

Finding New Plants for Introduction[©]

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BACKGROUND

The University of British Columbia Botanical Garden Plant Introduction Scheme has been introducing and recommending plants since 1985. Roy Taylor, then Director of the Botanical Gardens established the program in 1980 to foster strong links with the nursery industry and provide the public with a continuing source of interesting and reliable landscape plants. The UBC Botanical Garden, initially a campus arboretum planted in 1916, and subsequently reduced to a rose garden and a few ancillary plantings because of campus development through the 1960s, grew to over 70 acres under Dr. Taylor's direction. It now boasts magnificent collections of woody and herbaceous plants from around the temperate world in a variety of garden settings. It was from these collections that the idea for a plant introduction program was borne.

Our present Director, Bruce Macdonald (I.P.P.S. Western Region President 1988-89 and I.P.P.S. International President 1996-97), is responsible for most of the nursery industry groundwork for the program. Bruce can also be credited both in expanding the program internationally and in including a category for recommended plants in the introduction scheme. His close association with horticulturists and nursery owners in the UK has allowed us to bring a number of exceptional plants into our garden, trial them, and eventually propagate and distribute them to local nurseries.

For example, *Veronica peduncularis*'Georgia Blue' is a recent UBC recommended plant. A first rate perennial that produces clear blue flowers in spring and fall, it was collected by Roy Lancaster in the Caucasus region of the Russian Federation. *Cotinus*'Grace' is a robust shrub showing excellent color throughout the season; this hybrid smokebush was named by Peter Dummer, formerly the propagator at Hillier Nursery, for his wife, Grace. Peter Dummer is also known for his hybrid *Phygelius* cultivars. While recommended plants are not a source of income — UBC normally supplies our industry partners with recommended plants at cost — we feel it is our role to make good plants as widely available as possible.

Although we can point to excellent sales for many of our introductions and boast of consistent support by our industry partners, revenues to the Botanical Garden from introductions have tailed off significantly over the last few years. This is due primarily to cheating. That is, the royalty payments from some of the nurseries that have entered into agreements with us do not reflect actual production numbers. Perhaps more significantly, there are nurseries that have not entered into agreements with us and who do not pay any royalties, but are propagating and selling UBC introductions. It is estimated that the royalty money we received last year represents less than one third of the payments we are actually due — to say nothing of growers of whom we aren't aware.

To address this problem, our industry partners — primarily Vancouver area nursery growers, led by the British Columbia Landscape and Nursery Association (BCLNA),

our local nursery trade organization, have formed a company with which to administer the introduction program. The company will collect and share with the Botanical Garden all royalties and license fees, and will determine production levels and develop marketing strategies for all introductions and recommendations. Now, hopefully, we will see greater and more appropriate revenues from our introductions.

FINDING PLANTS FOR INTRODUCTION

Two of our first introductions *Arctostaphylos uva-ursi* 'Vancouver Jade' and *Genista pilosa* 'Vancouver Gold' were seedling selections given to us by Vancouver Island alpine plant enthusiast, E.H. Lohbrunner. 'Vancouver Jade' was nominated because of its heavy flowering, lush growth, and consistent rooting under mist. 'Vancouver Jade' also performs well in Vancouver's moist, cool weather, and so has become an extremely popular groundcover plant in the Pacific Northwest.

'Vancouver Gold' is another excellent landscape plant and was selected because of its fruitless habit. We have discovered to our dismay, however, that some Vancouver area nurseries are propagating a form of *G. pilosa* where seed pods form normally and calling it 'Vancouver Gold'.

A number of our later introductions were wild collected British Columbia natives. *Rosa woodsii* 'Kimberley' was collected by one of our former staff scientists, Wilf Nicholls, outside Kimberley, in south-eastern BC, and *Penstemon fruticosus* 'Purple Haze' was found in the mountains near Whistler, north of Vancouver. 'Purple Haze' and an evergreen blueberry, *Vaccinium ovatum* 'Thunderbird' were both collected by Al Rose, the former curator of the BC Native Garden. 'Thunderbird' is an outstanding selection that shows good upright growth and berries that are much larger and bluer than those from typical seedlings.

