Native Food Plant Propagation

Indigenous Greenhouse Factsheets

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Introduction

Greenhouses can be used to effectively propagate native plants, with several First Nation-operated native plant nurseries across British Columbia. Growing native food plants is a way to integrate local culture into greenhouse projects. Native food plants can be used in community projects, to create new Indigenous food forests, or for larger reclamation projects aimed at environmental restoration that recognizes cultural values.

Native plants are often more challenging to grow than domestic crops. Seeds can be sourced from specialty suppliers, but it is best practice to harvest and work with local seeds. In the nursery world, the source of seed is referred to as its "provenance". For example, with conifer trees that are being planted for reclamation projects, clients may request that seed provenance is regulated through the BC Ministry of Forests Seed Planning and Registration (SPAR) system. Other tree species, along with shrubs, forbs, and grasses do not fall under this regulation, but sourcing local seeds will ensure that seedlings are regionally adapted for your planting site.

You can grow many native plants using cuttings, but this creates exact copies of the parent plant and doesn't help increase genetic diversity in the nursery. Unique traits can be displayed in seedling stock, such as pest or disease resistance or climatic adaptability. Native plant seeds often require special care and preparation to achieve germination, but once established, are generally hardy and should grow vigorously at local planting sites.

The E-Flora BC website (E-Flora) is a widely used tool for native plant identification and provides a standard for the English and Latin names.

Seed collection and processing

The most commonly harvested native food plants are the various edible berries. To collect seed from berries, they should be harvested when ripe and transported to your processing site in a cooler. It is good practice to label the collected berries with the date and harvest location.

Specialized machines exist to extract seeds from berries and fruits, but these can be expensive. A simple technique is to use a blender with masking tape wrapped around the blades:

1. Add a cup or two of berries to the blender and fill up halfway with water. Run the blender until the berries are pulverized.
2. Pour off the contents into a large bowl to settle. The seeds should sink to the bottom with most of the fruit pulp and debris floating.
3. Skim off the pulp.
4. The seeds can then be collected in a sieve and washed off a few times. There will be some debris remaining that has to be picked out by hand.

Seeds can then be dried for storage or immediately processed for propagation. If you plan to store seeds long-term, they can be frozen, however, this can require additional drying to ensure the seeds are not damaged by the freezing process.

Collected seeds should be assigned a seedlot number that is used to track the collection date and site information along with any other notes.

Scarification

Native seeds often have a strong exterior coating to protect them when being eaten and dispersed by birds and other animals. Some seeds require the seed coat to be disturbed/altered (a process known as scarification) to trigger germination.

Common nursery scarification techniques

Physical

The seed coat is physically broken, usually with coarse grit sandpaper. Special containers can be built to grind entire seedlots between two layers of sandpaper at once.

Chemical

Acids can be used to break down the seed coat. The nursery industry often uses sulfuric acid; lemon juice can provide similar results. Soak the seeds in pure lemon juice for a minimum of 15 minutes.

Heat

Boiling water is poured over the seeds and left to soak for a period.

Not all seeds require scarification, and research should be done on each species. Sometimes it requires some trial and error to determine the best practices. Detailed note taking and data collection are essential.

Stratification

Most native seeds require some form of stratification. Stratification refers to using cold to mimic the natural process of winter. Most seeds benefit from 24-48 hours of soaking in water prior to commencing cold stratification. Be sure to change out the water every day. Seeds in stratification are prone to mold; a quick wash in peroxide can help minimize these issues.

After soaking, seeds can be placed in a stratification medium. The most common options are commercial peat, vermiculite, sand, or even inside some paper towel. The material around the seeds should be damp, not soaking wet. Aim for about 10% moisture. Place the seeds along with the stratification medium in a labeled bag and place in a refrigerator. Different seeds require different cold stratification times.Consult the literature!

Be sure to inspect stratifying seeds weekly for signs of mold, germination, or drying out. If mold is present, it is best to wash and retreat the seeds with peroxide prior to placing them in a new bag with fresh stratification media. There can be variability with different seedlots and early germination is common. Once a 10% germination is achieved, it is common to plant the entire seedlot.

Natural Stratification

This technique involves seeding in the fall and allowing the seeds to spend the winter in an unheated greenhouse. Expect natural germination once greenhouse temperatures start to raise above 1O°C in the Spring.

Grow Trays and Media

Styrofoam grow trays, called styroblocks, are the most-used grow trays in commercial nurseries. These trays have the advantage of providing insulation and can help protect extra stock left outside of the greenhouse during the winter. They also provide protection from excessive solar heat in the greenhouse during the growing season.

There are various sizes of grow trays recommended for different species based upon plant growth rate and root mass.

Greenhouse grow media can either be purchased premixed and mixed on site. Many growers are adopting the use of grow media that has been inoculated with beneficial mycorrhizal fungi. A simple mixture of peat moss, vermiculite, and dolomite lime can meet the needs of most native food plants. If it is a species that requires acidic environments, omit the lime.

Figure 1. Styroblocks are the norm in large-scale native plant operations. They provide insulative value that can protect seedlings from winter killing and reflect excessive summer heat.

