

NCRPIS Ornamental Curation & Research Project

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Ornamental Collection Description

We curate a diverse array of germplasm collections as part of the Ornamental Project, including woody landscape plants, herbaceous ornamentals, and mint-family plants.

The largest group is comprised of the woody landscape plants – trees, shrubs, and vines that are used in urban landscapes, for conservation plantings (such as windbreaks and buffer strips), for biomass, and for forestry and specialty products (such as willows for basketry).

The woody landscape plants can be divided into two subgroups, the larger includes 43 genera that are maintained at the Station for long-term conservation. The smaller includes a dynamic mix of accessions that are being temporarily cultivated to determine their utility as candidates for evaluation in the NC-7 Regional Ornamental Plant Trials.

Another major group of collections is made up of the herbaceous ornamentals and includes annuals, biennials, and perennials, focusing on the following families: Asteraceae, Malvaceae, Ranunculaceae, and Rosaceae.

Many of the herbaceous ornamental species also include plants with other economic uses (as vegetables, pesticides, medicinals) and some have been considered as candidates for industrial-crop development.

The final group curated in the Ornamental Project are mint-family plants that were originally assembled as part of a research program conducted in the 1980s to identify nectar sources for honeybees. Many of these species are also ornamental or are used as sources of phyto-pharmaceuticals or essential oils.

Ornamental Collection History and Development

The conservation of ornamental germplasm collections at the Station dates back at least to 1954, when Al Dodge worked with the 12 Agricultural Experiment Stations of the North Central Region to initiate the NC-7 Regional Ornamental Plant Trials. These Trials are conducted by a network of cooperators who evaluate new woody landscape plants for a ten-year period under a wide range of environmental conditions. In addition to trees and shrubs that were acquired for the trials, other ornamental germplasm was introduced through explorations and the efforts of a very active project to identify new industrial crops in the 1960s.

Starting in the mid-1980s, Mark Widrechner expanded these collections through more active curation, involving field collections, collaboration with the USDA-NRCS, seed exchanges with Botanical Gardens, and a project to evaluate native, mint-family plants as food sources for our burgeoning population of honeybees. The mint-family project gradually shifted its focus to aromatic species.

Three major "downsizing" events should also be noted. In the early 1990s, more than 400 accessions of trees and shrubs were transferred to the Woody Landscape Plant Germplasm Repository at the National Arboretum, which helped initiate that new active site. Similarly, in 2002, about 500 accessions of 23 herbaceous ornamental genera were transferred to the new Ornamental Plant Germplasm Center in Columbus, Ohio. Most recently, in 2004, curatorial responsibility for 240 accessions of *Echinacea* and *Hypericum* was given to the new Medicinal project, with support from the NIH-funded Center for Botanical Dietary Supplements.

Value and Uses of Ornamental Germplasm Collections

These germplasm collections are distributed frequently relative to overall collection size, with a peak of 117 external requests fulfilled in 2003. The woody landscape plant collections are presently being requested for such diverse uses as evaluation for resistance to Emerald Ash Borer (Asian *Fraxinus*), nutraceutical fruits (*Aronia*), and grape phylogeny and genomics (*Ampelopsis*).

The herbaceous ornamental collections include many genera with multiple economic uses. *Glebionis* and *Malva* include species used as green vegetables. *Tanacetum* includes herbs that contain aromatic compounds, pesticides (pyrethrins), and phyto-pharmaceuticals (parthenolides). For example, high parthenolide production was identified in *T. parthenium* PI 596395 (Cutlan et al., 2000). *Calendula* is being investigated as a source of calenic acid, an unusual fatty acid with industrial potential (Zu Beerentrup and Robbelen, 1987).



The mint-family plants have been evaluated for variation in honeybee preference (Widrechner, 1992), and, within this group, the genus *Agastache* has received considerable attention for variation in essential oil content and composition (Charles et al., 1991). These evaluations led to genetic research identifying both isozyme and pigment markers (Fuentes-Granados and Widrechner, 1997; Fuentes-Granados et al., 1998a) and the inheritance of essential oil composition (Fuentes-Granados et al., 2000). *Agastache rugosa* is also reported to contain novel antiviral compounds (Fuentes-Granados et al., 1998b).

Ornamental Collection Overview

Category	Genera	Accessions
Woody Landscape Plants (for conservation)	43	1000
Woody Landscape Plants (for NC7 Trials)	64	143
Herbaceous Ornamentals	63	727
Mint-family Plants	12	128
Total	182	1998

Major Genera Conserved

Genus	Category	Accessions
<i>Cornus</i>	WLP (Shrub)	132
<i>Betula</i>	WLP (Tree)	124
<i>Potentilla</i>	HO & WLP (Shrub)	113
<i>Calendula</i>	HO	83
<i>Fraxinus</i>	WLP (Tree)	65
<i>Spiraea</i>	WLP (Shrub)	63
<i>Alnus</i>	WLP (Tree and Shrub)	55
<i>Salix</i>	WLP (Tree and Shrub)	55
<i>Malva</i>	HO	54
<i>Rhus</i>	WLP (Shrub)	54
<i>Tanacetum</i>	HO	51
<i>Euonymus</i>	WLP (Shrub)	50
<i>Thalictrum</i>	HO	49
<i>Agastache</i>	Mint-family	45
<i>Caragana</i>	WLP (Shrub)	44
<i>Rumex</i>	HO	44
<i>Staphylea</i>	WLP (Shrub)	41
<i>Ligustrum</i>	WLP (Shrub)	35
<i>Monarda</i>	Mint-family	35
<i>Alcea</i>	HO	34

HO = Herbaceous Ornamental

WLP = Woody Landscape Plant

Special Features and Program Objectives

The woody landscape plant collections are closely connected with the NC7 Regional Ornamental Trials, which identify promising new plants suitable for Midwestern landscapes. During the course of regeneration of accessions being conserved at the Station, we keep an eye open for unusual, attractive plant forms or particularly well-adapted populations.

Data on woody plant survival and performance collected by the NC7 Regional Ornamental Trials has proven useful in quantifying climatic factors, such as low winter temperatures and moisture balance, that can be used to model plant adaptation and match landscape plants to appropriate environmental conditions (reviewed by Widrechner, 2004).

We also recognize the possibility that new landscape plants could naturalize and potentially become invasive. Thus, we are conducting risk-assessment research to establish criteria that can be used to minimize future risks (Widrechner et al., 2004).

While most of these collections are conserved as seeds with orthodox storage characteristics, our *Salix* collection is primarily made up of selected clones with special characteristics (basketry, biomass, bank stabilization, ornamental). We have been involved in a collaborative research project with the National Center for Genetic Resources Preservation in Fort Collins to develop reliable methods of cryogenic storage for dormant vegetative buds (Towill and Widrechner, 2004) to serve as a back-up for our field plantings.

Evaluating *Salix* clones



Preparing *Salix* stems for cryogenic storage



Seed regeneration for many of the larger, longer-lived species is challenging. We are working to develop new systems by using large cages and accelerating the reproductive maturity of trees and shrubs to reduce cycle times and more quickly make these accessions available for distribution.

2006 Shrub Cage Field



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