

sprouted from the roots. Most of the seedlings survived.

JOE FOUCEK: How long does it take to obtain a saleable plant?

JOHN PAIR: A minimum of 3 years is required to make a 6 to 8 foot branched tree. For a specimen with a 1¼ to 1½ inch caliper it will take 5 to 6 years.

PHILIP SOMMER: Do you know any trees of this species growing in the Maryland or Pennsylvania area?

FRANK GOUIN: There is one at the U.S. National Arboretum in Washington, D.C.

DON SHADOW: I saw them growing in Tifton, Georgia, this past summer and they had no problems. They were approximately 20 years old.

JACK ALEXANDER: We have some seedlings at the Arnold Arboretum. Last year they were outside but mulched with pine boughs. We did get some tip dieback.

JOHN PAIR: You will often get tip dieback but it will disappear after the plants reach 10 years old. I am not recommending it for Zone 5 but am always surprised at how it survives outside its normal range.

CHARLES TAFT: You mentioned the use of 2 lbs of sulfur per cu. yd. of medium, is the right? Are you putting lime into that? What is the pH?

JOHN PAIR: Most mixes with wood chips:peat:sand (3:1:1) plus 2 lbs sulfur range in pH from 6.1 to 6.5. We do not see the need for lime in our wood chip work.

Tuesday Afternoon, December 14, 1982

The afternoon session was convened at 2:00 p.m. with Leonard Stoltz serving as Moderator.

PROPAGATION OF PLANT CULTIVARS WITH "YATSUBUSA" CHARACTERISTICS

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In Japan, horticulturists have promoted gardening with ornamentals into highly refined art forms involving both artistically trained dwarfed potted trees and Japanese gardens. To meet the demands of both bonsai and Japanese gardens horti-

culturists have been searching for specialized plant material which will grow into "living sculpture". Japanese propagators, like Western propagators, are always searching for new or unusual plants material. Characteristics of special interest include: growth habits, size/shape, foliage coloring/shape, fruit coloring/shape, bark coloring/shape, cultural care, winter hardiness, and propagation ease. Select cultivars of numerous species have been propagated for the above reasons; however, the characteristics of growth habit are perhaps the most popular.

Definition and origin. Since the bonsai market is highly significant and economically important in the Japanese field of ornamental horticulture, many of the cultivars originally were selected and introduced for bonsai training. The Japanese term "yatsubusa" literally means "eight buds" or "cluster of eight buds". It is a rather loose term to describe plant cultivars which have the following characteristics: multiple buds, short internodes, small foliage, adventitious buds, hard wood, root rather easily, and dwarf in plant character. Generally speaking, such yatsubusa cultivars seem similar to witches' brooms and most tend to grow into tight little buns of foliage.

Although many of the yatsubusa cultivars originated as witches' brooms or their progeny from seedlings, many did not. Some originated as unusual seedlings, bud sports, and through natural hybridization. Generally the small seedlings a Western propagator might cull are just the plant a Japanese propagator seeks. Witches' brooms have even developed on bonsai specimens and have been propagated.

Table 1. Species which have "yatsubusa" characteristics.

Botanical Name	Common Name
<i>Acer palmatum</i>	Japanese maple
<i>A. buergerianum</i>	Trident maple
<i>Chaenomeles japonica</i>	Flowering quince
<i>Chamaecyparis obtusa</i>	Hinoki cypress
<i>C. pisifera</i>	Sawara cypress
<i>Cryptomeria japonica</i>	Japanese cryptomeria
<i>Ilex serrata</i>	Fine-tooth holly
<i>Juniperus rigida</i>	Needle juniper
<i>Picea glehnii</i>	Saghalin (Ezo) spruce
<i>Pinus densiflora</i>	Japanese red pine
<i>P. parviflora</i>	Japanese five-needle pine
<i>P. thunbergiana</i>	Japanese black pine
<i>P. thunbergiana</i> var. <i>corticosa</i>	Nishiki black or cork bark pine
<i>Ulmus parvifolia</i>	Chinese elm
<i>Zelkova serrata</i>	Japanese zelkova

Value. Plant material dwarf in character is excellent for bonsai training because of the small foliage and short internodes. However, its use does not have to end with bonsai

since Japanese gardens utilize plants which are usually confined to limited areas. Dwarf conifer gardens in the Western world and rock gardens are also two prime areas where yatsubusa type cultivars are of invaluable service. Since the size of the typical American garden is decreasing rather than increasing, plants which have a dwarf growth habit will become more important.

