

Soil Mixes and Containers for Growing Native Plants

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Soil Mixes

In many respects the success or failure of propagation activities depends on a proper choice of soil mixes or growing media, and for this reason many gardeners and growers have personal preferences and prepare their own mixes. Most mixes contain two or more of the following ingredients – sterilized soil, peat for water retention, perlite for aeration, and a fertilizer additive if plants are to remain in the medium beyond initial germination or rooting. All of these ingredients can be obtained at garden centres. Common mixes for various purposes are as follows:

Purpose	Sterilized Soil ¹	Peat Moss ²	Perlite/Vermiculite	Amendments
Germination/seedling mix	2 parts	1 part	1 part	2 tbsp of 2-13-0 bone meal to each 10 l. of mix
Cutting mix		1 part	2 parts	
Potting-on/ up mix	3 parts	2 parts	1 part	2 tbsp of 6-8-6 fertilizer to each 10 l. of mix

Commercial seedling and potting mixes can be purchased, but most of these are “soilless” (i.e. mostly peat-based). Many people use such mixes, however, if you prefer to have a real soil component (which may be important for micro-nutrients) you will either have to mix your own or add sterilized soil to a commercial mix. If you wish to produce your own sterilized soil, treat good quality garden soil outdoors (because of odour) in an old oven at 175^o for 30 to 40 minutes. Some nursery/garden supply outlets may rent soil sterilizers. Allow sterilized soil to cool and then bag in black plastic for future use.

“Soilless” mixes are particularly important in research applications because of the need to have comparability and reduce unintended variation between research treatments. The Pacific Forest Centre in Victoria uses the following mixes for various research and propagation purposes (Source: Rob Hagel).

¹ It is important to use sterilized soil as a base to prevent damping-off or root-rot diseases as well as to prevent the introduction of weed seeds into your propagation.

² If you are concerned about the environmental impacts of peat mining, a good alternative to peat moss is a relatively new product called “coir” (brand name “Beats Peat”) made from coconut husks, of which Southeast Asia has a near endless supply.

Name ³	Purpose	Peat/Coir	Vermiculite ⁴	Perlite ⁵	Washed Sand	Sifted Compost ⁶	Ground Bark ⁷	Coarse dolomite lime	Micromax micronutrient mix	Osmocote 18-6-12 (slow release) ⁸
PV-Perl	<ol style="list-style-type: none"> 1. Seedling mix for natives, ornamentals, tropical plants or conifers (with subsequent soluble fertilizer applications for supplying N-P-K at proper levels). 2. Potting up and/or on a wide variety of plants requiring rapid drainage and a highly aerated soil mix. 3. Initial potting up of rooted cuttings (some soluble fertilizer applications will be required). 	3 parts (one 3.8 cu. ft. bale)	1 part (2 cu. ft. or ½ a 4 cu. ft. bag)	1 part (2 cu. ft.)				750 g		
PV-LR	<ol style="list-style-type: none"> 1. Seeding mix for conifers, native plants or ornamentals where a low rate of fertilizer is desirable (soluble fertilizer applications will be required if faster growth rates are desired). 2. Mix for potting on of slow growing natives, ornamentals and greenhouse grown tropical plants. 	3 parts (one 3.8 cu. ft. bale)	1 part (2 cu. ft. or ½ a 4 cu. ft. bag)					750 g	175 g	750 g

³ These are the abbreviations used by PFC for naming their soil mixtures. P = perlite; V = vermiculite; S = sand; LR = low rate of fertilizer application

⁴ All reference to vermiculite refers to horticultural medium grade only.

⁵ All reference to perlite refers to horticultural medium grade only.

⁶ Sifted compost could also be sea soil (or other fish compost).

⁷ If ground bark is dry, add 30 L of water to moisten first. Alternatively, sea soil could be used which contains forestry fines.