If the seed lot is questionable or the species is known for poor germination, it's a good idea to sow the seeds in an open tray instead of a styroblock. Seeds that successfully germinate can be replanted into styroblocks to spend the season in the greenhouse. This technique is called dibbling.

Native plant greenhouse management and organization

While permanent raised beds in the ground are recommended for domestic food crops, native plants grown in trays are best situated on grow tables like a farm nursery. Native plants may have significantly different water needs so it is best to organize the grow tables based upon irrigation requirements. The seedlings, now referred to as 'plugs,' should be watered until the moisture reaches the bottom of the plug. This encourages full root development. Excessive watering can lead to fungal disease issues and algae blooms, so manage accordingly. When operating at the scale of a large greenhouse, anything that can be automated should be. Irrigation can be set on timers and adjusted based upon weather, temperatures, and ongoing observations. It is common to top the soil surface of the plugs with small gravel called forestry grit, or some other material such as vermiculite or rice hulls. This helps maintain consistent moisture levels and reduces algae growth.

Fertilization is also important to support vigorous growth. Commercial fertilizer injectors can be used to add water soluble fertilizer into the irrigation water at standard rates. This should be done on a regular schedule and adjusted based upon observations. Too much fertilizer can lead to tall, lanky plants that are weak and susceptible to disease, and too little can lead to stunted yellow plants.

Commercial nurseries most commonly use conventional water-soluble chemical fertilizer, but there are organic options. Liquid fertilizers work well, as do compost teas. Many organic growers claim that compost teas produce the strongest, most resilient stock.

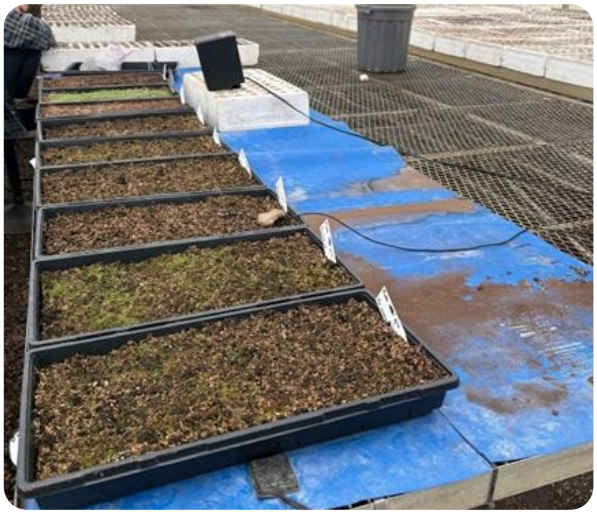

Figure 2. Many seeds have improved germination with the use of heat mats.

Figure 3. These professional grade heat mats are controlled by an external thermostat.

Harvest and planting

Native food plant seedlings can be harvested for planting as soon as there is a robust root system that holds the plug together. However, when planting out at sites that will not be cared for regularly, it is recommended to transplant out the native plants when they are dormant in the fall or early Spring. Plugs planted out at this time have significantly higher survival rates.

Common native food and medicine plants

Saskatoon, Amelanchier alnifolia

Saskatoon shrubs grow across the entire province and provide an abundant crop of easily harvested and delicious berries. Saskatoons are often found growing as an intercrop along with other food species, including beaked hazelnut, chokecherry, pin cherry, prickly rose, pacific crabapple and hawthorn. Rich and abundant food forests like this are commonly found around old Indigenous villages, camp sites, and trade routes.

Buffalo-berry or Soopalalie, Shepherdia canadensis

More commonly referred to as soopalalie, soapberry, or sxusem berry. One of the more culturally significant berries for many Indigenous nations. Buffalo-berries have, and continue to be, a highly valued trade item and are the essential ingredient in making Indigenous "ice cream". Buffalo-berry shrubs tend to be found in open sandy sites but also thrive under forest canopies. These beautiful shrubs are noted for their ability to be a host species for nitrogen-fixing bacteria, thereby contributing to available soil nutrients for other plants in their vicinity.

Black huckleberry, Vaccinium membranaceum

Black huckleberries are one of the most challenging berries to propagate, and many attempts to domesticate the berry have failed. They are typically found growing in the subalpine and are a preferred food for grizzly bears. Vaccinium species have unique pH requirements and depend on acidic conditions to grow. If propagated in a greenhouse setting, these plants should be planted in sites that have previously had black huckleberries growing, or they will likely fail to grow vigorously. There could be an unknown relationship between huckleberries and other components of their natural environment such as the fungal or bacterial communities that are essential for the plants to thrive, or perhaps it is just the unique soils and climates of their natural subalpine habitats that they depend upon.

Figure 4. Dormant rat root (*Acorus americanus*) plants overwintering inside a greenhouse. Growing Indigenous plant medicines can be an excellent want to incorporate cultural values into greenhouse operations.

Figure 5. Scrub birch (*Betula nano*) seedlings starting to emerge from dormancy inside an unheated greenhouse in late winter.

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