

Propagation *of* Interior British Columbia Native Plants *from* Seed

Shelley Hudson and Michael Carlson



Propagation *of*
Interior British Columbia
Native Plants *from* Seed

Shelley Hudson and Michael Carlson

September 1998

Foreword

In 1994 the British Columbia Forest Service staff at the Kalamalka Forestry Centre began propagating native shrub and non-commercial tree species of the B.C. Interior. The initial seed work involved seed collection, stratification and the growing of planting stock for revegetation projects along the Salmon River near Salmon Arm. This started as a cooperative effort with the Federal Department of Fisheries and Oceans and the community-based Salmon River Enhancement Society and since has expanded to include revegetation projects with forest districts, native bands and municipalities.

Forest Renewal B.C. funding for this project was obtained in 1996 under FRBC Research Award: HQ96363-RE and continues today. The plant propagation monographs (by species) included herein were produced by Ms. Shelley Hudson, Horticultural Specialist at the Kalamalka Forestry Centre, Vernon.

Questions about propagation techniques can be directed to Shelley at (250) 260-4771 or fax (250) 542-2230. Questions about other aspects of the project can be directed to Michael Carlson at (250) 260-4767 or fax (250) 542-2230.

Introduction

British Columbia's considerable diversity of soils, topographies and climates have given rise to a rich variety of native plant species. Many commercially valuable tree species have well-established protocols for seed collection, planting stock production, seedling handling and planting. Comparatively little is known about these activities for non-commercial shrub and tree species. Many of these deciduous shrub and tree species are being used for watershed restoration and rehabilitation of eroded slopes, road edges and landings. Demands for planting stock are increasing each year.

The following plant propagation monographs were developed to aid provincial growers in the production of high quality planting stock.

Growing objectives

1. To develop a growing system for non-commercial native shrubs and trees compatible with those of commercial conifers, using the styro container growing system already in place.
2. To ensure the ability to direct sow with filled, viable seed, into styro containers with minimal transplanting.
3. To identify techniques for effectively pretreating seeds to ensure fast, even germination.

In 1997 there was a change made from hot planting 2-year-old growing stock in June of the 2nd growing year, to planting 1-year-old dormant stock in the spring of the 2nd year. In general, we have determined that dormant planting stock survives and grows better than hot-planted 2-year-old stock.

Standard growing procedures for all native plant species

Soil media: 100% peat moss

Containers: styros – 77/125 ml (412A), 77/170 ml (415D), 60/250 ml (515A), 45/340 ml (615B)

Sow dates: April 1 – slow growing plants,
May 1 – fast growing plants

Germination temperatures: cool germinators – 20°C day/15°C night; warm germinators – 24°C day/20°C night (20 hour daylength for growing in greenhouse)

Propagation environment: germinate in greenhouse; move outdoors if desirable

Fertigation: enough nutrients to provide healthy growth. 30–75 ppm N 1–2 times per week. This may be done by overhead or bottom watering. Dry soil down between watering cycles.

Pruning/shearing: soft tissue prune one or more times as required – preferably before mid-August

Seedling specifications: height: 15–60 cm; rcd: 3–6+ mm; firm root plug

Lift and cold storage: same procedure as conifers. Wait for leaves to drop, around mid-November, store at -2°C.

Seed pre-treatment

Hydrogen peroxide: used to clean the coats of seed that tend to get too mouldy during stratification (e.g., soopolallie, saskatoon, twinberry).

Use 5–10% H₂O₂ for about 15 minutes. Rinse well. This may have to be repeated later. Seed is placed between layers of tissue in a plastic bag, top open slightly for air exchange.

Sulfuric acid (96%): may be required to soften tough coats (e.g., kinnickinnik, sumac, chokecherry). Handle H₂SO₄ with extreme care. Wear protective gear – respirator, eye protection, gloves; protect clothing. Always pour small amounts of acid into large volumes of water to prevent a heat reaction between the acid and water. Check seed every 15–30 minutes to ensure seed is not being damaged by the acid. Rinse seed well.

Temperature requirements: some seed may need a combination(s) of warm and cold stratification temperatures for specific periods of time. This sometimes coincides well with the seasons. Fall sow or stratify this seed outdoors to take advantage of the naturally fluctuating warm and cold temperatures from fall to spring (e.g., rose, snowberry, chokecherry).

Media: can provide a useful buffer to maintain moist conditions while seed is stratifying. This is especially convenient with long stratification periods of small seed where the ideal moisture levels are hard to maintain. The media can be chosen by the length of stratification time, size of the seed, the thinness of the seed coat and the tendency of the seed to mould.

