Project Title: Phytotoxicity of F6875 0.3G applied over the top to selected herbaceous and woody ornamental plants (August 2008 Trials)

Protocol #: 08-015

Narrative Summary (Results/Discussion)

Berberis

Phytotoxicity and Plant Growth. The Berberis plants in the control group showed phytotoxicity index values of less than 0.6 at all observation dates (Table 1, Figure 1, Table 6a). Treatment effects due to F6875 0.3G were significant at the 90% level at week 8, but the levels were less than 1.0 in every treatment indicating no economic damage. By week 10, however, the plants in the 1X and 2X treatment groups showed phytotoxicity index values of 1.8 and 1.7, representing slight damage. There were no significant treatment effects for height change or width change (Table 2, Figure 2a, Table 6a).

It should be noted that many plants showed some leaf abscission which is not reflected in the phytotoxicity or growth measurements. Leaf drop was not quantified in the study at any of the observation dates, but the photos (Figure 2a) show a low level of leaf drop in the control and much greater levels for plants that received F6875 0.3G. The results of this study were not conclusive and it should probably be repeated. Based on the visual characteristics (showing leaf drop incidence) and the marginal blemishes at week 10, we conclude that F6875 0.3G is not safe over Berberis.

Lobularia

Phytotoxicity and Plant Growth. The mean phytotoxicity index levels for Lobularia plants in the control group were below 1 for all of the trial except at week 10; but even that end point does not represent any substantial deleterious impact (Table 1, Figure 1, Table 6b). The plants in the 1X treatment showed no differences from the control over the entire experiment. The plants in the 2X and 4X treatments did show elevated phytotoxicity index levels. The symptoms included abscission of flowers and shoot dieback. The increases in height, width and volume index all showed significant treatment effects with the plants in the 2x and 4X treatments always significantly smaller than the plants in the control (Table 2, Figure 2b, Table 6b).

Lobularia showed significant treatment effects in the 2x and 4X treatments with significant shoot dieback symptoms and reduced growth. While the differences between the control and 1X were not significant for any of the observed variables, the fact that the 2X treatment results in damage would suggest that F6875 0.3G should not be registered for use on this plant.

Ophiopogon

Phytotoxicity and Plant Growth. Phytotoxicity index means for the Ophiopogon control plants were 0 throughout the experiment (Table 1, Figure 1, Table 6c). At the 4X dose, plants showed...
blemishes which by week 2 resulted in phytotoxicity index levels greater than 2 at every observation date. The 1X and 2X rates resulted in phytotoxicity mean values between those of the control and 4X, but generally the level was low and the level in the 1X rate was generally not higher than 1.22. There were no significant treatment effects on the height change and volume index change during the study (Table 2, Figure 2c, Table 6c). Width did show a significant treatment effect with the higher rates resulting in greater increases in width than the control.

The information obtained in this study on the effect of F6875 0.3G on Ophiopogon indicate that this herbicide appears to be safe at the 1X rate. At the 2X and 4X rates, F6875 0.3G is not safe on Ophiopogon, resulting in blemishes that would reduce economic value. Thus we cannot conclude that F6875 0.3G is safe on Ophiopogon.

**Materials & Methods:**

**Plant Material and Culture.** The plants for these trials were acquired and grown as indicated in Table 3. The experiment ran from August 14, 2008 to October 23, 2008 in an outdoor nursery under full sun. The plants were irrigated daily during the 10-week experiment using an automatic impact overhead sprinkler system delivering 1.5L per hour. Environmental conditions during the trial are indicated in Table 4.

**Experimental Procedure.** Thirty-six plants were randomly chosen and individually tagged for treatment with 0 (Control), 1X, 2X or 4X rates of the herbicide with 9 replicates per treatment. These dosages were prescribed in IR4 Ornamental Protocol 08-015 (Appendix A). The plants received the first application on August 14, 2008 and the second application 6 weeks later on September 25, 2008.

**Data Collection.** Phytotoxicity ratings were taken at week 0, 1, 2, 4, 6, 7, 8, and 10. The dates for those observations were August 14, 21, 28, September 11, 25, October 2, 9 and 23, 2008. Visual phytotoxicity evaluations were based on a numerical rating scale ranging from 0 (no injury) to 10 (complete kill) (Table 5). Plant height and width were measured at week 0 (August 14, 2008) and week 10 (October 23, 2008). Plant height (cm) was measured from the container soil surface to the top of the canopy. Plant width (cm) was measured twice along perpendicular lines at the widest part of the plant, resulting in W₁ and W₂. For each observation a canopy volume index was calculated so as to be able to determine if canopy volume was affected by the application of herbicide. The calculation was made as H*W₁*W₂, where H is the height and W₁ and W₂ are two width measurements. The usefulness of this index is based on the fact that many of the models for such a volume calculation are of the form a*H*W₁*W₂. The constant “a” depends on the assumption of the shape of the canopy. Since analyses of variance are scale-independent, the conclusion will thus be for the volume of the plant canopy.

**Statistical Analysis.** The data were analyzed using Proc GLM of the Statistical Analysis System (SAS). The phytotoxicity and change in mean value from the starting plant height, width and volume index were analyzed for significant differences using t-tests.
Acknowledgements:
The research was supported through funding from the USDA IR-4 Program, Western Region based at UC Davis, Davis, CA.

Personnel involved in this project included Linda Dodge (trial coordination, data collection, report compilation), Ron Lane (pesticide application, pest management), Marian Shahid, Jennifer Orsi, Katie Gross, Hsin Yi Cheng, Yan Zhaung and Dylan Portnoff (plant culture, data collection).

The materials being tested were supplied by the manufacturer/distributor. The plants were supplied by Monrovia Nursery, Visalia CA; UC Davis or purchased at Lowe’s Home Improvement Center, Vacaville CA.
Table 1. Phytotoxicity changes over 10 weeks for plants treated with 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6. Differing letters a, b, c... designate significant differences among the four means; "Yes" or "no" indicates whether there was an overall significant treatment effect at the 5% level (NA means no variation in data; "yes at 10%" means treatment effect was significant at 10% but not at the 5% level). Means ± SD (n=9)

Phytotoxicity Effect of F6875 0.3G on Berberis

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1 week</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>10 week</th>
<th>yes at 10%</th>
<th>10 week</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X</td>
<td>0.33 ± 0.17</td>
<td>a</td>
<td>0.44 ± 0.24</td>
<td>a</td>
<td>0.44 ± 0.24</td>
<td>a</td>
<td>0.22 ± 0.22</td>
<td>a</td>
</tr>
<tr>
<td>1X</td>
<td>0.44 ± 0.18</td>
<td>a</td>
<td>0.67 ± 0.17</td>
<td>a</td>
<td>0.89 ± 0.31</td>
<td>a</td>
<td>0.67 ± 0.17</td>
<td>a</td>
</tr>
<tr>
<td>2X</td>
<td>0.78 ± 0.22</td>
<td>a</td>
<td>0.78 ± 0.22</td>
<td>a</td>
<td>0.78 ± 0.22</td>
<td>a</td>
<td>0.56 ± 0.24</td>
<td>a</td>
</tr>
<tr>
<td>4X</td>
<td>0.67 ± 0.17</td>
<td>a</td>
<td>0.78 ± 0.22</td>
<td>a</td>
<td>0.56 ± 0.34</td>
<td>a</td>
<td>0.67 ± 0.33</td>
<td>a</td>
</tr>
</tbody>
</table>

