Seeking Cold-Hardy Camellias

Anthony S. Aiello

For those of us in more northern climates, trips to southern or West Coast gardens in early spring often result in admiration (and a little envy) for the range and beauty of camellias (Camellia spp.) that can be grown in Zones 7 or warmer. As with many plants, we always want those that are either too tender or too boreal for our zone; those plants well suited for a particular climate are all too quickly considered prosaic and it is the struggling arcane plants that most of us cherish as gardeners. It was the tantalizing possibility of finding more cold-hardy camellias that 25 years ago led to a plant hunting expedition and the resulting multi-year evaluations of a group of Camellia japonica.

Domestic and international plant exploration, and subsequent evaluation of plant acquisitions have been important missions of the Morris Arboretum in recent decades. Since the late 1970s, staff of the Morris Arboretum have participated in 20 plant collecting trips, including trips to South Korea, China, the Caucasus Mountains, and regions within the United States. On these expeditions, seed is collected and returned to the Morris Arboretum for propagation. (Occasionally live plants are collected, but because of difficulties with transportation and import regulation, seeds are the primary form collected.) One of the main goals of our plant exploration and evaluation program is broadening the genetic pool of known species to extend cold hardiness and increase vigor.

Between 1979 and 1991, Morris Arboretum staff participated in five collecting expeditions to South Korea. These trips were planned to sequentially cover different geographic regions of South Korea. The 1984 Expedition to Korea’s northwestern coast and islands (Korea Northwest Expedition – KNW) visited areas along the northwestern coast and inland to the Kwangnunng Arboretum (now Korea National Arboretum) of South Korea [Meyer 1985]. It is from this 1984 expedition that the Morris holds a number of accessions of Camellia japonica collected on Taechong and Sochong Islands, off the west coast of South Korea. The island collections represent some of the most northern collections ever made of common camellia. As an extension of the Asian land mass, Korea is exposed to a continental climate that includes strong, cold, and persistent winter winds. Even along the coast, the Korean climate is much harsher than that in Japan. As a result, despite their location in the Yellow Sea, these islands are exposed to more extreme temperatures than one would expect from their maritime location.

The Trip to the Islands

The idea of visiting and collecting from these island populations of Camellia japonica was instigated by Barry Yinger [Asiatica Nursery,
Lewisberry, Pennsylvania, who had read of this northern cold-hardy population in the early 1980s (Yinger 1989a; Yinger 1989b). Through great persistence, Yinger first encountered these plants on Taechong and Sochong Islands in the winter of 1981. Yinger relates how his concern that the camellias were destroyed during the almost total deforestation of Korea during World War II turned to delight once he reached the islands. Yinger wrote about his first encounter with these camellias on Sochong Island:

"... off we went, up the hillsides overlooking the Yellow Sea, buffeted by the cold wind from the northeast. The hillside was bleak and brown with few trees of any kind. The only greenery was an occasional grove of pines, the lower limbs of which had been chopped off for firewood. Up a little further and there—at last—a grove of camellias glittering green against the brown dried grasses, catching the winter sunshine and throwing it back to us." (Yinger 1989a)

By counting the growth rings of stumps of camellias that were cut for firewood, Yinger estimated the age of these trees, some of which were 15 to 18 feet (4.6 to 5.5 meters) tall, as close to 150 years old. These astonishing trees had silently witnessed the political vagaries that had affected the Korean peninsula and its people over that long period.

In October 1984, Yinger, then at the U.S. National Arboretum, returned to Taechong, Sochong, and Paekryong Islands with Sylvester March, Paul Meyer, and Peter Bristol (of the National, Morris and Holden Arboreta, respectively) along with their Korean colleagues Chang Yong June and Chang Yong Hun. Although these islands are controlled by South Korea they are located just south of the 38th parallel and north of the mainland border between North and South Korea. The islands are within view of North Korea, so they are of military and political significance; the explorers were required to
have a naval escort to reach and travel on the islands and were forbidden from photographing the boat on which they travelled. As Meyer (1985) wrote:

“... it must have been a peculiar sight as the Korean navy boat pulled out of Inchon Harbor. Among the Korean sailors were four American plant explorers eager to collect on a group of islands in the Yellow Sea. Piled high on the deck were herbarium presses, seed bags, and general expedition supplies. The pole pruners leaning against the gun turrets created a strange juxtaposition. If the North Koreans observed this they must have wondered what this unusual mission was all about.”

