Collection, Propagation, and Use of Native Plants

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INTRODUCTION

Before we begin let us decide what we mean by native plants for the purpose of this presentation. By native plants we mean plants found growing naturally in a certain area. They include native perennials, shrubs, and trees. These are the plants present in that area before other plants were introduced, intentionally or unintentionally, from elsewhere. These native plants evolved in their natural habitat over time and they can be assumed to be the most optimum plants for the sites where they are found. Along with the plants evolving in their particular area other life forms have evolved with them, such as mammals, birds, and insects, as well as more primitive life forms, including fungi and soil organisms which, together with nonliving elements, form complex ecosystems.

Native plants have an important role to play in maintaining the diversity of ecosystems in the less disturbed outlying areas where forestry and agriculture dominate, as well as in the urban areas. In conclusion, we can say that native plants will always be an essential component of the landscape, both urban and nonurban, for reasons of biodiversity, as well for their aesthetic value.

PROPAGATIVE MATERIAL

Native plants have been used for habitat restoration and landscaping purposes in British Columbia for at least the past two decades. Initially the common propagation method was to collect plants in their natural habitat and replant them in the desired location. In some instances, e.g. ferns, the root systems would be divided, and the divisions potted up. This practice has led to the disappearance of a number of species from extensive areas. Some local species that come to mind are: deer fern, *Blechnum spicant;* evergreen huckleberry, *Vaccinium ovatum;* white fawn lily, *Erythronium oregonum;* and western trillium, *Trillium ovatum.*

For obvious reasons the collection of plants is unacceptable. As a result the collection of native plants has been replaced, to a large extent, by plant propagation, although a substantial number of plants, e.g., ferns and wetland species (for restoration purposes mainly) are still collected from the wild.

Two main methods of propagation are currently being used: (1) seed; and (2) vegetative propagation by way of cuttings. Additionally, tissue culture is used for some species, e.g. a selection of *V. ovatum* like 'Thunderbird'.

In the case of native ferns, these can be propagated from spores.

Whether seed or cuttings are used for propagation depends on:

- The destination of the resulting plant material,
- Which one of the two methods is the easiest.

As to the destination of the plant material a distinction between two markets can be made:

Ornamental and/or Landscape Market. Some of the users of native plants for this

purpose attach a value to the uniformity, form, colour, or size of the product. As a result selections of several native plant species have been made, which are maintained by way of vegetative propagation. The University of British Columbia Botanical Garden has, through its plant introduction scheme, released a number of native plant selections. Some are: *Arctostaphylos uva-ursi* 'Vancouver Jade', *Ribes sanguineum* 'White Icicle', *V. ovatum* 'Thunderbird', and *Penstemon fruticosus* 'Purple Haze'.

Restoration or Rehabilitation Market. These users include mine sites, utility corridors, forestry sites, and wetlands. In this case, factors such as uniformity, size, etc. are not important; in fact plant selections are undesirable. The user will look for proper seed origin, i.e., geographic location, elevation, and biogeoclimatic zone in an effort to maintain the genetic variation of the species and the suitability of the new crop to the planting site.

VEGETATIVE PROPAGATION

In order to maintain a cultivar or selection, with its "improvements", cuttings are taken from plants of the desired selection either in the landscape or from (stock) plants in the nursery. This is also done for species not easily grown from seed. Some of these are: falsebox, *Paxistima myrsinites*; willows, *Salix* spp.; stonecrop, *Sedum* spp.; twinflower, *Linnaea borealis* var. *longiflora*; wild ginger, *Asarum caudatum*; strawberries, *Fragaria* spp.; and poplars and aspen, *Populus* spp.

In most cases softwood cuttings are taken, however, *Populus* spp. and *Salix* spp. are grown from hardwood cuttings. More research for the optimum timing when cuttings are to be to be taken needs to be done.

PROPAGATION FROM SEED

The majority of native plants are grown from seed. Seed is not easily available commercially, so seed has to be collected. As seed is not always produced reliably every year, it is a good idea to try to build a seed inventory large enough to cover at least a 2-year requirement.

Growers may collect their own seeds or they may use seed collectors. At Linnaea Nurseries Limited we collect seed crops that we can reach within 1 day; longer overnight trips are not economical. For this reason we contract out seed collections to contractors who cover other biogeoclimatic areas. This also allows us to obtain other species not available in our own collection area, and build up a seed inventory that includes the same species from different biogeoclimatic zones.

