

Plant Evaluation Notes

Boxwoods for Northern Midwest Landscapes

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Boxwood is a popular and an important landscape plant, both historically and in today's gardens. Many boxwoods have been cultivated since ancient times while others like the Korean box were introduced into cultivation more recently. Left to its natural shape or clipped, boxwoods can be used as hedges, specimen plants, sculptural topiary and box-edging. Boxwood is often a key plant in formal landscapes because it can be readily sheared. In northern gardens of the Midwest, boxwood are less common, but are used in the same ways as in other parts of the world.

Buxus is native to central Europe, Africa, eastern Asia, the West Indies and Central America. Boxwood is not native to North America, although in the southeastern United States, *Buxus sempervirens* is often called American box. Only three of the 30 species of *Buxus* are commonly cultivated in the northern Midwest. Littleleaf box (*Buxus microphylla*) and its botanical variety, the Japanese box (*Buxus microphylla* var.

japonica), are hardy to USDA Hardiness Zone 6 (Krussmann 1984). The Korean box, *Buxus sinica* var. *insularis*, formerly *B. microphylla* var. *koreana* (Batdorf 1989), has a smaller stature than the littleleaf box and is hardy to zone 4 (Dirr 1990). The small, yellow-green leaves of these plants are typically brown-toned in winter. *Buxus microphylla* and *Buxus sinica* var. *insularis* are considered the hardiest of all boxwood. *Buxus sempervirens*, common box, is hardy to zone 6 (Krussmann 1984) and has a greater stature than the preceding species. The large, dark green leaves remain evergreen all year.

Understanding the cultural needs of boxwood is important in creating a suitable growing environment. Boxwood is found naturally on limestone formations but is very tolerant of a wide range of soil types as long as the soil is not excessively wet or dry. Widely adaptable and easy to grow, boxwood accepts full sun or light shade. When grown in deeper shade, plants will be open and loose in habit. In

colder regions, light shade is more important in winter than in summer, because leaf scorch occurs in the winter sun. Selecting a site that shelters boxwood from drying wind is also important. Care must be taken when cultivating around the surface roots of boxwood, and mulching aids in protecting the roots throughout the year.

Combining the hardiness and compactness of the Korean box with the large, darker green leaf of the common box has resulted in a number of superior clones for northern climates. These hybrids offer the aesthetic effect of the common box with the increased hardiness of the Korean box. Many cultivars of the hardier littleleaf and Korean boxwoods can be found in the nursery industry today. The cultivar list of common box already seems endless, yet new cultivars of this popular species are introduced constantly.

There are, however, far fewer boxwood cultivars that are hardy and effective in colder, northern sites. Choosing a good, hardy boxwood that fits your intended use can be a challenge.



Buxus microphylla 'Fiori'

T. Clark



Clipped hedge of *Buxus* 'Glencoe' at Chicago Botanic Garden

D. Brennan

Evaluation Project

Boxwoods, like other broadleaf evergreens, can be seriously damaged or killed by the drying winds and scalding sun of harsh winters. Identifying boxwoods that would grow in northern climates was the goal of a research project initiated by the Chicago Botanic Garden in 1986.

The test group included cultivars of *Buxus microphylla*, *Buxus sempervirens*, *Buxus sinica* var. *insularis*, and plants of hybrid origin (Table 1). All names are valid according to the American Boxwood Society, except *B. microphylla* 'Fiori' (Batdorf 1989). The primary evaluation criteria were plant hardiness, winter foliage color, plant habit and insect resistance. The eight-year project evaluated the ornamental characteristics and cultural needs of each test plant to determine good boxwood cultivars for the Midwest landscape.

Three plants of each taxon were grown in a common area receiving full sun all day. The test site had good drainage, an average soil pH of 7.4 throughout the evaluation term and was surrounded on three sides by a five foot tall wooden fence. The surrounding fence and other shrubs in the area created a buffer that protected the site from wind. The soil base was clay loam with shredded leaves and wood chips added. Fertilizer was not applied during the evaluation term. Irrigation was given as needed. Plants were top-dressed with composted and shredded leaves to conserve water, to moderate soil temperature extremes and for aesthetic purposes.

Observations

The evaluation term was of sufficient length to observe the slow growing boxwoods. Plants were exposed to both mild

and severe winter weather conditions during this period (Table 2). Data were collected seasonally on hardiness, winter foliage color, habit, plant size, and insects or diseases.

Hardiness

Plant hardiness was measured by a cultivar's typical response to winter conditions. The taxa severely affected by winter temperatures were few, except during the winter of 1993-94 when temperatures reached a low of -22°F. *Buxus microphylla* var. *japonica* 'Green Beauty' was completely killed, and injured stem tips were noted on *B. microphylla* 'Sunnyside' and *B. sempervirens* 'Arborescens'. Latent winter injury accounted for the loss of approximately 25% of old wood on 'Arborescens' in 1994. Final damage was assessed in late May when signs of winter stress were fully evident.

