Developing *Lagerstroemia* Cultivars with Desired Flowering Characteristics

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Abstract

Open-pollinated seed from the *Lagerstroemia* cultivar 'White Chocolate' were irradiated to induce sterility. Over 800 plants were grown from this irradiated seed and evaluated for two years. Traits examined included date of flower initiation, flower color, plant type, leaf color, disease resistance, and seed set. Most plants flowered in mid-July, although there was little relation between the first-flowering date in the two years of the study. A range of flower and leaf colors were observed, and forty-six plants have been selected for further evaluation based on these traits. Slightly more than 60% of the plants flowered the first year from seed, and most of the remaining plants flowered the second year. Five of the 804 plants set no seed and are being evaluated further to determine whether mature plants will remain sterile, to determine the mechanism(s) of sterility, and to identify DNA sequences associate with sterility. This information will be useful in future research to develop sterile plants. Unfortunately, the sterile plants are not horticulturally outstanding, and the absence of seed set did not prolong flowering.

Introduction

Crapemyrtles (*Lagerstroemia* species and interspecific hybrids) are popular landscape plants in the southern United States. At the end of flowering, crapemyrtles produce unattractive dark-colored seed capsules. Creating a plant without these capsules would have several advantages. The plant would be more attractive after flowering and the lack of seed set could lengthen the duration of flowering. In other plant species we have noted that heavy seed production is associated with greater disease and insect susceptibility, and this could be an added benefit of sterile crapemyrtle plants. Concern about the ability of non-native plants to self-perpetuate in the landscape and out-compete native vegetation is an important issue for the horticulture industry. Research to develop sterile ornamentals also will show the public that the industry is proactive in addressing invasiveness issues.

Through the breeding program of Dr. Michael Dirr, the Horticulture Department at the University of Georgia has released a number of popular crapemyrtles, including disease-resistant dwarf cultivars in the Razzle Dazzle® Series. The current project was designed to build on this prior breeding success by developing sterile crapemyrtles, while at the same time making selections for cultivars with earlier flowering, longer flowering duration, and a different set of leaf and flower colors.

Materials and Methods

Open-pollinated seed from the crapemyrtle cultivar 'White Chocolate' were treated with gamma radiation to induce mutations. Rates of 0, 15, 22, 30, and 40 kr were used. The highest two doses killed all seed. Germination rates for the 15 and 22 kr averaged 15%. From these seedlings, 804 plants were evaluated in 3-gallon containers at the CANR during the growing seasons in 2006 and 2007. Sufficient insect activity was noted on the flowers to allow cross-pollination and seed set. We evaluated plants for sterility as well as date of first flower, desirable plant types, striking flower colors, flower amount, and pest resistance.

Results and Discussion

Of the total plants in this study, 11% (92 plants) were from the non-irradiated control, 55% (445 plants) were from the 15kr treatment, and 33% (267) were from the 22kr treatment. Slightly more than 64% of the plants flowered the first year from seed. In the second year, an additional 31% flowered, while 5% of the plants did not flower after being grown for two years. Twenty-eight plants were identified the first year as setting no seed. From this group, 23 produced seed in 2007. It is likely that many of these plants, particularly in the 22kr treatment, failed to set seed because there was insufficient time during the growing season to produce mature seed. In 2007, first flowering dates for these plants were one week earlier for the 15kr treatment and a full month earlier for the 22kr, allowing sufficient time for seed set.

Out of these 804 plants, we have identified 5 plants (0.6% of the total) that are most likely sterile, having set no seed in two consecutive years. The irradiation treatments that we used to induce sterility affect seed in a random fashion. Because very few plants in any breeding population are

horticulturally superior to their parents, there is a very low probability that we will identify a plant that is both attractive and sterile. In our study, these five sterile plants unfortunately do not possess outstanding horticultural traits. We had anticipated that plants failing to set seed would continue to flower. Unfortunately, the sterile plants did not flower any longer than the seed-producing plants in this study.

An additional aspect of this research was to identify plants that flower early, with the goal of creating crapemyrtle cultivars that would be attractive to consumers earlier in the growing season. We were interested in determining whether earlier flowering could be identified the first year that plants flowered. We anticipated that early flowering for seedling plants (grown in 2006) could be either genetically determined. We wanted to evaluate flowering date in both years, realizing that some plants flowering later in their first year of growth might have done so because they were immature, and that mature plants possibly would possess the early flowering trait.

On average, the plants in these populations began flowering in the middle of July. We saw very little relationship between the first flowering date of a plant in 2006 and its first flowering in 2007. Correlations between first flowering in the two years of the study were essentially zero. This suggests it could be challenging in this population to identify early flowering plants, or that selection would need to be made in different environmental conditions. However, we have identified plants each year of the study that began flowering in early June. These plants are undergoing continued evaluation and have been used in crosses to create more variability for early flowering.

We have retained a total of 46 plants from this population and are evaluating them further for ornamental value. Several plants have desirable combinations of the dark leaf color of 'White Chocolate' and different flower colors. Additional evaluation of pest resistance and overall adaptability are underway. We are also doing breeding work with several of these plants to further improve the combination of desired plant characteristics.

Table 1. Effects of irradiation on number and dates of flowering for seed-bearing plants of *Lagerstroemia*.

Treatment	Flowered both years				Flowered only in 2007	
	N	First flower date 2006	First flower date 2007	Correlation between first flower dates each year	N	First flower date
Control	83	July 21	July 21	0.00	8	July 23
15kr	255	July 17	July 7	0.08	152	July 29
22 kr	146	July 23	July 10	0.09	86	July 21

Table 2. Effects of irradiation on number and dates of flowering for seedless plants of *Lagerstroemia*.

Treatment	Flowered with no seed in 2006, but set seed in 2007	Flowered with no seed set both years	Flower date 2006	Flower date 2007	No flowers after two years
Control	1	0	July 28	July 10	0
15kr	7	3	August 16	August 6	28
22 kr	15	2	September 17	August 16	18