

CARL ORNDORFF: The slope is 1 in. per foot. On one end we have had snow drifts 4 ft. deep. The fiberglass sagged a little, however no structural problems developed. The other end is swept clean by the wind.

## ORNAMENTAL PLANT PROPAGATION IN JAPAN

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Japanese nurseries are among the best places in the world to observe a great diversity of cultivated plant species and variants, but they are much less rewarding for those who are intent on broadening their knowledge of propagation techniques. In Japan even the most prosperous nurseries rely on propagation techniques which many American nurserymen would consider primitive, inefficient, or inappropriate. When we do find imaginative propagation techniques in Japan we often observe them among hobbyists or in small, specialized nurseries, and then used to create a certain aesthetic effect rather than as a means for what we consider efficient production. It would surprise no one here to see pines grafted in Japan, but the Japanese practice of grafting scions of *Pinus parviflora* on stock of *P. thunbergiana* to combine the distinctive foliage of the former with the handsome bark of the latter might strike some of us as an excessive effort for an aesthetic effect.

The use of grafting to produce a pot of *Pereskia* with a dozen or more kinds of assorted cactus appended to its branches or to add branches at strategic points on the trunks of imperfect bonsai takes the use of grafting well beyond the point to which most American nurserymen are willing to go to make a sale. Yet examples of this kind of effort can be found in almost any ordinary nursery or garden center. The situation in Japan is often the reverse of the situation here where large aggressive nurseries are frequently in the forefront in the development and application of novel propagation techniques. This difference is a reflection of many of the fundamental differences between the Japanese and American approaches to ornamental horticulture and nursery production.

A basic feature of Japanese nursery production which has a strong effect on the choice of propagation techniques is the relatively small demand for plants for garden use as we perceive it in the West. Few families in Japan own more than a

miniscule plot and many have no garden space at all. As suburban families acquire automobiles what little outdoor space there is is likely to be given over for its care and storage. Most customers are therefore only interested in plants in pots, and most of these plants will never be planted in the ground. Even trees and shrubs are far more likely to spend their entire lives in a pot on the fire escape or along an alleyway than as part of a garden planting. For example, a common New Year's item in Japan is a large dish garden containing a twisted specimen of *Pinus parviflora*, a heavily-budded plant of a cultivar of *Prunus mume*, a small plant of *Nandina domestica*, and a dwarf *Sasa* accompanied by *Adonis amurensis* and other seasonal material. Virtually none of these plants will be maintained after the holiday season. So small is the demand for garden trees that a 2-meter tall *Magnolia × soulangiana* cultivar with a root ball costs less than a 1-meter long budded branch of the same plant for use in an ephemeral flower arrangement.

This situation affects the Japanese approach to propagation in several ways. One effect is that there is very little regard for the long-term suitability of the propagation method; thus the long-term compatibility of scion and understock and the garden hardiness or durability of the understock is not always considered. Japanese nurserymen will sell a slim scion grafted to an enormous understock knowing that it will never heal properly. The maximum number of flowers or fruit on the smallest possible plant is a market advantage and, if grafting will induce this, then it will be the technique used regardless of any other considerations.

A lack of garden space combined with the Japanese people's intense interest in plants requires the Japanese nurseryman to produce a variety of plants unthinkable in this country. In the nursery district of Angyo more than 6000 kinds of plants are produced in nurseries with a total area of 1100 acres, and one small nursery there grows over 600 kinds of ericaceous plants. Japanese interest in the widest possible range of novel, exotic, and bizarre plants makes it most difficult for many nurseries to propagate large numbers of plants under uniform conditions which permit economies of scale. Some very large nurseries in Japan resemble what we would consider a hobbyist-fanatic's home operation expanded beyond our wildest expectation.

The traditional organization of the Japanese nursery encourages the choice of the most labor-intensive propagation methods. Most Japanese nurseries are still family operations, often several generations old, in which all family members take an active role. Additional labor is had cheaply by taking

young men as apprentices from remote rural areas; these men are offered room and board and a small salary in return for training and the chance to make contacts in the nursery business. In Angyo in 1980 the labor cost for the installation of a typical suburban garden was 21% of the cost of the job, about \$2.25 per hour for skilled apprentice labor. This low labor cost discourages efforts to introduce labor-efficient propagation facilities and procedures.