Phytotoxicity Index increase from beginning of trial until:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>7 weeks</th>
<th>8 weeks</th>
<th>yes at 10%</th>
<th>10 week</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>1.22 ± 0.40</td>
</tr>
<tr>
<td>1X</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>0.11 ± 0.11</td>
<td>b</td>
<td>0.22 ± 0.15</td>
</tr>
<tr>
<td>2X</td>
<td>1.56 ± 0.71</td>
<td>b</td>
<td>1.11 ± 0.75</td>
<td>b</td>
<td>0.67 ± 0.67</td>
</tr>
<tr>
<td>4X</td>
<td>3.33 ± 0.83</td>
<td>a</td>
<td>3.33 ± 0.83</td>
<td>a</td>
<td>1.67 ± 0.69</td>
</tr>
</tbody>
</table>

Phytotoxicity Effect of F6875 0.3G on Lobularia

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1 week</th>
<th>2 weeks</th>
<th>yes</th>
<th>4 weeks</th>
<th>no</th>
<th>6 weeks</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>1.22 ± 0.40</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>1X</td>
<td>0.33 ± 0.33</td>
<td>ab</td>
<td>0.44 ± 0.44</td>
<td>ab</td>
<td>2.22 ± 0.68</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>2X</td>
<td>1.00 ± 0.71</td>
<td>ab</td>
<td>1.11 ± 0.81</td>
<td>ab</td>
<td>2.33 ± 0.85</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>1.78 ± 0.62</td>
<td>a</td>
<td>1.78 ± 0.62</td>
<td>a</td>
<td>3.11 ± 0.42</td>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>

Phytotoxicity Index increase from beginning of trial until:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>7 weeks</th>
<th>8 weeks</th>
<th>yes</th>
<th>10 week</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X</td>
<td>0.00 ± 0.00</td>
<td>c</td>
<td>0.00 ± 0.00</td>
<td>c</td>
<td>1.22 ± 0.43</td>
</tr>
<tr>
<td>1X</td>
<td>0.22 ± 0.22</td>
<td>b</td>
<td>0.22 ± 0.22</td>
<td>b</td>
<td>0.67 ± 0.44</td>
</tr>
<tr>
<td>2X</td>
<td>0.00 ± 0.00</td>
<td>b</td>
<td>0.78 ± 0.32</td>
<td>b</td>
<td>1.11 ± 0.48</td>
</tr>
<tr>
<td>4X</td>
<td>1.00 ± 0.50</td>
<td>a</td>
<td>2.33 ± 0.60</td>
<td>a</td>
<td>2.00 ± 0.58</td>
</tr>
</tbody>
</table>

Phytotoxicity Effect of F6875 0.3G on Ophiopogon

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1 week</th>
<th>2 weeks</th>
<th>yes</th>
<th>4 weeks</th>
<th>yes</th>
<th>6 weeks</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X</td>
<td>0.00 ± 0.00</td>
<td>c</td>
<td>0.00 ± 0.00</td>
<td>c</td>
<td>0.00 ± 0.00</td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>1X</td>
<td>1.22 ± 0.43</td>
<td>b</td>
<td>1.22 ± 0.43</td>
<td>b</td>
<td>1.00 ± 0.44</td>
<td>bc</td>
<td></td>
</tr>
<tr>
<td>2X</td>
<td>2.11 ± 0.31</td>
<td>ab</td>
<td>2.11 ± 0.31</td>
<td>ab</td>
<td>1.44 ± 0.41</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>4X</td>
<td>2.56 ± 0.53</td>
<td>a</td>
<td>2.56 ± 0.53</td>
<td>a</td>
<td>2.56 ± 0.50</td>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. Phytotoxicity ratings for plants exposed to two applications of 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6 (arrows). See Table 5 for explanation of ratings.
Table 2. Growth changes over 10 weeks for plants treated with 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6. Differing letters a, b, c... designate significant differences among the four means; "Yes" or "no" indicates whether there was an overall significant treatment effect at the 5% level (NA means no variation in data; "yes at 10%" means treatment effect was significant at 10% but not at the 5% level).

Means ± SD (n=9)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Treatment</th>
<th>Increase by week 10 of:</th>
<th>Height (cm)</th>
<th>Average Width (cm)</th>
<th>Volume Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berberis</td>
<td>0X</td>
<td>Height (cm)</td>
<td>3.83 ± 2.27</td>
<td>2.39 ± 1.42</td>
<td>5234.47 ±1442.47</td>
</tr>
<tr>
<td></td>
<td>1X</td>
<td>Height (cm)</td>
<td>2.78 ± 3.07</td>
<td>6.21 ± 2.48</td>
<td>10311.6 ±2552.84</td>
</tr>
<tr>
<td></td>
<td>2X</td>
<td>Height (cm)</td>
<td>1.33 ± 1.91</td>
<td>1.31 ± 2.15</td>
<td>6070.81 ±3559.14</td>
</tr>
<tr>
<td></td>
<td>4X</td>
<td>Height (cm)</td>
<td>-0.28 ± 1.97</td>
<td>4.31 ± 2.84</td>
<td>5949.44 ±4441.93</td>
</tr>
<tr>
<td>Lobularia</td>
<td>0X</td>
<td>Height (cm)</td>
<td>10.67 ± 1.17</td>
<td>20.19 ± 1.80</td>
<td>18741.7 ±2950.36</td>
</tr>
<tr>
<td></td>
<td>1X</td>
<td>Height (cm)</td>
<td>7.89 ± 1.05</td>
<td>18.69 ± 1.73</td>
<td>14252.7 ±2827.91</td>
</tr>
<tr>
<td></td>
<td>2X</td>
<td>Height (cm)</td>
<td>6.56 ± 0.97</td>
<td>16.75 ± 1.67</td>
<td>10469.9 ±1728.91</td>
</tr>
<tr>
<td></td>
<td>4X</td>
<td>Height (cm)</td>
<td>5.06 ± 1.37</td>
<td>11.39 ± 2.57</td>
<td>7682.78 ±2693.90</td>
</tr>
<tr>
<td>Ophiopogon</td>
<td>0X</td>
<td>Height (cm)</td>
<td>-3.06 ± 0.97</td>
<td>0.75 ± 1.13</td>
<td>-1650.4 ±1130.14</td>
</tr>
<tr>
<td></td>
<td>1X</td>
<td>Height (cm)</td>
<td>-2.89 ± 1.03</td>
<td>0.50 ± 0.56</td>
<td>-1494.0 ± 834.86</td>
</tr>
<tr>
<td></td>
<td>2X</td>
<td>Height (cm)</td>
<td>-3.83 ± 0.76</td>
<td>2.69 ± 0.68</td>
<td>-717.46 ± 768.53</td>
</tr>
<tr>
<td></td>
<td>4X</td>
<td>Height (cm)</td>
<td>-2.78 ± 0.85</td>
<td>3.89 ± 0.36</td>
<td>514.69 ± 435.21</td>
</tr>
</tbody>
</table>
Figure 2a. *Berberis* plants 10 weeks after two applications of 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6.
Figure 2b. *Lobularia* plants 10 weeks after two applications of 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6.
Figure 2c. *Ophiopogon* plants 10 weeks after two applications of 0 (Control), 0.375 (1X), 0.75 (2X) or 1.5 (4X) lb ai/acre F6875 0.3G (sulfentrazone + prodiamine) at weeks 0 and 6.
Table 3. Materials & Methods/Recordkeeping

