

ED MEZITT: *Sorbus americana* has always been a rather weak shrubby plant for us. Are there stronger plants available?

VOICE: We grow nothing but *S. americana* in the Chicago area. It is native to Lake County, Illinois and generally grows as a clump. It lives longer, gets less borers and has no fireblight. It also has better fall color than *Sorbus aucuparia*.

INTRODUCTION, TESTING, AND EVALUATION OF ORNAMENTAL PLANTS^{1,2}

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Plant introduction, in its broadest sense, is the introduction of wild plants into cultivation. Throughout the development of civilization, wherever man has gone, he has always taken along seeds of the plants with which he was familiar. The search for new or better plants was often an underlying reason for many of his explorations into unknown parts of the world.

THE HISTORY OF PLANT INTRODUCTION

Plant introduction in North America existed long before the colonial period. Only a few plants, from which the United States derives the major portion of its food and fiber, are native to North America north of Mexico. Some of the most important native plants, in terms of economic worth to U.S. agriculture, are sunflower, cranberries, blueberries, strawberries, conifers, and hardwoods. All of our major crops and most of our important fruits and ornamental plants have been introduced from foreign lands.

Although numerous valuable crop and plant species had been previously introduced, it was not until 1812 that the government of the new nation turned to any official consideration of agriculture and its development. Much progress was made through efforts of various individuals such as Benjamin Franklin and Thomas Jefferson. The latter was especially active

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while Minister to France, sending back seeds of many grasses, cereals, and vegetables and cuttings of olive and other fruit trees.

The U.S. Government early recognized the need for a continuing search for more adaptable crops. In 1819, the Secretary of the Treasury instructed all U.S. consuls to send useful plants back to the United States. This is the first official record of U.S. Governmental activity in the interest of foreign plant introduction. In 1827, President John Quincy Adams issued another circular instructing all U.S. consuls to "collect, and transmit seeds and plants, with information regarding climate, soil, propagation, cultivation, insect pests, and uses and agricultural literature." Several consuls participated and sent plant introductions to the United States. One of the consuls, Dr. Henry Perrine, in Campeche, Mexico, sent back many economic plants, and urged expansion of this program.

From 1836 to 1862, the Patent Office, U.S. Department of State, handled plant introduction activities. In 1836, the Patent Office was reorganized, and Henry L. Ellsworth was appointed Commissioner. Through his efforts, he secured in 1839, the first U.S. Government appropriation of \$1,000 for the collection and introduction of seeds and plants and the gathering and publishing of agricultural statistics. Ellsworth established the Federal Free Seed Program. By 1877, more than 2,000 packets of seed plus 150,000 packages of plants for cuttings were dispersed free of charge by the U.S. Government under this program.

In 1849, the Patent Office was transferred from the State Department to the Department of Interior, and a Commissioner of Agriculture was appointed to take charge of plant introduction activities. These events eventually led to the establishment of the U.S. Department of Agriculture in 1862. The new department did not receive cabinet rank at first and continued to be headed by a commissioner. Finally in 1899, because the department had developed and expanded so much, and the pressure from agricultural interests was so great, the position of Commissioner was raised to the cabinet rank of Secretary of Agriculture.

James Wilson, Director of the Iowa Agricultural Experiment Station, became Secretary of Agriculture in 1897, a position he held through three administrations. He was a man of broad agricultural interests and played a far-reaching role in the development of the U.S. plant exploration and introduction system.

Wilson brought together the scattered efforts of various divisions and established a new Section of Seed and Plant Introduction in 1898. The Secretary appointed David Fairchild, a dedicated plantsman, to head this new section with an appro-

priation of \$2,000. Since then, all seeds and plants introduced by the U.S. Department of Agriculture have been given a PI (Plant Introduction) number. Plant Inventories are published annually by the U.S. Department of Agriculture.

