Bamboos at the Arnold Arboretum—A Midwinter Performance Evaluation

Gary L. Koller

This unusual group of plants is hardier than most gardeners think.

Bamboos are woody, evergreen grasses grown extensively in Asia for food and shelter, as well as for landscape planting. There are believed to be 60 to 70 genera and approximately 1,200 species of bamboo worldwide, mostly growing in warm temperate or tropical climates. Only one species is native to the United States, *Arundinaria gigantea*, which has a natural range from Virginia, Kentucky, and southern Ohio to the Gulf of Mexico.

Bamboo has been cultivated for centuries in Asia and is revered for its strength, its flexibility, and its utility. The fact that it keeps its uniform green color throughout the year is seen as expressing virtue, persistence, and an unyielding spirit in the face of severe conditions. As a result of these qualities, the Asian people have used them extensively in their gardens to create places of reflection, dedication, and withdrawal, where the rustling sounds of the stems and foliage and the fluttering shadows cast by the leaves can be fully appreciated.

The adaptability of bamboo is remarkable. In nature they grow in plains, hilly areas, and high-altitude mountains, and in all soil types except those that are excessively wet, dry, or alkaline. In the northeastern United States, little is known about the hardiness of Asian bamboos or their growth potential. Mention the word bamboo to most gardeners and they cringe in horror, thinking only of its reputation for invasiveness and aggressiveness. Few know there are also bamboos that are only modest growers and easily kept in bounds.

The growth rhythms of bamboo are different from those of many woody plants. As the bamboo shoot, known as a culm, emerges from the ground, it is a fully preformed stem. It has the diameter it will always have, and it displays all the joints that will make up the entire length of the culm. Growth is strong and vigorous, and culms attain their full height in a few weeks. The culm never increases in height or diameter even though it may live for many years. The great strength and toughness of the bamboo arise from its rhizome, or underground stem, which produces the new sprouts and forms the structural foundation of the plant. Bamboos grow whenever soil and air temperatures are high enough to allow for such activity. When the stem is expanding above ground, the rhizome is dormant; and when the stem is fully grown, the rhizome becomes active. After planting, it generally takes bamboos three to five growing seasons for the rhizome system to develop enough size and vigor for the aerial parts of the plant to achieve their full size.

Because the rhizome system densely invades the top foot of soil, bamboos tend to be excellent plants for protecting the earth and preventing soil erosion. Most bamboo rhizomes terminate in a sharp point, which facilitates their colonizations of new ground, and makes them extremely difficult to contain in the garden. They can penetrate cracks in concrete, bricks, or rocks, and have been reported to emerge directly through asphalt. While the majority of bamboo roots and rhi-
Selected examples of culm habit, illustrated diagrammatically. (A) Sasa palmata; (B) Sinocalamus beecheyanus; (C) Phyllostachys nigra; (D) Schizostachyum hainanense; (E) Dinochloa scandens; (F) Sinocalamus affinis; (G) Bambusa textilis; (H) Arundinaria amabilis. Reprinted with permission from McClure, 1967.

zomes occupy the top foot of soil, a small percentage of them grow deeper, and these are a major impediment to effective containment in garden settings. I once asked a Japanese gardener how deep a barrier is used in Japan to contain the spread of a bamboo. He smiled, and said that even when a concrete barrier a meter and a half deep is installed, many bamboos still manage to escape.

Since most species of bamboo flower only at highly infrequent intervals, there is a severe shortage of flowering specimens in most botanical herbaria. This lack of reproductive specimens has forced botanists to define many bamboo species solely on the basis of their vegetative characteristics. Needless to say, this situation has led to incredible confusion in the botanical literature. Most bamboos, especially those that are widely cultivated, are listed under a wide assortment of scientific names. Without a doubt, many of the names currently used at the Arnold Arboretum are not the most up-to-date, since the experts themselves seldom agree about the correct name for a given species.

Arnold Arboretum bamboo grows without any special care or winter protection. New plantings are started in the spring using vigorous, container-grown stock. This minimizes root disturbance and gives the plants the entire summer to become established in their new growing environment. Bamboos need adequate moisture during this period of establishment, but with time they become more drought tolerant. The growth of bamboo can be stimulated by periodic applications of balanced fertilizer in April, June, and September. Once plantings are established, fertilizer is required only to encourage crop production (for the commercial bamboo shoots) or to stimulate greater culm diameter.

