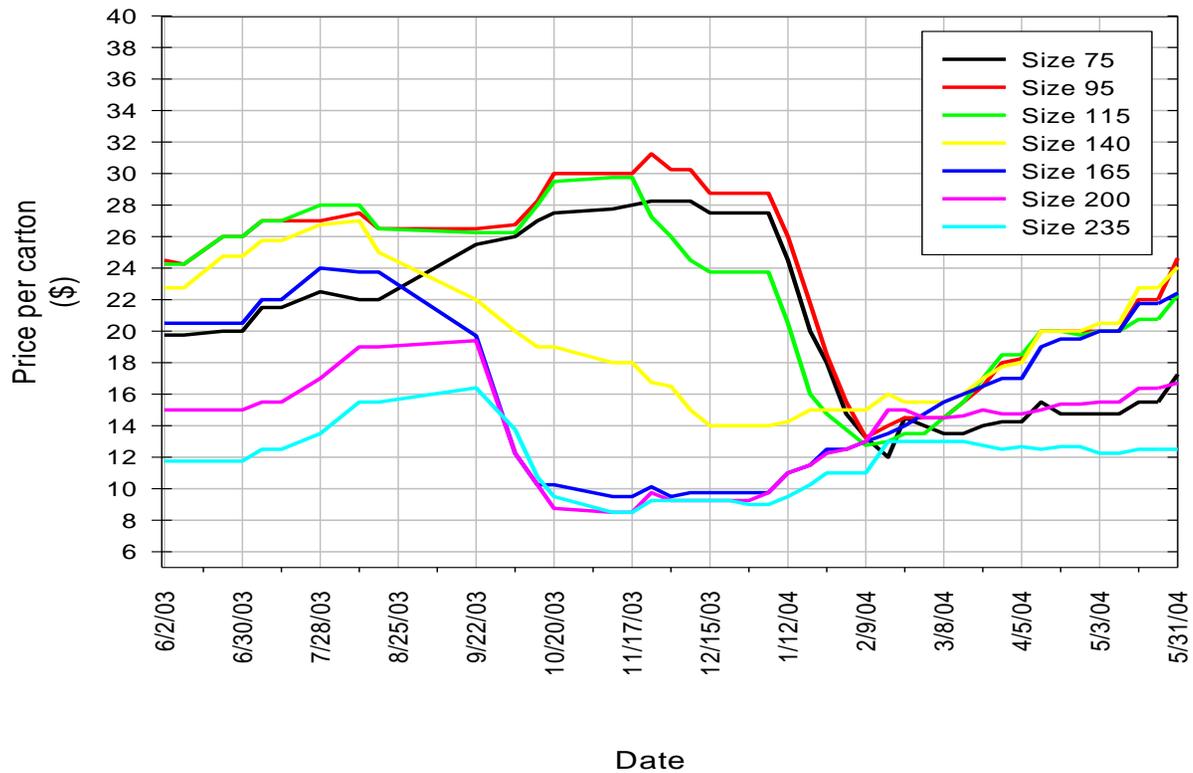


Figure 1. 2003-04 Los Angeles terminal market prices for fancy grade lemons.

