

LITERATURE CITED

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Plant Breeding Efforts in *Stokesia*, *Cercis*, and *Buddleja* at North Carolina State University

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INTRODUCTION

Breeding and genetic studies of various herbaceous perennial and woody ornamentals have been initiated by the author at North Carolina State University. These efforts, in conjunction with ongoing efforts by Dr. T. Ranney in the development of pest-resistant ornamental taxa, and the continuing commitment to new plant acquisition and testing by the J.C. Raulston Arboretum (JCRA), under the direction of Dr. Robert Lyons, reflect the department's commitment to the development of new cultivars for the nursery industry.

The author has initiated breeding efforts in various ornamental taxa based on available genetic resources currently available in the JCRA, and based on discussions with colleagues and nurserymen. In this report I will discuss the current efforts in *Stokesia*, *Cercis*, and *Buddleja* breeding. In addition to development of new ornamental cultivars, the research program will also focus on other related objectives including studies of reproductive biology, genetic diversity, propagation, and inheritance of important traits in these genera.

***Stokesia*.** *Stokesia laevis* (Hill) E. Greene (Stokes aster) is a herbaceous perennial native to the Southeastern U.S. Its range is quite restricted, with scattered populations found primarily in Mississippi, Alabama, Florida, Louisiana, and Georgia. Historically, Stokes aster has enjoyed moderate popularity in the perennials industry. Renewed interest in this plant has been fueled by the discovery in central Georgia of a population of Stokes aster demonstrating unique architecture. This population, now lost due to agricultural use of the site, was discovered in Colquitt County, GA, near the town of Omega by Ron Dieterman of the Atlanta Botanical Garden. Plants in this population showed tall, upright flowering scape architecture, unlike the shorter, non-upright scapes typical of the species. Selections from this population have given rise to the cultivar 'Omega Skyrocket'. 'Omega Skyrocket' has lavender-blue flower color typical of the species.

Our initial breeding objectives have focused on incorporating the novel upright scape architecture into a broader range of flower colors. Accordingly, we have hybridized 'Omega Skyrocket' with cultivars 'Alba', 'Mary Gregory', and 'Purple

Parasols', demonstrating white, yellow, and deep violet flower color, respectively. Preliminary hybridization experiments suggested that Stokes aster is sexually self-incompatible, simplifying the hybridization process and eliminating the need for emasculation (removal of male sexual flower parts on the intended female parent). First generation hybrid plants (F_1 progeny) in all crosses demonstrate both violet-blue flower color and upright growth architecture characteristic of 'Omega Skyrocket', suggesting genetic dominance of these characters. Selected progeny within each of these three F_1 families have been intercrossed, and F_2 seed have been obtained. F_2 populations, which will show genetic segregation for the various traits of interest, will be field planted in the summer of 2000. Individuals showing the desired combinations of traits will be selected and further tested in comparative performance trials.

Cercis. The late J.C. Raulston accumulated a large collection of species of *Cercis* and cultivars of *C. canadensis* L., now established at the J.C.R.A. The high number of interesting genetic variants in *C. canadensis* offers a number of breeding opportunities. Traits of interest include red leaf color ('Forest Pansy'), leaf variegation ('Silver Cloud'), double flowers ('Flame'), white flowers ('Alba'), pink flowers ('Wither's Pink Charm'), violet-red flowers ('Appalachian Red'), weeping growth habit ('Traveller' and 'Covey'), purple fruit color (some accessions of *C. canadensis* var. *texensis* [syn. var. *mexicana*]), and glossy foliage (*C. canadensis* var. *texensis*). We have made hybridizations in numerous combinations between all of these taxa. Initial hybridization attempts suggest that controlled crosses in *Cercis* are difficult, as fruit set was poor.

Because the pollination biology of *Cercis* is unknown, we resorted to emasculation when making crosses, which may result in flower injury and a decrease in fruit set. However, we were successful in obtaining F_1 seed from 15 different parental combinations in 1999. 'Traveller', a weeping cultivar of considerable breeding interest, is particularly difficult to use in hybridization. Two years of effort suggest that it is highly female sterile, and will produce little or no fruit. Additionally, 'Traveller' appears to produce little to no viable pollen, and also performs poorly as a male parent in hybridizations. Fertility of this cultivar will be studied further.

We have grown out open-pollinated progeny (seed collected from a specific cultivar, hence the female parent is known, but with no knowledge of the male parent) of various cultivars. Of particular interest are the progeny grown from seed collected from the variegated 'Silver Cloud'. Of 520 daughter plants, only two individuals showed the variegated character of 'Silver Cloud'. This demonstration of sexual transmission of the variegated trait from 'Silver Cloud' to its offspring suggests that the variegated character present in this clone is not caused by chimerism. Because of our lack of knowledge of the pollination biology of *Cercis*, and consequently our inability to infer whether these offspring are a result of self or cross pollination, no conclusions can be made regarding the inheritance of this trait at this time.

Buddleja. The high amount of genetic variability present in *Buddleja* affords considerable opportunity to develop new and novel taxa through controlled breeding. Initial efforts in our *Buddleja* breeding have focused on compactness, silver-gray leaf color, flower color, and the development of sterile cultivars. Considerable effort has been made hybridizing the yellow-flowered *Buddleja* 'Honeycomb' with various cultivars with the objective of developing yellow-flowered taxa demonstrating more

compact growth, greater flower production, and silver-gray foliage color. The potential for interspecific hybridization in *Buddleja* appears great. Numerous clones already in the commercial trade represent interspecific hybrids, and our initial breeding efforts suggest that controlled hybridization of *B. davidii* Franch. with *B. lindleyana* Fortune, *B. globosa* Hope, *B. fallowiana* Balf., and *B. salviifolia* (L.) Lam. are possible. Other interspecific combinations are currently being explored.

Because *Buddleja* has the potential to spread from cultivation, we are exploring the possibility of developing sterile cultivars. The approach we are using is to develop triploid (plants with three sets of chromosomes) cultivars by hybridizing normal diploid cultivars with a tetraploid clone (four chromosome sets) developed by Dr. Tom Ranney. These hybridizations appear successful. Progeny will be field tested in summer of 2000.

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New Color Plants for the South

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INTRODUCTION

My lifelong goal is to trial, discover, and develop low maintenance ornamental plants uniquely adapted to the South. Most of the plants I work with are tropical in origin and produced by cuttings. Others are old-fashioned heirlooms and I have a particular interest in perennial bulbs and reseeding annuals. This presentation includes a sampling of my recent projects.

***Lupinus texensis* 'Texas Maroon' (maroon bluebonnet).** An aggie maroon strain of the Texas State flower. This took years of selection from original blue tinges on pink flowers in a production field of pink bluebonnets. This was a joint introduction between Dr. Jerry Parsons and myself of Texas A&M University (TAMU). The selection was introduced by Wildseed of Fredericksburg, Texas, and is a 2000 TAMU CEMAP (The Coordinated Education and Marketing Assistance Program) promotion. This program is an industry - university cooperative program in which Texas A&M University and industry leaders partner in the identification of superior landscape plants for Texas and their subsequent promotion in the market place.

***Consolida ajacis* (syn. *C. ambigua*) (bunny bloom larkspur).** This is a selection of old-fashioned single larkspur by Dr. Jerry Parsons of TAMU. It blooms at Easter and has a rabbit in every flower!

***Petunia integrifolia* (syn. *P. violacea*) 'VIP' (VIP petunia).** 'VIP' is a vigorous, heat-tolerant, cultivar from South America. I made a selection from seed collected in a German garden. It has darker flowers and is more floriferous than the common