Although the collecting supplies were exposed to the sea air, the Americans were sequestered below decks in crowded cabins for the duration of the long trip. Once on the islands, the collectors were escorted by the sailor companions, who eventually chipped in and helped with seed collecting and cleaning (trip details from Yinger 1989a and 1898b; Meyer 1985; and Meyer, personal communication).

The Americans travelled among the three islands for approximately one week, making a large number of collections from a great diversity of plants. Among these were nine seed collections of *Camellia japonica* including some
that were growing in pastures and others that had been transplanted into local farmers’ gardens. Six of these came from Taechong Island and the other three from Sochong Island. The islands’ inhabitants recognized the beauty of these plants and often transplanted them into their small home gardens. Meyer (1985) found a grove on Sochong Island to be the most impressive; here, the camellias grew into large trees that grew luxuriantly on a site exposed to sea winds and salt spray. The areas where they grew were heavily cut and grazed by goats. Only tall plants with their lower foliage eaten remained, and the grazing prevented any natural regeneration of seedlings. (Here at the Morris we have a similar problem, except it is the white-tailed deer that browse on our low hanging camellia foliage.)

The human and livestock pressure on the islands was significant and the field notes describe collecting from resprouting plants in locations that were either cut-over forests, heavily grazed, or along roadsides. As unromantic as these types of plants and locations may sounds, they can make for excellent field

Collecting seeds from mature, open-grown *Camellia japonica* plants on Sochong Island. An unidentified Korean sailor is standing beneath the trees at left.

Fruit of *Camellia japonica* collected on the 1984 Korea – Northwest expedition. The camellia fruit is a woody capsule containing several seeds.
collecting. Compared to a mature forest, with little sunlight reaching the understory and fruits far out of reach, roadsides or regrown areas provide plants with sufficient sunlight to produce fruit while lending easy access to the plant collector.

In addition to the camellias, numerous other plants were collected on the islands, and many of these have grown exceptionally well for us. Most notable among these collections are Callicarpa japonica, Lindera obtusiloba, Sorbus alnifolia, Styrax japonica, Pinus thunbergii, and Viburnum bitchuense. Meyer (1985) was particularly impressed by seaside populations of Styrax japonica, which were noteworthy because of leathery and glossy leaves that were unaffected by salt spray or summer sun. Plants grown from this seed collection grace our parking lot where their May flowers provide a fragrant welcome to our visitors. Over the years we have lost many compound-leaved Sorbus species, but perhaps the best mountain ash for our area is Sorbus alnifolia. With its simple leaves, abundant white flowers, striking coral-red fruits, and russet fall color, the Korean mountain ash is one of my favorite plants throughout the year. Another standout from this group is Lindera obtusiloba; anyone who knows the sublime golden yellow fall color of Japanese spicebush agrees that it is one of the most outstanding shrubs for autumn foliage.

Wanted: A Hardy Camellia
What was the impetus that led to such effort to reach a far-flung corner of the world? As mentioned previously, camellias are exquisite garden flowers, but the vast majority of camellia cultivars are not hardy in regions colder than USDA hardiness Zone 7. From the late 1970s into the early 1980s a series of extremely cold winters devastated camellia collections at the U.S. National Arboretum and elsewhere (Ackerman 2007; Ackerman and Egolf 1992). At the National Arboretum alone, the harsh winters reduced the collection of 956 30- to 40-year-old plants to less than a dozen struggling survivors (Ackerman 2000; Ackerman and Egolf 1992). These severe winters—and the damage to large numbers of cultivars—inspired Dr. William Ackerman, a plant breeder and camellia aficionado at the National Arboretum, and Dr. Clifford Parks, a professor from the University of North Carolina in Chapel Hill, to undertake breeding programs to develop camellias cold-hardy in Zones 6 and 7. In light of the severe winters at the time of the Korean expeditions, there was considerable excitement about the potential for cold-hardy provenances of Camellia japonica coming from South Korea (Yinger 1989a). It was hoped that these northern collections of Camellia japonica would expand the hardiness of common camellia, generally considered to be reliably hardy in Zone 7 (Flint 1997) but historically not reliably cold hardy in the Philadelphia area (Zone 6b).