This development was the first landmark in the evolution of the U.S. Plant Introduction System as we know it today, but there was one significant weakness. There were no centralized facilities available for permanent maintenance and preservation of the seed once it was introduced and used. Consequently, much valuable germplasm was lost during the first 48-year period of the new system.

The passage of the Research and Marketing Act of 1946 is a second landmark in the evolution of the plant introduction system. It presented the opportunity for establishing Regional and Interregional Plant Introduction Stations with funding and staff provided by both the federal and state governments.

THE NATIONAL PLANT GERMPLASM SYSTEM

The National Plant Germplasm System (NPGS) is a coordinated network of institutions, agencies, and research units in the United States, which works cooperatively to introduce, maintain, evaluate, catalog, and distribute all types of germplasm. The principal elements of the NPGS are (Figure 1):

Figure 1. The principal elements of the National Plant Germplasm System.

- 1) The SEA-AR Germplasm Resources Laboratory at Beltsville, MD;
- 2) SEA-AR Plant Introduction Stations at Glenn Dale, MD, and Miami, FL;
- 3) State-Federal Regional Plant Introduction Stations at Ames, IA, Experiment, GA, Geneva, NY, and Pullman, WA;
- 4) The State-Federal Potato Introduction Station at Sturgeon Bay, WI;
- 5) The SEA-AR National Seed Storage Laboratory at Fort Collins, CO;
- 6) The Interregional Virus Free Deciduous Tree Fruit Laboratory at Prosser, WA; and
- 7) A large group of federal, state, and private plant germplasm curators. For example, the U.S. National Arboretum, Washington, DC, is a principal curator of germplasm of woody ornamentals.

Coordination of the research and service functions of these elements is achieved at the state, regional, and national levels. Each state agricultural experiment station (SAES) and participating federal agency is represented directly or indirectly on technical committees related to regional or interregional sta-

tions. Scientists who serve as technical committee members on these projects, not only collaborate in the evaluation of plant introductions but also formally represent the NPGS and provide liaison among other scientists at their respective locations.

Some of the representatives of each technical committee are members of the USDA-SEA-AR Plant Germplasm Coordinating Committee, which is internally advisory to SEA-AR. Several representatives of each technical committee also are members of the National Plant Germplasm Committee (NPGC). The NPGC also includes representation from the National Council of Commercial Plant Breeders and Cooperative Research.

These cooperative units, which comprise the NPGS, have the general mission of providing plant scientists with the germplasm needed to carry out their research. The research programs supported in this way vary widely and include the breeding of new varieties for such purposes as resistance to diseases, insects, air pollution, temperature, moisture, salinity, and other environmental stresses; for increased yield and improved quality; for ease of harvesting, better processing, and longer storage; for beautification, noise abatement, erosion control, and resistance to fire; and as sources of anticancer medicinals, analgesics, and industrial chemicals.

The NPGS is well established and is functioning to fulfill the germplasm needs for minimizing the genetic vulnerability of major crops. An advisory group to the NPGS, the NPGC, continually reviews, makes funding recommendations, and advises administrators of the USDA and SAES on needs and goals of the NPGS.

PLANT EXPLORATIONS

Introduction of plant materials is accomplished through planned foreign and domestic explorations. Planned explorations result from requests initiated by breeders, plant scientists, commodity groups, etc. Proposals for plant explorations can be submitted by any of these persons or groups to the Coordinator of the Regional Plant Introduction Station in their region for review and possible funding by USDA-SEA-AR.

Plant germplasm collected through USDA-financed plant explorations becomes a part of the NPGS. The Plant Introduction Officer, Germplasm Resources Laboratory, Beltsville, MD, catalogs all incoming accessions, assigns PI numbers, makes taxonomic identifications, and distributes PI materials to the Regional Plant Introduction Stations.

Germplasm also is entered into the NPGS from domestic research programs. This germplasm includes induced and natural mutations; cytological stock such as monosomes, trisomes, and

translocations; marker genes; species hybrids, breeding material with valuable combinations of characters; pest-resistant stocks; and obsolete commercial varieties that may have genes useful in the future. Research personnel who develop such material are obligated to call it to the attention of the appropriate Regional Plant Introduction Stations for inclusion into the NPGS.

