

ADEPT PHYTOTOXICITY IN POINSETTIA

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In late September there were reports of poinsettia with severe leaf burn in several greenhouses in Pennsylvania. The symptoms included leaf chlorosis, tip burn, leaf margin burn, and in severe cases unusual brown or tan crystalline material on the leaf in the damaged regions. The symptoms at first glance were very similar to Cycocel toxicity, and since they appeared at about the same time it seemed likely that might be the problem. However, some of the affected plants had not been treated with Cycocel and damage continued to develop indicating that the problem must be something else. Nutritional testing did not point to a nutrient toxicity. Further investigation suggested that a possible common link might be the application of the biofungicide RootShield®, (BioWorks, Inc.) And or the insect growth regulator Adept® (Uniroyal Chemical).

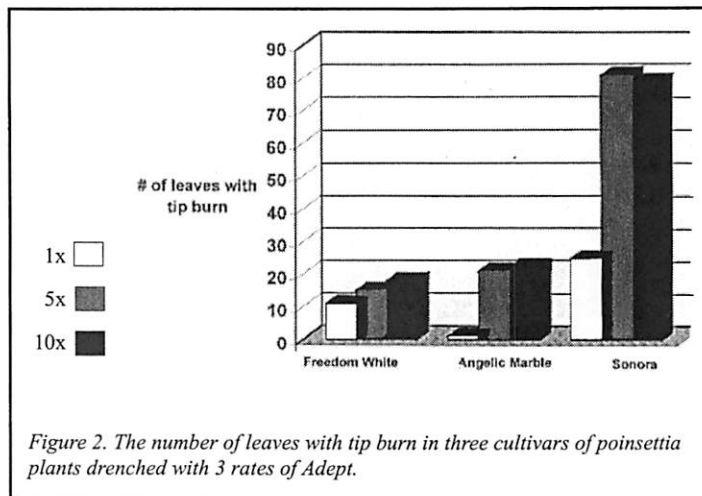
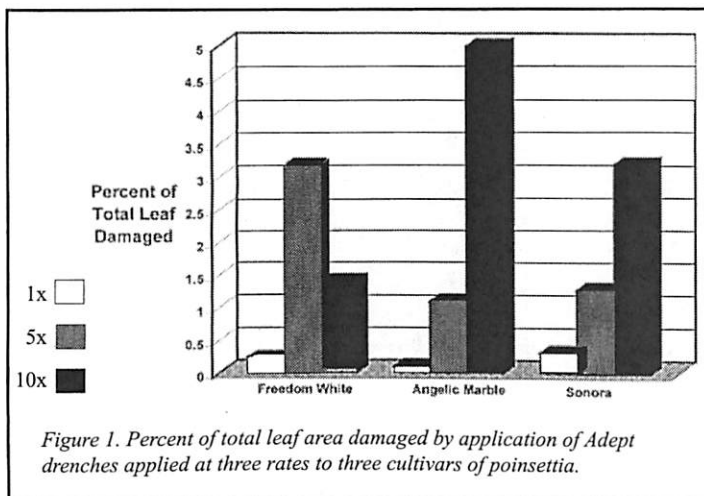
In an effort to determine the cause of the problem Adept and RootShield were applied to poinsettia plants in the Horticulture Greenhouses at Penn State. Damage from high applications was observed about 4 weeks after treatment. Cultivar differences in the severity of the phytotoxicity were also observed. A larger trial was then initiated to attempt to gain a better understanding of the problem.

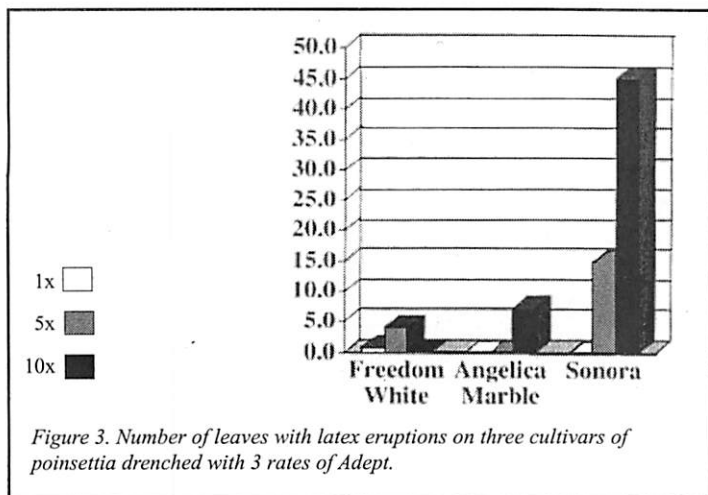
Poinsettia plants were treated with 0, 1x, 5x and 10x the label rate of Adept. Rootshield was not included in this trial. Three cultivars were treated, 'Freedom White,' 'Angelica Marble' and 'Sonora.' Plants were grown in a 24C greenhouse for 7 weeks after treatment. They were then harvested and the total leaf area, damaged leaf area, number of leaves with chlorosis, tip burn, marginal burn, and latex eruptions were recorded for each shoot of each plant. No data were collected from the untreated plants since no damage was observed on any of these plants.