The incredibly high cost of land in Japan makes space requirements the primary consideration in many nursery operations. In 1981 land in the nursery district of Angyo cost an average of more than 1½ million dollars per acre. It is very expensive to use land to maintain stock plants of trees and shrubs; thus the need to make a little propagating material go a long way is another force encouraging the widespread use of grafting. In the case of bamboo, the space required to maintain stock for division has led to the development of techniques to grow some bamboo species from culm cuttings. One large nursery now grows its entire stock of *Bambusa glaucescens* (often called *B. multiplex*) from one-node culm cuttings.

The very large number of small nurseries in Japan (over 500 in the 1100 acres of Angyo alone), plus the heightening of already intense competition because of static demand, encourages a kamikaze approach to plant introduction which influences the choice of propagation technique. A desirable new plant is propagated as quickly as possible in order to get a large number of plants on the market at a high price before other nurseries can propagate the plant and drive the price down. In this case the technique of choice is usually grafting of the smallest possible scion onto the largest possible understock. After the introduction of *Kalmia latifolia* 'Ostbo Red' into Japan several years ago, the first plants sold cost more than \$50 for a single shoot grafted very high on a stem of ordinary *Kalmia latifolia*. Three years later a husky cutting-grown plant cost about \$5.00. The cost of propagation had no influence at all on the choice of propagation technique. The decision to graft the early plants (in an unsatisfactory way) was based only on the desire to have large plants in a very short time. The decision to grow much better plants later from cuttings reflected the fact that there was by now a most severe shortage of *Kalmia* understock rather than any desire to grow a plant of better quality. I have purchased plants of *Hamamelis*, for which the understock is expensive, with the cultivar I wanted grafted on top and as many as four other grafts between it and the understock. Each of the grafts represented a cultivar grafted the season before which did not sell and was reworked for the following season.

A final and important influence on propagation of ornamentals in Japan is climate. The summer rainy season gives the Japanese nurseryman the opportunity to grow most of his cuttings outdoors with at most a simple frame and rice-straw mat shading. The almost daily showers from late spring through early August create an atmosphere of high humidity and good air circulation that many mist house owners would envy, and the mild winters are easy on newly rooted plants. Even some rather difficult subjects such as two-needled pines are grown from cuttings in open fields.

The traditional approach to propagation and nursery practice is undergoing change in Japan. The birth rate is low and labor costs are rising; each year it becomes more difficult to find young men to serve as apprentices. Many small nurseries are disappearing, and urban pressures on the traditional nursery districts near Tokyo, Osaka, Nagoya, and Kurume are forcing others to consolidate their operations in rural areas further from the cities. Some nurseries are beginning to experiment with European and American propagation systems which are less labor-intensive. Changing lifestyles are increasing interest in simpler, more uniform "Western" style planting for public areas and private gardens. We can expect that the Japanese will come to apply their technical finesse in this area as well as those spheres in which they have already adapted.

A revolution has already occurred in Japan in the propagation and production of specialty fruits and vegetables grown under plastic, and it will not be long before the approach to the propagation and production of ornamental plants is similarly affected. Let us hope that the matchless diversity of ornamental plants available in Japanese nurseries is not a casualty of that change.

BRUCE BRIGGS: A few years ago I understood that about 80% of the field nursery production in Japan was for bonsai. Is that still true?

BARRY YINGER: Bonsai enjoys periods of popularity and also down cycles in popularity. Currently I understand that it is quite popular. It is an extremely important part of the Japanese industry.

BRUCE BRIGGS: I understand that in some parts of Japan that they take cuttings of pine and put them in the river to leach out factors that inhibit rooting. The cuttings are then rooted in open fields. What type of pines are they doing this with?

BARRY YINGER: *Pinus densiflora*.