

Breeding Hardy Woody Landscape Plants

Harold Pellett

University of Minnesota Landscape Arboretum, P.O. Box 39, Chanhassen, Minnesota 55317

The goal of the landscape plant improvement program at the University of Minnesota is to develop and/or identify superior woody landscape plants that are tolerant of the climatic conditions of Minnesota and other northern areas. We approach this goal through two main activities: evaluation and breeding. In the evaluation area we try to acquire as many plants as we can that we think may have any chance of surviving under our conditions. Unfortunately, in the past couple of years we have had to curtail this activity greatly due to dwindling support. We also do a lot of cold hardiness testing in the laboratory to acquire definitive data on actual hardiness levels of different cultivars throughout the winter season. Plant improvement activities include breeding programs involving hybridization between different species or between plants of the same species that possess different desired traits. We also grow out open pollinated progeny for selection of superior plants in cases where we expect to have considerable genetic diversity in the populations. In both of these methods we are involved with a number of different plant genera and species.

We've made quite a few introductions over the last 15 years from this research effort. The plants introduced from our program provide examples of the diverse group of plants that we work with and illustrate the approaches that we use. Our introductions include: northwood red maple, (*Acer rubrum* 'Northwood'), autumn splendor buckeye, (*Aesculus* 'Autumn Splendor'), Princess Kay plum, (*Prunus nigra* 'Princess Kay'), northern sun forsythia, (*Forsythia* 'Northern Sun'), cardinal dogwood, (*Cornus stolonifera* 'Cardinal'), and freedom honeysuckle, (*Lonicera* 'Freedom'). All of the preceding plants have been available for several years and are becoming well established in the nursery trade. In addition we have several plant selections that are recent introductions or will be introduced in the next few years.

Acer rubrum 'Autumn Spire' is a fairly recent red maple introduction. It was selected from seedlings produced from seed collected from the wild. The female parent of 'Autumn Spire' was growing near Grand Rapids, Minnesota. 'Autumn Spire' was introduced for its hardiness in northern areas, and for its outstanding red fall color and narrow, upright plant form.

The next two selections are trees that we've decided to introduce but we haven't chosen names for them at this time. Both of these were selected from plants growing in our collections in the arboretum and did not result from controlled pollinations. A male selection of *Phellodendron* was made from a few trees that we grew from seed of *P. sachalinense* obtained from the Morton Arboretum. This selection may be of hybrid origin. The tree is quite vigorous, and has a higher branching habit than Amur corktree which is more commonly found in the trade. This characteristic would enable the tree to be trimmed up more easily for visual clearance under the canopy. A male selection of Kentucky coffeetree, *Gymnocladus dioica*, was made because of its excellent narrow, more upright crown and seedlessness.

Viburnum 'Emerald Triumph' is the first introduction from our breeding efforts

in the viburnum genus. It resulted from a cross between *V. burejaeticum* and *V. × rhytidophylloides* 'Allegheny'. 'Allegheny' is one of Don Egolf's introductions. It is a hybrid between *V. lantana* and *V. rhytidophyllum*. We look at 'Emerald Triumph' as a possible alternative to *V. lantana*. It is a more compact plant with darker, more glossy foliage. Its mature height and spread is about 8 ft. Fruit and flower qualities are similar to that of *V. lantana*. Fruits begin to color in early August in Minnesota, turning bright red and then black. Fall color develops quite late and frequently foliage is damaged by severe frosts before fall coloration fully develops. In extended fall seasons, an excellent bronze to dark red fall color develops.

When the honeysuckle witches'-broom aphid was first noticed in our area in 1981, we evaluated the various taxa of *Lonicera* in our collections at the Minnesota Landscape Arboretum for resistance and initiated a breeding program to develop resistant selections. Our goal has been development of resistant plants with pink to rosy red flower color and a fairly dense growth habit. We hoped to develop plants at least comparable to Zabel honeysuckle in plant quality but with resistance to the witches'-broom aphid. Through our breeding efforts, we have generated many hundreds of seedling that possess both rosy red flower color and resistance to the aphid. From those, we have selected 65 plants that have better plant form, flower quality, and late summer foliage quality. We have recently decided to introduce one of the earlier selections and have named it *L.* 'Honey Rose'. It has deep rosy red flower color, dark green foliage, and a compact plant habit with a mature height of 6 to 8 ft. Honey rose honeysuckle resulted from a cross between *L. tatarica* 'Zabelii' and *L. tatarica* 'Arnold's Red'.

'Northern Pearls' is a selection of *Exochorda serratifolia*. The mature plants are about 8 ft in height and 6 ft in width. It is hardy to Zone 4. 'Northern Pearls' is very showy for its large (2 in.) diameter white flowers which mask the foliage at time of bloom in mid May in Minnesota. Fall color is an attractive yellow.

