

# Floriculture $R_x$

## Diagnosing Problems Due to Plant Growth Regulators

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Plant growth regulators (PGRs) are excellent tools to help control undesirable stretch of floriculture crops. When used at the correct stage of development and rate, they provide excellent height control. Misapplications can lead to catastrophic results, which lower plant quality. Common problems include phytotoxicity, delayed flowering, and stunted growth (Figures 1 to 4). This handout is designed to aid in diagnosing the symptoms of PGR overdose. Symptoms typical for each PGR are shown.



Figure 1. The plants in the front row received an overapplication of an unknown PGR (but most likely a triazole type) while in the plug flat. The plants in the back row were not overdosed (nor did they have a PGR application made to them after being transplanted).

FlorRx.001  
January 2001

### Unknown PGR



Figure 2. The pansy plants received an overapplication of an unknown PGR (but most likely a triazole type) while in the plug flat. Three weeks after transplanting, only a limit amount of new growth had developed.



Figure 3. Uneven applications of PGRs can cause a reduction in the size of poinsettia bracts.



Figure 4. Leaves which are darker green and crinkled are typical PGR overdose symptoms.

### **A-Rest (ancymidol)**

It is a safe chemical with limited reports of phytotoxicity. Phytotoxicity symptoms appear as necrotic spots on leaves of plugs and poinsettias (Figure 5). Problems are more pronounced with high temperatures (>70°F).

### **B-Nine (daminozide)**

Phytotoxicity is not a problem with B-Nine. Because of its lower degree of activity, multiple applications may be required. These multiple applications can cause flower delay or reduced flower stalk elongation if applied too late (Figures 6 and 7).

### **A-Rest**



Figure 5. Phytotoxicity on poinsettias sprayed with 99 ppm A-Rest when temperatures were >70°F.

### **B-Nine**



Figure 6. A late B-Nine application to ranunculus inhibited the elongation of the flower spike.

### **B-Nine + Cycocel**



Figure 7. Crop delay and a reduction in bract size of poinsettia due to a late season application of B-Nine + Cycocel.

## Cycocel (chlormequat chloride)

Foliar sprays of Cycocel can cause a yellow spotting or discoloration of newly expanding leaves (Figures 8 to 11). Damage to the chloroplast causes the yellow spotting and symptoms are evident within 3 to 5 days after application. In general, problems occur when Cycocel rates exceed 1,500 ppm. Expansion of new leaves generally cover damaged leaves within a few weeks.



Figure 8. Typical leaf yellowing caused by Cycocel phytotoxicity of geraniums.



Figure 9. This pansy plant received an over-application of Cycocel (4,000 ppm) resulting in marginal leaf necrosis.

## Cycocel



Figure 10. Typical leaf yellowing caused by Cycocel phytotoxicity of poinsettias.



Figure 11. A more severe case of leaf yellowing due to Cycocel phytotoxicity of poinsettias.

## Bonzi (paclobutrazol) and Sumagic (uniconazole)

Both Bonzi and Sumagic are triazole type chemicals and have a high degree of activity. Over-application of these chemicals can result in leaf necrosis soon after application, darker green foliage with crinkled leaves, and severely stunted growth (Figures 12 to 16). Delay in flowering can also occur.

### Sumagic



Figure 12. Severe leaf distortion of the new growth resulted with excessively high rates of Sumagic. (These ornamental sweet potato plants grew out of the PGR effects after becoming established in the landscape.)



Figure 13. Cosmos plants sprayed with an excessive rate of Sumagic (left) and optimal rates on right.

### Bonzi



Figure 14. Begonias are extremely sensitive to Bonzi, resulting in severe stunting.



Figure 15. Excessive rates of Bonzi caused lower leaf necrosis and stunted growth of dahlia.



Figure 16. Excessive rates of Bonzi caused lower leaf necrosis, stunted growth, and a change in the flower orientation (to upward facing) of pot sunflower.

## Florel (ethephon)

Overdoses of Florel are mainly associated with delayed flowering (Figures 17 to 19). Applying Florel to plants under stress (temperature or water) also can result in leaf yellowing.

### Florel



Figure 17. Uneven spray applications of Florel to an individual plant can result in differences in growth and flowering.

### Florel



Figure 18. Florel caused abortion of the flowers, thus promoting vegetative development.



Figure 19. A closeup of geranium flowers showing the abortion caused by Florel.

**Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage and examine a current product label before applying any chemical. For assistance, contact an agent of the North Carolina Cooperative Extension Service in your county.**