<table>
<thead>
<tr>
<th>Protocol number</th>
<th>08-010</th>
<th>08-010</th>
<th>08-010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Short Name</strong></td>
<td>F6875 0.3G (sulfentrazone + prodiamine)</td>
<td>F6875 0.3G (sulfentrazone + prodiamine)</td>
<td>F6875 0.3G (sulfentrazone + prodiamine)</td>
</tr>
<tr>
<td><strong>Production Site Description</strong></td>
<td>Field Container</td>
<td>Field Container</td>
<td>Field Container</td>
</tr>
<tr>
<td><strong>PR Number</strong></td>
<td>26285</td>
<td>27793</td>
<td>26437</td>
</tr>
<tr>
<td><strong>Crop Latin Name</strong></td>
<td>Berberis thunbergii</td>
<td>Lobularia maritima</td>
<td>Ophiopogon japonicus</td>
</tr>
<tr>
<td><strong>Crop Common Name</strong></td>
<td>Barberry</td>
<td>Sweet Alyssum</td>
<td>Tall Mondo Grass</td>
</tr>
<tr>
<td><strong>Crop Cultivar</strong></td>
<td>Crimson Pygmy</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td><strong>Plant Source</strong></td>
<td>Liners from Monrovia received 2008_3_18</td>
<td>6-packs purchased at Lowe’s</td>
<td>Propagated from UCD stock plants</td>
</tr>
<tr>
<td><strong>Transplant Date</strong></td>
<td>2008_07_31</td>
<td>2008_08_07</td>
<td>2008_08_01</td>
</tr>
<tr>
<td><strong>Potting Mix</strong></td>
<td>UC Mix</td>
<td>UC Mix</td>
<td>UC Mix</td>
</tr>
<tr>
<td><strong>Pot Size</strong></td>
<td>1-gallon</td>
<td>1-gallon</td>
<td>1-gallon</td>
</tr>
<tr>
<td><strong>Spacing</strong></td>
<td>Pot-to-pot</td>
<td>Pot-to-pot</td>
<td>Pot-to-pot</td>
</tr>
<tr>
<td><strong>Expt. Design</strong></td>
<td>RCB</td>
<td>RCB</td>
<td>RCB</td>
</tr>
<tr>
<td><strong>Number of Reps</strong></td>
<td>3 blocks with 3 reps per block = 9</td>
<td>3 blocks with 3 reps per block = 9</td>
<td>3 blocks with 3 reps per block = 9</td>
</tr>
<tr>
<td><strong>Fertilizer Type</strong></td>
<td>Osmocote 15-9-12</td>
<td>Osmocote 15-9-12</td>
<td>Osmocote 1 5-9-12</td>
</tr>
<tr>
<td><strong>Fertilizer Application Date</strong></td>
<td>2008_08_07</td>
<td>2008_08_07</td>
<td>2008_08_07</td>
</tr>
<tr>
<td><strong>Irrigation type and frequency</strong></td>
<td>automatic overhead daily</td>
<td>automatic overhead daily</td>
<td>automatic overhead daily</td>
</tr>
<tr>
<td><strong>First Application and Measurements Date</strong></td>
<td>2008_08_14</td>
<td>2008_08_14</td>
<td>2008_08_14</td>
</tr>
<tr>
<td><strong>Second Application Date</strong></td>
<td>2008_09_25</td>
<td>2008_09_25</td>
<td>2008_09_25</td>
</tr>
<tr>
<td><strong>Final Measurements Date</strong></td>
<td>2008_10_23</td>
<td>2008_10_23</td>
<td>2008_10_23</td>
</tr>
</tbody>
</table>
Table 4. Environmental conditions during the experiment from 2008_08_14 to 2008_10_23

