PROPAGATION OF *BUXUS* AND *HIBISCUS*: A REVIEW—1940s TO 1980s

J. PETER VERMEULEN

John Vermeulen & Son, Inc.
Woodfern Road, P.O. Box 600
Neshanic Station, New Jersey 08853

I mention first-off that I do not consider myself an expert or an authority regarding either *Buxus* or *Hibiscus*. This is not to detract from their worthiness nor my appreciation, just a matter of circumstance. We have propagated and grown *Buxus* at John Vermeulen & Son for well over 40 years primarily from stem cuttings and in the 1950s were doing *Hibiscus syriacus* cultivars by whole root grafts but none since due to changing our product lines with the times. I believe both should have wider and more serious attention. Perhaps this review will help encourage that.

BUXUS

The genus *Buxus*, boxwood, is not native to North America. Literature variously claims some 30 to 70 species in western Europe, Mediterranean regions, eastern Asia, northwestern India, tropical and South Africa, and Central America. Discussion here will be limited to *B. microphylla* and *B. sempervirens*.

The trade and gardening public generally consider boxwood to be small, low, compact, and slow growing. Broadening the knowledge and uses promises much gain horticulturally and commercially, i.e. the larger *B. sempervirens* forms with some growing to 50 ft.

Although the hardiness factor has limited their use, recent selections can now be used in colder climates. Dirr (5) mentions three *B. sempervirens* cultivars, 'Inglis' and 'Pullman' to -20° F and 'Northern Find' to -30° F. In the 1950s former faithful member Joe Foucek of Sunnyside Nurseries in Troy, Illinois selected and grew a boxwood that was very hardy, kept a very good winter color and made up rather rapidly. I suggested he call it 'Sunnyside' and we listed it as such first in our 1964/1965 catalog as *B. microphylla* var. *koreana* 'Sunnyside'. Another introduced by Eastern Shore Nursery of Maryland is *B. microphylla* var. *japonica* 'Green Beauty'. It has withstood -22° F in our nursery and maintains excellent green winter color. Sheridan Nurseries of Mississauga Ontario, Canada offers four very hardy forms, 'Green Gem', 'Green Mound', 'Green Mountain' and 'Green Velvet', which Joerg Leiss (19) advises were selected from among 500,000 progeny of chance seedlings of *B. sempervirens* and thought to be crossed with

B. microphylla var. *koreana*. They are also drought resistant. Scarff's Nurseries (28) of New Carlisle, Ohio introduced *B. microphylla* var. *koreana* 'Wintergreen' (which they advise is now botanically known as *B. sinica* var. *insularis* 'Wintergreen') as an extremely hardy form.

Propagation. Larson (18), Leiss (19) and Roe (28) and others admit no spectacular advances in *Buxus* propagation in the 40 year period discussed here. Leiss writes "In the 1940's. . . nurseries in Europe did not even handle *Buxus*. Cemetery gardeners had hedges planted deep and. .rooted shoots were ripped off. . ." "When I came to Sheridan Nurseries *B. microphylla* var. *koreana* was the mainstay. Cuttings were made in glasshouses from a single year's growth. It took two years for them to develop. . .sand was used as a medium. *Buxus microphylla* var. *koreana* was also grown from seed with uniform populations and selections made for green color and particular habits."

Propagation at Scarff's is by stem cuttings starting in September. Roe and Sommers (28) gave us details in their 1988 paper to this Society. At our nursery we propagate by stem cuttings in late summer-early fall, after cuttings have hardened and before serious frost desiccation. Cuttings are stripped; treated with #2 Hormodin; inserted in flats containing granulated Canadian peat, clean sharp sand, horticulture grade perlite (1:1:1, v/v/v); and placed under intermittent mist until rooted. Tom McCloud at Appalachian Nursery takes 2- to 6-in. semi-hardwood cuttings from September 1 to 15, strips lower leaves, treats with Dip'N Grow (1 to 15, v/v) sticks in flats containing peat, perlite and styrofoam flakes (2:1:1, v/v/v), heats the medium starting October 15th to 60 to 65° F, mists, and gets 60 to 80% success.

Fraser Hancock (10), propagator at Sheridan Nurseries, advises: We use a similar system for about ½ of our crop of 300,000 cuttings (4 cultivars) using a raised sand bench with a white-poly tunnel covering. Cuttings are stuck September through October 31, and treated with 0.8% IBA in talc. These cuttings take 1½ years to root and results in 60 to 80% rooting. The other half go in sand and perlite beds in the greenhouse in December with bottom heat 65 to 70° F and rooting 90 to 95% in 8 weeks. Rooted cuttings are hardened off and moved to the field in spring. In the poly tunnel he prefers mature basal tissue and removes soft tips as these die in winter with the dead tissue subsequently causing fungal problems. The poly is shaded throughout, vented in summer.