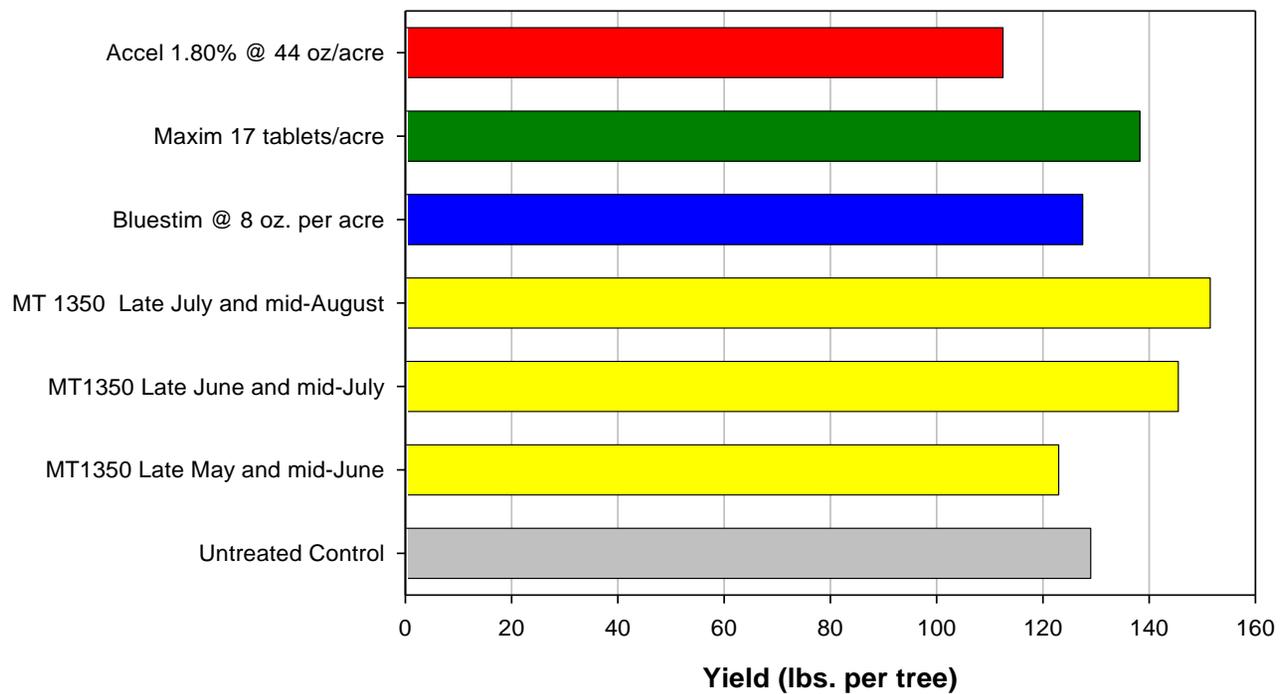


Figure 2. Yields of lemons treated with various plant growth regulators for the 2006-07 season. There was no significant difference between the treatments.

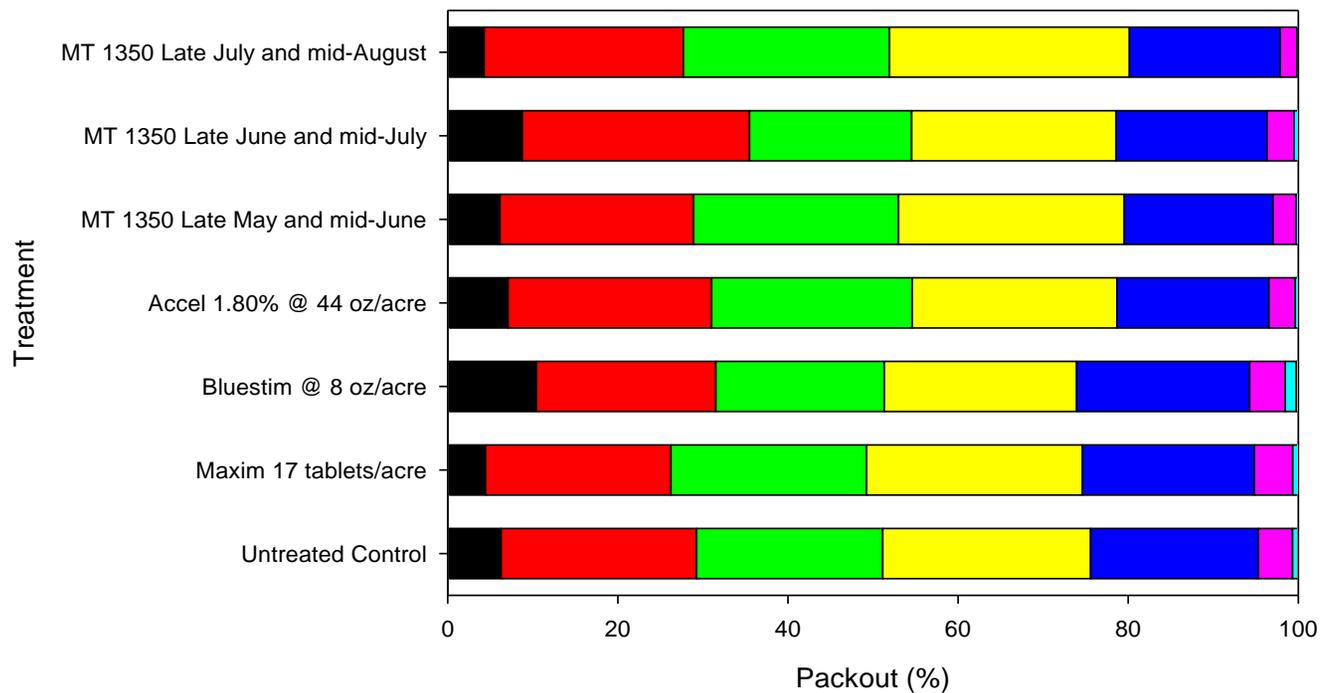


Figure 3. Packout of lemons treated with various plant growth regulators for the 2006-07 season. There was no significant difference between the treatments.