By Erik Runkle

Using Chlormequat Chloride with Success

Chlormequat chloride, the first plant growth retardant (PGR), was discovered in the late 1950s by Dr. N.E. Tolbert, a chemistry professor at Michigan State University. The first experiments were performed and published on wheat, in which applications of the chemical produced shorter plants with thicker stems. Dr. Tolbert also learned that application of gibberellins could overcome the effects of the PGR application. The first experiments on floriculture crops were performed around 1960 by Tolbert and Dr. R.S. Lindstrom, who showed that the chemical could be used as a drench to inhibit stem extension, increase stem thickness and increase leaf greenness of chrysanthemum and poinsettia.

Today, chlormequat chloride is used to promote flowering or inhibit extension growth of floriculture crops grown in greenhouses, shadehouses and container nurseries such as geranium, poinsettia, begonia, osteospermum and hibiscus. The two most common products in floriculture that contain this active ingredient are Cycocel (OHP Inc.) and Citadel (Fine Americas Inc.) The concentration of both products is the same, 11.8 percent, and their re-entry interval is 12 hours. Compared with other common PGRs, chlormequat chloride is rapidly metabolized by plants, animals, bees and microbes in soil, meaning it is a relatively safe and short-lasting chemical when applied to crops and thus, a more forgiving PGR. For example, chlormequat chloride can be applied to poinsettia at low rates (500 to 750 ppm) after short days begin with little or no effect on bract size. This can be useful for growers who battle high temperatures in late September or early October.

Figure 1. A single spray application of products that contain chlormequat chloride inhibited stem extension of salvia. The spray was made one week after transplant to crops grown at 72° F under a 16-hour day with high light. Photo taken four weeks after application, courtesy of Matthew Blanchard.

Some application guidelines for chlormequat chloride are listed below. Consult the product labels, PGR technical specialists, as well as university and extension educators, for more information on successful commercial use of this PGR.

- Chlormequat chloride is absorbed by leaves and roots, so it is effective when applied as a foliar spray, sprench, substrate drench or liner dip.
- The most common application method is as a spray at a volume of 2 to 3 quarts per 100 sq. ft. Common spray rates are 750 to 1,500 ppm but can go as high as 3,000 on some crops (Figure 1). However, at rates above 1,250 ppm, a short-term phytotoxic response is more likely to occur. The typical phytotoxic response is a yellowing of immature leaves at the margin that appears within five days of application. Depending on the rate and crop, the yellowing can disappear or be fairly persistent. Therefore, growers are encouraged to experiment with different rates on a small scale to determine height control and phytotoxicity responses.
- Drench applications do not cause phytotoxicity. However, since typical drench rates are 1,500 to 3,000 ppm, their expense limits their use.
- Spray applications are most effective when made under slow-drying conditions, such as early morning or on a cloudy day. Avoid misting or watering for at least six hours after an application to ensure plant uptake of the PGR.
- Growth inhibition responses of sprays typically last for a few weeks, so repeated applications are sometimes necessary.
- As with all PGRs, applications are more effective when made as plants begin to rapidly elongate, such as one to two weeks after transplant.
- Although chlormequat chloride is primarily used to inhibit extension growth, it can also accelerate flowering of a few crops. For example, sprays of chlormequat chloride can accelerate flowering of some seed geranium cultivars when made between two and five weeks after germination.
- Late applications (within two to three weeks of marketing) should be avoided on finish crops, since they can potentially reduce flower size and cause phytotoxicity that persists when plants are sold.
- A tank-mix combination of chlormequat chloride plus daminozide (e.g., B-Nine, Dazide) has been shown to be more active than using either product alone g

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