⁸ The fertilizer referred to in all mixes is Osmocote 18-6-12 slow-release fertilizer (8 to 9 month release rate). This fertilizer should be exhausted after one complete growing season. Growing stock on for another year will require either potting on the stock, soluble fertilizer during the next year (weekly application of 20:20:20 soluble fertilizer at 0.5g/l), or top dressing with Osmocote (or another controlled release fertilizer) to maintain proper nutrition.

Name ⁹	Purpose	Peat/Coir	Vermiculite ¹⁰	Perlite ¹¹	Washed Sand	Sifted Compost ¹²	Ground Bark ¹³	Coarse dolomite lime	Micromax micronutrient mix	Osmocote 18-6-12 (slow release) ¹⁴
PVS-LR ¹⁵	<ol style="list-style-type: none"> 1. Potting up of conifers, natives and nursery stock requiring low fertilizer rates. 2. Potting up seedling plugs to one gallon or larger pots. 3. Useful for many native plants that like good drainage and when more weight is desired to prevent pots from blowing over. 	3 parts (one 3.8 cu. ft. bale)	1 part (2 cu. ft. or ½ a 4 cu. ft. bag)		1 part (2 cu. feet)			750 g	175 g	750 g
PV-LR + sifted compost ¹⁶	<ol style="list-style-type: none"> 1. Potting up some native plants that prefer higher organic content (e.g., <i>Aquilegia formosa</i>). 	3 parts (one 3.8 cu. ft. bale)	1 part (2 cu. ft. or ½ a 4 cu. ft. bag)			Up to 50% volume		750 g	175 g	750 g
Garry oak mix	<ol style="list-style-type: none"> 1. Growing of oak seedlings that demand a highly aerated soil and rapid drainage. 2. Potting on rhododendrons to gallon or larger containers. 	3 parts (one 3.8 cu. ft. bale)	2 parts (one 4 cu. ft. bag)	1 part (2 cu. ft.)			3 parts (5 cu. ft.)	1500g	350 g	1000 g

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¹⁵ When you need to make only a small amount of soil with some more moisture holding capacity and weight, you can add ~20% sand to the PV-LR mix (4 parts PV-LR : 1 part sand) to get PVS-LR.

¹⁶ When potting up some native plants that prefer higher organic content, you can add sifted compost (up to 50% compost).

Soil Components

Component	Purpose	Local Supplier
Peat moss (or coconut coir) 	Peat provides moisture retention when added to any soil and is the main component of “soilless” mixes. Coir is a more sustainable alternative manufactured from coconut husks.	<ul style="list-style-type: none"> • Direct Solutions (formerly Evergro) • Borden Mercantile • Integrity Sales and Distributors • Gardenworks (coir)
Vermiculite <ul style="list-style-type: none"> • Sold in 4 cu. ft. bags 	Vermiculite is an inorganic soil additive that provides aeration and moisture retention for “soilless” growing mixes. Breaks up heavy soils. Holds 5x its weight in water. Sterile, does not contain any contaminants and lasts indefinitely. It is manufactured from a silicate material that expands when heated.	<ul style="list-style-type: none"> • Direct Solutions • Borden Mercantile • Integrity Sales and Distributors
Perlite <ul style="list-style-type: none"> • Sold in 120 L (~4 cu. ft. bags) 	Perlite (volcanic glass) is an inorganic soil additive that provides aeration and drainage capacity and prevents soil compaction. Sterile, does not contain any contaminants and lasts indefinitely.	<ul style="list-style-type: none"> • Direct Solutions • Borden Mercantile • Integrity Sales and Distributors
Washed sand	Sand provides drainage and aeration and helps weigh down pots placed outdoors. Sand used should be washed, sharp sand (not play sand). It should feel sharp and gritty, not round, when rolled between fingers.	<ul style="list-style-type: none"> • Victoria Landscape and Gravel Mart • Peninsula Landscape Supplies Ltd.
Ground bark <ul style="list-style-type: none"> • Available in bulk from landscape suppliers 	Ground bark mulch provides organic matter, aeration and drainage or tree seedlings such as Garry oaks. If ground bark is dry, add 30 L of water to moisten first. Alternatively, sea soil could be used which contains forestry fines.	<ul style="list-style-type: none"> • Victoria Landscape and Gravel Mart • Integrity Sales and Distributors • Peninsula Landscape Supplies Ltd.