Our collections of Asian plants are an incredible resource for introductions. To date, half a dozen plants derived from our Asian collections have made their way into the introduction program. *Clematis chiisanensis* 'Lemon Bells' is a selection we made in the garden from seedlings derived from Korean seed. The flowers are significantly larger and the stems darker than typical seedlings. *Clematis koreana* is another related species and we have made crosses between them. Both species are not overly robust, and are probably ideal for containers and patio gardening. *Rubus pentalobus* is an evergreen groundcover native to Taiwan. Richard Pearson, a UBC anthropology professor and amateur botanist, gave us seed he collected there, atop Mt. Morrison. Our selection, which is amber fruited, appears to be hardier than other forms, but benefits from overhead protection in the winter.

The stunning white and pink fruited *Sorbus hupehensis* 'Pink Pagoda' came to us as a seedling from a Victoria, BC area nursery. As far as we can tell, the plant should actually be called *S. oligodonta* (Bot. Ed. note: *S. oligodonta* is a syn. for *S. hupehensis*). The Himalayan *S. oligodonta* is confused with the true *S. hupehensis* and is apparently an apomict — apomicts produce fertile seed without fertilization, so all individuals of an apomorphic species are clones. We are in the process of acquiring other selections of *S. hupehensis*, such as Coral Fire^{®TM}, 'November Pink,' var. *obtusa* (syn. 'Rosea'), and 'Rufus' to test this hypothesis. Another apomorphic mountain ash, *S. reducta*, became one of our recommended plants. *Sorbus reducta* is a dwarf, suckering deciduous shrub with carmine pink fruit, native to China and Burma. The original plants at UBC came from seed distributed by Wisley Garden in England.

Other Asian recommended plant species in our program include *Microbiota decussata*, a shade tolerant juniper relative and *Lilium formosanum* var. *pricei*, a dwarf lily easily grown from seed, and producing flowers at an early age.

The Botanical Garden has derived plants from deliberate breeding efforts of its own, such as the popular Mandarin honeysuckle, developed by Wilf Nicholls. 'Mandarin' is a hybrid of the hardy *Lonicera ×brownii* 'Dropmore Scarlet' and the spectacular, long-tubed, open-throated, Chinese *L. tragophylla*. 'Mandarin' is vigorous and hardy, but unfortunately has little or no fragrance. To introduce fragrance, Wilf's subsequent breeding work included crossing 'Mandarin' with *L. periclymenum* 'Belgica'. The result is softer orange flowers and fragrance. Hardiness trials are now underway.

THE FUTURE

At the Botanical Garden, we feel many of the plants in our collections are worthy of introduction, and we are working hard to propagate and trial the best of them. Plants we're looking to nominate for introduction or recommendation include some of the following: *Dichroa febrifuga*, a Chinese hydrangea relative. Our plants were raised from seed collected in the wild in South Central China in 1988, and they appear to be quite different from other seedlings of this species. *Sinocalycanthus* (or *Calycanthus*) *chinensis* is a spicebush with huge camellia-like flowers, ideal for woodland conditions in the Pacific Northwest. Our plants were raised from seed distributed by Shanghai Botanical Garden. The species flowers reliably in heavy shade, but plants are not particularly sun tolerant. *Rehmannia elata*, a superb perennial woodlander came to us from a Vancouver area nursery. They raised seed received from the Royal Horticulture Society seed exchange. Our plants appear to be hardier than their ascribed Zone 9 rating. Another herbaceous perennial we see as a potential recommended plant is *Francoa sonchifolia*, from Chile.

