ORNAMENTAL NATIVE PLANTS OF BRITISH COLUMBIA: THEIR SELECTION, PROPAGATION, AND INTRODUCTION

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British Columbia has a resource of native plants whose potential is not always appreciated. The range of plants is extremely variable and very dependent upon the Province's diverse climate—from the alpine areas of the coast and Rocky Mountains to the dry, arid areas of the south east. Also there is the high rainfall area of the Queen Charlotte Islands, containing many unique species, to the drier Vancouver Island and numerous adjacent islands.

This paper is to discuss some of the species that the University of British Columbia considers as a basis for further selection and introduction into nursery production for sale as ornamental plants for the urban landscape.

Besides the many economically important forestry species such as *Abies grandis, Pseudotsuga menziesii, Thuja plicata,* and *Tsuga heterophylla*, perhaps the best known native tree is the Pacific or western flowering dogwood, *Cornus nuttallii.*

Cornus nuttallii. This is distributed naturally throughout southern British Columbia and on into Southern California. Spectacular in flower, with its white showy bracts, it is normally seen growing in and among other native flora, as too much sun will split its bark. Also in recent years, the dogwood leaf blotch fungus, *Gloesporium* sp. has severely weakened trees through dieback of young shoots and premature defoliation. Flower size and habit is variable in the wild so that considerable scope is offered for selection in flower size, habit, hardiness, and resistance to dogwood leaf blotch.

The fruits and seeds of *Cornus nuttallii* mature in September and October. Following fruit collection, seed is extracted. Prior to sowing under glass in the spring, two methods are effective for overcoming dormancy—cold stratification at 3 °C for 14 weeks, or acid digestion for 20 min., using concentrated sulfuric acid followed by cold stratification at 3 °C. The latter is particularly useful for seed collected in hotter climates or older seed but care must be taken as to the length of acid digestion, as embryo damage may occur. For clonal forms such as *C. nuttallii* 'Ascona' and *C. nuttallii* 'Corigo Giant', cutting propagation is rather unpredictable but bench grafting in January or February, or chip or T-budding in August is effective in British Columbia. *Cornus florida* should be used as the rootstock

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because of its easy availability, but of more importance, is that it also gives considerably better establishment following transplanting.

One of British Columbia's pioneer nurserymen was Henry M. Eddie. During the 1930s and 1940s, he began hybridizing *C. nuttallii* with *C. florida* to bring together the qualities of both plants. Besides hardiness, habit, and fall colour, his initial aim was to breed a pink-flowered hybrid with flowers similar to the parent *C. nuttallii*. A number of hybrids arose including a compact weeping form, but all these were lost in the very heavy flooding of the Fraser River in 1947. Fortunately for us today, he planted one selection adjacent to what is now the Vancouver International Airport. This tree was subsequently named *Cornus* 'Eddie's White Wonder' and patented and introduced into the United States by Wayside Gardens. This unique hybrid has since been internationally acclaimed and grows successfully in various regions of the world. Although it is hardy in Ohio and Tennessee, it first did not grow well. Initially this was thought to be due to climate, but later it was found that trees bought from the West coast were worked on *C. nuttallii* and not *C. florida*.

A foundation has now been initiated at the University of British Columbia Botanical Garden and named the Henry M. Eddie Plant Development Foundation. This Foundation will be used mainly to support plant breeding, plant collecting programs, and clonal selection. Repeating some of the crosses initially made by Henry Eddie are planned for the future.

Arbutus menziesii. This is another tree but with a narrower natural distribution. It has attractive cinnamon-coloured bark and orange dull-red fruit. In the wild it grows from 10 to 25 m in height and normally is found on rocky, coastal outcrops of Western British Columbia and off-shore islands. When first seen growing in nature, I realized why we were having problems growing it on nurseries in the U.K. It thrives in dry locations and excessive water quickly makes it susceptible to *Phytophthora* root rot. Provenance does affect hardiness following seed collection. Seed is best stratified for 12 weeks at 3 °C prior to sowing under glass. The seedlings must be protected from late spring frosts during the early years following germination.

Amelanchier alnifolia. Another species under evaluation is a different form of *Amelanchier alnifolia*, which has intense white flowers and fall colour. In Canada, the work at Beaverlodge Experimental Station, Alberta, is well known for research in selecting fruiting forms for culinary purposes, e.g., *A. alnifolia* 'Smoky'. Seed propagation in spring is reliable following a 8 to 12 week stratification period at 3 °C. (Timing is vital when collecting the berries as trees are quickly stripped by birds). *A. alnifolia* seed is particularly prone to fungal infection during stratification, so precautions are advised.

Although softwood cutting propagation is often unpredictable, satisfactory results have been produced when preparing cuttings just as the basal tissues of the new shoots become lignified. Following shallow wounding, 0.8% to 1.0% IBA in talc is applied and the cuttings are stuck into a well-drained medium of 1:1 peat moss and perlite (or peat moss and bark) and then placed under mist or fog. Premature leaf fall takes place if cuttings are stressed.