At Monrovia Nurseries, Azusa, California, Dennis Connor reports all *Buxus* are propagated from 1½ in. softwood cuttings most of the year. These are washed in baths of 15 ppm chlorine then 200 ppm Physan, receive a quick-dip in 1000 ppm IBA, are stuck in flats with pasteurized mix of ROS peat, redwood sawdust, and plaster sand

(4:1:1, v/v/v), and placed under mist in outdoor beds in full sun. Bottom heat is kept at 80 °F. Rooting takes about 6 weeks.

I found the following discussions in previous IPPS Proceedings:

1954 Steavenson using mist over flatted cuttings in unshaded open beds. (31)

1955 De Groot using Chloromone on winter and summer cuttings (3)

1956 Hancock rooting summer cuttings with the Burlap Cloud method (11) (the method was updated in 1988 by grandson Fraser Hancock) (9)

1960 Kester dealing with stratification requirements for seed propagation (17)

1961 Piringer using supplemental light to enhance rooting (27)

1963 Hess reported *Buxus* response to long days is variable (14)

1965 Good and Tukey on leaching resulting from mist applications (7)

1965 Wott and Tukey on the influence of nutrient mist on rooting (34)

1966 Nelson on the role of bottom heat on root initiation (25)

1977 Milbocker using controlled environment in a humid chamber (23)

1983 Morgan and Colbaugh on the influence of sanitation treatments (24)

1988 Roe and Sommer discuss hardiness, new cultivars, and rooting of cuttings (28)

The Boxwood Bulletin of the American Boxwood Society, P.O. Box 85, Boyce, VA 22620, carries articles on *Buxus* propagation in the following volumes 2 (3,4), 3 (1), 6 (2), 8 (1), 13 (2), 14 (1), 16 (1), 20 (3), 22 (4), 23 (2), 25 (2), 27 (2, 4), 29 (1).

Research. Cdr. P.D. (Swede) Larson at the Blandy Experimental Farm of the American Boxwood Society (ABS) (18) states there is confusion and misinformation regarding origin of most cultivars, and that most being worked with show different responses to various factors applied in propagation. He states: 1) with *B. sempervirens* 'Suffruticosa' there may be 150 different unrecognized cultivars that could respond differently; 2) comments that *Buxus* cuttings root rather easily indicating experience with limited or confined groups. Interestingly, he observes that cuttings root best when taken from the top ⅓ of the plant. He urges a much greater research participation over a wide geographical area with a wide selection of cultivars to arrive at perhaps 20 or so outstanding cultivars having sufficient commercial potential so as to increase their popularity and use.

The ABS has cooperated with and partially funded research by Dr. Thomas Banko of VA Truck and Ornamental Research Farm of Virginia Beach, VA. Some of this work he has kindly consented to have included in this paper hoping to generate additional cooperation and support. His goal is to determine rooting response relative to times of cutting selection. Research reported here was done in 1985-86. About the 1st and 15th of each month, April, 1985, through March, 1986, 100 cuttings were taken from each of 5 subjects, *B. microphylla* var. *koreana*, *B. microphylla* var. *japonica*, *B. sempervirens* 'Suffruticosa', *B. sempervirens* and *B. harlandii*. All plants were mature and in full sun. Buxus sempervirens 'Suffruticosa' cuttings were 6 cm (2½ in.) long, others 10 cm (4 in.). All were stripped at basal end. Fifty cuttings received a 5-second dip in K-IBA, 4000 ppm. Fifty cuttings received no treatment. Twenty cuttings of each of the five subjects, 10 treated and 10 not treated, were stuck in flats containing a mix of pulverized pine bark and coarse perlite (1:1, v/v) and placed in a glass house kept to 60° F. There was no bottom heat and cuttings received 5 sec. of mist every 5 min. Cuttings were lifted after 20 weeks. The results:

Treated Cuttings: (optimum rooting times)

B. microphylla var. *koreana:* best mid-May to mid-September, poor mid-September through January and moderately well February 1 to mid-May

B. microphylla var. *japonica:* best mid-June through mid-September, poor through winter, better in April

B. sempervirens 'Suffruticosa': best July through October, poor during winter, better February through April

B. sempervirens: best mid-December through mid-April, also early July through early October, poor mid-October through early December

B. harlandii: uniformly rooted close to 100% throughout the year

Untreated Cuttings: All were similar to treated cuttings, however treated cuttings had more and stronger roots; also the optimum rooting periods were narrowed, *B. harlandii* rooted close to 100% except in October through November.

