Maple Collection Development Plan

Purpose

To preserve and display a comprehensive reference collection of maples (*Acer*), with emphasis on Asian and North American species, hybrids, and cultivars adapted to the Mid-Atlantic region.

The United States National Arboretum's living collections are part of the National Plant Germplasm System (NPGS) administered by the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS). Repositories in the NPGS collect, characterize, conserve, and distribute plant genetic resources to scientists, botanical gardens and arboreta, and nursery professionals in the United States and abroad. The acquisition of new cultivars and additional wild-collected *Acer* is critical to maintaining diversity and scientific and economic relevance of the Maple Collection. The genus *Acer* is one of the most important ornamental genera, with maples filling landscape niches from dwarf container plants to large shade trees. They are popular throughout the United States and temperate areas of the world for their diversity, adaptability and fall color display.

History

The Maple Collection spans the entirety of the 90 years of National Arboretum history. Four species are native to the National Arboretum, including *Acer negundo, A. saccharum, A. rubrum* and *A. saccharinum.* Oliver Freeman, a botanist with the USDA, and one of the first employees of the National Arboretum, made controlled crosses between *Acer rubrum* and *A. saccharinum* in 1933 at the arboretum. He began evaluating the progeny the following year. Two original *A.* ×*freemanii* remain in the collection (NA7775 and NA79137).

Maple accessions from the 1930's and 1940's still survive, including a nursery-sourced *Acer buergerianum* (NA2837*H), *A. griseum* seedlings (NA2189) originating from an original E. H. Wilson collected plant, *A. maximowiczianum* (NA567) from seed purchased in Japan in 1931, and *A. tataricum* subsp. *ginnala* (NA574*J) seedlings from seed purchased in China in 1933. During the same time period, the National Arboretum received propagules of an *A. truncatum,* wild collected in 1905 by Frank Meyer in China (NA1602).

In 1962, the collection of *Acer palmatum* grew exponentially with the donation of 50 cultivars by Henry Hohman, owner of Kingsville Nursery, located in Kingsville, Maryland. He donated an additional 50 cultivars in 1969. Many cultivars from the William Gotelli donation augmented this collection.

From the 1970s to the present, numerous additional *Acer* taxa were added. Many were wild collections made in Japan and China by arboretum staff, or by the North America China Plant Exploration Consortium (Appendix A). Numerous cultivars were added during this time frame as well (Appendix B).

Six *Acer rubrum* cultivars were introduced from the National Arboretum as the result of the breeding and evaluation work by Dr. Alden Townsend, research geneticist and lead scientist in the urban tree breeding program. Cumberland, New World, and Red Rocket resulted from provenance progeny tests across the range of red maple, and Brandywine, Somerset, and Sun Valley were developed from a breeding program emphasizing growth, fall color and leafhopper tolerance. All six cultivars are planted in the collection.

Dr. Frank Santamour, Jr., research geneticist in the National Arboretum tree breeding program, studied wound compartmentalization, graft compatibility, and chromosome numbers in *Acer*. He also produced checklists of cultivated maples for *Acer rubrum, A. platanoides, A. saccharinumum,* and *A. saccharum*. Maples in the USNA collection were often used in these studies.

Mission Fulfillment

This collection supports the National Arboretum mission by providing a well-documented collection available for education, display, and collaborative scientific studies and distribution. These efforts support the education, genetic research, conservation, and germplasm distribution objectives of the U.S. National Arboretum.

For educational and aesthetic purposes, maples are incorporated throughout the gardens in order to demonstrate their varied landscape uses and niches, , and complement an assortment of other plant groups and design styles at the National Arboretum.

Strengths of the Collection

The Maple Collection contains over 500 accessions, representing 275 taxa, the majority of which are well-adapted to Mid-Atlantic growing conditions. The collection is located throughout the grounds of the National Arboretum, Washington, DC, and at the Woody Landscape Plant Germplasm Repository, located at the Beltsville Agricultural Research Center's South Farm in Beltsville, MD. This large area contains various microclimates and soil types which support numerous and diverse individual species and cultivars. Each maple specimen is identified with a record label and nearly every specimen on the USNA grounds has a display

label. Many accessions are unique to the USNA, and are not represented in other Plant Collection Network gardens (Appendix D).

Wild-collected accessions, many with multiple collection sites over several years, are represented at the arboretum, including plants from Armenia, Azerbaijan, China, Georgia, Japan, Russia, Turkey and the United States. Wild-collected accessions from National Arboretum expeditions to Japan are particularly valuable, and include *A. palmatum* subsp. *matsumurae* (NA44905), *A. palmatum* subsp. *palmatum* (NA45208), and *Acer japonicum* (NA45189). *Acer truncatum* is represented from two wild populations in Japan, (NA44904 & NA45011), and one site in China (NA72429). *Acer pictum* subsp. *mono* is represented by two collection sites in Japan, (NA51032 & NA51256), and six wild populations in China (Appendix A).