The nine accessions of Camellia japonica were collected on the Korean islands in October 1984, and some of these seeds were sown at the Morris Arboretum beginning in November of that year. Eight of the nine accessions germinated successfully, with varying numbers of seedlings among accessions. Given the northern locations of the parent populations, we began...
a long-term field and garden trial of several accessions. Since the late 1980s plants grown from these collections have been evaluated for cold hardiness and several ornamental characteristics such as general vigor, leaf quality and retention, flower abundance and color, and plant habit. The camellias in this study all exhibit attractive evergreen foliage and single red flowers, which is typical of the straight species. These plants are large shrubs, reaching up to 12 feet (3.6 meters) tall or higher in 25 years. Although their single red flowers are not like the very showy forms grown farther south, their greatest value is in their hardiness and potential for breeding.

The Tryouts Begin

In 1986 plants were designated for one of two parallel evaluation studies: either a replicated field trial, or garden settings throughout the Arboretum. Of the eight successfully germinated accessions, six were eventually planted in the Arboretum’s trials or throughout the Arboretum.

In April 1987, 730 seedlings were planted in a replicated field trial at the Arboretum’s Bloomfield Farm research area and were evaluated for cold hardiness. From 1989 to 1993 all of these plants were evaluated for general foliage quality, vigor, and hardiness (survival) on a scale of 1 to 5 (with 1 being dead and 5 being excellent). As would be expected with seedling grown plants, there was great variation in the survival and quality of plants in this study (Aiello et al. 2008).

By June 1990, 589 plants survived, and 283 were deemed acceptable because they had a rating of 3, with only slightly damaged foliage. Three years later, in August 1993, the cutoff for retaining plants was elevated to a 4 ranking, that is, plants that showed only occasional foliar damage. At this level of scrutiny only 40 of 170 remaining plants made the grade. The winters of 1993–94 and 1994–95 resulted in further loss of plants, and by April 1995 the remaining plants were moved to our greenhouses. Then, between the fall of 1995 and spring of 1999, 25 of these highest rated plants from the original 730 in the Bloomfield trial were planted into the Arboretum’s public garden for further assessment (Aiello et al. 2008).

In a parallel study, between 1987 and 1991 an additional 33 of the originally germinated seedlings that were not part of the formal field trial were planted in protected garden settings throughout the Arboretum. These plants did not receive the formal ratings applied to their siblings in the research plots. Nevertheless, the winters took their toll and by October 1999, 22 of these plants remained in the garden.
Bringing it All Together

In October 1999, shortly after I arrived at the Morris Arboretum, a total of 50 camellias were alive in garden settings throughout the Arboretum. Faced with what was already a 15-year old trial, I wanted to bring some resolution to this evaluation effort and to determine which of the remaining plants truly stood out among the others. The 50 plants included the 25 plants from the field trials, 22 remaining plants from those originally planted in garden settings, and three additional plants which had been cutting-grown in our greenhouse from original seedlings. These 50 plants were growing in protected areas throughout the Arboretum, where the camellias could grow under the canopy of conifers or against buildings, where they were shielded from strong winter winds and afternoon sun. For example, one group was massed to the north of a very large Chamaecyparis pisifera that screens our parking lot from Meadowbrook Avenue, a quiet residential street that borders our property. Another group was planted along the northeast face of Gates Hall, the Arboretum’s administration building.