HIBISCUS

Of the 150+ species worldwide I will focus on *Hibiscus rosa-sinensis*, the Zone 9/10 Chinese hibiscus, and *H. syriacus*, the Zone 6 rose of Sharon or shrub Althea. *Hibiscus syriacus* and cultivars,

being hardy, were discussed in early I.P.P.S. meetings. Chadwick (2) in 1953 reported on storage vs. no storage on rooting of hardwood cuttings; in 1962 Halward (8) reported on the use of dormant scionwood and using side or veneer grafts with 1 year mature scionwood on *H. syriacus* in winter-spring; Whatley, Thompson and Williams (33) in 1966 tell of beneficial effects of using dimethyl sulfoxide (DMSO) as a carrier or synergist for auxins in the rooting of softwood cuttings; in 1969 Carville (1) recounted highly successful rooting of softwood cuttings under outdoor polyethylene tents. In 1979 Loach (20) reported decreased rooting at very low light levels under mist. Currently Tom McCloud of Appalachian Nurseries, Waynesboro, PA is taking 4 to 6 in. softwood cuttings July 1 to 15; leaving 2 to 3 leaves; not wounding; treating with Dip'N' Grow 1 to 20; sticking in peat and vermiculite (2:1, v/v) in a shaded greenhouse bench without bottom heat, under mist, and averaging 80 to 90% rooting.

With the expansion of IPPS memberships to moderate and tropical climates more work began to be shared with the less hardy (Zone 9/10) *H. rosa-sinensis*. Roller (29) reported grafting procedures at Cartwright Nurseries, Winchester, Tennessee in his 1964 paper at Sacramento, California. In a recent letter he recalls 30 years ago rooting in sand or any of the commercial mixes using new firm, but not hard, wood leaving 2 to 3 leaves, using 25% Chloromone or #2 Hormodin and just enough mist to keep leaves from wilting. He states budding was not difficult and was successful when he budded on green, soft shoots.

Hess (12, 13, 15) used *H. rosa-sinensis* in rooting cofactor research in 1959, 1961 and 1965. We have had papers from Walters (32) on cuttings, grafting and budding in 1967; Macdonald (22) on the effects of lighting on propagation in 1969; grafting was also discussed by Palmer (26) in 1973 and Scott (30) in 1975 and 1976. Also in 1976 de Lance (4) reported on the effects of bottom heat; in 1984 Kelety (16) told us about propagation and container culture in Texas; and in 1985 we heard how they do it "down under" from Wellesley Eden (6) in his paper, "*Hibiscus* Propagation in Cool Climates".

A wealth of information is given us by Bruce Macdonald (22) in his book *Practical Woody Plant Propagation for Nursery Growers.* He covers mother plants on page 513, seed treatment, page 45; hardwood cuttings, page 307; heated bins as an alternative to conventional grafting and budding on page 322; the Melfert unit container for rooting cuttings on page 210—the unit being a 'padded envelope' the padding being a growing medium with cuttings rolled individually in each envelope; different grafting types on pages 511, 517, 518, 563,578 and 587; and machine grafting on page 196.

Current practice at Monrovia Nurseries, Azusa, California as given by Dennis Connor advises taking 2½- to 3-in. semi-softwood cuttings all year, leaving one leaf which is cut in half, and washing in baths of 15 ppm chlorine then 200 ppm Physan. After a quick basal-end dip in liquid IBA at 1,000 ppm the cuttings are stuck in flats containing a pasteurized mix of perlite and peat-moss (9:1, v/v). Rooting occurs under intermittent mist over 80 °F bottom heat in a greenhouse, with air temperature kept at 85 to 90 °F, in about 4 weeks.

