GROWERTALKS

Features

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Don’t Stress Over Geranium Propagation

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Unlike most other annuals, unrooted geranium (zonal and interspecific) cuttings are considered high priority for sticking, as they have a short postharvest life and a low tolerance to high temperatures and exposure to ethylene during shipping and storage. Unfortunately, unrooted geranium cuttings won’t show any signs of having experienced one or more of these stresses upon arrival. But a few days after stick, some cultivars may begin to develop leaf yellowing and gradual senescence (Figure 1). Undesirable or prolonged shipping or storage conditions can increase respiration (reducing carbohydrates), and increase ethylene generation and accumulation in the shipping package and box, which can cause leaf yellowing and senescence during propagation.

Figure 1. Geraniums can develop yellow leaves during propagation if shipping is delayed, or they’re exposed to high temperature or ethylene.

While yellow leaves don’t make liners unusable or unmarketable, growers often have to manually remove the yellow and senescing leaves to avoid gray mold (Botrytis cinerea) infection and this can be very labor intensive. Given that gray mold accounts for 10% of losses on geranium cuttings during propagation, senesced leaves shouldn’t be ignored. Fortunately, not all geranium cultivars are as susceptible to stress during shipping and/or storage as others. Typically, geranium cultivars with red, orange and purple flowers are much less susceptible to leaf yellowing than cultivars with white, pink and salmon flowers. Additionally, many breeding companies are adding ethylene blocking sachets that are activated in high humidity in the packaging. They work by binding to ethylene receptors in the plant, thus preventing the absorption of ethylene.

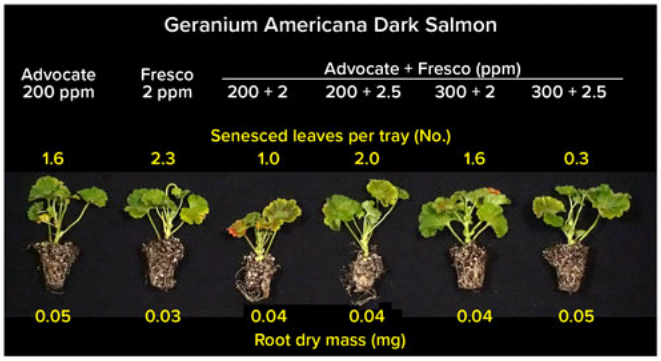

Figure 2. Americana Dark Salmon Geranium cuttings 28 days after being sprayed with 200 ppm rooting hormone (Advocate), 2 ppm BA+GA4+7 (Fresco), 200 ppm Advocate + 2 ppm Fresco, 200 ppm Advocate + 2.5 ppm Fresco, 300 ppm Advocate + 2 ppm Fresco, or 300 ppm Advocate + 2.5 ppm Fresco.

Our previous research has determined that a spray application of plant growth regulators (PGRs) containing benzyladenine (BA; a cytokinin) and gibberellic acid (GA) suppresses lower leaf yellowing and senescence of geranium cuttings. Neither BA nor GA4+7 applied alone will prevent leaf yellowing. The two active ingredients have to work synergistically. You might already be familiar with the use of the PGRs Fascination or Fresco on Easter lilies prior to or after visible bud to prevent older leaves from turning yellow. However, one of the challenges when using BA+GA4+7 on geranium cuttings is that it can slow down, inhibit or reduce root development on cuttings that have been treated. Luckily, this undesirable consequence can be overcome with the use of a rooting hormone. In recent years, applying rooting hormones as a foliar spray has gained popularity due to the labor savings and elimination of spreading diseases as compared to basal dips. Therefore, the objective of this study was to determine if a single overhead spray application of a tank mix of BA+GA4+7 and a rooting hormone on geranium cuttings with different flower colors would prevent leaf yellowing and not delay rooting or cause a phytotoxicity.

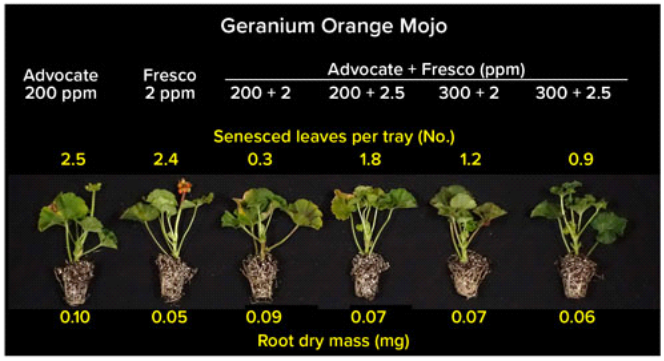

Figure 3. Orange Mojo Geranium cuttings 28 days after being sprayed with 200 ppm rooting hormone (Advocate), 2 ppm BA+GA4+7 Fresco, 200 ppm Advocate + 2 ppm Fresco, 200 ppm Advocate + 2.5 ppm (Fresco), 300 ppm Advocate + 2 ppm Fresco, or 300 ppm Advocate + 2.5 ppm Fresco.