Sorbus pseudovilmorinii is a shrubby species that shows great variation. We have plants from seed collected in Yunnan at 11,000 ft, some with pink berries and some with scarlet berries. They all seem to make small multi-stemmed trees. We now have a number of wild-collected accessions of *Acer tschonoskii* subsp. *koreanum*, the Korean butterfly maple. The species appears to be relatively uniform, whether from Korea or China and produces exceptional autumn color every year.

We've always been big on woody climbers at UBC. *Holboellia fargesii*, an evergreen vine from the mountains of southern China, is one we would dearly love to distribute more widely, but have not been able to as it is extremely difficult to propagate vegetatively. Finally, one of our most exciting Chinese acquisitions is an excellent pink form of *Staphylea holocarpa* collected by Edward Needham on Mt. Omei about 10 years ago. The bladdernuts are a little known group of shrubs or multi-stemmed trees with compound leaves. We feel that this individual is significantly different from other seedlings and from other *Staphylea* species in terms of its vigour, stem, leaf, and flower quality and we're looking forward to trialing it.

The UBC Botanical Garden continues to work closely with nurseries locally and around the world, to enter into agreements with other botanical institutions, purchase seed shares from professional seed collectors and send out its own personnel to find new plants. These initiatives all contribute to the collections, and the Introduction Program. Perhaps the most exciting thing to have happened to us for some time, however, was the hiring this September of a full-time ornamental

plant breeder, Dr. Andrew Riseman, who comes to us from Penn State University and the Danish Institute of Agricultural Sciences. The next stage for the Botanical Garden is to continue to acquire new and exciting plants, to put Dr. Riseman's expertise to work, and build on the cooperation and collaboration of our nursery partners to make the Plant Introduction Program work for all of us.

Selection and Propagation of Deep-rooted Ornamental Trees for Urban Environments[©]

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Ornamental trees in urban environments provide myriad biological, physical, economical, and sociological benefits. Trees: (1) provide a habitat for a wide range of animal life, (2) function as a cleansing mechanism for polluted air, (3) shade houses and other structures thus reducing the need for electrically powered air conditioners during the summer, and (4) provide an environment in which human beings can connect with nature. However, some trees have root systems that cause damage to sidewalks, curbs, and gutters. This damage is the result of planting trees in planting areas that are too small or too narrow and/or the trees inherent tendency to have shallow, horizontally oriented roots (Barker, 1987; Barker and Wagar, 1987). As these shallow roots produce secondary thickening growth they tend to upheave pavements around them. Several popular tree species have been associated with sidewalk and curb displacement. They include: *Liquidambar styraciflua* (sweet gum), *Morus alba* (white mulberry), *Fraxinus* spp. (ash), *Ulmus* spp. (elm), *Magnolia grandiflora* (southern magnolia), *Prunus* spp., *Pinus radiata* (Monterey pine), *Eucalyptus globulus* (blue gum eucalyptus), and *Cinnamomum camphora* (camphor) (Hamilton, 1984a).

This problem is of major proportions in many cities in California. In a survey of cities in the Bay Area in 1984, 60% of the street trees were estimated to have caused some or severe damage (Hamilton, 1984b). A more recent survey of sidewalks in San Jose, California, found the estimated repair cost for tree related damage to be \$14.3 million and annual concrete repair costs attributed to tree damage range from \$0.18 to \$13.65 per tree (Peper and McPherson, 1995). It's quite apparent that even a partial solution to this problem would result in substantial savings for city residents and governments.

There are engineering, design, improved materials, and biological/genetic approaches to solving this problem. Engineering solutions include the use of steel plates bolted directly to exposed roots to prevent or minimize future damage and the use of root barriers in an attempt to force roots down below sidewalks and curbs. Design solutions include providing adequate planting strip space for tree trunk diameter increases and root crown flair. Newer paving materials may provide the necessary flexibility to prevent cracking and complete disruption of the pavement.

Another possible approach to this problem is to identify, select, and vegetatively propagate trees that are deep-rooted. The basic premise behind this approach is that it is reasonable to expect as much variability in below-ground architecture for trees