LITERATURE CITED

1 Carville, L 1969 Propagation of softwood cuttings under polyethylene tents *Proc Inter Plant Prop. Soc* 19 290-294

2 Chadwick, L C 1953 The fundamentals of propagating deciduous shrubs by hardwood cuttings *Proc. Inter. Plant Prop. Soc.* 3.120-133

3 De Groot, C 1955 The use of Chloromone on winter and summer cuttings *Proc Inter Plant Prop. Soc* 5 51-52

4. De Lance, P 1976 Electric soil and hot-house heating *Proc. Inter Plant Prop. Soc* 26 369-373

5 Dirr, M A 1977 *Manual of Woody Landscape Plants,* Stipes Publishing Company, Champaign

6 Eden, W A 1985. *Hibiscus* propagation in cool climates *Proc Inter Plant Prop Soc* 35.132-134

7 Good, G L and H B Tukey, Jr 1965 The influence of intermittent mist on the mineral nutrient content of cuttings during propagation *Proc Inter Plant Prop Soc.* 15 78-86

8 Halward, R 1962 Collection, storage and use of dormant scionwood *Proc Inter Plant Prop Soc.* 12 144-149

9 Hancock, F M 1988 The burlap cloud method for rooting deciduous shrub cuttings. *Proc Inter Plant Prop. Soc* 38 170-177

10 Hancock, F M 1990 Sheridan Nurseries, Mississauga, Ont Canada Personal correspondence

11 Hancock, L 1956 The burlap cloud method of rooting softwood cuttings in soil *Proc. Inter. Plant Prop Soc* 5 56-57

12 Hess, C E 1959 A study of plant growth substances in easy and difficult to root cuttings *Proc Inter Plant Prop Soc* 9 39-45

13 Hess, C E. 1961 Characterization of the rooting cofactors extracted from *Hedera Helix L.* and *Hibiscus rosa-sinensis L Proc. Inter. Plant Prop. Soc* 11.51-56

14. Hess, C E 1963 Why certain cuttings are hard to root *Proc. Inter Plant Prop. Soc.* 13:63-71.

15 Hess, C.E. 1965 Rooting cofactors—identification and functions *Proc. Inter. Plant Prop. Soc* 15 181-186

16 Kelety, M.M. 1984. Container-grown *Hibiscus* propagation and production. *Proc Inter Plant Prop Soc* 34 480-486.

17 Kester, D E 1960. Seed dormancy and its relationship to nursery practices *Proc Inter. Plant Prop. Soc* 10.256-266.

18 Larson, P D 1990 Personal communication. Blandy Experimental Farm, P O Box 65, Boyce, VA 22620

19 Leiss, J. 1990. Personal correspondence. Living Carpet, 1462 Dundas Crescent, Mississauga, Ont L5C 1E9, Canada.

20 Loach, K 1979. Mist propagation—past, present and future *Proc Inter Plant Prop Soc* 29 216-229.

21. Macdonald, A B 1969. Lighting—its effect on rooting and establishment of cuttings (a short review) *Proc Inter Plant Prop Soc.* 19 241-247

22 Macdonald, A B. 1986 *Practical Woody Plant Propagation for Nursery Growers,* Timber Press, Portland, OR

23 Milbocker, D C 1977 Propagation in a humid chamber. *Proc. Inter Plant Prop. Soc.* 27 455-461

24. Morgan, D L. and P F. Colbaugh 1983 Influence of chemical sanitation treatments on propagation of *Buxus microphylla* and *Peperomia caperata Proc. Inter Plant Prop. Soc* 33 600-607

25. Nelson, S.H. 1966 The role of bottom heat in the rooting of cuttings *Proc Inter Plant Prop Soc* 16 174-181.

26 Palmer, A.W 1973 Grafting tropical Hibiscus *Proc Inter Plant Prop Soc* 23 374-375.

27 Piringer, A.A 1961 Photoperiod, supplemental light, and rooting of cuttings Proc. Inter *Plant Prop Soc* 11 261-276

28 Roe, K and P Sommer 1988 Boxwood production in the U S Midwest *Proc. Inter Plant Prop Soc* 38 559-562.

29 Roller, J B 1964. Texas tips. *Proc Inter. Plant Prop. Soc* 14 219-220

30 Scott, A 1975 A successful technique for grafting *Hibiscus Proc Inter Plant Prop Soc* 25 387-388

31. Steavenson, H 1954 Mist propagation under lath shade *Proc Inter Plant Prop. Soc.* 4:113-119.

32. Walter, H 1967. Propagation of Chinese *Hibiscus. Proc. Inter Plant Prop. Soc.* 17·263-265.

33. Whatley, B.T , S O Thompson and G. Wılliams, Jr 1966. The effects of nutrient solution, foliar spray, 3-indolebutyric acid and dimethyl sulfoxide (DMSO) on rooting of *Hibiscus syriacus. Proc. Inter Plant Prop. Soc.* 16.287-290.

34 Wott, J.A. and H B Tukey, Jr 1965. Propagation of cuttings under nutrient mist *Proc. Inter. Plant Prop Soc* 15 86-94.