<table>
<thead>
<tr>
<th>Date</th>
<th>Net Rad (Ly/day)</th>
<th>Max Air Temp (°F)</th>
<th>Min Air Temp (°F)</th>
<th>Avg Vap (mBars)</th>
<th>Avg wSpd (MPH)</th>
<th>Precip (in)</th>
<th>CIMIS ETo (in)</th>
<th>Avg Rel Hum (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/14/2008</td>
<td>315</td>
<td>103.3</td>
<td>59.9</td>
<td>13.4</td>
<td>4.8</td>
<td>0</td>
<td>0.26</td>
<td>41</td>
</tr>
<tr>
<td>8/15/2008</td>
<td>308</td>
<td>104.6</td>
<td>58.5</td>
<td>13</td>
<td>4.7</td>
<td>0</td>
<td>0.26</td>
<td>39</td>
</tr>
<tr>
<td>8/16/2008</td>
<td>304</td>
<td>92.3</td>
<td>60.5</td>
<td>13.7</td>
<td>6.2</td>
<td>0</td>
<td>0.24</td>
<td>48</td>
</tr>
<tr>
<td>8/17/2008</td>
<td>323</td>
<td>83.2</td>
<td>58.3</td>
<td>13.9</td>
<td>8.1</td>
<td>0</td>
<td>0.24</td>
<td>58</td>
</tr>
<tr>
<td>8/18/2008</td>
<td>324</td>
<td>81.1</td>
<td>56.9</td>
<td>13.8</td>
<td>8.5</td>
<td>0</td>
<td>0.24</td>
<td>61</td>
</tr>
<tr>
<td>8/19/2008</td>
<td>299</td>
<td>82.1</td>
<td>55.5</td>
<td>13.8</td>
<td>5</td>
<td>0</td>
<td>0.2</td>
<td>60</td>
</tr>
<tr>
<td>8/20/2008</td>
<td>308</td>
<td>87.9</td>
<td>54</td>
<td>15.4</td>
<td>4.9</td>
<td>0</td>
<td>0.22</td>
<td>60</td>
</tr>
<tr>
<td>8/21/2008</td>
<td>308</td>
<td>88.6</td>
<td>62.1</td>
<td>16.5</td>
<td>4.9</td>
<td>0</td>
<td>0.23</td>
<td>56</td>
</tr>
<tr>
<td>8/22/2008</td>
<td>300</td>
<td>92.3</td>
<td>57.2</td>
<td>15.2</td>
<td>4.3</td>
<td>0</td>
<td>0.22</td>
<td>53</td>
</tr>
<tr>
<td>8/23/2008</td>
<td>303</td>
<td>90.6</td>
<td>55.7</td>
<td>14.8</td>
<td>4.3</td>
<td>0</td>
<td>0.22</td>
<td>56</td>
</tr>
<tr>
<td>8/24/2008</td>
<td>302</td>
<td>94.1</td>
<td>53.5</td>
<td>14.2</td>
<td>4.4</td>
<td>0</td>
<td>0.23</td>
<td>51</td>
</tr>
<tr>
<td>8/25/2008</td>
<td>295</td>
<td>94.4</td>
<td>56.7</td>
<td>12.6</td>
<td>6.9</td>
<td>0</td>
<td>0.27</td>
<td>45</td>
</tr>
<tr>
<td>8/26/2008</td>
<td>293</td>
<td>94</td>
<td>55.1</td>
<td>11</td>
<td>5.4</td>
<td>0</td>
<td>0.25</td>
<td>39</td>
</tr>
<tr>
<td>8/27/2008</td>
<td>276</td>
<td>100.5</td>
<td>55.7</td>
<td>10.1</td>
<td>4.9</td>
<td>0</td>
<td>0.27</td>
<td>30</td>
</tr>
<tr>
<td>8/28/2008</td>
<td>296</td>
<td>101.9</td>
<td>67.6</td>
<td>10.9</td>
<td>7.1</td>
<td>0</td>
<td>0.3</td>
<td>27</td>
</tr>
<tr>
<td>8/29/2008</td>
<td>279</td>
<td>101.9</td>
<td>59.4</td>
<td>12.1</td>
<td>4.1</td>
<td>0</td>
<td>0.25</td>
<td>35</td>
</tr>
<tr>
<td>8/30/2008</td>
<td>280</td>
<td>93.7</td>
<td>59.2</td>
<td>12.7</td>
<td>6.6</td>
<td>0</td>
<td>0.25</td>
<td>45</td>
</tr>
<tr>
<td>8/31/2008</td>
<td>271</td>
<td>82.6</td>
<td>52.8</td>
<td>8.2</td>
<td>6.9</td>
<td>0</td>
<td>0.25</td>
<td>34</td>
</tr>
<tr>
<td>9/1/2008</td>
<td>254</td>
<td>85.4</td>
<td>62.2</td>
<td>5.2</td>
<td>16</td>
<td>0</td>
<td>0.4</td>
<td>19</td>
</tr>
<tr>
<td>9/2/2008</td>
<td>247</td>
<td>91.6</td>
<td>56.4</td>
<td>6.6</td>
<td>3.7</td>
<td>0</td>
<td>0.22</td>
<td>23</td>
</tr>
<tr>
<td>9/3/2008</td>
<td>239</td>
<td>97.6</td>
<td>58.3</td>
<td>7.8</td>
<td>5.1</td>
<td>0</td>
<td>0.25</td>
<td>25</td>
</tr>
<tr>
<td>9/4/2008</td>
<td>248</td>
<td>98.6</td>
<td>57.8</td>
<td>9.2</td>
<td>4.3</td>
<td>0</td>
<td>0.24</td>
<td>29</td>
</tr>
<tr>
<td>9/5/2008</td>
<td>248</td>
<td>100.3</td>
<td>54.5</td>
<td>10.1</td>
<td>3.9</td>
<td>0</td>
<td>0.23</td>
<td>30</td>
</tr>
<tr>
<td>9/6/2008</td>
<td>244</td>
<td>99.2</td>
<td>56.8</td>
<td>10.2</td>
<td>3.8</td>
<td>0</td>
<td>0.22</td>
<td>31</td>
</tr>
<tr>
<td>9/7/2008</td>
<td>245</td>
<td>96.1</td>
<td>56.5</td>
<td>11.4</td>
<td>4.3</td>
<td>0</td>
<td>0.21</td>
<td>40</td>
</tr>
<tr>
<td>9/8/2008</td>
<td>253</td>
<td>88.7</td>
<td>49.8</td>
<td>11.4</td>
<td>4.4</td>
<td>0</td>
<td>0.2</td>
<td>48</td>
</tr>
<tr>
<td>9/9/2008</td>
<td>246</td>
<td>77.7</td>
<td>50.5</td>
<td>12.3</td>
<td>7</td>
<td>0</td>
<td>0.18</td>
<td>61</td>
</tr>
<tr>
<td>9/10/2008</td>
<td>236</td>
<td>88.2</td>
<td>50.5</td>
<td>12.4</td>
<td>4.2</td>
<td>0</td>
<td>0.17</td>
<td>57</td>
</tr>
<tr>
<td>9/11/2008</td>
<td>236</td>
<td>88.7</td>
<td>50.6</td>
<td>12.6</td>
<td>4</td>
<td>0</td>
<td>0.18</td>
<td>54</td>
</tr>
<tr>
<td>9/12/2008</td>
<td>241</td>
<td>84.1</td>
<td>48</td>
<td>11.5</td>
<td>4.5</td>
<td>0</td>
<td>0.17</td>
<td>56</td>
</tr>
<tr>
<td>9/13/2008</td>
<td>221</td>
<td>87.6</td>
<td>44.7</td>
<td>10.8</td>
<td>3.5</td>
<td>0</td>
<td>0.16</td>
<td>54</td>
</tr>
<tr>
<td>9/14/2008</td>
<td>226</td>
<td>91.4</td>
<td>45.7</td>
<td>10.9</td>
<td>3.5</td>
<td>0</td>
<td>0.17</td>
<td>50</td>
</tr>
<tr>
<td>9/15/2008</td>
<td>221</td>
<td>90</td>
<td>49.6</td>
<td>11.6</td>
<td>3.7</td>
<td>0</td>
<td>0.17</td>
<td>50</td>
</tr>
<tr>
<td>9/16/2008</td>
<td>159</td>
<td>86</td>
<td>50.1</td>
<td>11.5</td>
<td>4.5</td>
<td>0</td>
<td>0.14</td>
<td>53</td>
</tr>
<tr>
<td>9/17/2008</td>
<td>223</td>
<td>76.6</td>
<td>49.1</td>
<td>9.8</td>
<td>6.8</td>
<td>0</td>
<td>0.18</td>
<td>52</td>
</tr>
<tr>
<td>9/18/2008</td>
<td>214</td>
<td>77.8</td>
<td>41.7</td>
<td>9.2</td>
<td>4.9</td>
<td>0</td>
<td>0.16</td>
<td>52</td>
</tr>
<tr>
<td>9/19/2008</td>
<td>210</td>
<td>78.3</td>
<td>48.8</td>
<td>11.3</td>
<td>5.2</td>
<td>0</td>
<td>0.16</td>
<td>58</td>
</tr>
<tr>
<td>9/20/2008</td>
<td>202</td>
<td>78</td>
<td>50</td>
<td>13.5</td>
<td>3.9</td>
<td>0</td>
<td>0.14</td>
<td>66</td>
</tr>
<tr>
<td>9/21/2008</td>
<td>207</td>
<td>79.9</td>
<td>49.3</td>
<td>12.3</td>
<td>4.1</td>
<td>0</td>
<td>0.16</td>
<td>59</td>
</tr>
<tr>
<td>9/22/2008</td>
<td>199</td>
<td>84.9</td>
<td>51.9</td>
<td>8.3</td>
<td>6.8</td>
<td>0</td>
<td>0.22</td>
<td>35</td>
</tr>
<tr>
<td>9/23/2008</td>
<td>196</td>
<td>90.6</td>
<td>45</td>
<td>7.4</td>
<td>2.9</td>
<td>0</td>
<td>0.17</td>
<td>32</td>
</tr>
<tr>
<td>9/24/2008</td>
<td>190</td>
<td>89.4</td>
<td>46.9</td>
<td>7.9</td>
<td>3.3</td>
<td>0</td>
<td>0.17</td>
<td>34</td>
</tr>
<tr>
<td>9/25/2008</td>
<td>179</td>
<td>90.4</td>
<td>52.5</td>
<td>8</td>
<td>3.2</td>
<td>0</td>
<td>0.17</td>
<td>31</td>
</tr>
</tbody>
</table>
IR-4 Ornamental Horticulture Program
Research Report Form