Starting in the fall of 1999 and continuing through the spring of 2004, the 50 plants throughout the Arboretum were visually evaluated. In the spring and fall of each year the plants were rated for a variety of ornamental traits including general vigor, hardiness, leaf retention, and foliar and floral characteristics. Plants with foliage that was deep green, glossy, disease-free, and with no winter injury received the highest ratings. Although there was not a great deal of variation in floral traits, plants with greater numbers of flower, flowers that were more open, and flowers with richer bright scarlet color were considered the most desirable. There was also significant variation in plant habit and we gave higher ratings to denser and more regularly shaped plants (Aiello et al. 2008).

After these visual evaluations were completed in late 2004, 43 plants remained alive and each year’s ratings for these plants were combined. These 43 plants were grouped into three categories according to overall performance and appearance after 5 years of evaluation. These categories were somewhat subjective but allowed us to consolidate several seasons of information into a shorthand that would clarify the better performing plants.

Of the 43 plants, the top 15 (“A” rating) exhibited consistent, positive performance in three key areas of the evaluation criteria. In particular, these plants flowered every year, maintained a desirable habit, and retained attractive glossy green foliage throughout the seasons. The foliage quality is especially important in March, when the effects of winter start to show on poorer performing plants. Because Camellia japonica flowers on old wood before new growth emerges, we were especially interested in those plants that retained high quality foliage as the flowers emerged from March into April. The middle 16 plants (“B” rating) generally performed well in one or two areas of the evaluation, but their performance was either not consistent, or was poor in the other categories. For instance, “B” plants may have had good foliage quality but their flowering was poor or inconsistent, or they might have had beautiful flowers but scraggly open habits that detracted...
from the overall quality of the plant. The lowest rated 12 plants (“C” rating) generally performed poorly in several categories. In some instances, they may have exhibited one positive characteristic, but this was overridden by the overall appearance of plant.

The Current Situation and Next Steps
After more than 20 years of evaluation, the numbers of Korean *Camellia japonica* at the Arboretum has gone from approximately 750 plants to just over 40 individuals. The remaining plants represent six of the original nine collections from Korea (KNW 312, 342, 344, 348, 350, and 352) and are a valuable genetic resource for introduction and breeding. Although their ornamental value may not compare to cultivars hardy in the southern and western United States, our plants exhibit attractive single red flowers and glossy evergreen foliage. They represent a significant advance in the hardiness of common camellia, with suitability for Philadelphia and the mid-Atlantic region, and possibly the lower Ohio Valley and coastal New England. These cold-hardy selections will appeal to Zone 6 gardeners who have coveted these plants after visiting the “Camellia Belt” found in southeastern and West Coast states.

Along with evaluating the remaining plants in our collection, over the past several years we have been propagating and distributing cutting-grown individuals from our highest rated plants. Camellias have been provided to other public gardens throughout the northeastern United States, including Chanticleer, and the Scott, Tyler, Willowwood, Polly Hill, and Arnold Arboreta. Our hope is that distributing this material will help conserve the germplasm and provide evaluation over a broader range of climates.

Camellias with glossy green foliage that remained attractive through the winter received higher ratings in the evaluation.
Single, red flowers were standard for the Korean seedlings, though some plants had more vibrant color or greater numbers of flowers.

Currently we are planning to name and introduce several individual plants from our *Camellia japonica* trials (see sidebar). Two of these plants are those that show the highest ratings for combination of plant habit, foliar quality, and flower density. One plant shows a striking upright habit and a fourth is consistently precocious, regularly blooming in late autumn compared to the normal early spring blooming time of the species.

Presently there are three commercially available introductions from the 1984 Korean *Camellia japonica* collections. These are: ‘Korean Fire’ (KNW 352) a 2003 Pennsylvania Horticultural Society Gold Medal winner that was introduced by Barry Yinger through Hines Nursery (Bensen 2000); and ‘Longwood Valentine’ and ‘Longwood Centennial’ (KNW 350) introduced by Longwood Gardens (Tomasz Aniśko, personal communication).

