Sumagic (Uniconazole) Enhances Flowering of 'Shishi-Gashira' Camellia[1]

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Abstract

Growth of *Camellia sasanqua* Thunb. [*C. hiemalis* Nakai] 'Shishi-Gashira' was either unaffected or was inhibited by single foliar sprays of Sumagic (uniconazole), while flower number was significantly greater. A 5 ppm spray of (Sumagic) uniconazole increased flower number 53% without influencing growth indices, days to flower or flower diameter. A 20 ppm spray increased flower number 113% without affecting days to flower or flower diameter; however, growth indices were reduced up to 21%.

Index words: growth retardant, uniconazole, Sumagic

Growth regulators used in this study: Sumagic (uniconazole), (E)-1-(p-chlorophenyl)-4,4-dimethy1-2-(1,2,4-triazol-1-yl)-penten-3-ol.

Species used in this study: 'Shishi-Gashira' camellia (*Camellia sasanqua* Thunb. [*C. hiemalis* Nakai] 'Shishi-Gashira').

Significance to the Nursery Industry

In the commercial production of camellias, growers encourage vigorous growth in order to produce larger plants in a shorter period of time. When marketed at retail, plants with flowers or flower buds present sell more readily. However, vigorously growing plants tend to set few if any flower buds. A single foliar spray of 5 ppm Sumagic (uniconazole) can increase flower or flower bud number 53% without reducing growth indices, flower size or delaying flowering. Increased flowering with low rates of Sumagic (uniconazole), coupled with darker foliage and little or no reduction in growth relative to control plants, should produce more marketable plants for the retail and wholesale markets. A Sumagic (uniconazole) spray of 20 ppm may double flower or flower bud number without affecting time of flowering or flower size, however, growth indices may be reduced as much as 21%. Sumagic (uniconazole) rates above 5 ppm may be useful in producing compact indoor flowering pot plants which would subsequently be transplanted into the landscape.

Introduction

Camellia sasanqua cultivars are highly desirable woody landscape plants widely used in the Southeastern United States for their showy fall to winter flowers, lustrous dark green foliage and refined growth habit. Small, actively growing plants, which may be found in nurseries, have 3 or 4 growing periods during a single season. When plants are small, growers want vigorous growth and a profuse bud set since larger plants demand a higher price and plants with buds or flowers sell more readily than those without them. However, vigorously growing young plants tend to set few if any buds and if buds are set, growth is slowed in proportion to the number of buds set (7).

Growth retardants are routinely applied to numerous potted crops to produce compact plants. A secondary benefit of growth retardant application with some crops is early or enhanced flowering. Growth retardants may also be useful in the promotion of flowering of woody nursery crops for landscape use, as indicated in research with *Rhododendron* (3) and *Jasminum* (8), or in the production of camellias for temporary use as indoor flowering potted plants (10).

Triazole inhibitors, a group of plant bioregulants represented by Sumagic (uniconazole) and Bonzi (paclobutrazol), suppress stem elongation by the inhibition of gibberellin acid biosynthesis (4) and have growth retardant activity on a wide range of crop species (2). Flowering of woody plants has been promoted with both Sumagic (uniconazole) and Bonzi (paclobutrazol) (3, 5, 9).

This study was conducted to investigate changes in vegetative growth and flowering of 'Shishi-Gashira' camellia following spray application of Sumagic (uniconazole). The intention was to produce flowering plants at a younger age which would be more marketable, or flowering potted plants that could subsequently be planted into the landscape. 'Shishi-Gashira' is a rose red, semidouble to double flowering cultivar that blooms over a 5-month season and has a low, arching growth habit.

Materials and Methods

Uniform 18.0 cm (7.0 in) liners of 'Shishi-Gashira' camellia were potted on March 21, 1989, into 3.8 l (#1) containers of a pine bark:sand (7:1 by vol) growth medium amended per m^3 (yd^3) with 3 kg (5 lb) dolomitic limestone, 8.3 kg (14 lb) Osmocote 17N-3P-10K (17-7-12), and 0.9 kg (1.5 lb) Micromax micronutrient fertilizer. Plants were grown outdoors under 47% light exclusion fabric and watered daily by overhead irrigation.