The Arboretum Bamboos in Winter

The Arnold Arboretum has grown a few bamboos for decades, but over the last ten years the collection has been expanded to the point where 26 taxa are now successfully established out-of-doors. When we began adding to our collection some ten years ago, I was sure that most species would not be hardy and that harsh winter temperatures would restrain the vigor of those that survived. I now realize that many species are not only fully root hardy, but also completely top hardy, and that a great many of them, once established, exhibit exuberant growth. I am amazed by their toughness and their tenacity, and fearful of their advances now that many have thrived beyond all expectations. As a result of this experience, the Arnold Arboretum is beginning to establish a track record of how bamboos perform in our New England climate, and how they might be integrated into landscape designs.
The two basic types of bamboo rhizome, (A) pachymorph or clumping, consisting of short, thick segments that develop relatively close to the parent culm; (B) leptomorph or running, consisting of long slender segments that develop relatively far from the parent culm. Reprinted with permission from McClure, 1967.

Not all bamboos are evergreen as far north as Boston. To determine which ones were, I decided to make a midwinter observation tour of the bamboos growing out-of-doors at the Arnold Arboretum. I made my tour on February 8, 1989, a sunny day with a light dusting of snow, and temperatures in the upper twenties. As I began my survey, I looked upon the lack of evergreen character as disadvantageous from a landscape design standpoint. Once out on the grounds inspecting the plants closely, I found many with foliage bleached to beige, a warm color that I found to be an attractive addition to the dull browns, grays, and dark greens of the New England winter landscape. In addition I enjoyed the gentle sounds of leaves brushing against one another, which seemed to create the illusion of endless whispering.

So that the reader might get to know these plants, I have prepared the following list of Arboretum bamboos, along with a map showing their planting locations (p. 36). The best way to learn about bamboos is to observe them firsthand through several seasonal changes. The notes that follow are based on midwinter characteristics, and readers should note that the summer colors are green, except for the variegated or colored foliage varieties.

**Arundinaria humilis**

Mitford
1352-83; map 33-b-4

Planted March 1985. This running bamboo is growing in light shade and typical acid loam, with excellent water and air drainage. The vigorous, upright culms are 4 to 6 feet (1-2 m) tall and form a dense clump. Foliage is 40% green and 60% tawny beige.
**Arundinaria pumila**
Mitford
1353-83; map 27-b-3

Planted March 1985. This plant is growing in typical acid loam, with excellent water and air drainage. The culms are 4 to 6 feet (1-2 m) tall, with a somewhat rangy habit due to crowding by a neighboring plant. The foliage is 95% beige and 5% green.

**Arundinaria pygmaea**
Asch. & Graebn.
262-85; map 33-d-2

Planted March 1985. This species is growing in full sun to light shade, in acid soil with excellent water and air drainage. The culms stand 2 to 3 feet (0.5-1 m) tall and are densely crowded together. The plant is extremely invasive and forms a good ground cover when planted in a mass. The foliage is 100% beige.

**Arundinaria simonii**
A. & C. Riv.
"Simon Bamboo"
1357-83; map 27-b-3

Planted March 1985. This bamboo is growing in the middle of a bed of English ivy, in moderate shade, and in dry, gravelly soil. It is a weak grower, with culms growing only about 1 foot (0.3 m) tall. This lack of vigor is probably due to insufficient cultural support rather than to lack of hardiness. Foliage is 100% beige.

**Arundinaria variegata**
(Sieb.) Makino
"Dwarf Whitestripe Bamboo"
474-86; map 32-c-1

Planted spring 1986. This bamboo is growing in dry soil with sharp drainage, in the shade of a large specimen of *Franklinia alatamaha*. This is one of the most desirable of the dwarf variegated bamboos with culms that stand 1 to 2 feet (0.5 m) tall and form a small dense clump. The foliage is tawny brown.

**Arundinaria viridi-striata**
(Sieb.) Makino
22510; map 15-c

Planted in the early 1900's, this bamboo is growing in a bottomland situation with adequate moisture throughout the year. The plant has spread vigorously and occupies a large area. Growth is restrained by mowing the lawn around it. Culms are 3 feet (1 m) tall and the foliage is tawny beige with no sign of green. The plant would be taller if it were not cut to the ground annually with a rotary mower. This planting has a handsome winter appearance in contrast to the drab grays and browns of the surrounding lawn and woods. This plant adapts well to underplantings of bulbs such as *Galanthus*, *Scilla*, *Chionodoxa* and *Puschkinia*.