Since 1898, some 434,000 plant introductions have entered into the NPGS. Over 190 foreign and domestic plant explorations have been funded by the USDA, more than 50 to collect ornamental plants.

Ornamental Plant Explorations. Many of our ornamental plants were brought originally from foreign lands by professional plant explorers who went on long and often hazardous journeys to collect ornamental plants. A few of the outstanding and dedicated plant explorers who made the USDA's plant exploration program truly successful are as follows:

NIELS E. HANSEN (1897-1906). Professor Hansen, Horticulturist at the Agricultural College of South Dakota, became the USDA's first plant explorer. The USDA's PI number 1 started with Hansen's collection from Moscow, Russia. His expedition was funded by the USDA and lasted from June, 1897, to March, 1898. The itinerary included eastern European Russian, Turkestan, Western China, and Siberia. Hansen made his second exploration trip to Russia in 1906.

Hansen sent thousands of seeds and plants to the U.S. Plant Introduction Office. Although the main objective of Hansen's trips was to collect alfalfa and forages, he sent several ornamental PI's of barberry, *Caragena*, crabapples, *Crataegus*, *Elaeagnus*, *Euonymus*, *Lonicera*, *Potentilla*, *Rhamnus*, and roses.

DAVID FAIRCHILD (1899-1933). Fairchild, the pioneer USDA plant explorer and first Head of the USDA's Seed and Plant Introduction Section, was one of the most successful and outstanding of the early 20th century U.S. plant explorers. He was highly competent, and many of his ornamental introductions from the Orient succeeded in the United States. He made eight plant exploration trips during 1899-1933. During his 1899-1903 trip to Japan, he brought back the first of the famous flowering cherry trees planted in Washington, D.C.

FRANK N. MEYER (1905-1918). Frank Meyer made four trips to Asia between 1905 and 1918 and brought several new species of *Euonymus*, Chinese elm, lilac, wild roses, *Viburnum*, and ornamental willows. Meyer found a dwarf lilac species on the high Wu-tai-shan mountain in northeastern China; the species was later named after him. This small lilac species, *Syringa meyeri*, blossoms as a very young plant and is especially treasured in modern landscape.

Meyer also collected pear seeds for rootstock purposes, which later resulted in the release of the Bradford ornamental pear. *Pyrus calleryana* 'Bradford', PI 209840 (a selection from PI 47261), is a beautiful, thornless, symmetrical, and upright-growing tree. It is loaded with white flowers during spring, occasionally followed by small brown fruits that are not edible. During the summer, it has dark green foliage which turns to gold-orange or red-mahogany during the fall.

JOSEPH F. ROCK (1911-1923). Joseph Rock, an Austrian plant collector, was first sent to Burma by the USDA in 1911 to search for the chaulmoogra tree (*Hydnocarpus kurzii*), the oil of which was used to treat leprosy. From Burma, he proceeded to China, India, and Siam, where he remained intermittently until 1923. Rock introduced many new species of lilies, azaleas, and rhododendrons to the United States.

JOHN L. CREECH (1955-present). John Creech, Director, U.S. National Arboretum, USDA-SEA-AR, Washington, D.C., is among the most active of modern-day leaders in the field of ornamental plant explorations. In 1956, he co-authored the USDA/Longwood Gardens (Kennett Square, PA) Joint Ornamental Plant Exploration Program, which resulted in 11 exploration trips in Asia, Europe, South America, and Australia.

