Special Research Report #430: Post Production

Use of Benzyladenine to Enhance Production and Postharvest Quality of Floricultural Crops: 2. Postharvest performance

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BACKGROUND

Lower leaf yellowing, leaf abscission, and flower bud abortion of floriculture crops are production disorders that reduce plant quality and negatively impact sales across the United States. Exogenous applications of products that contain a synthetic plant hormone benzyladenine (BA), alone or in combination with (±) the hormone gibberellic acid (GA), reportedly can improve quality of potted plants by reducing these disorders. However, the use of BA on floral crops has been limited at least in part due to the lack of adequate information on application techniques, timing, and effective rates of these products. This research evaluated the use of several BA±GA products to improve plant quality and postharvest characteristics, which could increase sales, reduce shrinkage, improve consumer satisfaction, and potentially generate a higher sales price.

Chemical abbreviations (and commercial products): BA1 = BA (Configure), BA2 = BA (BAP-10), BA+GA = BA+GA_{4+7} (Fascination or Fresco), GA = GA_{4+7} (Novagib).

MATERIALS & METHODS

Plants were treated with sprays or drenches of BA1, BA2, or BA±GA at various concentrations and timing to determine how BA±GA influences the postharvest performance of potted poinsettia, geranium, gerbera, and miniature rose. All plants were grown at 68 to 73 °F in the research greenhouses at Michigan State University following established production protocols. After treatments, plants received a simulated shipping treatment for 2 or 4 days in darkness and then were held at 68 °F with a 12-hour photoperiod and 25 $\mu mol \cdot m^{-2} \cdot s^{-1}$ (170 footcandles) of light, and relative humidity of 70%.

RESULTS

Poinsettia 'Freedom Red'

In poinsettia 'Freedom Red', sprays of BA±GA at 2.5 or 5 ppm inhibited leaf senescence by up to 55% compared with the non-sprayed controls after ≥2 weeks of post-harvest storage (Figure 1). A spray of BA+GA was more effective than BA alone in inhibiting leaf senescence after postharvest for ≥3 weeks. Spraying the entire plant or only the lower leaves were both equally effective strategies for inhibiting leaf senescence.

Geranium 'Pinto Red'

Geranium 'Pinto Red' sprayed with BA+GA had 2 to 15 fewer chlorotic and necrotic lower leaves and had higher quality ratings after storage for 2 and 4 weeks compared with non-sprayed plants. BA alone had no effect on lower leaf chlorosis or visual quality. In a separate

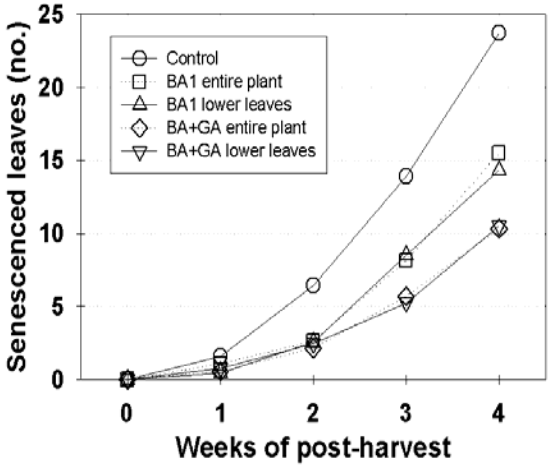

Figure 1. Sprays of BA (□/□) and BA+GA (◊/□) applied to the entire plant (□/◊) or lower leaves (□/□) of poinsettia inhibited leaf senescence compared to control plants (O).

experiment, spray treatments of 2.5, 5, or 10 ppm GA and 5 or 10 ppm BA+GA at visible bud significantly reduced leaf chlorosis and necrosis measured at 1 and 2 weeks after storage (Figure 2). GA treatments of 5 or 10 ppm at visible bud significantly increased plant height.

Gerbera and Miniature Rose
Similar studies performed with potted gerbera 'Festival Dark Eye Orange' and miniature rose showed that BA±GA had no effect on lower leaf chlorosis or visual quality ratings during storage, irrespective of application time.

CONCLUSION

We have identified how BA±GA can be applied by greenhouse growers to improve the postharvest performance of potted flowering crops, including geranium and poinsettia. This information can be used by greenhouse growers to reduce lower leaf loss and thus improve the postharvest performance of these high-value floriculture crops. Growers are advised to avoid application of GA to the top of plants as this can cause unwanted stem elongation. Small-scale grower trials are recommended to determine appropriate rates.

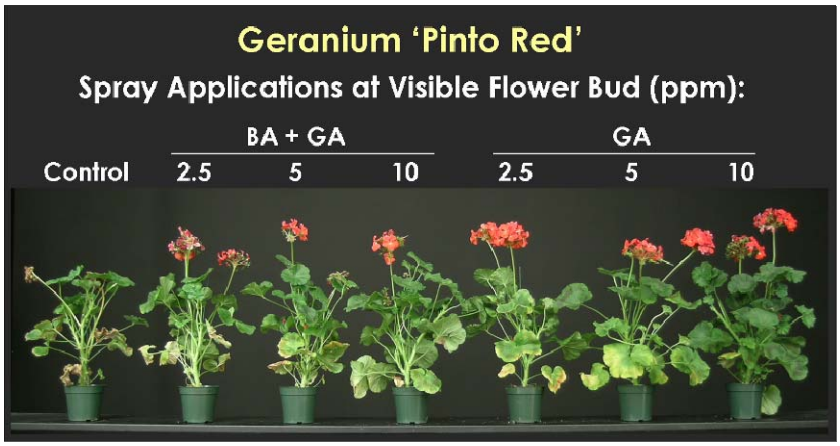

Figure 2. Products containing the hormone gibberellic acid (GA) with or without benzyladenine (BA) sprayed at visible bud inhibited lower leaf chlorosis and necrosis of geranium after storage.

IMPACTS TO THE INDUSTRY

Lower leaf yellowing and necrosis is a common disorder in the production of potted geranium and on occasion, other greenhouse crops (Figure 3). Through this project, we have identified a way for greenhouse growers to reduce lower leaf loss of geranium and poinsettia by up to 50%. As a result, growers can produce higher-quality plants and spend less money on labor to manually remove yellow and dead leaves.

Figure 3. Currently, greenhouse growers manually remove lower leaves that have turned yellow or brown during production of potted geranium. This project has identified a way to reduce lower leaf loss of geranium, which can save labor and increase the aesthetic quality of plants.

Acknowledgments
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For Additional Information
Contact: Erik Runkle by E-mail at runkleer@msu.edu or read the article entitled "Improving Branching and Postharvest Quality" published in the August 2008 issue of GPN magazine.