A successful seed collector:

- Knows the collection area well
- Has an inborn interest in plants growing in their natural environment
- Has a basic knowledge of seed and plant biology
- Is able to use field guides and identify plant species
- Has the time and ability to locate adequate seed crops, as well as to monitor seed development and maturity
- Knows when and how to collect seed, ship, and store it
- Properly records and labels any seed collected.

Types of seed the collector encounters:

- Seeds in fruits, containing from a single or several to many seeds, e.g., *Rosa* spp., *Amelanchier* spp., *Cornus* spp.,and *Vaccinium* spp.
- Dry seeds, e.g., in capsules containing a number of seeds like, *Menziesia ferruginea, Rhododendron* spp. or achenes, a dry fruit containing a single seed, e.g., the *Asteraceae*, in the case of conifers, seed in cones.

Seed maturity is an important factor, which strongly influences the seed germination rate. Immature seed has a low germination rate or does not germinate at all. On the other hand, if the collector waits too long, the seed will often fall off the plant or will be eaten by birds. In many cases the "collection window" occurs between the time when seeds reach the required maturity level for collection and when seeds are released and dispersed naturally. It can be as short as a couple of days. Crop monitoring, therefore, is essential.

SEED MATURITY

Seed maturity can be evaluated in different ways and varies with species. Many berries turn from hard and green fruits to soft and to a color indicating the stage of maturity, e.g., orange/red for rose hips, blue for *Mahonia* species, and orange for *Cornus canadensis*. In the case of dry seed, seed heads or capsules will turn from green to brown.

Whenever feasible, before collecting berries, cones, capsules, etc., the seed-containing structure should be opened, e.g., cut with a knife to check the presence and the number of seeds. If there is no seed present, or in the case of seed cones, if the seed count is very low, a seed collection may not be worthwhile.

Other criteria in judging seed maturity include:

- Seed color, usually brown if mature.
- Hardness of seed, milky or soft seeds are immature. Mature seed is hard; cannot be squeezed, indicating a low seed moisture content.
- Embryo development; a mature embryo fills at least 90% of the embryo cavity. This requires cutting the seed with a sharp knife or one-sided razor blade. The embryo is usually cream to yellow in color, while the seed storage tissue (megagametophyte) is white. An empty seed or a discolored seed (often with a "woody" brown seed interior) indicates seed is not viable.

Mature berries and dry seeds are collected by hand in pails or plastic bags. Tree seeds require different methods. Mature cones can be picked off trees or collected from squirrel caches. In some cases, e.g., *Thuja plicata, Alnus* spp., the collector can wait till seed is ready to be dispersed naturally, by shaking the branches and collecting the seed that drop on a tarp below the tree.

Berries, seeds, and cones in transit and temporary storage are to be kept cool, ideally, between 2 to 4C (35 to 39F).

SEED PROCESSING

Upon arrival at the processing location, seed has to be checked for weight, quality, maturity and, in the case of dry seeds, for moisture content. Most dry seeds benefit from additional drying on trays or racks in a dry, well ventilated space. Often an unused, dry spot in the greenhouse works well.

Berries should be processed as soon as possible. For most cases a simple food processor is adequate. Large commercial macerators and separators are available, but expensive (there are several European products costing in excess of CDN $10,000 each).

The berries are macerated (ground into a pulp), which takes from 25 sec to 5 min per batch. If processed for too short a time pulp is not removed adequately. If processed too long seed may be damaged. Stop the processor regularly to check. Experience will do the rest. The pulp and the seed are separated in water. A 20-liter (5-gal) pail works well. As a rule, the good, heavy (filled) seeds sink to the bottom, and the pulp and empty seeds are floated off. To prevent losing valuable seed, the water solution containing seeds and pulp is run through a strainer. Have several strainers with different mesh sizes at hand. Floating seeds must be checked (cut with a knife) regularly to ensure that not too many filled seeds are floated off with the pulp. The pulp has to be checked for the presence of seed and may have to be re-processed. Most of the debris can be floated off and seed purities of approximately 90% to 95% upon completion of processing are quite common.