<table>
<thead>
<tr>
<th>Date</th>
<th>Net Rad (Ly/day)</th>
<th>Max Air Temp (°F)</th>
<th>Min Air Temp (°F)</th>
<th>Avg Vap (mBars)</th>
<th>Avg wSpd (MPH)</th>
<th>Precip (in)</th>
<th>CIMIS ETo (in)</th>
<th>Avg Rel Hum (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/26/2008</td>
<td>188</td>
<td>91.2</td>
<td>55.6</td>
<td>10.2</td>
<td>3.5</td>
<td>0</td>
<td>0.17</td>
<td>39</td>
</tr>
<tr>
<td>9/27/2008</td>
<td>180</td>
<td>94.1</td>
<td>54.4</td>
<td>9.7</td>
<td>4.3</td>
<td>0</td>
<td>0.19</td>
<td>35</td>
</tr>
<tr>
<td>9/28/2008</td>
<td>178</td>
<td>98.9</td>
<td>58.6</td>
<td>9.1</td>
<td>4.8</td>
<td>0</td>
<td>0.2</td>
<td>30</td>
</tr>
<tr>
<td>9/29/2008</td>
<td>176</td>
<td>88.9</td>
<td>55</td>
<td>11.9</td>
<td>4.7</td>
<td>0</td>
<td>0.16</td>
<td>50</td>
</tr>
<tr>
<td>9/30/2008</td>
<td>174</td>
<td>88.2</td>
<td>55.1</td>
<td>11.3</td>
<td>3.2</td>
<td>0</td>
<td>0.16</td>
<td>44</td>
</tr>
<tr>
<td>10/1/2008</td>
<td>152</td>
<td>90.2</td>
<td>53.1</td>
<td>10.3</td>
<td>3.8</td>
<td>0</td>
<td>0.16</td>
<td>39</td>
</tr>
<tr>
<td>10/2/2008</td>
<td>132</td>
<td>76.6</td>
<td>32</td>
<td>13.7</td>
<td>7.7</td>
<td>0</td>
<td>0.14</td>
<td>55</td>
</tr>
<tr>
<td>10/3/2008</td>
<td>25</td>
<td>70.3</td>
<td>52.8</td>
<td>13</td>
<td>6.4</td>
<td>0.04</td>
<td>0.06</td>
<td>70</td>
</tr>
<tr>
<td>10/4/2008</td>
<td>165</td>
<td>73.2</td>
<td>51.3</td>
<td>13.6</td>
<td>7.7</td>
<td>0.04</td>
<td>0.14</td>
<td>69</td>
</tr>
<tr>
<td>10/5/2008</td>
<td>171</td>
<td>75.1</td>
<td>43.9</td>
<td>11</td>
<td>3</td>
<td>0</td>
<td>0.12</td>
<td>63</td>
</tr>
<tr>
<td>10/6/2008</td>
<td>172</td>
<td>81.8</td>
<td>46.3</td>
<td>11.8</td>
<td>3</td>
<td>0</td>
<td>0.13</td>
<td>58</td>
</tr>
<tr>
<td>10/7/2008</td>
<td>165</td>
<td>86.8</td>
<td>50.6</td>
<td>10.6</td>
<td>3.7</td>
<td>0</td>
<td>0.15</td>
<td>47</td>
</tr>
<tr>
<td>10/8/2008</td>
<td>158</td>
<td>84.1</td>
<td>52.8</td>
<td>8.3</td>
<td>5.7</td>
<td>0</td>
<td>0.18</td>
<td>36</td>
</tr>
<tr>
<td>10/9/2008</td>
<td>147</td>
<td>72.4</td>
<td>52.1</td>
<td>4.4</td>
<td>13.2</td>
<td>0</td>
<td>0.28</td>
<td>23</td>
</tr>
<tr>
<td>10/10/2008</td>
<td>144</td>
<td>64.7</td>
<td>49.9</td>
<td>4</td>
<td>16.6</td>
<td>0</td>
<td>0.27</td>
<td>25</td>
</tr>
<tr>
<td>10/11/2008</td>
<td>141</td>
<td>65.4</td>
<td>47.9</td>
<td>3.5</td>
<td>13.5</td>
<td>0</td>
<td>0.24</td>
<td>22</td>
</tr>
<tr>
<td>10/12/2008</td>
<td>133</td>
<td>70.2</td>
<td>45.7</td>
<td>3.2</td>
<td>10.5</td>
<td>0</td>
<td>0.22</td>
<td>20</td>
</tr>
<tr>
<td>10/13/2008</td>
<td>134</td>
<td>81</td>
<td>49</td>
<td>4.3</td>
<td>8.3</td>
<td>0</td>
<td>0.21</td>
<td>22</td>
</tr>
<tr>
<td>10/14/2008</td>
<td>139</td>
<td>80.3</td>
<td>39.4</td>
<td>5.6</td>
<td>2.2</td>
<td>0</td>
<td>0.12</td>
<td>32</td>
</tr>
<tr>
<td>10/15/2008</td>
<td>142</td>
<td>82.8</td>
<td>42.6</td>
<td>6.6</td>
<td>2.6</td>
<td>0</td>
<td>0.13</td>
<td>36</td>
</tr>
<tr>
<td>10/16/2008</td>
<td>134</td>
<td>84.9</td>
<td>45.4</td>
<td>6.6</td>
<td>4.1</td>
<td>0</td>
<td>0.16</td>
<td>32</td>
</tr>
<tr>
<td>10/17/2008</td>
<td>117</td>
<td>84.7</td>
<td>43.4</td>
<td>7.6</td>
<td>2.2</td>
<td>0</td>
<td>0.11</td>
<td>39</td>
</tr>
<tr>
<td>10/18/2008</td>
<td>123</td>
<td>84.1</td>
<td>51.5</td>
<td>8.1</td>
<td>5</td>
<td>0</td>
<td>0.14</td>
<td>40</td>
</tr>
<tr>
<td>10/19/2008</td>
<td>132</td>
<td>76.9</td>
<td>43.6</td>
<td>9.2</td>
<td>3.4</td>
<td>0</td>
<td>0.11</td>
<td>56</td>
</tr>
<tr>
<td>10/20/2008</td>
<td>127</td>
<td>76</td>
<td>40.7</td>
<td>9.6</td>
<td>3</td>
<td>0</td>
<td>0.09</td>
<td>60</td>
</tr>
<tr>
<td>10/21/2008</td>
<td>108</td>
<td>79.9</td>
<td>46.5</td>
<td>5.8</td>
<td>11.2</td>
<td>0</td>
<td>0.24</td>
<td>27</td>
</tr>
<tr>
<td>10/22/2008</td>
<td>106</td>
<td>82.3</td>
<td>50.3</td>
<td>4.8</td>
<td>5.1</td>
<td>0</td>
<td>0.16</td>
<td>23</td>
</tr>
<tr>
<td>10/23/2008</td>
<td>108</td>
<td>87.2</td>
<td>45.4</td>
<td>5.6</td>
<td>2.9</td>
<td>0</td>
<td>0.13</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 5. Numerical plant damage rating scale used for phytotoxicity determinations.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description of plant damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No damage</td>
</tr>
<tr>
<td>1</td>
<td>No visible damage but unintended (non-permanent) impact</td>
</tr>
<tr>
<td>2</td>
<td>Slight leaf/tissue damage (curling leaves, necrosis, etc.)</td>
</tr>
<tr>
<td>3</td>
<td>Marginal chlorosis on some leaves (damage on up to 10% of plant)</td>
</tr>
<tr>
<td>4</td>
<td>10% – 20% of plant damaged</td>
</tr>
<tr>
<td>5</td>
<td>Significant damage to much of plant (30% - 40%)</td>
</tr>
<tr>
<td>6</td>
<td>40% – 60% of plant damaged</td>
</tr>
<tr>
<td>7</td>
<td>Chlorosis or necrosis on most of plant (60% - 70%)</td>
</tr>
<tr>
<td>8</td>
<td>Abscised leaves, branch dieback</td>
</tr>
<tr>
<td>9</td>
<td>Tissue severely damaged (80% - 100% of plant)</td>
</tr>
<tr>
<td>10</td>
<td>Complete kill</td>
</tr>
</tbody>
</table>