*A female giant panda feeding on the shoots of a Fargesia bamboo in its native habitat in the Wolong Reserve in central China. Photo courtesy of George B. Shaller.*
**Fargesia spathacea**  
Franchet  
(= *Sinarundinaria murielae* and *Thamnocalamus spathaceus*)  
“Umbrella Bamboo”  
851-81; map 32-c-2

Planted spring 1981. This elegant bamboo is growing in full sun and typical acid loam with excellent water and air drainage. The culms stand 6 to 9 feet (2-3 m) tall and form a large, non-invasive clump with a graceful fountain-like habit. The edge of each leaf is beige-colored, while the central portion is bright green, creating a delicate texture in the winter landscape. This species is very hardy and has been cultivated at the Arnold Arboretum since 1960. In China, the umbrella bamboo grows at elevations between 3,000 and 10,000 feet (1000-3000 m), and is often an important food item in the diet of the giant panda.

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**Phyllostachys aureosulcata**  
McClure  
“Yellowgroove Bamboo”  
707-77; map 32-a-3

Planted March 1985. This bamboo is growing in full sun and typical acid loam with good water and air drainage. The culms are 10 to 12 feet (3-4 m) tall and stiffly upright. They are bright green, marked with a yellow groove. The plant is well established and shows vigorous spreading tendencies. The foliage is nearly 100% green.

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**Phyllostachys bambusoides**  
Sieb. & Zucc.  
“Giant Timber Bamboo”  
369-80, 490-80; map 50-c

Planted spring 1980. This species is growing in light shade and poor-quality dry soil. It is completely exposed to winter winds. The culms are 6 to 9 feet (2-3 m) tall and display little vigor and little spread. The foliage is 100% tan in color.

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**Phyllostachys bissetii**  
McClure  
1405-84; map 27-b-2

Planted July 1985. This bamboo is growing in moderate shade and dry soil. The culms are 1 foot (0.3 m) tall and lack vigor, possibly due to the fact that the plant was pulled up by vandals shortly after planting. Foliage is 80% beige and 20% green.

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**Phyllostachys congesta**  
Rendle  
371-80; map 50-c

Planted spring 1980. This bamboo is growing in full sun and poor-quality dry soil with full exposure to winter winds. The culms are 6 to 9 feet (2-3 m) tall and stiffly upright. The foliage is 95% green and is very attractive in the winter.

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![Fargesia spathacea in its native habitat in Fang Hsien, China, at 8000 feet (2500 m). The plants are 10-15 feet (4-5 m) high with yellow culms. This photo was taken by E. H. Wilson on June 19, 1910, and labeled Arundinaria murielae.](image_url)
**Phyllostachys dulcis**
McClure
"Sweetshoot Bamboo"
405-68; map 16-d

Planted spring 1970. This bamboo is growing in light to moderate shade in rich, moist bottomland soil. The upright culms are 10 to 12 feet (3-4 m) tall, vigorously spreading, and have formed a dense impenetrable thicket. The new shoots of this species are considered a delicacy by the Chinese.

**Phyllostachys flexuosa**
A. & C. Riv.
373-80 and 532-80; maps 50-c and 32-c-1

Planted spring 1980. This bamboo is growing in full sun and moist, rich soil at one site and poor, dry soil at the other. Those plants in the better soil have become our most vigorous bamboo, spreading rapidly and occupying a large area. The culms are 12 to 15 feet (4-5 m) tall and broadly arching, presenting a very graceful appearance. The foliage is 95% green with only light winter damage on the sunny side of the clump. The leaves remain fully green until early spring when, in response to the brighter light and warmer temperatures, they turn beige.

**Phyllostachys makinoi**
Hayata
374-80; map 50-c

Planted spring 1980. This bamboo is growing in light shade and poor-quality dry soil, fully exposed to the winter wind. The culms are 6 feet (2 m) tall, and the foliage moderately green with some beige around the edges. The plant is not particularly vigorous.

**Phyllostachys meyeri**
McClure
375-80; map 50-c
"Meyer Bamboo"

Planted spring 1980. This Chinese bamboo is growing in full sun in moist, well-drained soil. At the edge of the clump, the culms average 6 feet (2 m) tall, rising to 12 feet (4 m) in the center. A moderate to strong grower, all the outer leaves are tan, while the inner ones retain some green.

**Phyllostachys nidularia**
Munro
376-80; map 50-c

Planted spring 1980. This bamboo is growing in light shade and poor-quality dry soil, fully exposed to the winter wind. The culms are 6 to 9 feet (2-3 m) tall, and all the leaves are tan. The plant is not vigorous.

**Phyllostachys nigra 'Hale'**
[Lodd.] Munro
"Dwarf Blackstem Bamboo"
492-80; map 32-c-2, 32-c-4

Planted spring 1981. This distinctive bamboo, with black canes, is growing in full sun and typical acid loam. A strong grower, it has spread over a sizable area. The vigorous culms grow up to 6 feet (2 m) tall and are somewhat reflexed in their habit. In their second year, they turn a beautiful jet-black color. The foliage is 50% tan and 50% green. Normally the culms of this species develop their black stems in their second year, but the culms of the cultivar 'Hale' color during their first season.