Component	Purpose	Local Supplier
Dolomite lime (coarse) <ul style="list-style-type: none"> Sold in 23 kg bags 	Dolomite lime is used to adjust the pH of “soilless” media that contain peat (which is naturally acidic). Commercial “soilless” mixes such as Pro-mix and Sunshine mix already have it added.	<ul style="list-style-type: none"> Direct Solutions Borden Mercantile Integrity Sales and Distributors
Micromax micronutrient mix <ul style="list-style-type: none"> Sold in 23 kg bags 	Micromax micronutrient mix provides micronutrients (e.g. trace minerals) essential for proper nutrition in “soilless” mixes. It is not necessary to add Micromax if you are adding a real soil component (e.g., potting soil, sea soil) to your mix.	<ul style="list-style-type: none"> Direct Solutions Integrity Sales and Distributors
Osmocote 18-6-12 (8-9 month release rate) <ul style="list-style-type: none"> Sold in 23 kg bags 	Provides macronutrients (nitrogen, phosphorous and potassium) essential for proper nutrition, especially in “soilless” mixes.	<ul style="list-style-type: none"> Borden Mercantile Integrity Sales and Distributors
Sifted compost <ul style="list-style-type: none"> Available in prepackaged bags from various retailers or in bulk quantities of ½ yard or more from landscape suppliers 	Adds organic matter and improves aeration and drainage. <i>Important to ensure it is weed free.</i>	<ul style="list-style-type: none"> Victoria Landscape and Gravel Mart (made from green waste)
Fish compost <ul style="list-style-type: none"> Available in prepackaged bags from various retailers or in bulk quantities of ½ yard or more from landscape suppliers  	Contains macro- and micronutrients. Manufactured from fish by-products and forestry fines. <i>Usually the supplier guarantees it to be weed free unless it has been sitting outside in open bins.</i>	<ul style="list-style-type: none"> Integrity Sales and Distributors (Sea Soil) Victoria Landscape Gravel Mart (Earth, Land, Sea) Peninsula Landscape Supplies Ltd. (Earthbank Fish Compost <i>made on Vancouver Island!</i>)

Component	Purpose	Local Supplier
<p>Pro-mix (available in PGX, BX and HP)</p> <ul style="list-style-type: none"> Sold in 3.8 cu. ft. compressed bales 	<p>Pre-mixed “soilless” medium that is available in various formulations of peat/vermiculite/perlite depending on whether you are looking for a germination mix (PGX), general purpose (BX) or high porosity mix (HP) for species requiring fast drainage. Unique to this brand is the inclusion of mycorrhizal fungi which touted to promote stronger, healthier plants. Certain mixes are also available with a biofungicide to prevent damping-off and root-rot diseases. All mixes have been adjusted for pH with dolomite lime. Need to add Micromax and Osmocote 18-6-12 for proper nutrition.</p>	<ul style="list-style-type: none"> Direct Solutions
<p>Sunshine mix (available in #1-5)</p> <ul style="list-style-type: none"> Sold in loose bags or 3.8 cu. ft. bales 	<p>Pre-mixed “soilless” medium comparable to Pro-mix. Available in various formulations of peat/vermiculite/perlite depending on whether you are looking for a germination mix (#3), general purpose (#1) or high porosity mix (#4). All mixes have been adjusted for pH with dolomite lime and also contain a low nutrient charge (gypsum). Need to add Micromax and Osmocote 18-6-12 for proper nutrition. Tends to be a bit cheaper than Pro-mix and does not contain myccorhizal fungi or biofungicide).</p>	<ul style="list-style-type: none"> Borden Mercantile Integrity Sales and Distributors

Containers

A wide range of growing containers is available from garden shops and nursery supply companies, ranging from single pots through multiple plastic cell-packs to multi-cell styrofoam blocks (called styroblocs). Choice of containers will depend on the type of plant to be grown and the personal preference of the grower.