Table 1: Boxwood Comparison and Characterization Data

<i>Buxus</i>	Height/width	Growth Rate ¹	Winter Color	Habit	Recommended
'Glencoe'	39 × 60 in.	slow to medium	green++	mounded	yes
'Green Gem'+	31 × 31 in.	slow to medium	green++	globose	yes
'Green Mound'+	29 × 38 in.	slow to medium	green++	mounded	yes
'Green Mountain'+	53 × 38 in.	fast	green++	pyramidal	yes
'Green Velvet'+	32 × 35 in.	slow to medium	green++	mounded	yes
<i>microphylla</i> 'Fiori'	18 × 35 in.	slow	brownish-tone	broader than tall	yes
<i>microphylla</i> 'Sunnyside'	37 × 68 in.	fast	green++	broadly mound+++	no
<i>microphylla</i> var. <i>japonica</i> 'Green Beauty'	33 × 50 in.	slow to medium	yellow to brown	mounded	no
<i>sempervirens</i> 'Arborescens'	66 × 55 in.	fast	green	pyramidal	no
<i>sinica</i> var. <i>insularis</i> 'Winter Beauty'	36 × 50 in.	medium	yellowish-green	mounded	yes

¹ Average annual growth rate: slow (less than 2 in.), medium (2 to 5 in.); fast (greater than 5 in.)

+ Hybrid origin—*Buxus sinica* var. *insularis* × *Buxus sempervirens*

++ Typically green, slight burgundy off-color in some winters.

+++ Form altered by tip injury each winter.

In most years, winter injury was limited to tender, late season growth only. This type of growth was sporadic and usually consisted of one to five leggy shoots at the top of a plant. All plants exhibited injury to late season growth, in at least one year, except *Buxus sinica* var. *insularis* 'Winter Beauty'. The only cultivars to consistently suffer foliar and stem damage each year were 'Sunnyside', which usually lost several inches of new growth across the top of each plant, and 'Green Beauty', which had a high percentage of desiccated leaves in 1988, 1990, 1991 and 1994.

'Sunnyside' put on a greater amount of new growth late in the season than any other boxwood in the trials. Damage was usually evident in early winter, sometimes soon after the first hard freeze. The unsightliness of the burned and bleached stem tips detracted from the display throughout the winter months. To alleviate this problem, late season growth on 'Sunnyside' was removed in the fall of 1992. Only a few injured stem tips were present on the plants in the following spring.

Foliage

Foliar character varied among the test boxwood from the large, glossy, bright green leaves of 'Sunnyside' to the glaucous green leaves of 'Green Mound' and 'Winter Beauty' to the dark green leaves of 'Green Mountain'. The large, deep green leaves of the hybrid cultivars, including 'Glencoe', were similar to those of *Buxus sempervirens*. The littleleaf and Korean boxwoods had small, yellowish-green foliage during the summer. The leaf color of many boxwoods changed during the winter months and in certain years significantly altered the ornamental aspect of those cultivars.

While a complete color change was rare, some cultivars showed a slight off-coloring in specific winters. The boxwood hybrids (*Buxus sinica* var. *insularis*

× *B. sempervirens*) from Sheridan Nurseries Ltd., Ontario, Canada ('Green Gem', 'Green Mound', 'Green Mountain' and 'Green Velvet'), exhibited a slight bronze or burgundy winter color in 1992 and 1993 only. The same tones were noted on 'Glencoe' in 1987, 1988, 1991, 1992 and 1993, and 'Sunnyside' in 1988 and 1992. *Buxus sempervirens* 'Arborescens' did not change color in any winter, except for an occasional stem tip. 'Green Beauty', 'Winter Beauty' and *B. microphylla* 'Fiori' off-colored yellow-brown to brown every year, although the degree of color varied between winters. The undersides of leaves damaged by boxwood psyllid turned brown, regardless of whether or not a plant changed color in winter.

Habit

Plant habits were evaluated for shape, size and fullness. Most cultivars had forms that were rounded or broader than tall. 'Glencoe', 'Green Gem', 'Green Mound' and 'Green Velvet' had tight, mounded habits that remained so throughout the trial period. In comparison, 'Winter Beauty' became open and loose as the

plants grew older. The upright stems of 'Green Mountain' were long and remained separate from each other, creating an open appearance as the plants aged. Pyramidal in outline, the habit of *B. sempervirens* 'Arborescens' was open and irregular. It also had the largest stature of any box in the trial. Plants were not sheared or altered by pruning, except for 'Fiori' which was clipped beginning in 1988 as part of its design use in the garden. The annual loss of top growth on 'Sunnyside' altered the normal development of its habit, making it almost twice as wide as tall. Annual growth rates were measured as slow (less than 2 in.), medium (2 to 5 in.) and fast (greater than 5 in.).