The cultivars of Japanese maples from section *Palmata* series *Palmata* are well represented, with over 150 accessions, many are rare historical cultivars. Several of these cultivars were collected directly from Japanese nurseries, including *A. palmatum* 'Aoyagi' (NA40918), 'Jiro-shidare'(NA40893), 'Kurabeyama'(NA40896), 'Shishigashira' (NA 42389), and others (Appendix B).

The USNA herbarium possesses an extensive collection of maple vouchers from worldwide sources, particularly from areas where maples are most diverse, including East Asia, the Caucasus, and the United States. The *Acer* holdings in the herbarium are considered one of the best in North America, with both wild-collected and cultivated materials well represented. In addition, there are many historically significant vouchers, including original Ferdinand Rugel collections from the southeastern United States in the 1830's, and many of Frank Meyer's collections in Asia from the early 1900's.

Challenges of the Collection

While the collection contains many valuable wild-collected accessions, and important cultivars, it faces the challenge of stagnation. Some of the older plants and early accessions are in decline.

The Mid Atlantic climate is an excellent climate to grow many maples, but not all are well-adapted, particularly the snakebark maples (section *Macrantha*). Snakebark maples are often native to mountainous areas, and decline in vigor after 10 or 15 years growing in the Washington, D.C. where high night-time temperatures during summer severely impact growth; most prove to be short lived trees. Weather too, can affect the health of the Maple Collection. Occasionally, very cold temperatures following a very warm winter can damage Japanese maple

branches, making them susceptible to disease. Plants survive, but several years' worth of growth is lost.

Some specimens have declined and ultimately been killed by infection of *Verticillium*. Given the fact that this fungus may persist indefinitely in soil, it may limit the replanting of maples in some areas of the arboretum.

The heavy clay soils found at the arboretum provide challenging growing conditions for many plants, and maples are no exception. Efforts should be made to plant irreplaceable germplasm in the best locations throughout the arboretum.

Invasiveness is a concern for several species of maple in the eastern United States. Monitoring is an on-going effort, and two species are noted as occurring spontaneously at the National Arboretum: *Acer campestre* was documented as persistent on Mt. Hamilton; *A. palmatum* has seeded in areas around the Gotelli collection.

Current and Future Development

Horticulture staff have successfully conducted a complete inventory of *Acer* at the National Arboretum. All plants have been evaluated for health, and all have accession labels. Most maples throughout the arboretum have new display labels. All inventoried plants have been mapped, and their locations available publicly online through the National Arboretum's Botanical Explorer (ABE) software, or our mobile phone app.

To best match the growing requirements of individual species, the varied microclimates available at the National Arboretum should be utilized, beyond those present in the core Maple Collection and Asian Collection. An Asian maple may be better suited to the cooler slopes and better drained soils of Mount Hamilton, than to conditions found in the Asian Collection, with heavier soils and less air movement.

We will continue collecting *Acer* species across their native ranges, especially when those opportunities arise in Asia, Eastern Europe, and the United States. In an effort to keep the collection current, original-sourced or well-documented cultivars will be added, to reflect the latest standards of the landscape industry. In particular, new cultivars in section *Palmata* will be evaluated for suitability, and added to the National Arboretum collection, as these are perennial favorites of the industry and public alike.

Species in section *Trifoliata,* (*A.griseum, A. maximowiczianum,* and *A. triflorum*) are well adapted to the Mid-Atlantic climate and are resistant to *Verticillium*. Efforts should be made to collect and evaluate many different accessions, for outstanding landscape characteristics.

There are opportunities in section *Platanoidea,* especially *A. pictum, A. truncatum, A. miyabei,* and hybrids with *A. platanoides,* to be used as replacements for *A. platanoides*. These species are well adapted to the Mid-Atlantic area, and there are many accessions in the collection (Appendix A and B). The National Arboretum will continue to collect these species and evaluate modern cultivars developed by the industry and other breeders.

Plant renewal efforts are underway and will continue. Valuable accessions are being propagated and replanted, with an emphasis on older trees in decline (Appendix C). In addition, efforts will be made to propagate accessions that are unique to the National Arboretum and distribute them to botanical institutions to ensure their survival (Appendix D).

Herbarium vouchers will be prepared for accessions that have been added to the collection in the last few years, with emphasis on collecting during flowering and fruiting seasons.

As an integral, historic, and valuable core collection at the U.S. National Arboretum, the Maple Collection will continue to be a living resource in which *Acer* germplasm will be documented, evaluated, preserved, distributed, and showcased.

Appendices

Appendix A – complete list of wild collected accessions, with sources and date collected

Appendix B – complete list of original sourced, or close to original accessions

Appendix C – list of important accessions in decline or questionable health to be propagated

Appendix D – list of valuable accessions, unique to the National Arboretum

Collection Development Plan

Collection: Maple Collection

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Approvals:

10/24/17

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