Overwintering of rooted cuttings can be a problem. As with other *Amelanchier* species it is best not to remove cuttings from the flats for potting until after the first flush of growth the following spring. Root cuttings are reliable if prepared in 5 to 10 cm lengths during January or February and dusted with a fungicide prior to sticking. To provide greater reliability in vegetative propagation, micropropagation is developing as a standard technique for the clonal forms.

Paxistima myrsinites. An evergreen widespread native shrub found in drier locations is *Paxistima myrsinites* (Oregon box or myrtle boxwood) with its very small red flowers and leaves similar to *Buxus sempervirens* and *Ilex crenata.* Despite being popular as cut foliage for florists, it is becoming increasingly in demand by landscape architects. There is considerable variation of habit and leaf form in the wild so that seed-raised nursery crops show a considerable variation in product. Clonal selection of different forms collected by Al Rose, curator of the University of B.C. Native Garden, has resulted in a very attractive weeping form, *P. myrsinites* 'Emerald Cascade', which roots readily under contact polyethylene film during September through January, following a 0.8% IBA application in talc. Its consistent performance makes it an ideal candidate for direct sticking. Its drawback in nursery production is its susceptibility to the soil-borne pathogen, *Pythium irregulare.*

Trials are underway at participating nurseries for further study. In the long term we are sure this native plant will be widely used within dry locations in the urban landscape.

Vaccinium ovatum. This is another genetically variable native plant. *Vaccinium ovatum* (evergreen huckleberry) is abundant in many coastal locations. An outstanding form with excellent reddish-brown new growth with masses of pink flowers in the spring followed by black berries in late summer has been named and registered as *V. ovatum* 'Thunderbird'. Obtaining enough cutting material may be a problem as branches containing flowering shoots are shy to break. Hard pruning of stock plants will encourage vigorous non-flowering shoots. Also rooting cuttings containing flowers are very irregular in breaking the following spring.

Successful rooting within 8 to 10 weeks under contact polyethylene from September through January is accomplished using 0.8% IBA in talc.

Ribes sanguineum. This is a well-known deciduous shrub relatively widespread in the coastal regions from British Columbia into northern California. Many cultivars are standard features in many European gardens. In the wild, flower colour is variable with colours ranging from mid-pink to bright pink into red. Other variations include inflorescence size and habit. Recently a long racemed white form from our Botanical Garden was named, registered, and introduced as *Ribes sanguineum* 'White Icicle'. A very attractive soft shell-pink clone is currently under evaluation for potential introduction. An unusually hardy form has been collected with the hope it will subsequently mean that this plant has a wider sales distribution within Canada. Propagation by the standard procedure of softwood cuttings in June and July and deciduous hardwood cuttings in November and January, as used for other cultivars is recommended.

Philadelphus lewisii. This is another deciduous shrub showing genetical variation, particularly in flower size. We are currently testing a particularly large-flowered form. However, mainly because of hardiness, we are hybridizing the more compact forms with other ornamental species. One of these is the Asian species, *P. delavayi* var. *melanocalyx*, which has an outstanding purple colour on its pedicel and calyx.

Potentilla fruticosa. This is widespread in British Columbia and noted for its extreme hardiness. The British Columbia nursery industry has found some of the current pink and red clones from Europe not sufficiently hardy in containers during extreme cold weather. Also a number of the current yellow clones do require considerable shearing during their production cycle. A plant given to the Garden in 1976 by the late Ed Putnam of Kirkland, Washington was named by the evaluation panel of the Plant Introduction Scheme of the Univ. of British Columbia (PISBG) program for introduction. It is very compact, thus requiring minimal pruning, produces a mass of yellow flowers with an attractive wavy petal over a long period, but also is extremely hardy in containers. The 1988/89 winter of extreme temperatures severely damaged a number of the current commercial yellow cultivars. This cultivar has been registered and named as *Potentilla fruticosa* 'Yellow Gem'. It is readily propagated by softwood cuttings in May through July, or deciduous hardwood cuttings in November through January. Stock plants should be heavily pruned in winter because a profusion of flowers reduces vegetative growth available for cuttings.

Arctostaphylos uva-ursi. Native plants of British Columbia provide a number of important ground covers, e.g., *Cornus canadensis* and *Gaultheria procumbens*, but *Arctostaphylos uva-ursi* is, by far, the major ground cover favoured by landscape architects. Again it is very widespread and variable in the wild and, until recently, nursery

growers mainly propagated from shoots collected in the wild which, in turn, gave a variable product. Also, percentage rooting varied considerably with a range from 40% to 70%. By far, one of the most important introductions through the P.I.S.B.G. has been *A. uva-ursi* 'Vancouver Jade'. Rooting up to 90% is obtained and it is vigorous with an excellent uniform habit, producing in the spring numerous darker pink flowers than the type species. It has bright green foliage, that is more tolerant to some of the common pathogens and turns an attractive purple-red colour in cold climates. It is best rooted under mist, plastic or fog, using 0.8% IBA in talc as nodal or heel cuttings in October through January. There are two important criteria for success, firstly ensuring the cuttings are not stressed prior to sticking (being an evergreen this is often overlooked, particularly if late summer and early fall cuttings are stressed—so irrigation of stock plants in dry summers is important). Secondly, the rooting medium must be well drained; we use 1:1:1 peat moss, perlite, and pumice. Two to three cuttings per pot are recommended for direct sticking.

