

Genetic Improvement of Woody Landscape Plants: Case Studies in *Viburnum*[®]

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INTRODUCTION

The genus *Viburnum* represents a group of highly diverse ornamental plants, which fill many landscape niches. Viburnums possess a wide range of ornamental characteristics, including showy flowers (some fragrant), attractive foliage, colorful and persistent fruit, pleasing habit, and striking fall color.

The goal of this breeding project is to combine the divergent ornamental characteristics of *V. lantana* (fruit display and hardiness) and *V. carlesii* (fragrant flowers, compact habit, and attractive fall color) into novel ornamental clones.

MATERIALS AND METHODS

Embryo rescue, micropropagation, and polymerase chain reaction-based procedures have been essential in the development of a hybrid population, increasing the base of usable germplasm, and improving efficiency of selection (Hoch et al., 1995; McCown and Hoch, 2004). Embryo rescue allowed for the recovery of plants from the *V. lantana* × *V. carlesii* wide cross. The initial F₁ hybrids resulting from this cross have led to a population of hybrids that combines the ornamental characteristics of these two species. At present, the second generation of these crosses is under evaluation and has produced a significant amount of variation in all observable traits. These clones have been planted in replicated test plots at two University of Wisconsin Agricultural Research stations, two plots at the West-Madison station (Zone 4b, 5a), and one at the Rhinelander Station (Zone 3b).

A wide range of characteristics, both ornamental and cultural, are under selection within these breeding lines. Among the ornamental characteristics being observed are: inflorescence size, coloration, and fragrance; fruit set and duration of red/orange fruit color; plant habit; and foliage characteristics, both summer traits and the duration of red/orange autumn color.

Four important cultural traits are also under evaluation: resistance to the introduced insect pest, the viburnum leaf beetle, *Pyrrhalta viburni* (Paykull); resistance to verticillium wilt (*Verticillium* spp.); cold hardiness; and ease-of-propagation via semi-softwood cuttings.

RESULTS AND DISCUSSION

A great amount of variation has been produced in all of the ornamental characteristics under observation, providing a wealth of material for selection and further breeding. In particular, variation in leaf characteristics and plant habit has been particularly striking (Fig. 1).

Leaf samples have been sent to Dr. Paul Weston at Cornell University for viburnum leaf beetle feeding assays. These assays have revealed large differences among clones for resistance to this insect, including a number of highly resistant individuals (Hoch et al., 2004).



Figure 1. Hybrid *Viburnum* test plot at the University of Wisconsin West Madison Agricultural Research Station showing variation in form within the population.



Figure 2. Hybrid *Viburnum* test plot at the University of Wisconsin Rhinelander Agricultural Research Station. Plant on the left has died back to the snow-line, while the plant on the right did not sustain winter damage and is flowering.

While most of the plants in this population are proving resistant to verticillium wilt, a number of highly susceptible clones exist, and these differences in susceptibility have been consistent across replications within and between test plots. A new study has been initiated to more rigorously screen these clones for resistance to these soil-borne fungi.

The test plot at the Rhinelander Research Station is located in U.S.D.A. Hardiness Zone 3, providing an effective test for hardiness in the upper Midwest. This plot has demonstrated the greater hardiness of *V. lantana*, and this hardiness has been inherited by a number of the hybrid clones (Fig. 2).

Viburnum lantana propagates readily via softwood cuttings, while *V. carlesii* has proven to be problematic in commercial settings, both in its capacity to root and to overwinter as rooted cuttings. A project to study the inheritance of the ability to propagate via cuttings was initiated 2 years ago with the help of funding from the I.P.P.S. This summer cuttings were harvested from field-grown plants of the hybrid and parental lines for the first time and put into a commercial propagation regime at McKay Nursery Company in Waterloo, Wisconsin. Initial observations indicate that significant variation in ability to root is present within this population.

The plants in this population will require approximately 2 more years of evaluation before select clones can be released to commercial growers for production evaluation. Interbreeding of selected individuals from this population is also taking place.

LITERATURE CITED

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