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Special Research Report #460: Post-shipping Cutting Dips Improve Cutting Rooting and Survival

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Background

Large numbers of cuttings are imported from off-shore and the value of each shipment can range from hundreds to tens of thousands of dollars. Delays during shipping can result in wilted cuttings with low carbohydrate reserves that might be developmentally delayed or disease prone, if they root at all. Propagators are faced with the difficult decision of whether to use the cuttings and try to maintain production schedules or wait for replacement cuttings. Post shipping recovery solutions can improve cutting performance by supplying needed plant compounds in a fast manner prior to propagating the plants.

Materials & Methods

Year 1. Geranium ('Rocky Mountain Violet' and 'Tango Dark Red'), New Guinea impatiens ('Fanfare Orchid' and 'Super Sonic White') and poinsettia ('Prestige Red' and 'Whitestar') stock plants were grown in campus greenhouses and cuttings harvested at the appropriate stage for each species. Cuttings were stored at 20°C for 0, 24 h (slight wilting), or 48 h (moderate wilting) to simulate shipping stress and then either dipped in treatment solutions for 30 min. and planted in rooting substrate or sprayed with the treatment solutions after cuttings were placed in rooting media on propagation benches. The following treatment solutions were applied with or without Capsil® 30 (4 oz./100 gal.): Urea (0, 0.1, 0.2, or 0.4 ppm), Pageant® fungicide (8, 12 or 16 oz./100 gal), sucrose (0, 1 or 2%), fructose (0, 1 or 4%), glucose (0, 1 or 4%), K-IBA (water soluble IBA, 100 or 400 ppm), Configure® (BA, 2.5 ppm), Configure (2.5 ppm) + K-IBA (400 ppm), Fascination® (GA and BA, 2.5 ppm), and Fascination (2.5 ppm) + K-IBA (400 ppm). Data recorded before and after storage included shoot rating, number of yellow or abscised leaves, and fresh weight of cuttings. Data recorded after propagation included shoot and root rating, number of yellow or abscised leaves, fresh and dry weight, root number and length, and rooting percentage.

Year 2. Successful compounds from Year 1 were combined into mixed solutions and applied to unrooted geranium, New Guinea impatiens and poinsettia cuttings subjected to no or moderate postharvest stress. Cuttings were dipped (30 min.) and/or sprayed

immediately after sticking with K-IBA (400 ppm dip), Pageant (8 oz./100 gal. for impatiens dip, 12 oz./l00 gal. for geraniums and poinsettias dip), fructose (1% dip) and/or
Configure (2.5 ppm spray) + K-IBA (100 or 400 ppm spray) in the following combinations (all treatments except water only included Capsil):

- Water only
- Water + Capsil only
- KIBA dip
- KIBA + Pageant dip
- KIBA + fructose dip
- KIBA, Pageant + fructose dip
- KIBA, Pageant + fructose dip (0 min. dip)
- Pageant dip
- Fructose dip
- Pageant dip, BA +KIBA spray
- Pageant + fructose dip, BA + KIBA spray
- Fructose dip, BA + KIBA spray
- BA+KIBA (100) spray
- BA+KIBA (400) spray

An untreated control treatment was included. In addition, with one of the treatments (KIBA, pageant + fructose dip) the cuttings for dipped and immediately removed from the dip (0 min.) as compared to the 30 min. dips for the other treatments.

Year 3. Unrooted geranium and New Guinea impatiens cuttings were subjected to no or moderate postharvest stress and then dipped into Capsil plus Zerotol® for either 3 or 30 min. or plus KleenGrow™ for 3 min. Appropriate control treatments were included: cuttings were untreated or dipped into either water only or water plus Capsil.

Results

Year 1. Overall, increased postharvest stress reduced rooting of all three species, especially for geranium and poinsettia cuttings. Cultivars within each species differed in rate and amount of rooting and other parameters. Dips were more effective than sprays, except for solutions containing Configure for all three species and Pageant for impatiens, which were more effective as sprays. Interestingly, for most treatments, including water only, dipping cuttings into solutions had a positive effect on rooting even when applied to unstored/unstressed cuttings.

Rooting of **geranium** cuttings subjected to postharvest stress was enhanced with dips of K-IBA (400 ppm), Pageant (12 or 16 oz./l00 gal.), glucose (1 or 4%), fructose (1%) or urea (0.4 ppm) or with sprays of Configure (2.5 ppm) + K-IBA (400 ppm) immediately after sticking cuttings.

Rooting of **impatiens** cuttings subjected to postharvest stress was enhanced with dips of K-IBA (400 $mg \cdot L^{-1}$) or urea (0.4 $mg \cdot L^{-1}$).

Rooting of **poinsettia** cuttings subjected to postharvest stress was enhanced with dips of 400 ppm K-IBA or 1 or 4% fructose, or with sprays of 2.5 ppm Configure + 400 ppm K-IBA immediately after sticking cuttings.