Rosa woodsii. Two very hardy species which are being increasingly used for reclamation and erosion control are *Rosa woodsii* (Woods' rose) and *Shepherdia canadensis*. *Rosa woodsii* is widely dispersed and typically it is relatively low-growing, bearing fragrant pink flowers and small leaves. Recently we have been collecting variants in the wild and have a promising low-growing selection for container work bearing a profusion of bright pink flowers and fruits which will subsequently require vegetative propagation from softwood cuttings. Typically *Rosa woodsii* is propagated by seed. As with many rose species, seed germination from year to year can be unpredictable. However a guideline confirmed through work at Reid, Collins Nurseries, Aldergrove, B.C. is to proceed with a pre-sowing treatment of warm stratification 60 days at 20 °C, followed by 90 days at 3 °C, which should give around 45% germination.

Shepherdia canadensis. This belongs to the Elaeagnaceae family and thrives in dry open areas. It is a dioecious nitrogen-fixing species that varies from low to medium in height, has a silvery underside to the leaf, and bears coloured berries ranging from yellow to red.

Propagation by cuttings is difficult thus seed propagation is the recommended method. Best results have been achieved at Reid, Collins Nurseries through a pre-sowing treatment of 5 to 7 minutes of acid digestion, using concentrated sulfuric acid, followed by a 30-day cold-moist stratification at 3 °C. This treatment should result in a 55% to 60% germination.

The Ericaceae family contains a number of gems for ornamental use—many of which are listed in specialist catalogues in Europe and North America. These include *Andromeda polifolia, Arctostaphylos columbiana, Cassiope mertensiana, Cladothamnus pyroliflorus,*

Gaultheria ovatifolia, Kalmia poliifolia, Menziesia ferruginea, Rhododendron macrophyllum, Phyllodoce empetriformis.

Although many of these root successfully from cuttings, seed propagation is very satisfactory. For native species and other ericaceous plants the procedure we use at the University of British Columbia nursery is to sow seeds in containers or flats in the early spring. The seed-sowing medium is: sieved sphagnum peat moss; perlite (can substitute coarse sand or Turface(r)); sterilized loam 1:1:1.

To each cubic metre (cubic yard) of the mix is added: 1160 g (31.2oz) superphosphate; 580 g (15.6 oz) dolomitic limestone; and 110 g (2.9 oz) Ethazol (Truban).

A thin layer of milled sphagnum moss is laid over the medium on to which the seeds are carefully sown and left uncovered. Next they are lightly misted and placed on the glasshouse bench with an optimum air temperature of 16 °C. The containers or flats are best covered with shade cloth or a sheet of glass and brown paper. It is essential they are checked once or twice a day for watering needs and signs of damping off. When of sufficient size to handle, the seedlings can be transplanted into flats or small pots.

We feel that some native herbaceous perennial species offer considerable potential for introduction. With this in mind we applied to the B.C. Nursery Trades Association for a provincial-federal grant under the economic and regional development agreement in Canada for new agricultural and horticultural programs. A grant for $99,616 was received and currently a systematic collection is being carried out by Dr. Wilf Nicholls and Dr. Gerald B. Straley in many different locations in British Columbia.

Beforehand considerable consultation was carried out with industry to develop criteria and target species. Emphasis will be for retail sales and for export into the United States. Criteria include a wide range of hardiness across North America, compactness in a 10.0 cm pot, and floriferous during April and May, after which time garden centre sales can drop dramatically. Target plants include *Anemone multifida, Douglasia, Dryas, Lupinus, Penstemon, Plemonium,* and *Phlox*. Already a number of interesting finds have occurred, which include an excellent *Penstemon* and a dwarf perennial *Lupinus* on Vancouver Island, growing no more than around 15 cm.

Another important aspect with this program is also the support and advice being received from the Provincial Department of Highways which is particularly interested in species which can be mass planted or sown adjacent to new road development.

In conclusion, British Columbia, with its some 3,000 different species, offers considerable potential for recollecting and evaluation for modern nursery production and subsequent wholesale and retail sales. This challenge opens up a new phase in our plant introduction

scheme to stimulate the selection and use of improved forms and relatively unknown species for the British Columbia nursery industry. In turn, it is a challenge the University of British Columbia Botanical Garden eagerly accepts.

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