Creech made eight plant exploration trips from 1955 to 1978 in northern India, Nepal, Japan, Hong Kong, Taiwan, Siberia, and the USSR and brought back a wealth of ornamental plant materials. The introductions collected by Dr. Creech are notable, not only for their immediate horticultural value, but also for their potential in plant breeding, such as disease resistance, ornamental characteristics, etc. The introductions of *Betula platyphylla* var. *japonica* (PI 235128) and *B. maximowicziana* (National Arboretum No. 39811) represent authentic material for the nursery trade and arboreta of two outstanding ornamental birches that had been represented by incorrectly identified or hybrid material.

In addition, Dr. Creech has introduced several hundred cultivars and wild species representing major plant groups such as *Abies*, *Acer*, *Adonis*, *Ardisia*, *Aucuba*, *Camellia*, *Chrysanthemum*, *Cotoneaster*, *Cryptomeria*, *Elaeagnus*, *Eurya*, *Hedera*, *Hemerocallis*, *Ilex*, *Lagerstroemia*, *Nandina*, *Pieris*, *Rhododendron*, and *Wisteria*.

New cultivars developed through breeding by Dr. Creech or selections made by him and others from his PI are as follows:

Chrysanthemum 'Montana' and 'Tokyo'
Cotoneaster microphylla 'Emerald Spray'
Euonymus fortunei 'Longwood'
Eurya japonica 'Winter Wine'

Hedera helix 'Yalta'
Ilex 'Albert Close', 'William Cowgill', 'Howard Dorsett',
 'Edward Goucher', and 'Harry Gunning'
Juniperus conferta 'Emerald Sea'
Sedum spurium 'Royal Pink'
Rhododendron 'Bayou', 'Ben Morrison', 'Green Mist', 'Mrs.
 L.B.J.', 'Petite', 'Pink Ice', and 'Whitehouse'

NC-7 REGIONAL ORNAMENTAL PROGRAM

The members of the NC-7 Technical Committee, during their annual meeting in Brookings, SD, in January 1954, recognized that there was a lack of ornamental plants capable of withstanding the extreme weather conditions in the North Central Region. The committee approved an ornamental evaluation project, which led to the organization of the NC-7 Ornamental Subcommittee.

The NC-7 Ornamental Subcommittee, consisting of one representative from each SAES and one from the NC Regional Plant Introduction Station, organized a program of uniform testing and evaluation of ornamental plants in the North Central Region. The subcommittee meets every other year and prepares a list of ornamental plant materials desired for future testing and evaluation. Foreign and domestic ornamental PI also are added to this list as they become available.

The horticulturist at the NC Regional Plant Introduction Station assembles the desired plant materials. The plants are either propagated at the Regional Plant Introduction Station or obtained from other sources such as nurseries, botanic gardens, arboreta, experiment stations, etc. Plants are either distributed without increase or are grown at the Regional Station until they attain adequate size and number and then are distributed to the NC-7 trial cooperators, as well as to arboreta and botanic gardens (Table 1). The average annual minimum temperature at the planting sites vary from -40°C (-40°F) to -18°C (0°F) (U.S. Department of Agriculture Plant Hardiness Zone 3-6).

Table 1. List of North Central Regional Ornamental Trial Cooperators.

Alaska	Alaska Agri. Exp. Sta., Fairbanks Alaska Plant Materials Center, State of Alaska, Palmer Washburn Farm and Nursery, Palmer
Colorado ²	Dept. of Horticulture, Colorado St. Univ., Fort Collins
Illinois	Dept. of Horticulture, Univ. of Illinois, Urbana Dept. of Plant and Soil Science, Southern Illinois Univ., Carbondale Dept. of Horticulture, Kishwaukee College, Malta Morton Arboretum, Lisle Chicago Botanic Garden, Glencoe
Indiana	Dept. of Horticulture, Purdue Univ., West Lafayette