Researcher(s): Heiner Lieth, UC Davis
PRNumber(s): 26437, 26285, 27793
Table 6a Raw Data for *Berberis*

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>Plant Size at week 0</th>
<th>Plant Size at week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Height (cm) Width1 (cm)</td>
<td>Height (cm) Width1 (cm)</td>
</tr>
<tr>
<td>Control A</td>
<td>1</td>
<td>0</td>
<td>22 41 13.5</td>
<td>20 38 21</td>
</tr>
<tr>
<td>Control A</td>
<td>2</td>
<td>0</td>
<td>17.5 43 24.5</td>
<td>20 35 27</td>
</tr>
<tr>
<td>Control A</td>
<td>3</td>
<td>0</td>
<td>22 34 16.5</td>
<td>27 35 23</td>
</tr>
<tr>
<td>Control B</td>
<td>1</td>
<td>0</td>
<td>18 24 13</td>
<td>38 24 8</td>
</tr>
<tr>
<td>Control B</td>
<td>2</td>
<td>0</td>
<td>20.5 40 33</td>
<td>18 57 37</td>
</tr>
<tr>
<td>Control B</td>
<td>3</td>
<td>0</td>
<td>19 36 17</td>
<td>26 38 17</td>
</tr>
<tr>
<td>Control C</td>
<td>1</td>
<td>0</td>
<td>12.5 20 10.5</td>
<td>12.5 20 9</td>
</tr>
<tr>
<td>Control C</td>
<td>2</td>
<td>0</td>
<td>16.5 43 30.5</td>
<td>20 56 29</td>
</tr>
<tr>
<td>Control C</td>
<td>3</td>
<td>0</td>
<td>19.5 29.5 27</td>
<td>20.5 39 26</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>18.6 34.5 20.6</td>
<td>22.4 38.0 21.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phytotoxicity at week 0</th>
<th>Phytotoxicity at week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block</td>
<td>Rep</td>
</tr>
<tr>
<td>1X A 1</td>
<td>0 0 0 0 0 1 1 1 3</td>
</tr>
<tr>
<td>1X A 2</td>
<td>0 0 0 0 0 0 0 0 1</td>
</tr>
<tr>
<td>1X A 3</td>
<td>0 0 0 0 0 1 1 1 2</td>
</tr>
<tr>
<td>1X B 1</td>
<td>0 1 1 1 0 0 0 2</td>
</tr>
<tr>
<td>1X B 2</td>
<td>0 1 1 1 0 0 0 2</td>
</tr>
<tr>
<td>1X B 3</td>
<td>0 1 1 1 1 1 1 2</td>
</tr>
<tr>
<td>1X C 1</td>
<td>0 1 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>1X C 2</td>
<td>0 0 1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>1X C 3</td>
<td>0 0 1 3 1 1 1 1 2</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0 0.3 0.4 0.4 0.2 0.2 0.2 0.6</td>
</tr>
</tbody>
</table>

| 2X A 1 | 0 1 1 1 1 1 1 2 | 22 45.5 35 | 28 48 34 |
| 2X A 2 | 0 1 1 1 1 1 1 3 | 24.5 27 16 | 22.5 25 19 |
| 2X A 3 | 0 1 1 1 1 1 1 2 | 18 40 47 | 23 53 44 |
| 2X B 1 | 0 0 0 0 0 0 0 0 1 | 22 23.2 26.7 | 26 22 19 |
| 2X B 2 | 0 0 0 0 0 0 0 0 1 | 22 48.5 19 | 20.5 30 22 |
| 2X B 3 | 0 0 0 0 0 0 0 0 0 | 26 48 22 | 18 52 29 |
| 2X C 1 | 0 2 2 1 0 0 1 2 | 20 37 21 | 31 33 28.5 |
| 2X C 2 | 0 1 1 2 2 2 2 2 2 | 20.5 25 14 | 21 19 13 |
| 2X C 3 | 0 1 1 1 0 0 1 2 | 25 44 25 | 22 58 39 |
| Mean   | 0.0 0.4 0.7 0.9 0.7 0.7 0.7 1.8 | 19.4 33.6 20.9 | 22.2 40.7 26.2 |

