Gibberellic Acid-induced Flowering of Syngonium podophyllum Schott ‘White Butterfly’

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Abstract. Syngonium ‘White Butterfly’, growing in 1.6-L pots and treated in August with a single GA3 spray at 250 to 2000 mg·L−1, flowered within 86 days. Mean flower number increased with GA3 concentration. Flowers were normal in appearance and were fertile. Chemical name used: gibberellic acid (GA3).

Members of the family Araceae, commonly called aroids, are one of the most important group of ornamental tropical foliage plants. Five aroid genera, including Aglaonema, Dieffenbachia, Spathiphyllum, Epipremnum, and Syngonium, were responsible for 19% of the annual wholesale volume in Florida in 1993 (Sheehan, 1994), and interest continues in developing new cultivars. Consumers prefer plants with novel foliage that perform well in interior environments. Growers seek plants with good growth rates, branching, and an attractive growth habit, in addition to insect and disease resistance.

Unpredictable flowering patterns of aroids greatly hindered attempts at breeding until Aglaonema (Henny, 1983), Dieffenbachia (Henny, 1980), and Spathiphyllum (Henny, 1981) were induced to flower with a single foliar spray of gibberellic acid (GA3). Although some GA3-induced flowers may be distorted and small, fertility is not affected. The ability to control flowering of these aroids has permitted breeders to develop new Syngonium cultivars propagated in vitro and available in Florida were classified morphologically (Henley and Robinson, 1993). Extensive differences in several morphological characteristics were observed, including plant height and width, leaf length, width and color, and number of basal shoots (Henley and Robinson, 1993).

The diversity of important ornamental traits makes Syngonium a desirable genus for improvement by breeding. Hybridization could also be used to introduce genes into S. podophyllum from other species to increase the genetic base. Consequently, ability to control flowering of Syngonium is important. However, under low light levels in commercial greenhouse and interiorscapes, Syngonium does not flower.

Materials and Methods

To test the effect of GA3 on flowering of Syngonium, an experiment was initiated in Aug. 1997 using 50 rooted liners of Syngonium podophyllum ‘White Butterfly’ from tissue culture planted into 15-cm (1.6 L) pots filled with Vergro Container Mix A (2 Canadian peat : 1 perlite : 1 vermiculite; Verlite Co., Tampa, Fla.). Plants were grown in a shaded greenhouse with a maximum photosynthetic photon flux (PPF) of 250 µmol·m−2·s−1 under natural photoperiod with high/low temperature set points of 35/18° ± 2° C. Length and width of leaves, plant height, leaf length, and number of basal shoots (Henley and Robinson, 1993) were observed, including plant characteristics were observed, including plant height and width, leaf length, width and color, and number of basal shoots (Henley and Robinson, 1993).

![Image](image-url)

Fig 1. A flowering plant of Syngonium podophyllum ‘White Butterfly’ 90 d after treatment with a single foliar spray of GA3, at 1000 mg·L−1. Arrows indicate the flowers.

Table 1. Effect of a single foliar spray of gibberellic acid (GA3), applied during August, on plant growth and flowering of Syngonium podophyllum ‘White Butterfly’ grown in 15-cm pots. Means are averages for 10 plants per treatment.

<table>
<thead>
<tr>
<th>Treatment rate (mg·L−1)</th>
<th>Leaf width (cm)</th>
<th>Leaf length (cm)</th>
<th>Canopy height (cm)</th>
<th>No. vines</th>
<th>Total no. flowers</th>
<th>Mean no. flowers/vine</th>
<th>Mean no. days to flower</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10.4</td>
<td>19.3</td>
<td>27.7</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>---</td>
</tr>
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<td>250</td>
<td>10.5</td>
<td>17.4</td>
<td>26.6</td>
<td>2.6</td>
<td>4.8</td>
<td>1.8</td>
<td>86.0</td>
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<tr>
<td>500</td>
<td>10.2</td>
<td>17.5</td>
<td>26.8</td>
<td>4.0</td>
<td>7.6</td>
<td>1.9</td>
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<tr>
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<td>10.2</td>
<td>17.0</td>
<td>26.4</td>
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<td>8.7</td>
<td>2.0</td>
<td>85.6</td>
</tr>
<tr>
<td>2000</td>
<td>10.8</td>
<td>18.7</td>
<td>28.2</td>
<td>4.9</td>
<td>11.3</td>
<td>2.4</td>
<td>83.3</td>
</tr>
</tbody>
</table>

Significance: NS, ** Nonsignificant or significant at P ≤ 0.05 or 0.01, respectively; L = linear; Q = quadratic.
width of the largest leaf, and canopy height, were measured the day before treatment. Levels of GA₃ (GibGro 4% GA₃ liquid; Agtrol Chemical Products, Houston, Texas) tested ranged from 250 to 2000 mg·L⁻¹ a.i. Two hundred milliliters of each treatment solution, with two drops of Tween 20 added as wetting agent, was sprayed as evenly as possible among 10 replicates. Final data included plant canopy height, length and width of the largest leaf, number of vines, total number of flowers, and number of days to the first open flower (indicated by unfurling of the spathe) on each plant.

Results and Discussion

None of the control plants flowered during the course of this experiment. Ninety percent of plants treated with 250 mg·L⁻¹ GA₃ flowered, while all flowered at the higher rates. The total number of flowers per plant and the mean number of flowers per vine both increased significantly linearly and quadratically with rate (Table 1). Flowers were normal in appearance and were fertile (Fig. 1).

Treatment with GA₃ had no significant effect on leaf width or canopy height; leaf length was slightly (although significantly) shorter than that of the controls at all GA₃ levels. However, GA₃ had an effect on apical dominance at higher concentrations, as there was a significant linear and quadratic increase in the number of vines per plant. In a previous report (Imamura and Higaki, 1988), GA₃ applied to Anthurium andraeanum Linden. induced an increase in new shoot number in plants that had been topped, but not in intact plants. In a separate report, GA₃ treatment of Anthurium scherzeranum Schott. to induce flowering caused no increase in branching (Henny and Hamilton, 1992). Other aroid genera have not produced additional secondary branches following GA₃ treatment (Henny, 1980, 1981, 1983).

Treatment with GA₃ had no significant effect on flowering time; all flowering plants produced the first open spathe ≈85 d following treatment. In a second experiment, winter treatment of Syngonium induced flowering within ≈120 d (data not shown). The delay in flowering can be explained by slower plant growth due to cooler greenhouse temperatures.

This study indicates that GA₃ can increase the number of vines and mean number of flowers per vine in Syngonium. The increased flower number should help plant breeders provide a more diverse selection of cultivars.

Literature Cited