Going forward, our goal is to distribute our selections and compare them to other known cold-hardy forms of *Camellia japonica*. We are also working with plant breeders to share material in the hope that the hardiness inherent in our plants can be utilized to develop cold-hardy varieties with greater variation in flower color and form. Much of the work in developing cold hardy camellias has been conducted by Dr. Ackerman and Dr. Parks (Aniśko 2000). Additionally, Longwood Gardens continues a long research program in breeding and selecting camellias (Aniśko 2000).

The evaluation of woody landscape plants is a long-term commitment, one that often spans the tenures of staff at institutions that
New Camellia Introductions

There are four plants that we are planning to name and introduce. The varietal names and descriptions of these are as follows. All heights are approximate.

‘Balustrade’ (86-043*J / KNW 342). One of two plants at the Studio Building, a small office building near our administrative offices. This plant has a very narrow, upright habit and strongly upright branch angles. This plant has been growing in its current location since the spring of 1988 and is 11 feet (3.4 meters) tall and 3 feet (.9 meter) wide. The single flowers are a good scarlet red, typical of the species. It received an overall “A” ranking and flowered every year, with excellent lustrous foliage.

‘Meadowbrook’ (86-050*U / KNW 352). One of a grove of plants growing on the north side of a large Chamaecyparis pisifera along Meadowbrook Avenue, near the Arboretum’s parking lots. This plant has outstanding blue-green foliage. It has been growing in its current location since December 1995 and is 12 feet (3.6 meters) tall and 6 feet (1.8 meters) wide. Its flower color is a rosy red and lighter in color than others that we have evaluated. It received an overall “A” ranking, flowered every year, and had especially high marks for foliage quality and habit. This was ranked the number one overall plant of the entire evaluation. It is fully branched to the ground with an excellent ovate habit.

‘Bloomfield’ (86-050*W / KNW 352). Another in a grove of plants growing on the north side of a large Chamaecyparis pisifera along Meadowbrook Avenue, near the Arboretum’s parking lots. This plant combines the best flowering of all of our plants with excellent foliage quality and vigorous growth. This plant has been growing in its current location since December 1995 and is 16 feet (4.9 meters) tall and 9 feet (2.7 meters) wide. The single flowers are scarlet red, typical of the species. It received an overall “A” ranking, flowered every year, and had especially high marks for foliage quality and habit. This received an overall “A” ranking, flowered every year, and had especially high marks for foliage quality and habit. This was the number one overall plant of the entire evaluation. It is fully branched to the ground with an excellent ovate habit.

‘Morris Mercury’ (86-050*Z9 / KNW 352). One of a group of plants growing on the north side of Gates Hall, the Arboretum’s administrative offices. This is a precocious, fall blooming plant. This plant has been growing in its current location since October 1999 and is 11 feet (3.4 meters) tall and 7 feet (2.1 meters) wide. It has a more open habit than the others, with an upright arching branch habit. This plant blooms regularly in November of each year, with sporadic blooms the following spring. Despite flowering every year, it received an overall “B” rating due to its open habit and foliar damage after cold winters of 2000 and 2001.

Camellia japonica plants growing along Meadowbrook Avenue at the Morris Arboretum. ‘Bloomfield’ (Morris Arboretum 86-050*W) is pictured at the center of this photograph.
collect, propagate, and evaluate these plants. At the Morris Arboretum we have found that plants collected in the 1980s in South Korea have exceptional cold hardiness and adaptability. For example, stems from *Cornus kousa* that were also collected on the 1984 KNW expedition showed significantly more freezing tolerance in tests than plants of either Japanese or Chinese origin (Aiello 2005). Likewise, after more than 20 years of evaluation, the Korean *Camellia japonica* plants represent some of the most cold-hardy collections ever made of common camellia. These collections may extend the hardiness of *Camellia japonica* into more northern areas and bring the spring pleasure of camellias to eager gardening audiences.

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**Literature Cited**


Anthony S. Aiello is the Gayle E. Maloney Director of Horticulture and Curator at the Morris Arboretum of the University of Pennsylvania in Philadelphia, Pennsylvania.