Small growers and individuals interested in native plants will probably begin with plastic pots because they're readily available from nursery shops and many gardeners will have acquired a range of pot sizes when they buy shrubs, perennials and bedding plants for their garden. Pots are available in a range of colours (pick dark colours to limit algal growth on the inside of the pots), shapes (round and square), and sizes (commonly 2, 3, 4, 5 and 6 inch, 1 gallon and 2 gallon). In the smaller sizes the square pots are probably preferable because they will be watered and fertilized *en mass*, and since there are no spaces between the edges of the pots, there is less water and fertilizer waste during ongoing, post-propagation care. Many growers feel that when potting-on beyond 6" pots (for higher-value shrubs and perennials), 1 and 2 gallon pots are easier to handle when moving plants around.

When higher levels of production are required it will be necessary to move to multi-container systems, since they can be handled more easily and cheaply than single pots. The most common, easily-available and inexpensive of these systems are plastic cell-packs, consisting of a 21" by 11" plastic tray with perforations for drainage, and light-weight, formed plastic containers that sit inside the tray and are available in a range of sizes. Obviously the size of the cell determines the number of plants per tray; e.g. a tray of 1.5 inch² cells will contain 72 cells, while a tray of 2.25 inch² cells can contain 32 to 36 cells depending on whether the cells are individually-formed or in blocks of six. Trays can last many years, but the containers are more fragile and UV sensitive and will seldom last beyond two growing seasons.

Most large-scale production in B.C. for forestry and reclamation planting utilizes styrobloc containers. These are large (18, 20 or 24" long, 14" wide, and 6-9" high) blocks of styrofoam containing varying numbers, sizes and densities of cavities. The most common container dimensions accommodate between 112 and 200 plants with cavity volumes ranging from 50 to 100 ml. Smaller and larger cavity volumes are available for specialty plant products. Styroblocs incorporate a relatively new root-training feature with four vertical ribs inside the cavity to prevent roots from "spiraling" when they reach the cavity sides. Styroblocs are fairly robust and can be re-used many times if proper care is taken. The primary disadvantage of styroblocs is that, unlike pots and plastic cells, they don't fit inside one another for efficient storage. This is not a problem for large-scale operations but most small-scale growers will simply lack adequate storage space.

Resources

- Styroblocks (styrofoam): <http://www.beaverplastics.com/Agriculture/documents/styroblocks.pdf>
- Hortiblock Trays (hard plastic): <http://www.beaverplastics.com/Agriculture/horticulture.html>
- Root Trainers: <http://www.beaverplastics.com/Agriculture/rootTrainers.html>
- Cell packs: http://www.sungro.com/files/2012_Catalog.pdf
- Horticultural supplies (Canada): http://www.growercentral.com/about_evergro.cfm
 - Online supplier for peat moss, Pro-mix, perlite, vermiculite, osmocote, micromax etc.
OR you can buy direct from their branch in Victoria (see Direct Solutions below).

Local Suppliers

Direct Solutions (Victoria)

(previously called Evergro, Nu-gro)
360 Garbally Road, Victoria
Ph: 250-381-2281

Borden Mercantile (Saanich)*

3960 Borden St., Victoria
Ph: 250-479-2084

Integrity Sales and Distributors (Saanichton)*

2180 Keating Cross Road, Saanichton
Ph: 250-544-2072

Victoria Landscape and Gravel Mart (Victoria)

2516 Pleasant St., Victoria
Ph: 250-381-2419

Penninsula Landscape Supplies Ltd. (Central Saanich)

2078 Henry Ave., Sidney
Ph: 250-656-6719

Gardenworks (various locations)

*Also a good source for propagation containers including plug trays, cell packs, flats, trays and pots 2" up to 20 gallon). Integrity Sales and Distributors sell items individually as well as in bulk cases.
