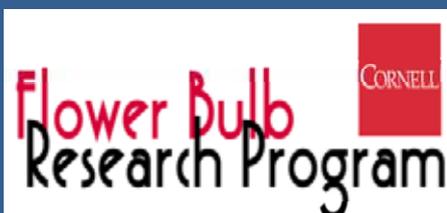




RESEARCH NEWSLETTER



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Topflor has Potential for *Crocoshmia* Height Control!

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In recent years, *Crocoshmia* has been gaining in popularity throughout the world. 'Lucifer' is probably the best-known cultivar and has been selected by the IBC as the 2010 Summer Bulb of the Year. While 'Lucifer' is widely regarded as "the" cultivar, many other cultivars exist in colors from red to orange to yellow. While the flowers and leaves have a distinct tropical appearance, many cultivars of *Crocoshmia* are surprisingly hardy. We have had many cultivars over winter years on end in Ithaca (zone 5). (To be clear, however, many factors affect *Crocoshmia* winter hardiness, so in most cases it should not be considered "reliable" colder than Zone 6). *Crocoshmia* therefore offers value and appeal to both growers and consumers.

Crocoshmia corms can be planted in early to mid spring in pots, grown for several weeks, sold at retail, and then transplanted into the garden. They also have potential as a summer pot or patio plant. One potential problem is size. Some cultivars of *Crocoshmia* (including 'Lucifer') can grow over one meter tall. This height can cause problems with wind damage to foliage and flowers. Perhaps more importantly, 1 meter tall *Crocoshmia* is more difficult and expensive to ship than relatively shorter plants.

In an effort to keep *Crocoshmia* plants at a more manageable height during nursery production, a study was devised to test the effectiveness of plant growth regulators (PGRs) on height control of four commercially available cultivars of *Crocoshmia*. The PGR Topflor (fluprimidol) reduces stem elongation by reducing the amount of gibberellin in the plant.



Since gibberellin functions as a “cell growth” hormone, reducing its level in the plant by PGRs tends to produce shorter plants, but with the same number of leaves. With a new plant such as *Crocosmia*, the initial studies are often guesswork as to rates to try, and so it was with this study. In this work, Topflor was initially evaluated as a pre-plant dip and post-emergence soil drench. Both West Coast (USA) and Dutch-grown *Crocosmia* corms were used.

What we Did

The first set of corms were received from a West Coast (USA) supplier Feb. 13 2009, and held at 3C until treatment. The second set of corms were received from the Netherlands (via Westerbeek Bulb Company) and held at 3C until treatment.

Corm dips: On April 24, 2009, *Crocosmia* cultivars ‘Lucifer’, ‘Carmine Brilliant’ and ‘George Davidson’ (from the USA) and ‘Lucifer’, ‘Carmine Brilliant’, ‘George Davidson’ and ‘Emberglow’ (from the Netherlands) were soaked for 10 minutes. Corms were size 10/12, except ‘George Davidson’, which was 8/+. The treatments were:

1. Water (control)
2. Topflor 5 ppm
3. Topflor 10 ppm
4. Topflor 15 ppm and
5. Topflor 15 ppm plus 1 mg/pot Topflor drench

After dipping, corms were allowed to dry one hour then planted in one-gallon nursery pots, four corms per pot, in Sunshine LC8 potting media. There were 6 pots per treatment.

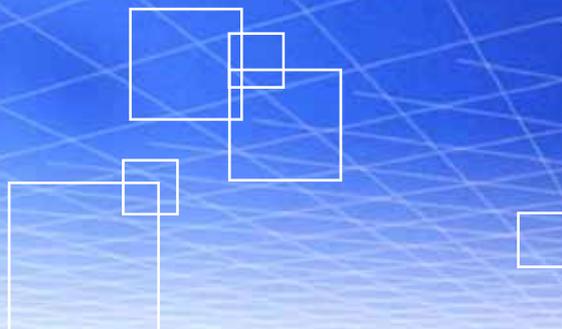
Media drenches: On April 24, 2009 *Crocosmia* ‘Lucifer’ (from USA) and cultivars ‘Lucifer’, ‘Carmine Brilliant’, ‘George Davidson’ and ‘Emberglow’ from the Netherlands were planted in one-gallon nursery pots, four corms per pot, in Sunshine LC8 potting mix. There were 6 pots per treatment.

The treatments were:

1. Water (control)
2. Topflor 5 ppm
3. Topflor 10 ppm
4. Topflor 15 ppm and
5. Topflor 15 ppm plus 1 mg/pot Topflor drench
6. Topflor drench, 1 mg/pot
7. Topflor drench, 2 mg/pot

All dips were for 10 minutes, given at room temperature. Drenches were applied when 3 or more corms had emerged from the soil to a height of 5-15 cm. Drenches were applied on June 3 on ‘Lucifer’, ‘Emberglow’ and ‘George Davidson’ and on June 11 for ‘Carmine Brilliant’. All drenches were given at a volume of 240 ml (8 ounces) per pot, with pots irrigated a few hours before PGR application. While this may seem a large volume, it must be noted these were 1 gallon nursery pots that have a much larger volume than a 6” greenhouse pot.

