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 *Aglaonema* and *Dieffenbachia* cultivars, and allowed commercial production of blooming *Spathiphyllum* on predictable schedules throughout the year.

The aroid genus *Syngonium* consists of ≈20 species native to tropical Central and South America. Because of the shape of juvenile leaves *Syngonium* are commonly referred to as nephthytis, or as arrowhead vine. A single species, *S. podophyllum* Schott., is the origin of most commercially grown nephthytis. New cultivars have been introduced directly from the wild or selected from mutants ob-

served during production. In the past 10 years, tissue culture has become the primary method of propagation as well as the primary source of mutations. In a recent report, 28 different *Syngonium* cultivars propagated in vitro and available in Florida were classified morpho-

logically (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

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.

Treatment rate (mg·L ⁻¹)	Leaf width (cm)	Leaf length (cm)	Canopy height (cm)	No. vines	Total no. flowers	Mean no. flowers/vine	Mean no. days to flower
0	10.4	19.3	27.7	0	0	0.0	---
250	10.5	17.4	26.6	2.6	4.8	1.8	86.0
500	10.2	17.5	26.8	4.0	7.6	1.9	86.0
1000	10.2	17.0	26.4	4.4	8.7	2.0	85.6
2000	10.8	18.7	28.2	4.9	11.3	2.4	83.3
Significance	NS	L*	NS	L**, Q**	L**, Q**	L**, Q**	NS

NS, *, **Nonsignificant or significant at $P \leq 0.05$ or 0.01, respectively; L = linear; Q = quadratic.

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.

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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 scherzerianum* 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.

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