

NC-7 REGIONAL ORNAMENTAL TRIALS: EVALUATION OF NEW WOODY PLANTS

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INTRODUCTION

The North Central Regional Plant Introduction Station was established in Ames, Iowa in 1948. The activities of this Station are conducted under the auspices of a continuing research project funded by the United States Department of Agriculture and twelve state agricultural experiment stations in the north central United States (Wilson et al. , 1985). This project was the seventh such cooperative project in the North Central Region and is commonly referred to as the NC-7 Project.

The official title of the NC-7 Project. "Introduction, Multiplication, Evaluation, Preservation, Cataloguing, and Utilization of Plant Germplasm," describes the range of activities conducted at the Plant Introduction Station. Throughout the years, the species of plants maintained by the Station have occasionally changed, but

research at the Station has always emphasized the preservation and evaluation of germplasm collections of field and vegetable crops. These germplasm collections form part of the United States' National Plant Germplasm System and serve as important sources of genetic diversity for researchers worldwide (White et al., 1989).

There is, however, a unique program at the Station, which addresses some of the regional needs of landscape horticulture. This program, the NC-7 Regional Ornamental Plant Trials, began in 1954 through the efforts of a small group of dedicated horticulturists under the leadership of Professor S.A. McCrory of South Dakota State College (now University) (Dodge, 1962).

The north central United States is a region of climatic extremes and many parts of the region have alkaline soils that developed under grasslands. Because of these conditions, the diversity found in commercially available woody plants adapted to the area is less than that found in most other parts of our nation. The NC-7 Regional Ornamental Plant Trials were started with the ultimate goal of expanding the range of useful plants in the nursery trade. But, rather than serving as a structured introduction program, such as the University of British Columbia Plant Introduction Scheme or Chicagoland Grows, the emphasis in this program has been placed on detailed, long-term evaluations at a broad range of sites rather than on promotion of new plants (Pastore, 1988).

PROJECT ORGANIZATION

Trial site cooperators in the NC-7 Trials cooperate to varying degrees with their local nursery industry to introduce promising materials.

The NC-7 Trials rely on a network of horticultural cooperators located at sites scattered across the region and at a few sites in other states with similar climatic characteristics (Table 1). The cooperator network is coordinated by the Horticulturist (of the North Central Regional Plant Introduction Station) with the advice of a committee made up of representatives from the participating state agricultural experiment stations (Bhella, 1979).

Each year the Horticulturist assembles a collection of about 10 to 15 new items for testing. During the winter, a descriptive list of these plants is sent to each cooperator, and the cooperator selects plants to be tested at that site. During the spring, the plants are shipped or hand-delivered to the sites. The cooperators then establish plantings, observe and evaluate the plants through the seasons, and prepare performance reports one, five, and ten years after planting. These reports are sent to the Plant Introduction Station where they are recorded.

Because of the broad range of environments found among the trial sites, it is unusual for any particular trial plant to perform well at a majority of the sites, making system-wide releases difficult. However, when plants perform especially well at sites, the Horticulturist assists trial site cooperators in introducing the new plants with any official releases initiated through the cooperators' institutions rather than through the Plant Introduction Station.

PLANT ACQUISITION

New plants for the NC-7 Trials are acquired many ways. Three of the most common ways are through USDA supported exploration, seed exchange, and donation.

The National Plant Germplasm System funds both domestic and foreign plant exploration to obtain needed

Table 1. List of NC-7 Ornamental Plant Trial Sites

<u>Alaska:</u> University of Alaska, Fairbanks Alaska Plant Materials Center, Palmer	Grand Rapids West Central Experiment Station, Morris Southern Experiment Station, Waseca
<u>Colorado:</u> Colorado State University, Fort Collins	<u>Missouri:</u> University of Missouri, Columbia SCS Plant Materials Center, Elsberry
<u>Connecticut:</u> University of Connecticut, Storrs	<u>Nebraska:</u> Blair City Park, Blair University of Nebraska, Lincoln University of Nebraska, North Platte
<u>Illinois:</u> Southern Illinois University, Carbondale Chicago Botanic Garden, Glencoe University of Illinois, Urbana	<u>New Hampshire:</u> University of New Hampshire, Durham
<u>Indiana:</u> Ball State University, Muncie	<u>North Dakota:</u> North Dakota State University, Absaraka SCS Plant Materials Center, Bismarck North Dakota State University, Bottineau North Dakota State University, Carrington North Dakota State University, Dickinson
<u>Iowa:</u> Iowa State University, Ames	<u>Ohio:</u> Mount Airy Forest Arboretum, cincinnati The Holden Arboretum, Mentor Ohio State University, Wooster
<u>Kansas:</u> KSU Colby Branch Station, Colby SCS Plant Materials Center, Manhattan KSU Horticulture Research Center, Wichita	South Dakota: South Dakota State University, Brookings City of Spearfish, Spear-fish
<u>Maine:</u> University of Maine, Orono	<u>Wisconsin:</u> University of Wisconsin, Madison
<u>Michigan:</u> Michigan State University, East Lansing SCS Plant Materials Center, East Lansing	
<u>Minnesota:</u> Minnesota Landscape Arboretum, Chanhassen North Central Experiment Station,	

germplasm (Perdue and Christenson, 1989). In recent years, only a few of these exploration trips have been specifically for ornamentals, but useful materials may also be collected as an added benefit of explorations for other crops. For example, many plants with potential ornamental value were collected in 1988 by Dr. Maxine Thompson of Oregon State University during her trip to Pakistan to sample its diverse fruit germplasm.