DESCRIPTION AND PROPAGATION OF SELECTED CULTIVARS

Generally, the same propagation techniques used in the common production of ornamentals can be used with yatsubusa cultivars. However, the bonsai propagator has special requirements necessary to produce plants for bonsai training. The methods and techniques described are used in the production of bonsai. They can be modified and simplified for the average gardener not interested in bonsai.

PINE

Pinus parviflora 'Kokonoe'. This cultivar of the common Japanese five-needle pine is popular for bonsai because of short, slightly twisted needles which are dark green, sometimes glaucous. When allowed to grow without pruning, shoots may extend to 10 inches or more. There are currently over 100 different cultivars of *P. parviflora*, many of them dwarf and in the yatsubusa grouping. The cultivar 'Zuisho', although a bit tender to cold, has superb growth habits for bonsai and develops a fat trunk in a very short period of time.

Pinus thunbergiana 'Banshoho'. Several different cultivars of Japanese black pine exist. However, 'Banshoho' is one of the best because of its growth habit. Although many other cultivars have shorter needles, they are too congested and tight to train into bonsai. This pine grafts quite easily and fills out into a globe-shaped dwarf mound in a few short years.

Pinus thunbergiana var. *corticosa* 'Kyokko'. Although this cultivar of the nishiki or cork-bark variant of Japanese black pine is not actually in the yatsubusa grouping, it is dwarf and slower growing than common nishiki black pine. The main feature is that it will root from cuttings taken in early spring. Several different yatsubusa cultivars do exist of nishiki black pine.

Yatsubusa pines are normally propagated by grafting onto a two-needle understock, including *P. parviflora*, which has five needles. The roots of two-needle pine (*P. thunbergiana*) tend to inhibit winter yellowing of foliage and can better withstand the occasionally drying out in containers than do five-needle pines. The cultivar 'Zuisho', however, is not com-

patible with two-needle understock and must be grafted onto five-needle pine understock or rooted. The cut on the understock for scion insertion must be made low, directly into the crown of the plant, for bonsai training to avoid an obvious swelling graft union.

'Kyokko' nishiki black pine roots well, as does 'Fuji'. When rooted cuttings grow, the thick corky bark will develop on the roots as well as the trunk, thus avoiding a thin base which is objectionable for bonsai training. Cuttings of 'Kyokko' and 'Fuji' nishiki black pine are taken in early spring from the second growth of last year's shoots. Cuttings are taken with a straight cut at the basal end and treated with a 2% indolebutyric acid treatment in talc. Clean, sharp sand is used for a rooting medium and holes are pre-drilled for each cutting to avoid tearing of the delicate tissue. Cuttings are placed in a bright location, out of direct sun, and rotated to allow even light and air circulation.

Yatsubusa cultivars of pine are often air layered for bonsai training because they tend to develop roots completely around the trunk, a desirable characteristic. Although large quantities of stock plants are necessary when air layering pines, it is common practice in Japan where the bonsai market is big. Western propagators probably would not find it economically feasible to air layer yatsubusa pines since large numbers are difficult to produce. Air layers are generally made in spring. The best place to air layer a pine is directly below a whorled branch formation. Although a simple upward cut can be made to stimulate rooting, several techniques have been used for air layering bonsai. A complete ring of bark is sometimes taken from a branch to be air layered, and small flaps are made in the cuts to direct the new roots outwards. Long fiber sphagnum moss is placed under the flaps and around the area to be rooted. It is then covered with clear polyethylene until roots appear. Some cultivars of yatsubusa pine will root in one month's time. Older branches can take up to a year or two.

MAPLES

Acer palmatum 'Kiyohime'. This cultivar of Japanese maple is one of the finest for bonsai training because of its horizontal growth habit, ability to live in a container, and hardiness. The new growth in spring is colorful as is the traditional red of autumn.

Acer palmatum 'Kotohime'. Although this yatsubusa cultivar has much smaller foliage than 'Kiyohime', it is not as desirable for bonsai because of its extreme upright growth habit. The plant is popular in rock gardens and other small areas.