Iowa	Dept. of Horticulture, Iowa St. Univ., Ames Iowa Arboretum, Beaver Bickelhaupt Arboretum, Clinton
Kansas	Dept. of Horticulture, Kansas Sta. Univ., Manhattan Kansas St. Univ., Colby Branch St., Colby Kansas St. Univ., Hort. Exp. Field, Wichita Plant Materials Center, USDA-SCS, Manhattan Kansas Landscape Arboretum, Washington
Kentucky ^y	Dept. of Horticulture, Univ. of Kentucky, Lexington
Maine ^x	Dept. of Plant and Soil Sciences, Univ. of Maine, Orono
Michigan	Dept. of Horticulture, Michigan St. Univ., East Lansing Division of Campus Parks and Planning, Michigan St. Univ., East Lansing Michigan St. Univ., Hidden Lake Gardens, Tipton Rose Lake Plant Materials Center, USDA-SCS, East Lansing Matthaei Botanical Garden, Univ. of Michigan, Ann Arbor
Minnesota	Landscape Arboretum, Univ. of Minnesota, Chaska Univ. of Minnesota, Southern Exp. Sta., Waseca Univ. of Minnesota, West Central Exp. Sta., Morris Univ. of Minnesota, North Central Exp. Sta., Grand Rapids Paul Bunyan Arboretum, Brainerd
Missouri	Dept. of Horticulture, Univ. of Missouri, Columbia Plant Materials Center, USDA-SCS, Elsberry Missouri Botanical Garden, St. Louis
Nebraska	Dept. of Horticulture, Univ. of Nebraska, Lincoln Univ. of Nebraska, North Platte Sta., North Platte District Conservationist, USDA-SCS, Blair Kearney St. College, Kearney Forestry Division, City of Omaha, Omaha Parks and Rec. Dept., City of Scottsbluff, Scottsbluff
North Dakota	Dept. of Horticulture, North Dakota St. Univ., Fargo Dept. of Horticulture, North Dakota St. Univ., Carrington North Dakota St. Univ., Dickinson North Dakota St. Univ., Bottineau Branch, Institute of Fores- try, Bottineau Plant Materials Center, USDA-SCS, Bismarck
Ohio	Dept. of Horticulture, Ohio Agri. Res. and Dev. Center, Wooster Secrest Arboretum, Ohio Agri. Res. and Dev. Center, Wooster Nursery Crops Research, USDA-SEA-AR, Delaware Mt. Airy Forest Arboretum, Cincinnati Holden Arboretum, Mentor Cox Arboretum, Dayton
South Dakota	Dept. of Horticulture, South Dakota St. Univ., Brookings Dept. of Horticulture, South Dakota St. Univ., Highmore Dept. of Horticulture, South Dakota St. Univ., Yankton
Wisconsin	Dept. of Horticulture, Univ. of Wisconsin, Madison Univ. of Wisconsin Arboretum, Madison Boerner Botanical Gardens, Hales Corners Paine Arboretum, Oshkosh

^z Western Region

^y Southern Region

^x Northeastern Region

Since the start of this program, about 350 ornamental plant introductions have been distributed in the NC Region. Once a cooperator receives plants, he/she sends a report of planting, and 1-, 5-, and 10-year performance reports. Information on per-

formance is compiled, and 5- and 10-year evaluation summaries are prepared and distributed to the cooperators, plant scientists, nurseries, etc. Research findings of significant horticultural interest are published in professional, semiprofessional, or popular journals and magazines.

The results of these regional ornamental trials have provided plant scientists, nurserymen, and homeowners with useful information on the potential of new ornamental plants.

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Tuesday Evening, December 11, 1979

The twenty-ninth annual banquet was held in the Ballroom West of the Sheraton St. Louis Hotel, St. Louis, Missouri.

On behalf of the Society, awards were presented to Mr. William Mertens, Department of Horticulture, Virginia Polytechnic Institute and State University, for the best graduate student award paper and to Dr. Robert D. Wright who was the advisor for the work presented in the paper by Mr. Mertens.

The award for the best undergraduate paper was presented to Mr. David Eichholz, Department of Horticulture, Purdue University, and Drs. Henry Robitaille and Paul Hasegawa, advisors for Mr. Eichholtz's paper.