| 4X A 1 | 0 1 2 3 3 3 3 3 2 | 24 27.5 23 | 24.5 25 15 |
| 4X A 2 | 0 1 1 1 1 1 1 1 2 | 24 41 25 | 21 55 30 |
| 4X A 3 | 0 1 1 1 1 1 1 1 2 | 24 26 17.5 | 14 37 21 |
| 4X B 1 | 0 1 1 0 0 0 0 0 1 | 19.5 40.5 27 | 31 51 35 |
| 4X B 2 | 0 1 1 0 0 0 0 0 0 | 19 23 19 | 20 48 20 |
| 4X B 3 | 0 1 1 1 1 1 1 1 0 | 21 9 23 | 21 34 29 |
| 4X C 1 | 0 0 0 0 0 0 0 0 0 | 18.5 38 24.4 | 19 25 23 |
| 4X C 2 | 0 0 0 0 0 0 0 0 1 | 24.5 38 21.5 | 27 29 20 |
| 4X C 3 | 0 0 0 0 0 0 0 0 0 | 27.5 39.5 18.5 | 22 41 21 |
| Mean   | 0.0 0.7 0.8 0.6 0.7 0.7 0.7 0.9 | 22.4 31.4 22.1 | 22.2 38.3 23.8 |
## Table 6b Raw Data for *Lobularia*

<table>
<thead>
<tr>
<th>Phytotoxicity Report Form</th>
<th>Plant Size at week 0</th>
<th>Plant Size at week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height (cm)</td>
<td>Width1 (cm)</td>
</tr>
<tr>
<td>Treatment Block Rep 0 1 2</td>
<td>4 6 7 8 10</td>
<td></td>
</tr>
<tr>
<td>Control A 1 0 0 0 0 0 0 0 0 0 0 8.5 14 12</td>
<td>14 26 26</td>
<td></td>
</tr>
<tr>
<td>Control A 2 0 0 0 0 0 0 0 0 0 0 9 11 10</td>
<td>25 40 38</td>
<td></td>
</tr>
<tr>
<td>Control A 3 0 0 0 0 0 0 0 0 2 7 11 9</td>
<td>17 38 32</td>
<td></td>
</tr>
<tr>
<td>Control B 1 0 0 0 0 0 0 0 0 0 0 9 12 12</td>
<td>20 35 22</td>
<td></td>
</tr>
<tr>
<td>Control B 2 0 0 0 0 0 0 0 0 0 3 9 12 12</td>
<td>16.5 30 23</td>
<td></td>
</tr>
<tr>
<td>Control B 3 0 0 0 0 0 0 0 0 0 2 7 13.5 10.5 9</td>
<td>19 37 30</td>
<td></td>
</tr>
<tr>
<td>Control C 1 0 0 0 0 0 0 0 0 0 2 7.5 12 10 20 40 34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control C 2 0 0 0 0 0 0 0 0 0 0 6.5 12.5 11 21 35 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control C 3 0 0 0 0 0 0 0 0 0 0 9 14 14 16 32 31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.2</td>
<td>8.1 12.4 11.2</td>
<td>18.7 34.8 29.2</td>
</tr>
<tr>
<td>1X A 1 0 0 0 0 0 0 0 0 0 0 8 13 10</td>
<td>15 31 25</td>
<td></td>
</tr>
<tr>
<td>1X A 2 0 0 0 0 0 0 0 0 0 0 9 11 10</td>
<td>14 33 27</td>
<td></td>
</tr>
<tr>
<td>1X A 3 0 0 0 0 0 0 0 0 0 0 8 14 9.5</td>
<td>20.5 32 27</td>
<td></td>
</tr>
<tr>
<td>1X B 1 0 0 0 1 0 0 0 5 0 0 8 12 10.5</td>
<td>14.5 28 21</td>
<td></td>
</tr>
<tr>
<td>1X B 2 0 0 0 0 0 0 0 0 0 2 7.5 12 10</td>
<td>17.5 34 31</td>
<td></td>
</tr>
<tr>
<td>1X B 3 0 0 0 0 0 0 0 0 0 2 9 13 12</td>
<td>17 39 23</td>
<td></td>
</tr>
<tr>
<td>1X C 1 0 0 1 1 0 3 4 5 0 0 8.5 13 8</td>
<td>21 41 41</td>
<td></td>
</tr>
<tr>
<td>1X C 2 0 0 0 0 0 0 0 0 0 2 8.5 13 8</td>
<td>21 41 41</td>
<td></td>
</tr>
<tr>
<td>1X C 3 0 0 0 0 0 0 0 0 0 4 7 14 12</td>
<td>12.5 32 29</td>
<td></td>
</tr>
<tr>
<td>Mean 0.0 0.0 0.1 0.2 0.0 0.3 0.4 2.2</td>
<td>8.1 12.7 10.2</td>
<td>16.0 33.1 27.1</td>
</tr>
<tr>
<td>2X A 1 0 1 0 0 0 0 0 0 0 0 8.5 13 9</td>
<td>15 33 26</td>
<td></td>
</tr>
<tr>
<td>2X A 2 0 0 0 0 2 6 7 8</td>
<td>6.5 13.5 9.5</td>
<td>12 24 21</td>
</tr>
<tr>
<td>2X A 3 0 1 0 0 0 0 0 0 0 0 7.5 13 9</td>
<td>11 31 25</td>
<td></td>
</tr>
<tr>
<td>2X B 1 0 2 0 0 0 0 0 0 2 7.5 11.5 10.5</td>
<td>17 34 27</td>
<td></td>
</tr>
<tr>
<td>2X B 2 0 0 0 0 0 0 0 0 4 8 14 10</td>
<td>13 30 27</td>
<td></td>
</tr>
<tr>
<td>2X B 3 0 0 0 0 0 0 0 0 2 6 11 10</td>
<td>15 34 25.5</td>
<td></td>
</tr>
<tr>
<td>2X C 1 0 6 6 6 3 3 3 3 3 3 8 13 12</td>
<td>12 21 17</td>
<td></td>
</tr>
<tr>
<td>2X C 2 0 4 4 0 0 0 0 0 0 8 12.5 7.5</td>
<td>12 33 26</td>
<td></td>
</tr>
<tr>
<td>2X C 3 0 0 0 0 0 0 0 0 0 2 7.5 12 9</td>
<td>19 36 31</td>
<td></td>
</tr>
<tr>
<td>Mean 0.0 0.1 0.7 0.6 1.0 1.1 2.3</td>
<td>7.4 12.6 9.6</td>
<td>14.0 30.7 25.1</td>
</tr>
<tr>
<td>4X A 1 0 5 5 0 0 3 3 3 3 7.5 14 10</td>
<td>13.5 23 20</td>
<td></td>
</tr>
<tr>
<td>4X A 2 0 5 5 3 0 2 2 2</td>
<td>7.5 11 9</td>
<td>13.5 20 20</td>
</tr>
<tr>
<td>4X A 3 0 5 5 4 0 0 0 2 8 14 11</td>
<td>13 23 17</td>
<td></td>
</tr>
<tr>
<td>4X B 1 0 5 5 3 0 3 3 4</td>
<td>9 13 9</td>
<td>8.5 16 15</td>
</tr>
<tr>
<td>4X B 2 0 5 5 0 0 0 0 3</td>
<td>8 12 9</td>
<td>9.5 26 20</td>
</tr>
<tr>
<td>4X B 3 0 5 5 5 5 5 5 5 6</td>
<td>7.5 11 9</td>
<td>7 11.5 6</td>
</tr>
<tr>
<td>4X C 1 0 0 0 0 0 3 3 3 3 7 11 9.5</td>
<td>15 30 24</td>
<td></td>
</tr>
<tr>
<td>4X C 2 0 0 0 0 0 0 0 2</td>
<td>8.5 13 11</td>
<td>17.5 34 28</td>
</tr>
<tr>
<td>4X C 3 0 0 0 0 0 0 0 3</td>
<td>8 15 12</td>
<td>19 40 35</td>
</tr>
<tr>
<td>Mean 0.0 3.3 3.3 1.7 0.6 1.8 1.8 3.1</td>
<td>7.9 12.7 9.9</td>
<td>12.9 24.8 20.6</td>
</tr>
</tbody>
</table>
### Table 6c Raw Data for Ophiopogon