Trial site cooperators also have been involved in domestic exploration to acquire new plants. Recent collections have emphasized plant populations growing at sites with stresses similar to those encountered in the region. One of the most productive domestic explorations was conducted in 1984 by Drs. James Klett and James Feucht of Colorado State University in the Rocky Mountains.

As one of the world's active gene banks, each year the North Central Regional Plant Introduction Station provides about 20,000 samples of germplasm to researchers around the world (Roath et al. , 1990). As a courtesy, many researchers who have received seeds reciprocate by sending the Station lists of seeds collected by personnel at their institutions.

Acquiring seeds through seed exchange lists can be problematic. Beyond an occasional problem with quarantine restrictions, the most troublesome problems occur either because of the lack of controlled

pollination in cultivated collections (producing unknown hybrids) or because of incorrect identifications (Donnelly, 1989). However, if one is mindful of these potential problems, seed exchange can be a more efficient and inexpensive way to obtain useful material from remote parts of the world than can plant explorations.

Direct donation is another way of obtaining plants for the NC-7 Trials. Occasionally, donations have come from institutions with large numbers of extra plants after exploration. Since 1984, plants from northern Japan and the Soviet Union have been donated by the Chicago Botanic Garden, and plants from South Korea, by the Holden Arboretum and by the National Arboretum.

More deliberate donations result when an originator of a new selection propagates it for advanced testing in the NC-7 Trials. Selected plants or cuttings produced by commercial nurseries and by research projects at many universities, by the USDA Soil Conservation Service, and by Agriculture Canada have been donated for testing during the last decade.

PLANT SELECTION

Since 1954, 495 accessions have been distributed for testing. About 50% of these accessions were trees (both evergreen and deciduous); 40% were shrubs; and the rest were vines, ground covers, and herbaceous perennials. A list of these accessions

can be obtained from the Plant Introduction Station.

The criteria used to select these plants are subjective and somewhat arbitrary. Factors considered include how a new plant may be an improvement over currently available ones, either because of aesthetics or adaptation, experience with new cultivated plants at a particular site or limited number of sites, and hypothetical performance of new wild plants based on the climate and soil of their native habitats (Ware, 1983). Other factors that can influence the decision to distribute an accession include ease of propagation and culture, the number and size of the propagules available in a particular year, and the specific interests of trial site cooperators. Many new accessions have unknown propagation requirements, and the Horticulturist is regularly challenged to produce these plants in sufficient number and size. Ideally, trial plants are chosen that can meet future trends in the landscape and nursery industry. Because the plants are evaluated for a ten-year period, it is advantageous to keep up with emerging problems and changing needs. Some current trends in the landscape and nursery industries influencing the introduction of new plants have been identified in a recent review by Widrlechner (1990). These trends include increased interest in low maintenance and xeriscape plantings, plantings better adapted to urban stresses, more regional diversity through the use of locally adapted plants, edible landscaping, and the use

of tissue culture for commercial propagation.

PLANT EVALUATION

Reviews of the evaluation procedures used in the NC-7 Trials, as they have evolved over time, can be found in reports by Dodge (1962), Bhella (1979), and Pastore (1988). In the early years of the NC-7 Trials, cooperators completed a "Species - Planting Site Report Form" for each accession tested, five years after planting (Dodge, 1962). This form asked for data on survival, growth and size of the plants, and for use recommendations. During the 1960's, reporting was expanded to include a "Report of Planting Form," and "One-, Five and, Ten-Year Performance Reports" (Bhella, 1979). These forms included information about site characteristics and more data on the plant's aesthetic characteristics and explanations of injuries and losses.

Until 1984, all recordkeeping relied on paper files. The development of the Germplasm Resources Information Network (Perry et al., 1988) led to the development of a new reporting system with data stored in a computerized database. Forms in use before 1984 were modified to allow computer generation and to simplify data entry. These forms are still completed by the cooperators and sent to the plant Introduction Station, where they are entered onto the computer.

Until 1980, the Plant Introduction Station produced a series of factsheets

summarizing the performance of trial plants. Now that a large amount of performance data is held by the database, a new system of summarizing performance data needs to be developed. The Germplasm Resources Information Network database is accessible to the public (Perry et al., 1988), and it should be possible to develop a system for database users to examine and easily interpret these data.

Beyond the valuable data collected by trial site cooperators, good trial results have occasionally led to the naming and introduction of new cultivars. Cultivars introduced as a direct result of the NC-7 Trials include 'Cheyenne' privet (Ligustrum vulgare L.), 'Meadowlark' forsythia (Forsythia europaea Degen & Bald. x ovata Nakai), and 'Smokey' dianthus (Dianthus plumarius L.) (Widrechner, 1985).

CONCLUDING REMARKS

The NC-7 Trials are one of the longest running evaluation networks for landscape plants in the United States. Many of the 36 trial sites have been participating since the 1950's and have developed extensive collections of interesting plants. These plants are available for public observation and teaching, and are often featured in field days for local nursery and landscape workers. Through the NC -7 Trials, extensive performance data on the aesthetic and adaptation characteristics of nearly 500 accessions have been assembled. From 1959 to 1980,

factsheets summarizing the performance of many plants were prepared. Specific data from all trial plants are available from the Plant Introduction Station on request.

Although only a few cultivars have been introduced as a direct result of the NC-7 Trials, trial plants can serve as a source of locally adapted propagation material. The NC-7 Trials also provide horticulturists and nursery workers throughout the region with an early examination of new releases from other institutions.

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