All plants were grown on the ground on weed mat in an uncovered hoop house at the Blue Grass Lane research facility in Ithaca NY. Plants were watered weekly from April 24th to June 11th with 200 ppm N fertilizer. Liquid fertilizer was continued until drenches were applied, at which point all



plants were transferred to drip irrigators, which provided clear water for the continuation of the growing season.

Data were taken on the date of first flowering, and on plant height (top of flower stalks), leaf height (top of leaves) and the number of flowering stems per pot.

Results

Corm source. In general, both corm sources responded similarly to the PGR treatments, and plants were of the same general size. West coast corms of 'Carmine Brilliant' did, however, show serious leaf disease problems that affected overall growth. In this newsletter, photos and data for the Dutch corms are shown, but both sources responded similarly.

Topflor Dips. Between the concentrations of 5-15 ppm, preplant corm dips had little effect on growth of any cultivar (see Figures 1-4, comparing the 4 left-most plants in each photo, and data in Table 1). There did seem to be a trend towards shorter plants with higher Topflor concentrations in 'Emberglow' and 'George Davidson', and perhaps additional experiments could be done to assess this. As this was a first experiment with *Crocosmia*, we were unsure of concentrations to test, but we may have guessed pretty well.

Pre-plant Topflor dips caused a slight to longer (8-9 day) delay in flowering, which was cultivar-dependent. Also, the higher concentration treatments reduced the number of flower stalks, again in a cultivar dependent manner. This is of course

undesirable, and should be confirmed with more studies prior to industry use.

Topflor Drenches. Compared with preplant dips, soil drenches with Topflor show much more potential for height control in *Crocosmia*. In fact, the doses we selected (1 and 2 mg/pot) were too high, and will need to be reduced in subsequent studies.

In Figures 1-4, you can see that the 15 ppm dip plus 1 mg drench treatments (5th plant from the left) is much shorter than the 15 ppm dip treatment (4th plant from the right), and is very similar in size to the 1 mg drench treatment (second from the right). Thus, almost all height reduction is due to the drench treatment, not the dip.

In Figures 5-8, direct effects of 1 and 2 mg/pot Topflor drenches can be seen compared with the controls. With 'George Davidson', even 1 mg/pot is too high a rate as the plants are excessively stunted. With the other cultivars, 1 mg/pot is perhaps too much, depending on desired outcome. For example, with 'Lucifer', 1 mg Topflor per pot is probably about right. With 'Carmine Brilliant' and 'Emberglow', 1 mg Topflor/pot gave enough growth control that the plant could potentially be used as a patio container subject.

While the 1 ppm Topflor drench treatment reduced flower stem number in 'Emberglow' and 'George Davidson' 'Lucifer' and 'Carmine Brilliant' showed no reduction in flower stalk numbers. Drench treatments tended to cause similar delays in flowering.

Conclusions

This experiment represents a great step forward in the quest for growth control in *Crocasmia*. At the concentrations and dip lengths used (5-15 ppm Topflor, 10 minutes), not enough growth control was seen in most instances. Further experiments should focus on higher concentrations and/or longer soak durations.

Topflor soil drenches at 1 mg/pot proved to be extremely effective in reducing growth, resulting in plants that were either well sized, or too small, depending on the cultivar and concentration.

Potential adverse effects varied by cultivar, the most notable was a reduction in flower stems per pot.

Future studies should confirm whether this response is real, and whether concentrations can be adjusted to give adequate height control without the adverse effects. In the meantime, growers could be encouraged to conduct their own trials, with suggested rates of 0.5 mg Topflor (lower than our lowest rate) per pot.

Assuming an application volume of 240 ml (8 ounces) per pot, the resulting concentration is 2.1 ppm (mg/l). Recipes to treat various numbers of pots are given in the table.



Emberglow

Recipes to prepare 0.5 mg/pot Topflor drenches. These are correct only when the Topflor is delivered in a volume of 240 ml (8 ounces) per 1 gallon nursery container. (Divide liters by 3.78 to get gallons).

| Dose | Drench volume per pot (ml) | No. of pots | PGR solution required (L) | Topflor required (ml) |
|------------|----------------------------|-------------|---------------------------|-----------------------|
| 0.5 mg/pot | 240 ml | 100 | 24 L | 13.2 ml |
| 0.5 mg/pot | 240 ml | 250 | 60 L | 32.9 ml |
| 0.5 mg/pot | 240 ml | 500 | 120 L | 65.8 ml |

Effects of pre-plant Topflor dips and/or Topflor drenches on growth of 4 *Crocasmia* cultivars.