Numerous other yatsubusa type cultivars exist which have red foliage, variegated foliage, and other growth habits. All are easy to graft onto *A. palmatum* understock in winter. Bonsai propagators root maples if possible to avoid graft unions. Semi-softwood cuttings taken in early summer will normally root within 6 to 8 weeks when treated with Hormodin No. 3 root-inducing hormone and placed under intermittent mist. Bonsai propagators are especially careful with the development of roots all around the base of the cutting. If roots do not develop all around the base, the plant is often discarded. Fine quality bonsai should have an even development of roots all around the trunk. 'Koto-hime' roots incredibly fast, sometimes in less than one week. Large diameter cuttings, up to 1½ inches, have even rooted and grown but later died in winter. Other yatsubusa maple cultivars which are easy to root include: 'Kashima', 'Chiba', 'Katsura', 'Murasaki-kiyo-hime', 'Beni-komachi', 'Beni-maiko' and 'Yama-hime'.

ELM AND ZELKOVA

Ulmus parvifolia 'Yatsubusa'. There are numerous "dwarf" Chinese elm cultivars, among them several yatsuba type selections. The common 'Yatsubusa' cultivar has very small but long leaves and an open growth habit. The dark green glossy leaves are attractive in spring and summer.

Ulmus parvifolia 'Yatsubusa-Hokkaido'. This is perhaps the smallest of all elms with foliage smaller than ¼ cm. Upon first glance, this elm looks like a fern! It roots quite easily but is difficult to grow. It seems to require a dormant period but sometimes dies in winter. Additional observation and experimentation is necessary. The bark develops a dark black color when the plant reaches about 10 years of age. This slow-growing elm would be ideal for an unusual container-grown plant but is too small for a garden planting. It is, in fact, too small for common size bonsai and is generally restricted to miniature bonsai under 6 inches in height.

Zelkova serrata 'Yatsubusa'. This is the only yatsubusa type cultivar I am aware of in the species. The leaves are quite tiny when container-grown but will enlarge when field grown. Specimens in the ground have reached 4 feet in height with limited pruning in 12 years. 'Yatsubusa' zelkova must be carefully watched because branches tend to grow with the common zelkova foliage.

Yatsubusa elms and zelkova are easy to root and much easier to overwinter than maple cuttings. The methods and techniques for rooting these plants are identical to those for the maples including large diameter cuttings.

Since dwarf plants are becoming more and more desirable for landscape and bonsai purposes, the yatsubusa cultivars will increase in popularity. Easy propagation and cultivation should make them profitable to grow. If more are available on the market, interest in bonsai would increase, since bonsai was the original purpose for selecting these jewels of the ornamental horticultural world.

REFERENCES

- Okimoto, Takashi. 1980. Nishiki black pine — propagation and training techniques, Part 1. *International Bonsai*. 4:4-10.
- Valavanis, Wm.N. 1975. Encyclopedia of Bonsai Art, Vol. 1, Bonsai Creation and Design using Propagation Techniques. Symmes Systems, Atlanta, GA.
- Valavanis, Wm.N. 1976. Encyclopedia of Classical Bonsai Art, Vol. 2, Japanese Five-needle Pine. Symmes Systems, Atlanta, GA.
- Valavanis, Wm.N. 1978. Japanese maple propagation — Part II. Cuttings and airlayering. *The Bonsai Bulletin*. 2:12-15.
- Valavanis, Wm.N. 1979. Plant profile — Kyokko-nishiki black pine.
- Valavanis, Wm.N. 1979. Plant profile — Kiyohime Japanese maple. *International Bonsai*. 2:16-18.

WILLIAM MERCHANT: My experience with a few persons who are bringing in pines from Japan is that they are bringing in 30 to 40 different types that all look the same when they are small. How can we be sure that Japanese propagators are not making switches without us knowing about it?

WILLIAM VALAVANIS: That does happen and you just have to grow them next to each other and observe them. Sometimes the differences are so subtle, like the twist of a needle, that an unskilled person would just not recognize it.

DON SHADOW: Do 'Beni-komachi', 'Beni-maiko', and similar cultivars root as well as 'Koto-hime' and 'Kiyohime'?

WILLIAM VALAVANIS: 'Beni-komachi' and 'Beni-maiko' will root.

DON SHADOW: What about the cultivar 'Katsura'; will it root?

WILLIAM VALAVANIS: Very easy to root.

DON SHADOW: So most of the yatsubusa type *Acer palmatum* cultivars root fairly easily?

WILLIAM VALAVANIS: Yes.