The study

Unrooted cuttings of geranium (Pelargonium interspecific) Calliope Medium White and Orange Mojo, and (Pelargonium zonal) Americana Dark Salmon were received from a commercial breeder and left in the shipping package and box for 24 hours to simulate a delayed shipment. Cuttings were then stuck in 72-cell trays filled with a moistened peat and perlite mix. The trays were placed in a greenhouse with an air temperature of 70F (21C), a vapor-pressure deficit to 0.3 kPa, daily light integral of 11 mol·m–2·d–1 and on top of a bench with root-zone heating providing a substrate temperature of 75F (24C) and overhead misting containing 60 ppm N as necessary. The following morning, sprays containing a surfactant and 0, 2 or 2.5 ppm each of BA+GA4+7 (Fresco; Fine Americas) with or without 0, 200 or 300 ppm of 20% indole-3-butyric acid (IBA; Advocate, Fine Americas) were applied to the cuttings overhead. The “greenness” of lower leaves was measured seven days after the beginning of propagation with a chlorophyll content meter and the number of senesced leaves was recorded throughout the study. Shoot and root dry weights were measured 28 days after cuttings were treated and placed in the greenhouse.

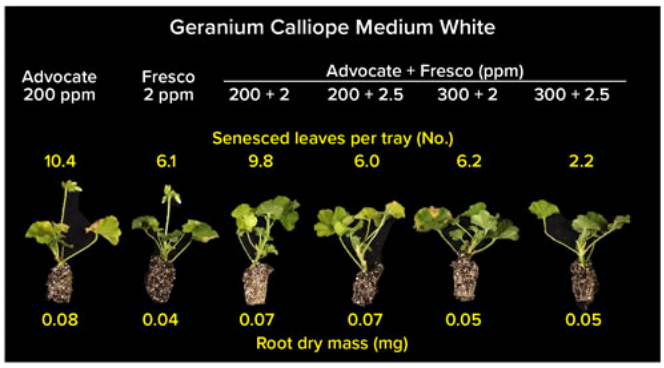

Figure 4. Calliope Medium White Geranium cuttings 28 days after being sprayed with 200 ppm rooting hormone (Advocate), 2 ppm BA+GA4+7 (Fresco), 200 ppm Advocate + 2 ppm Fresco, 200 ppm Advocate + 2.5 ppm Fresco, 300 ppm Advocate + 2 ppm Fresco, or 300 ppm Advocate + 2.5 ppm Fresco.

What we found

Regardless of the cultivar, the cuttings with the greenest leaves and the fewest senesced leaves four weeks after stick were those that received a 2.5 ppm spray application of BA+GA4+7 (Figures 2, 3 and 4). The application of BA+GA4+7 at 2 or 2.5 ppm with or without an IBA rooting hormone to cuttings did not cause any stem elongation or any visible phytotoxicities. As expected, the cultivar with white flowers (Calliope Medium White, Figure 4) had the most senesced leaves compared to the other two cultivars with orange or salmon flowers (Figures 2 and 3). Across all three cultivars, the application of 2 ppm of BA+GA4+7 without an IBA rooting hormone reduced root dry mass by 40% to 50%. However, a tank mix of Fresco (2 to 2.5 ppm) + Advocate (200 to 300 ppm) increased the root dry mass of Calliope Medium White by 25% to 75% over cuttings that were sprayed with 2 ppm Fresco alone.

Conclusion

There was no negative effect of tank mixing BA+GA4+7 + an IBA rooting hormone on any of the three cultivars tested even if they weren't prone to leaf yellowing. This could allow growers to apply this tank mix to geranium cuttings in propagation as an insurance policy, thus simplifying management decisions. Generally, a spray application of 2.5 ppm BA+GA4+7 + 300 ppm IBA rooting hormone resulted in the greenest cuttings and minimal to no delay in rooting with the use of a rooting hormone. Always conduct your own studies before applying any PGR to your crops as environmental and cultural difference can impact the results. **GT**

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