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VOICE: What was the growth rate of the shoots after rooting, and did you get multiple shoots?

TOM BANKO: Yes, they do throw multiple shoots and that needs to be worked on. The growth rate can be quite fast. With heavy fertilization, we have obtained 3 ft the first year.

BOXWOOD PRODUCTION IN THE U.S. MIDWEST

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Gardeners have known the value of *Buxus* species (boxwood) for thousands of years as: specimens, foundation plants, hedges, edging for knot gardens, accent plants, topiary, bonsai, and many other applications limited only by the imagination.

Boxwoods are native to Europe and parts of Asia. *Buxus sempervirens* has been in cultivation since the time of ancient Rome. During the middle ages it was cultivated in castle gardens and monasteries. During the seventeenth and eighteenth centuries it was in general use in Europe. It was during that time that colonists brought boxwood to America.

Along the coast in the states of Virginia, Maryland, and the Carolinas *B. sempervirens* cultivars did beautifully, but as the people moved westward, midwestern nurserymen learned of the limits of its range. Midwestern nurserymen have suffered many

disappointments when trying to grow *B. sempervirens* cultivars in their fields. They have not been able to tolerate midwestern (Zones 4 and 5) winters characterized by temperatures of -10 to -20°F , often without snow cover. These conditions, along with strong drying winds, have made field production of common boxwood economically unfeasible.

Today several cultivars of common boxwood are grown in the midwest with production in containers that can be protected from such severe winters. Once these cultivars are established in a protected garden site they may do well for years. For field production of boxwood, midwestern nurseries turned to Asia as a source of hardier types.

In 1918 E. H. Wilson found *B. microphylla* var. *koreana* and planted it at the Arnold Arboretum. Intrigued by the reported hardiness of the plant, Howard Scarff ordered one pound of seed from Manchuria in 1935. After sowing in flats with a sand medium seeds germinated and grew 100%. Eventually the seedlings grew large enough to line out in the field. The plants did well except that the foliage turned brown over winter. In 1950 Mr. Scarff noticed a few plants held their green color over winter; he selected cuttings from these. The resulting plants did well but lacked uniformity. In 1958 he selected 25 of these plants with the same color, habit, and uniformity, and placed them in a stock block. Progeny of this stock block were the original Wintergreen boxwood that went into the trade. This selection has stood the test of time and is still the most satisfactory boxwood for our area of the midwest and known for its outstanding hardiness and winter color. As beautiful a plant as *B. microphylla* var. *koreana* 'Wintergreen' can be, it is not without problems from a field production standpoint.

'Wintergreen' breaks bud very early in the spring (late March in our area) and the lush new growth is very susceptible to frost damage, which is characterized by a uniform dieback of the twigs. This can render the plants unsalable and necessitate heavy shearing and loss of size. While not killing plants, frost damage can render whole fields unsalable and make a long production cycle of 8 to 10 years even longer. Overcoming the problem of susceptibility to frost damage and the resulting increase in production time is why we are so excited about the hybrid boxwoods introduced by Sheridan Nursery, Canada in the 1970s. These resulted from random crosses of Korean and common box that were growing side by side in the nursery during the early sixties. Of the seedlings resulting from this cross, four were selected and named:

Buxus 'Green Velvet' is a vigorous globe form. It has the large dark green leaves of its common box parent, which it retains through the winter. *Buxus* 'Green Velvet' is a relatively fast grower. Under good cultural conditions one can expect to have a 12 to 15 in. salable shrub from a 3 to 5 in. rooted cutting in 6 years.

Buxus 'Green Gem' (PP #3736) is a slower growing dwarf selection reported to mature at 2 × 2 ft. It has smaller dark green foliage than 'Green Velvet' and a compact habit that would be ideal for low formal hedges. 'Green Gem' has a moderate growth rate. Under good cultural conditions one can expect to have a 10 to 12 in. salable shrub from a 3 to 6 in. rooted cutting in 6 years.

Buxus 'Green Mountain' is a vigorous grower with a very upright habit so that we are trimming it into pyramidal forms. The foliage is much like that of 'Green Velvet'. Under good cultural conditions one can expect to have an 18 to 24 in. pyramidal plant in 8 years from a 3 to 5 in. cutting.

Buxus 'Green Mound' was the fourth cultivar in the green series; however, because of its close resemblance to 'Green Velvet' we have not pursued its production.

'Green Velvet' is not a patented plant but is protected by the Canadian Ornamental Plant Federation (C.O.P.F.) and we pay a voluntary royalty to them. 'Green Mountain' and 'Green Mound' are not protected.

Aside from the ornamental attributes of the green series of boxwoods there are several other reasons why mid-western nurserymen and propagators should be aware of these plants from a production stand point.

- 1) Late bud break—the Sheridan hybrids break bud 3 to 4 weeks after the Korean cultivars, which is beyond the time when we generally get low enough temperatures to kill new growth.
- 2) Hardiness—the Sheridan hybrids appear to have inherited the hardiness of its Korean parent. We have not experienced any damage since starting field production but have only had temperatures to -10°F without snow cover. Professor Edward R. Hasselkus from Wisconsin reported that three sister seedlings of *Buxus* 'Green Velvet' have been growing in the University of Wisconsin arboretum for 18 years. (1) They were winter injured once in the 78-79 winter at -28°F . They suffered no injury at -28°F in the 84-85 winter.
- 3) Drought tolerance—something that the drought of 1988 has taught us is the ability of these plants to tolerate drought.
- 4) Vigor—the Sheridan hybrids produce salable plants two years earlier than either Korean boxwoods or taxus cultivars.

Propagation of *Buxus* starts with collection of cuttings. The timing of collection does not seem to be a critical factor in propagation of boxwood. We used to wait until a couple of hard frosts, thinking the accumulation of carbohydrates would increase rooting percentage. However, because of the large quantity of cuttings we

now take, we start in September and have seen no decrease in rooting percentage as a result of the early cutting date. If one's objective is quantity of cuttings, then the succulent autumn wood can be pulled off the more mature spring wood with a heel attached. These short 1 to 3 in. cuttings, after a quick-dip into 1000 IBA, root readily at a 95% take. If larger cuttings are desired, take 5 to 7 in. cuttings of spring wood and soak for 2 min in 5,000 K-IBA. One can expect a 90% take using this method. We stick our cuttings in sand that is 30% #9 (almost pea gravel) and 70% concrete sand but any well-drained medium should work. Culturally, we maintain the medium at 70°F. and keep it evenly moist. A Subdue drench is used every 6 to 8 weeks on the cuttings as a preventative against *Phytophthora*. We use a rate of 2 oz/100 gal of water and drench with one pint/ft². In 6 to 8 weeks callus appears and in 10 to 12 weeks roots appear. Once we see roots we begin a fertilization program. We apply 9-45-15 liquid feed at 100 ppm N constant feed until the cuttings are ready to be potted. We pot 'Green Gem' and 'Wintergreen' in 2¼ in. Nu Pots and 'Green Velvet' and 'Green Mountain' in 3 in. Nu Pots. We use Fafard No. 3 potting medium.

Growing-on of rooted cuttings is done in polyhuts.

In summer the huts are covered with 40% shade. In winter we use a double layer poly (one layer clear and one opaque) with minimum heat. Fertilization is 500 ppm 21-7-7 acid special every 10 to 14 days from March to August. After two years we have a 4 to 6 in. branched liner ready to go to the field.

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MIKE YANNY: Do any of the Sheridan hybrids flower and set seed?

JOERG LEISS: If you do not fertilize them they will flower.