Year 2. As with year one, postharvest stress reduced rooting of all species and there were differences in rooting among the cultivars. For all species, solutions that included K-IBA (400 ppm) had the greatest rooting based on cutting dry weight and root number, length and percentage. In addition, dipping cuttings into water plus Capsil produced better rooting than not applying any treatment.

For **geraniums**, the K-IBA solutions that also included fructose and/or Pageant produced the best results (Figures 1 and 2). The 0 min. dip produced slightly less rooting than the 30 min. dip.

Figure 1. 'Tango Dark Red' geranium cuttings dipped for 30 min. into either water + Capsil (left) or water + Capsil + K-IBA + Pageant + fructose (right).

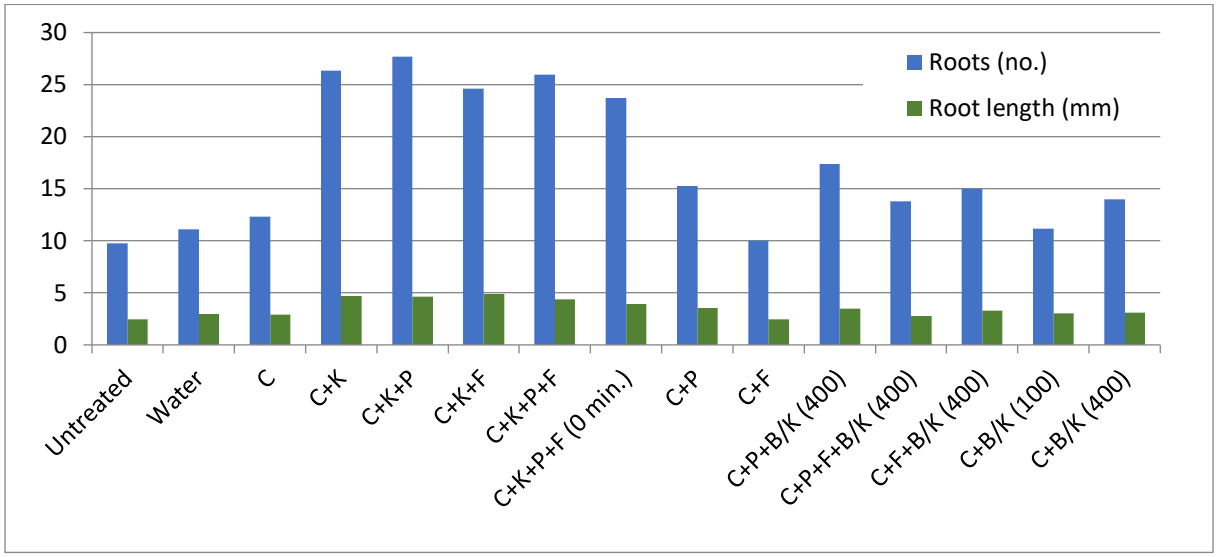

Figure 2. Geranium cuttings dipped into solutions with various compounds for 30 min.: C=Capsil, K=K-IBA (400 ppm), P=Pageant (12 oz./l00 gal.), and F=fructose (1%) and/or treated with sprays of B/K=Configure (BA, 2.5 ppm) + K-IBA (100 or 400 ppm).

For **New Guinea impatiens**, any of the K-IBA solutions yielded excellent results (Figure 3). The 0 min. dips produced similar rooting as with the 30 min. dips.