**Phyllostachys nuda**
McClure
369-85; map 49-d

Planted spring 1987. This bamboo is growing in light to moderate shade in a rich, moist soil. The culms are 6 feet (2 m) tall and upright in habit. The foliage is all green with very little tan. According to reports, this is the hardiest of the phyllostachid bamboos, perhaps because of its ability to drop all its leaves in response to extreme winters.
**Phyllostachys viridis**
(Young) McClure
380-80; map 50-c

Planted spring 1980. This bamboo is growing in full sun and poor dry soil, fully exposed to winter winds. The culms are 8 to 10 feet (2-3 m) tall. The leaves are mostly green, with beige around the edges. The plant does not appear to be particularly vigorous.

*Sasa palmata*
(Marliac) Nakai
17578; map 16-d

Planted in 1891 with stock from Sapporo, Japan. This very hardy bamboo is growing in a moist shady bottomland. The plant has formed a large, dense colony with culms 6 to 8 feet (2-3 m) tall. The thick, leathery leaves are about 15 inches (0.2 m) long and 3 inches (0.07 m) wide, giving the plant a bold, tropical appearance. An extremely hardy, rapidly spreading bamboo. About one-third of the Arboretum's colony flowered in May 1977, following a brush fire that occurred in 1976. The planting died back after flowering, and took about five years to recover.

**Pseudosasa japonica**
(Sieb. & Zucc.) Makino
"Arrow Bamboo"
382-80, 1355-83; maps 16-d and 27-b-1

Planted March 1984. This bamboo is growing in light shade and poor-quality dry soil. The culms are about 3 feet (1 m) tall and form a dense clump. The foliage is all tawny beige and extremely handsome in appearance.

**Pseudosasa japonica var. tsutsuminana**
Yanagita
1356-83; map 27-b-1

Planted March 1985. This slow-growing bamboo is planted in light shade and poor-quality dry soil. The culms are about 2 feet (0.6 m) tall and form a small, dense clump. The foliage is 95% beige. The winter foliage on this cultivar is not as attractive as that of the species.

**Sasa tessellata**
(Munro) Mak. & Shib.
1354-83; map 33-b-4

Planted March 1985. This bamboo is growing in light shade and typical acid loam with good water and air drainage. The culms are 4 to 6 feet (1.5-2 m) tall, and have formed a dense colony that is spreading vigorously. This plant produces the largest leaves of any bamboo growing at the Arnold Arboretum, 24 inches (0.6 m) long and 4 inches (0.1 m) wide. They are 90% green in winter.

**Sasa veitchii**
(Carr.) Rehd.
"Kumazasa"
1390-78; map 1-a, 2-b

Planted spring 1983. This bamboo is growing in moderate shade and moist soil. The culms stand 18 inches (0.5 m) tall and are spreading slowly. The foliage is 75% beige and 25% green. On many of the leaves one can still detect the characteristic marginal stripe as a different shade of beige. During summer the foliage is solid green, but in early October a tan border develops along the margin of each leaf. From this point, through the following spring, the plant is visually most attractive. This species is used extensively in Japanese garden design (see inside front cover).
Sasa veitchii. A portion of a plant showing the rhizome, the diffuse clump habit, and the leafy culm with determinate inflorescences. Reprinted with permission from McClure, 1967.

Semiarundinaria fastuosa
[Marl.] Makino
“Narihira Bamboo”
263-85; map 32-c-1

Planted March 1985. This bamboo is growing in full sun and rich, well-drained soil. The culms are 6 to 8 feet (2-3 m) tall and very straight. This plant is a strong runner. The leaves are mostly green toward the interior of the clump.

Shibataea kumasaca
[Zoll.] Nakai
“Okamezasa”
264-85; map 33-b-4

Planted March 1985. This bamboo is growing in full sun to light shade, in typical acid loam with excellent water and air drainage. The culms are 2 to 3 feet (0.7-1 m) tall, but many of them have been bent over by ice and snow. The plant is a slow but steady spreader, eventually forming a dense clump. The foliage is 90% green.

Sources

Gary L. Koller is managing horticulturist at the Arnold Arboretum and teaches Landscape Architecture at the Graduate School of Design, Harvard University.

ERRATA, WINTER 1989 ISSUE:
page 62. Photo credit should read: Photograph by Malcolm Woronoff, Air Photos of New England, Inc. with orthographic correction by Swissair Photo + Surveys, Ltd.

page 67. The oak should be identified as Quercus velutina not Quercus alba.
Bamboos growing outdoors at the Arnold Arboretum, February, 1989.