#### Phytotoxicity Report Form

<table>
<thead>
<tr>
<th>Ophiopogon F6875 IR4 Trial</th>
<th>Phytotoxicity at week</th>
<th>Plant Size at week 0</th>
<th>Plant Size at week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height (cm)</td>
<td>Width1 (cm)</td>
<td>Width2 (cm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Height (cm)</td>
<td>Width1 (cm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Width2 (cm)</td>
<td></td>
</tr>
<tr>
<td>Control A 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control A 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control A 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control B 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control B 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control B 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control C 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control C 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control C 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 1X A 1

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>10</th>
<th>Height (cm)</th>
<th>Width1 (cm)</th>
<th>Width2 (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>A 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>Control</td>
<td>A 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17.5</td>
<td>26.5</td>
<td>26</td>
</tr>
<tr>
<td>Control</td>
<td>A 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15.5</td>
<td>27.5</td>
<td>23</td>
</tr>
<tr>
<td>Control</td>
<td>B 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11.5</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Control</td>
<td>B 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>27.5</td>
<td>22.5</td>
</tr>
<tr>
<td>Control</td>
<td>B 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19.5</td>
<td>29</td>
<td>27</td>
</tr>
<tr>
<td>Control</td>
<td>C 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>Control</td>
<td>C 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>23.5</td>
<td>21</td>
</tr>
<tr>
<td>Control</td>
<td>C 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>20.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>14.8</td>
<td>24.5</td>
<td>21.2</td>
</tr>
</tbody>
</table>

#### 2X A 1

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>10</th>
<th>Height (cm)</th>
<th>Width1 (cm)</th>
<th>Width2 (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>A 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>Control</td>
<td>A 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Control</td>
<td>A 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Control</td>
<td>B 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>17</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Control</td>
<td>B 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16.5</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Control</td>
<td>B 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12.5</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Control</td>
<td>C 1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>12.5</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Control</td>
<td>C 2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>20.5</td>
<td>19</td>
</tr>
<tr>
<td>Control</td>
<td>C 3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9.5</td>
<td>20.5</td>
<td>21.5</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0</td>
<td>0.0</td>
<td>0.8</td>
<td>1.2</td>
<td>1.2</td>
<td>1.0</td>
<td>1.2</td>
<td>1.2</td>
<td>1.0</td>
<td>13.0</td>
<td>21.4</td>
<td>19.7</td>
</tr>
</tbody>
</table>

#### 4X A 1

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Block</th>
<th>Rep</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>10</th>
<th>Height (cm)</th>
<th>Width1 (cm)</th>
<th>Width2 (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>A 1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Control</td>
<td>A 2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Control</td>
<td>A 3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>17.5</td>
<td>21</td>
<td>23.5</td>
</tr>
<tr>
<td>Control</td>
<td>B 1</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>11.5</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Control</td>
<td>B 2</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Control</td>
<td>B 3</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>15</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Control</td>
<td>C 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Control</td>
<td>C 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Control</td>
<td>C 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0</td>
<td>1.0</td>
<td>2.3</td>
<td>2.0</td>
<td>2.2</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>13.7</td>
<td>21.1</td>
<td>20.9</td>
<td>10.9</td>
</tr>
</tbody>
</table>

---

**Researcher(s):** Heiner Lieth, UC Davis

**PRNumber(s):** 26437, 26285, 27793
Appendix A: F6875 0.3G Crop Safety
Ornamental Protocol Number: 08-015

Objective: Determine phytotoxicity of F6875 0.3G on herbaceous perennials.

Experimental Design:
- Plot Size: Must be adequate to reflect actual use conditions.
- Replicates: Minimum of 3 replications (preferably 4) with 3 plants per replicate

Application Instructions: Depending upon research site and plant materials, various experiments can be established. Two applications are to be made approximately 6 weeks apart, with the first application within 7 days after potting, preferable between 24 and 48 hours. However, plant materials must have broken dormancy prior to first application. For liquid applications, use a minimum of 20 gal per acre. Applications should be made over the top of the plants using application equipment consistent with conventional commercial equipment. For all materials, target dry foliage. If dew is present at the time of application, note it. Irrigate with ½ inch water between 1 and 4 hours after application. Note: Liquid materials need at least 1 hour drying time prior to irrigation.

Plant Materials: Contact your Regional Coordinator for an up-to-date list. Plants grown in field containers are preferred to in-ground.

Evaluations: Record plant height & width at initial and final evaluations only. At 1, 2, and 4 weeks after each application, record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). If appropriate, also include ratings for chlorosis, defoliation, stunting or other growth effects on a scale of 0 to 10 (0 = No effect; 10 = Complete plant affected). If any phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, irrigation, liner size, plant height & width, and plant growth stage at application and data collection dates.

Treatments

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate</th>
<th>Contact Information to obtain materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6875 0.3G (sulfentrazone + prodiamine)</td>
<td></td>
<td>FMC, Bobby Walls, 919-735-3862, <a href="mailto:bobby_walls@fmc.com">bobby_walls@fmc.com</a></td>
</tr>
<tr>
<td>Untreated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reports:
- Reports submitted electronically on the standard IR-4 Ornamental Horticulture Research Report Form are preferred.

A report submitted electronically is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 681 US Hwy 1 S, North Brunswick, NJ 08902-3390, Phone 732-932-9575 x4629, palmer@aesop.rutgers.edu OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-4880, E-mail: evvea@comcast.net.

Draft Date: 1/23/08 Revised By: CLP

Researcher(s): Heiner Lieth, UC Davis

PRNumber(s): 26437, 26285, 27793