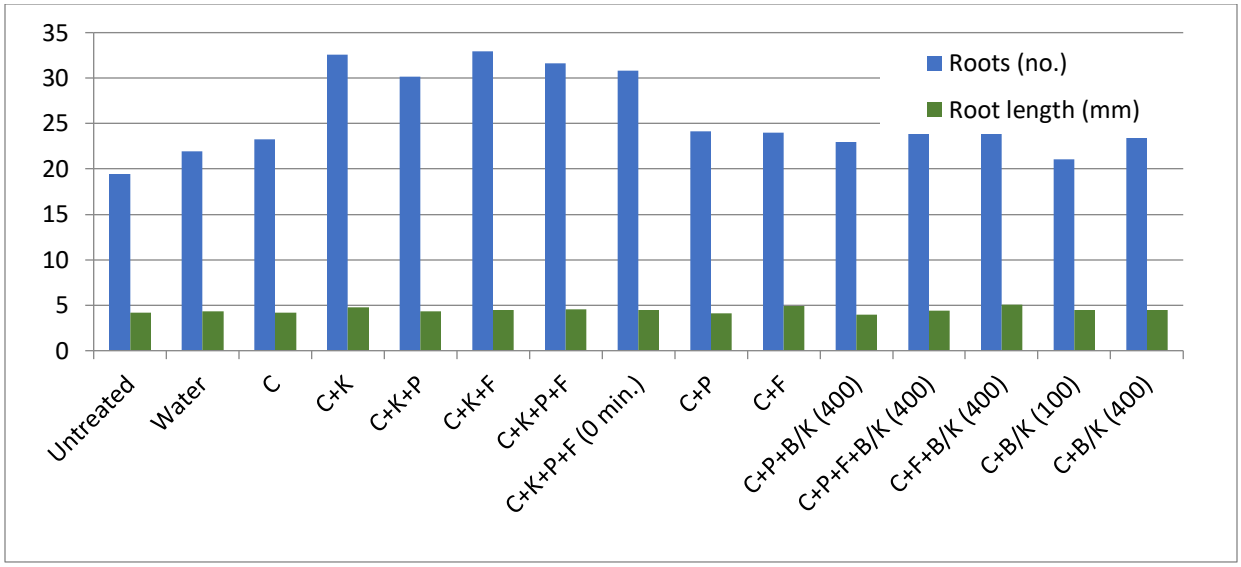

Figure. 3. New Guinea impatiens cuttings dipped into solutions with various compounds for 30 min.: C=Capsil, K=K-IBA (400 ppm), P=Pageant (8 oz./100 gal.), and F=fructose (1%) and/or treated with sprays of B/K=Configure (BA, 2.5 ppm) + K-IBA (100 or 400 ppm).

For **poinsettias**, the K-IBA solutions that also included fructose and/or Pageant produced the best rooting (Figure 4). The 0 min. dips were not as effective as the 30 min. dips.

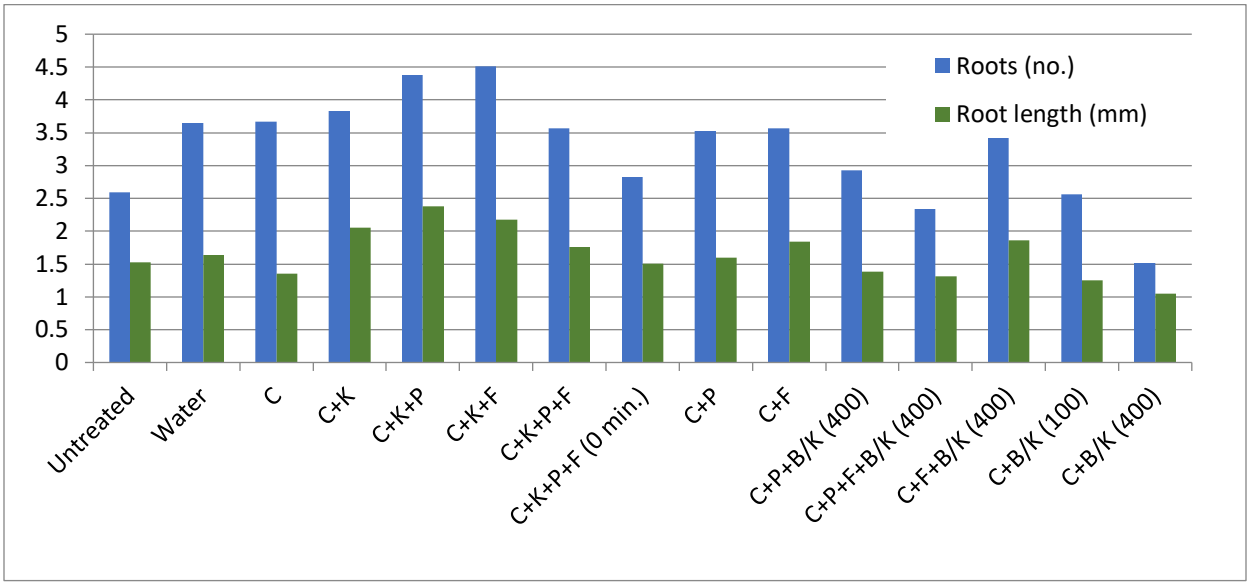

Figure. 4. Poinsettia cuttings dipped into solutions with various compounds for 30 min.: C=Capsil, K=K-IBA (400 ppm), P=Pageant (12 oz./l00 gal.), and F=fructose (1%) and/or treated with sprays of B/K=Configure (BA, 2.5 ppm) + K-IBA (100 or 400 ppm).

Year 3. As with the other experiments, postharvest stress reduced rooting and there were differences in rooting among the cultivars. However, treatment with Zerotol or Kleengrow had no apparent effect on the cuttings.

Conclusions

Increased postharvest stress (wilting) reduced rooting of all three species, especially for geranium and poinsettia cuttings. While the exact recipe varied with the species, postharvest cutting dips (recovery solutions) clearly improved rooting of geranium, New Guinea impatiens and poinsettia cuttings. The best recipe for geraniums and poinsettias was a 30 min. dip into K-IBA (400 ppm) plus either fructose or Pageant. For New Guinea impatiens, dip into K-IBA (400 ppm) solution for 0 to 30 min.

For most treatments, including water plus Capsil, dipping cuttings into solutions had a positive effect on rooting even when applied to unstored cuttings. It should be noted that for impatiens, dipping wilted cuttings in any solution made the cuttings easier to stick by restoring turgor. Dips would likely have a similar effect on other species that have soft cuttings.

Industry Impact

These handling protocols will allow offshore cutting suppliers and U.S. propagators to improve propagation success of cuttings after shipping and storage, which will increase profitability and reduce loss during shipment and propagation.

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