Insects or Diseases

Boxwood psyllid (*Psylla buxi*) was the only pest observed on test plants. The psyllid nymph is active for a very short period in the spring and feeds on developing buds, causing a cupping of the leaves. Controlling the insect is difficult because it is enclosed within the cupped leaves and also produces a waxy secretion that gives it additional protection. The adult insect is a fly that inserts its eggs between the bud scales during early summer, where the eggs then overwinter. Insect damage was highly conspicuous because of the leaf cupping, but no long term injury to plant health was noted. Damage was most evident in winter when the undersides of the cupped leaves turned brown. 'Winter Beauty' did not exhibit damage until 1992. 'Green Gem', 'Green Mound' and 'Sunnyside' were unaffected until 1991, whereas all other cultivars were first injured in 1988. Damage was most severe on 'Green Beauty', with approximately half of its new growth affected each spring. Plants were not chemically treated to eliminate the insect. All cultivars were disease-free during the evaluation period.

Table 2: Winter Temperature Summary for 1986 to 1994

Winter	Lowest temp. °F	# of days at 0°F or below	Last Frost Date
1986-87	-5	3	4/9
1987-88	-13	16	5/1
1988-89	-15	12	5/7
1989-90	-6	1	5/3
1990-91	-2	3	4/22
1991-92	-8	2	4/28
1992-93	-5	2	6/1
1993-94	-22	18	5/27

Data obtained from the Chicago Botanic Garden weather station

Latitude: 41°51'N. Longitude: 87°37'W.
Altitude: 176.4-190.35m (624-669 ft. a.s.l.)

Chicagoland Green™ Boxwood

Chicagoland Green™ Boxwood (*Buxus* 'Glencoe') is a 1994 introduction of Chicagoland Grows® Inc., a non-profit corporation formed by the Chicago Botanic Garden, The Morton Arboretum and the Ornamental Growers Association of Northern Illinois (OGA). Chicagoland Green™ Boxwood is a presumed hybrid received for evaluation at the Chicago Botanic Garden in 1982.

Chicagoland Green™ Boxwood is a broadleaf evergreen shrub with a dense, broadly mounded habit. Twelve year old plants at the Chicago Botanic Garden are three feet tall and five feet wide. The medium green foliage maintains excellent color throughout the year. Plants growing in open field conditions exhibited no measurable damage after exposure to record low temperatures (-27°F) in the winter of 1993/1994.

This cultivar has shown excellent insect and disease resistance. Boxwood psyllid has been observed periodically but has not significantly affected ornamental qualities. It is easily transplanted balled and burlapped or containerized. Chicagoland Green™ Boxwood is best sited with shelter from winter wind and sun. The performance of plants located in open fields has been superior to other cultivars in the trade.

Chicagoland Green™ Boxwood is a clonal selection with proven performance in a broad spectrum of production environments and landscape applications. Ease of container production makes this selection ideal for retail market sales.

Information provided by Chicagoland Grows® Inc. For further information or a list of wholesale nursery sources contact: Plant Introduction Program, Chicago Botanic Garden, 1000 Lake Cook Road, P.O. Box 400, Glencoe, Illinois 60022.



Winter injury of late season growth on *Buxus microphylla* 'Sunnyside'

Summary

Ten boxwood taxa were evaluated through eight very different winters at the Chicago Botanic Garden (USDA Hardiness Zone 5b). Plants were rated 'recommended' or 'not recommended' based on plant hardiness, winter foliage color, habit, growth rate and insect damage. Positive attributes in one category may not have outweighed negative attributes in another. For example, the excellent summer color and character of the foliage of 'Sunnyside' was not as important to its rating as was its lack of hardiness.

The boxwoods with superior characteristics that are highly recommended are: 'Glencoe', 'Green Gem', 'Green Mound', 'Green Mountain', 'Green Velvet', *B. microphylla* 'Fiori' and *B. sinica* var. *insularis* 'Winter Beauty'. Boxwoods that are not recommended for general use are: *B. microphylla* 'Sunnyside', *B. microphylla* var. *japonica* 'Green Beauty' and *B. sempervirens* 'Arborescens'.

Overall winter survival and frequency of winter damage were both taken into consideration when determining hardiness. In the evaluation, the injury to late season growth was not considered a criterion for judging a cultivar not hardy. Removal of late growth before winter may result in little or no stem injury in most winters.

Winter color was a major evaluation criterion. Off-coloring was not predictable or consistent for any particular cultivar. Although an evergreen character is desirable, winter foliage color was attractive in the case of the burgundy color of 'Glencoe' and the Sheridan boxwoods, while cultivars with yellowish-brown winter color were not as appealing. Psyllid damage was present in most years and must be considered when growing boxwood. Psyllid damage was more prominent in winter when the off-coloring was pronounced on the undersides of the cupped leaves.

The results of the trial show that boxwood can indeed be grown in the colder areas of the Midwest and that more than one cultivar can be used. The newer hybrids are especially useful in providing a character that is reminiscent of the less hardy common box. Selecting a hardy cultivar will ensure successful cultivation of boxwood in northern Midwest landscapes.

References

- Batdorf, L.R. 1989. Checklist of *Buxus* L. The Boxwood Bulletin 28(3):43-49.
- Dirr, M.A. 1990. Manual of woody landscape plants. Champaign, IL: Stipes Publishing.
- Krussmann, G. 1984. Manual of cultivated broad-leaved trees & shrubs, Volume I, A-D. Portland, OR: Timber Press.