The following treatments were applied on May 26 in a volume of 204 ml/m^2 (2 qt/100 ft^2): a single Sumagic (uniconazole) application of 0, 5, 10, 15, 20, 40 or 60 ppm. Applications were applied using a hand-held sprayer to uniformly wet foliage and stems. Treatments were applied at approximately 1400 hours. Ambient temperature was 32.2°C

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Table 1. Influence of Sumagic (uniconazole) on growth and flowering of 'Shishi-Gashira' camellia.

Uniconazole rate (ppm)	Growth indices[z]							Flower number[y]	Days to first flower[x]	Flower diameter[w] (cm)
	May 26, 1989	June 23	July 21	Aug. 18	Sept. 15	Nov. 30	May 30, 1990			
0	17.6	21.1	24.3	27.6	28.2	29.0	37.8	3.8	167	6.8
5	16.7	20.2	24.2	27.1	28.6	29.0	39.2	5.8	164	6.5
10	15.7	17.9	21.4	24.5	26.1	26.5	35.7	5.1	165	6.7
15	16.9	17.8	19.8	22.4	24.0	24.2	33.9	5.9	168	6.6
20	18.0	18.2	20.9	21.8	22.9	23.0	33.1	8.1	168	6.5
40	17.5	17.8	19.2	21.0	21.9	22.1	30.5	6.9	171	6.3
60	17.4	18.0	19.1	20.2	20.5	20.8	30.0	7.6	176	6.8
Significance[v]										
Linear	NS	*	**	**	**	**	**	*	**	NS
Quadratic	NS	**	*	NS	NS	**	NS	NS	NS	NS
Cubic	NS	NS	NS	**	NS	NS	NS	NS	NS	NS

[z]Growth indices = (height + width at the widest point + width 90° to the widest point) ÷ 3; treatments were applied on May 26, 1989.

[y]Flower and flower bud number determined when first flower fully opened.

[x]Days to first flower after treatment application.

[w]Diameter of first fully open flower on each plant.

[v]NS, *, **: non-significant or significant at 5% (*) or 1% (**) level.

(90°F) and relative humidity was 65% at time of application. Plants were arranged in a completely randomized design with 5 replicates of 2 plants per treatment.

Plant height and growth index [(height + width at the widest point + width 90° to the widest point) ÷ 3] were measured about every 4 weeks during the 1989 growing season and again on May 30, 1990, following the spring flush of growth. Time until flowering was determined from the time plants were treated until the first flower was fully open. At this time, flower number, which included open flowers and flower buds, and flower diameter were ascertained. Rate response to uniconazole was determined by regression analysis.

Results and Discussion

Plants treated with Sumagic (uniconazole) exhibited darker green, smaller leaves and shorter internodes than control plants. This appearance is common among plants treated with triazole retardants and concurs with observations made in other studies (1, 6). Because of similar trends in heights and growth indices in response to treatments, only growth indices are presented. Beginning 4 weeks after treatment (June 23) and continuing through May 30 of the following year, plant growth, as indicated by growth indices, was less (linearly or quadratically) as rate of Sumagic (uniconazole) increased (Table 1). This reduced growth reached a maximum of 28.3% on November 30 by plants treated with 60 ppm Sumagic (uniconazole). By May 30, 1990, the reduction in growth indices relative to the control was 20.6% with the application of 60 ppm of Sumagic (uniconazole) but 12.4% or less with rates of 20 ppm or less.

Flowering, as indicated by flower and flower bud number, increased from 3.8 per plant for the control to a high of 8.1 per plant with the 20 ppm treatment. This change represented a 113.2% increase in flowering. Even with the lowest rate of Sumagic (uniconazole), 5 ppm, flower number increased 52.6% relative to the control. Time to first flower increased with increasing rates of Sumagic (uniconazole), although treatment means were similar for rates of 20 ppm or less. Flower diameter was not affected by uniconazole rate.