At the recommended rate (1 oz/100 gal) there was a slight yellowing of the leaf tips in many of the Adept treated plants that was not observed in untreated plants. This leaf tip yellowing was minor and would probably not have been noticed had these plants not been subjected to close scrutiny. At higher rates (5 and 10x) Adept caused significant damage to the poinsettia cultivars tested. The amount of damage increased with increasing Adept application rate.

The leaf area afflicted increased from near 0 when the recommended rate was applied to 1.1 - 3.2% at 5x and 1.4 - 5.0% at 10x. The total damaged area of the leaf was more or less the same for each of the cultivars, but the type and severity of the damage differed from one cultivar to the next. Sonora was most susceptible to tip burn with 65% of the leaves displaying that symptom after 5 and 10x Adept treatments. Sonora also had more leaves with latex eruptions than either Freedom White or Angelica Marble. Latex eruptions were an interesting symptom observed in the afflicted tissue of the most severely damaged plants. Cells in the damaged area apparently burst, resulting in the formation of a small bead of latex. These latex beads dried forming small brown or tan crystals attached to the necrotic regions of the leaf. Latex eruptions seem to be diagnostic of damage caused by Adept.

Leaves expanding during or shortly after the time of treatment were most affected. Damage also varied from shoot to shoot on any given plant. Leaves on some shoots were severely damaged, while leaves on other shoots on the same plant were undamaged or showed only minor symptoms. In general, the most damaged shoots were the smaller sheltered ones in the middle of the plant. Some plants had damage on leaves of holly a few shoots, while most of the leaves on the plant were undamaged. The distribution of damage seemed to reflect uptake and transpiration. The larger dominant shoots were more damaged because of higher transpiration. In plants where only one or two of the dominant shoots were affected it seems likely that there was an uneven application or uneven root uptake of the drench. This is similar to uneven distribution of plant nutrients observed when different parts of the root system are supplied nutrients and others are not. When nutrients are supplied to only one part of the root system the concentration of the nutrient in the shoot tissue supplied by that root is increased while nutrients in other shoots are not. It is likely that Adept (or most likely its breakdown products) as a drench applied, transpiration stream distributed substance would likewise end up in specific shoot tissues if the concentration were higher in the corresponding portion of the root zone. This could come about as the result of uneven application or distribution of the drench in the medium and likely explains much of the damage observed in commercial green-





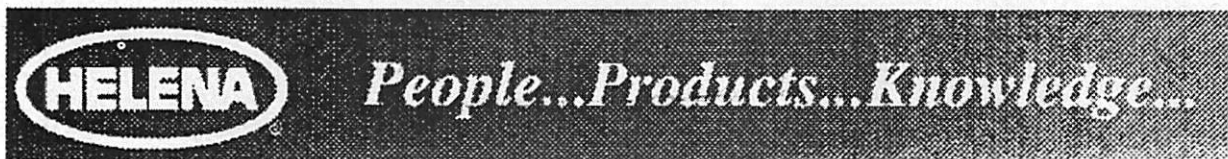
houses. Unless great care is taken in applying the drench it will mostly saturate the zone directly beneath where it is poured onto the medium surface. If the proper amount of active ingredient for treating the whole pot ends up in only part of the medium the result is a higher than recommended concentration in that zone. This can be further compounded by water channels and contiguous macropores in the medium and uneven distribution of the root system. It has been suggested that the addition of RootShield may have contributed to the problem in some commercial greenhouse ranges. Although that suggestion was not tested in this study, it remains a clear possibility. RootShield has been reported to increase root growth and activity in treated plants. It is quite possible that increased root activity might lead to increased uptake and enhanced phytotoxicity.

The difference between a poison and a medicine is the dose. Too much of almost any pesticide can be phytotoxic. The key to safe use of a pesticide is applying enough to do the job at the right time and place. Apply too much, apply unevenly, or under the wrong conditions and non-target plant damage is a likely result. Based on our observations the IGR Adept has a relatively narrow window of safety when used on poinsettia in the fall. Growers should be very careful to follow the label, being sure to apply the chemical evenly to avoid overdosing any portion of the root system.

Summary

- Adept can cause significant damage in poinsettia when applied at 5x or 10x the label rate.
- The symptoms of adept phytotoxicity include leaf chlorosis, tip burn, leaf margin burn, and in severe cases latex eruptions in affected tissues.
- The damage was primarily in tissues with high transpiration and growth rates. Some shoots exhibit more damage than others, maybe due to greater root activity or uneven drench application.

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