The greatest effort in our breeding program has been devoted to development of cold hardy deciduous azaleas. Introductions to date include 'Pink Lights', 'Rosy Lights', 'Orchid Lights', 'Spicy Lights', 'Golden Lights', 'Northern Hi-Lights', and selection #43 for which we have not yet selected a name. The latest addition to the "Lights Series" of deciduous azaleas is 'Northern Hi-Lights'. Flower color is creamy white with a bright yellow upper petal. Plants grow to 4 ft in height and 4 to 5

ft in width. Foliage is quite resistant to mildew but not totally immune. Flower buds are hardy to -30F in mid winter. Foliage is a dark green and has a slight bronzy appearance as it first emerges in spring. Flowers open in late May in Minnesota. Selection #43 is a vigorous plant with red-orange flowers. Flower buds are hardy to -30F. in mid winter.

We are continuing our efforts with azaleas to obtain a more complete color range and to develop cultivars with better plant habits, foliage quality, and better resistance to mildew. We still need cultivars with pure yellow and red or near red flower color. We have many selections with pure yellow flowers and several with red-orange flower colors that are approaching true red. In recent years we have been using *Rhododendron viscosum* and Choptank River hybrids as parents. We have crossed them with many different Exbury cultivars. We now have many selections from second and, in some cases, third generation progenies. Many of these have excellent foliage qualities and nice clear flower colors representing quite a range of colors. We need to evaluate them further to determine their cold

hardiness capabilities.

All of the introductions mentioned have been introduced through a royalty program. Funds from the royalties are used to support continuation of our breeding activities. Anyone interested in producing our introductions can contact me for details.

We are continuing efforts with most of the species represented by the introductions mentioned and are also involved to some extent with several other genera. Other efforts include work with shrub roses, *Philadelphus*, *Spiraea*, and intergeneric hybrids between *Sorbus* and other genera of the Pomoideae subfamily.

CENTER FOR DEVELOPMENT OF HARDY LANDSCAPE PLANTS

In addition to our breeding program at the University of Minnesota, I have been quite active in the Center for Development of Hardy Landscape Plants. There is tremendous potential for breeding of landscape plants as you can see by what we've been able to accomplish in Minnesota, by the efforts that Elwin Orton described earlier, by the activities at the U.S. National Arboretum, and others. However, in total there is a very limited amount of effort devoted to breeding of landscape plants. There is a definite need for more effort to develop and select landscape plants that are more tolerant to the biological and environmental stresses that we often expect them to tolerate. The Center for Development of Hardy Landscape Plants was established to help increase that effort.

The Center is a relatively new organization that was established in 1990 to develop landscape plants that are more stress tolerant. The Center is a cooperative effort organized as a non-profit corporation. Researchers located at nearly seventy different institutions across North America and in the Scandinavian and Baltic countries are cooperatively participating in the research efforts.

Through funds generated by contributions of supporting members, the Center has initiated some breeding programs. The initial effort, started in 1991, is breeding of small landscape trees of *Pyrus*. We have used the pear species collections growing at the USDA clonal repository in Corvallis, Oregon, to do most of the crossing. Interspecies crosses have been made between several different species that have the potential to contribute desirable characteristics. In general, the pears are fairly tolerant to heavy soils and thus survive in many landscape sites where other trees do not do well.

The only pear species that has received much landscape use in North America is the Callery pear, *P. calleryana*. They are hardy only to Zone 4b and thus are not reliable for use in Minnesota. The most cold hardy species is the Ussurian pear, *P. ussuriensis*, which unfortunately grows fairly large and has a larger fruit than is desired in many landscape sites. *Pyrus fauriei* is a large shrub or small tree that is also quite hardy (Zone 4a) and develops an excellent fall color and small black fruit. *Pyrus salicifolia* has attractive silvery foliage, while several of the species such as *P. nivalis* and *P. elaeagrifolia* have good potential for drought or heat tolerance. Another species with considerable merit, *P. betulifolia*, has small fruit and attractive foliage. The leaves are bright green on the upper surface and silvery green beneath, reminiscent of the quaking aspen.

We now have many hybrid populations of different combinations of these species. The first generation hybrids (F₁s) are being grown at the Washington State University Experiment Station in Puyallup, Washington. When they reach flow-

ering age, we will produce F_2 populations and distribute them to sites in many different geographic regions for evaluation to select superior plants that are well adapted to the climatic conditions of the region in which they are selected. In this way we can efficiently breed and select plants for use in many different regions. We have started a second project to breed small maples and, as resources become available, we will expand this approach to breed many different groups of landscape plants. Through the Center we can develop excellent landscape plants that are adapted to many different regions of the world. However, for the Center to be able to continue and expand the activities started, and to be able to exist for the long term, we need a much broader base of support. We need widespread support from the nursery industry as well as the gardening public. Our sole source of continuing support is our supporting membership. Members receive our quarterly newsletter which describes activities underway and provides data from research results. To become a supporting member, contact me or other members or participants of the Center.

RALPH SHUGERT: Could you comment on the fragrance of the Northern Lights series of azaleas you have introduced.

HAROLD PELLET: 'Pink Lights', 'Rosy Lights', and 'Spicy Lights' are the best.

VOICE: Does 'Emerald Triumph' set seed.

HAROLD PELLET: It will set some seed by itself.