After processing, the seed needs to be dried. This can be done on fine mesh wire or cloth screens, which are easy to construct. The same screens can be used to screen off most of the remaining debris from the dry seed. Screens with different mesh sizes will be required. Seed that is to be sown or stratified shortly after processing can be dried back to between 10% and 30% moisture content. Seed that will go into (long-term) storage must be below 10% moisture content. Either a dry stove or lots of experience will be needed to determine moisture content.

Store seed in air-tight containers, or 4 mil plastic bags at approximately 2C (35 to 36F). For long-term storage (2 to 10 years) ensure moisture content is below 8% for freezer storage at -5/10C (20/15F). Some (often nonhardy coastal) species do not store well at temperatures below freezing.

RECORDS

Records are an essential tool in quality and inventory control. Records are to include the following information: name (and address) of collector, botanical species name, collection location, collection date, seedlot number, weight of seed before processing, weight of seed after processing and drying, filled seed count, seed purity in percentage, number of seeds per dry weight unit (e.g., gram, ounce, etc.), yield of seed per weight or volume unit of collected seed before processing and storage location (e.g., box number, shelf number).

With this information you build up a database on collectors, collection areas, yield comparisons between collection years and locations, sowing rates, costing, invoicing, etc. A computer is a helpful tool for record keeping!

SEED STRATIFICATION

At Linnaea Nurseries two methods of stratification are used:

1) Natural stratification; mostly in propagation trays filled with peat moss or some other soil medium.
2) Artificial stratification; in cooler at approx. 2C (35 to 36F).

Where we have found no advantage in natural stratification we stratify seed in plastic bags in the cooler, e.g., *Arctostaphylos uva-ursi, C. canadensis, Amelanchier alnifolia,* and *Shepherdia canadensis.*

Standard Procedure. Seeds are soaked for 24 to 48 h in running water, drained, mix with moist peat moss, and store in plastic bag in cooler for the required duration for the species. Stratification development can be monitored by taking a seed sample (e.g., 25 seeds) out of the bag followed by a germination test during the final stages of the stratification period.

For natural stratification seed is sown in late summer or early fall for species requiring warm/cold stratification, e.g., *Mahonia* spp., *Acer* spp., and *Symphoricarpos albus*. Many species are sown in October and November. Many native perennials are sown in early spring.

Seed flats are either left outside without protection (woody species) or in the case of small-seeded species with thin seed coats and some perennials, in an unheated shelter house.

Seed scarification (e.g., using acid, crushing, grinding, etc.) is rarely used at Linnaea Nurseries.

Seed germination timing can be influenced somewhat by bringing seed flats into a heated greenhouse either earlier or later (e.g., between February and April). If in doubt whether stratification is satisfactory, carry out a germination test before moving seed flats into the warm greenhouse.

Stratified seed can be sown just before germination or seed can be allowed to germinate in seed flats and be transplanted into the desired container type.

Generally, growing media should be well drained, using fairly coarse peat moss in combination with perlite, pumice, and sometimes some sand. Being aware of the natural growing conditions of native plants is helpful in selecting the growing media and growing regime, i.e., water, fertilizer, and shade requirements.

Once the native plant seedling is established you will find that the growing requirements are similar to the non-native crops, and the same rule applies: the grower's footsteps are the best fertilizer.

USE OF NATIVE PLANTS

We have touched on some of the uses for native plants. One of the oldest uses, and often not thought of as such, is in growing seedlings for reforestation purposes. Almost all seedlings planted in logged areas are native conifer species. More recently, native shrub and nonwoody species are used for deactivation of logging roads, landings, etc., as well as slope stabilization, erosion control, streambed restoration, etc.

Public pressure has led to legislated measures and a general preparedness to repair the damage to the landscape from forestry, mining, gas pipelines, and urbanization. Although the methods used by some environmental groups may sometimes be questionable, it is largely thanks to their pressure that the public has become aware of environmental issues and a new environmental ethic has come about. This has led to an increased interest in end use of native plants which has provided new opportunities to the nursery industry. Furthermore, initiatives such as Greenways, Naturescape, and recently the establishment of the BCNPS, British Columbia Native Plant Society are reinforcing awareness and use of native plants in the (urban) landscape, including their use in the garden.

It is my belief that native plants have a continuing role to play in maintaining a healthy environment, and for that reason we at Linnaea Nurseries are prepared to identify and fill the needs created by this new reality.

ADDITIONAL READING:

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