| Cultivar | Treatment | Height at Full flower | | Date of flowering | Number of flower stalks |
|-------------------|--|-----------------------|-----------|-------------------|-------------------------|
| | | Flower stalk (cm) | Leaf (cm) | | |
| Carmine Brilliant | Control | 60.7 | 57.2 | 14-aug | 9.8 |
| Carmine Brilliant | 5 ppm Topflor dip, 10 minutes | 61.8 | 60.3 | 18-aug | 5.8 |
| Carmine Brilliant | 10 ppm Topflor dip, 10 minutes | 53.3 | 55.3 | 24-aug | 5.8 |
| Carmine Brilliant | 15 ppm Topflor dip, 10 minutes | 54.7 | 57.2 | 23-aug | 5.8 |
| Carmine Brilliant | 15 ppm Topflor dip, 10 minutes + 1 mg/pot drench | 24.0 | 32.2 | 24-aug | 5.8 |
| Carmine Brilliant | 1 mg/pot drench | 36.2 | 45.3 | 15-aug | 7.2 |
| Carmine Brilliant | 2 mg/pot drench | 28.7 | 38.8 | 18-aug | 4.0 |
| Em berglow | Control | 88.2 | 72.3 | 8-aug | 11.0 |
| Em berglow | 5 ppm Topflor dip, 10 minutes | 82.0 | 70.3 | 9-aug | 12.8 |
| Em berglow | 10 ppm Topflor dip, 10 minutes | 80.0 | 73.8 | 8-aug | 14.8 |
| Em berglow | 15 ppm Topflor dip, 10 minutes | 80.0 | 65.0 | 7-aug | 13.7 |
| Em berglow | 15 ppm Topflor dip, 10 minutes + 1 mg/pot drench | 52.5 | 48.3 | 9-aug | 13.0 |
| Em berglow | 1 mg/pot drench | 53.0 | 49.5 | 17-aug | 6.5 |
| Em berglow | 2 mg/pot drench | 45.5 | 45.5 | 18-aug | 5.0 |
| George Davidson | Control | 63.0 | 52.3 | 12-aug | 7.5 |
| George Davidson | 5 ppm Topflor dip, 10 minutes | 57.7 | 46.2 | 16-aug | 3.5 |
| George Davidson | 10 ppm Topflor dip, 10 minutes | 51.2 | 43.8 | 19-aug | 3.7 |
| George Davidson | 15 ppm Topflor dip, 10 minutes | 43.5 | 36.5 | 21-aug | 2.5 |
| George Davidson | 15 ppm Topflor dip, 10 minutes + 1 mg/pot drench | 17.8 | 23.0 | 21-aug | 2.2 |
| George Davidson | 1 mg/pot drench | 22.3 | 28.8 | 19-aug | 3.0 |
| George Davidson | 2 mg/pot drench | 13.3 | 28.3 | 21-aug | 2.5 |
| Lucifer | Control | 98.2 | 78.0 | 1-aug | 3.8 |
| Lucifer | 5 ppm Topflor dip, 10 minutes | 97.7 | 81.5 | 2-aug | 3.8 |
| Lucifer | 10 ppm Topflor dip, 10 minutes | 99.5 | 82.5 | 4-aug | 3.7 |
| Lucifer | 15 ppm Topflor dip, 10 minutes | 96.0 | 77.0 | 5-aug | 4.3 |
| Lucifer | 15 ppm Topflor dip, 10 minutes + 1 mg/pot drench | 75.8 | 55.3 | 6-aug | 2.7 |
| Lucifer | 1 mg/pot drench | 79.8 | 64.7 | 6-aug | 3.3 |
| Lucifer | 2 mg/pot drench | 77.7 | 58.3 | 5-aug | 4.0 |



Figure 1. Effect of Topflor dips and drenches on 'Carmine Brilliant'. L to R: control, 5, 10, and 15 ppm Topflor dip, 15 ppm Topflor dip + 1 mg/pot Top drench, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.

Figure 2. Effect of Topflor dips and drenches on 'Emberglow'. L to R: control, 5, 10, and 15 ppm Topflor dip, 15 ppm Topflor dip + 1 mg/pot Top drench, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.





Figure 3. Effect of Topflor dips and drenches on 'George Davidson'. L to R: control, 5, 10, and 15 ppm Topflor dip, 15 ppm Topflor dip + 1 mg/pot Top drench, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.



Figure 4. Effect of Topflor dips and drenches on 'Lucifer'. L to R: control, 5, 10, and 15 ppm Topflor dip, 15 ppm Topflor dip + 1 mg/pot Top drench, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.



Figure 5. Effect of Topflor drenches on 'Carmine Brilliant'. L to R: control, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.

Figure 6. Effect of Topflor drenches on 'Emberglow'. L to R: control, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.



Figure 7. Effect of Topflor drenches on 'George Davidson'. L to R: control, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.



Figure 8. Effect of Topflor drenches on 'Lucifer'. L to R: control, 1, 2 mg Topflor drench/pot. Experiment 2009-P2.