A maximum increase in flower and flower bud number of 113.2% occurred when plants were treated with 20 ppm of Sumagic (uniconazole). Growth indices of these plants were 12.4% smaller than nontreated plants. The greater compaction and enhanced flowering of plants treated with 20 ppm of Sumagic (uniconazole) suggest that this treatment may be useful in the commercial production of camellias for temporary use as interior flowering plants before later planting in the landscape.

Plants treated with 5 ppm of Sumagic (uniconazole) produced 52.6% more flowers than control plants, but plants were similar in size. Increased flowering with low rates of Sumagic (uniconazole), coupled with darker foliage and little or no reduction in growth relative to control plants, should produce more marketable plants for retail and wholesale nurserymen.

(*Ed. note:* This paper reports the results of research only, and does not imply registration of a pesticide under amended FIFRA. Before using any of the products mentioned in this research paper, be certain of their registration by appropriate state and/or federal authorities.)

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Shade Tree Growth and Nutritional Status as Influenced by Fabric Container and Trickle Fertigation[1]

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Abstract

Five species of landscape shade trees, when grown in fabric containers, showed small but significant reductions in caliper and height compared to field-grown control trees after each of 3 growing seasons, 1988–1990. Reductions also were observed in certain leaf nutrients: N and Ca after the second year, and P and K after the third year. There were increased levels of leaf Mn (1989), Zn (1990), and starch (1989). Trees of all species receiving 5.7 L (1.5 U.S. gal) of water per day plus 200 ppm of supplementary N applied twice weekly had consistently larger caliper after each of the 3 growing seasons and tended to have higher leaf Mn content after the second year. There was inconsistent, little, or no difference in height, or in other leaf nutrients, due to fertigation treatments or to irrigation alone.

Index words: Shade trees, mineral nutrients, carbohydrates, fabric containers, nursery culture, trickle irrigation, fertigation

Species used in this study: Littleleaf linden (*Tilia cordata* Mill. 'Olympic'); silver maple (*Acer saccharinum* L.); honey locust (*Gleditsia triacanthos* var. *inermis* Willd. 'Skyline'); green ash (*Fraxinus pennsylvanica* var. *lanceolata* (Borkh.) Sarg.); and Norway maple (*Acer platanoides* L.).

Significance to the Nursery Industry

Fabric containers are being used more by tree nurseries but there is need for information on cultural factors such as fertigation and irrigation practices. In the present study, conducted on a fertile, fine sandy loam soil with a large available moisture holding capacity, fabric containers reduced growth of all species, but the effect was limited. Final caliper reduction, although consistent across the 5 species studied and statistically significant, was small after 3 growing seasons [≤ 5 mm (0.2 in) mean over all species] and may be of marginal importance. In contrast, trickle fertigation increased growth of all species marginally; irrigation alone was of no benefit. On less fertile soil with lower moisture holding capacity, fertigation and irrigation should produce more growth and the effect of fabric containers may be more pronounced.

Introduction

In the early 1980's, nurseries began using in-ground (Field-Grow) fabric containers to grow large shade trees (11). Field-Grow containers are cylindrical with walls of a strong, non-woven, geotextile polypropylene fabric through which water and nutrients filter freely (11, 13, 14). The bottom of the container is constructed of clear, low-density polyethylene that minimizes downward root growth.

Compared with traditional-grown trees, fabric-grown trees are reported to have a greater proportion of total harvestable roots, the root system is more fibrous, smaller and easier to ship and handle (11, 12, 14), and has higher levels of carbohydrates (3, 6, 7) and (or) nutrients (3, 11). These factors are reported to reduce the seasonal constraints of planting, harvesting, and survivability of fabric-grown trees (14).

There has been limited but increasing evidence of reduced stem and root growth (2, 12) and significant redistribution

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