Stratification time/media: (soak seeds 24–48 hours before stratification)

- *up to two months:* put bare seed in a vial or plastic bag allowing for air to exchange. Place moist cotton or tissue above seed. Gently shake seed weekly to move it around and prevent mould from growing. Remoisten cotton/tissue as required.
- *more than two months:* Place seed in a mesh bag and put between layers of peat. Check peat moisture weekly and check for mould. Move seed around occasionally to prevent moulding.

Germination test Seeds are tested prior to sowing to determine germination capacity and vigour. Soopollalie should be tested at cooler temperatures for best results.

For more information contact Shelley Hudson
Kalamalka Forestry Centre
3401 Reservoir Road
Vernon, B.C. V1B 2C7
Phone: (250) 260-4771
Fax: (250) 542-2230
Email: Shelley.Hudson@gems5.gov.bc.ca

Contents

Foreword	iii
Introduction	iv
Growing objectives	iv
Standard growing procedures for all native plant species	iv
Seed pre-treatment	v
Germination test	vi
For more information	vi
Moist site plants:	
Black Hawthorn/ <i>Crataegus douglasii</i>	1
Black Twinberry/ <i>Lonicera involucrata</i>	2
Blue Elderberry/ <i>Sambucus cerulea</i>	3
Chokecherry/ <i>Prunus virginiana</i>	4
Douglas Maple/ <i>Acer glabrum douglasii</i>	5
Flat Top Spirea/ <i>Spiraea betulifolia</i>	6
Hardhack/ <i>Spiraea douglasii</i>	7
Mountain Alder/ <i>Alnus incana</i> ssp. <i>tenuifolia</i>	8
Ninebark/ <i>Physocarpus capitatus</i>	9
Nootka Rose/ <i>Rosa nutkana</i>	10
Paper Birch/ <i>Betula papyrifera</i>	11
Prickly Rose/ <i>Rosa acicularis</i>	12
Red Elderberry/ <i>Sambucus racemosa</i>	13
Red-osier Dogwood/ <i>Cornus stolonifera</i>	14
Sitka Alder/ <i>Alnus sinuata</i>	15
Thimbleberry/ <i>Rubus parviflorus</i>	16
Trembling Aspen/ <i>Populus tremuloides</i>	17
Dry site plants:	
Common Juniper/ <i>Juniperus communis</i>	18
Mock Orange/ <i>Philadelphus lewisii</i>	19
Ocean Spray/ <i>Holodiscus discolor</i>	20
Red Stem Ceanothus/ <i>Ceanothus sanguineus</i>	21
Saskatoon/ <i>Amelanchier alnifolia</i>	22
Snowberry/ <i>Symphoricarpos albus</i>	23
Snowbrush/ <i>Ceanothus velutinus</i>	24
Soopolallie/ <i>Shepherdia canadensis</i>	25
Spreading Dogbane/ <i>Apocynum androsaemifolium</i>	26
Sumac/ <i>Rhus glabra</i>	27
Tall Oregon-grape/ <i>Berberis aquifolium</i>	28
Suggested reading	29
Index of common names	30

Black Hawthorn

Crataegus douglasii

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Clean with H ₂ O ₂ 10% for 15 minutes. Stratify 4 months in mesh bag, between layers of peat, at 2°C. Soak seed for 24–48 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D) or try 77/125 ml (412A)
<i>Sow date</i>	April – May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 20–40 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is usually only one-third filled and difficult to separate the empties. May want to sow into a mini block or propagation tray with insert and transplant later. Grows quite slowly; group with other slow growers and water less often.

Black Twinberry

Lonicera involucrata

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Clean seed with 5–10% H ₂ O ₂ for 15 min. Stratify 3 months in a plastic bag with tissue at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Responds well to bottom watering.
<i>Pruning/shearing</i>	soft tissue prune one or more times as required before mid-August. Grows vigorously – multiple shearing required.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed subject to excessive moulding. May have to clean with H ₂ O ₂ again. Check stratifying seed weekly; avoid mould growth by opening the bag and moving the seed around.

Blue Elderberry

Sambucus cerulea

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify for 1 month warm, 3–4 months cold in mesh bag, between layers of peat, or can fall sow or stratify seedlot naturally outdoors. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50–75 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Attracts mites – check regularly beginning early. Treat immediately – predator mites can be effective, especially when used at early stages of infestation.

Chokecherry

Prunus virginiana

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Treat with H ₂ SO ₄ 15–90 min. Stratify 2 months warm followed by 4 months cold in mesh bag, between layers of peat; can fall sow or stratify seedlot naturally outdoors. Soak seed for 24–48 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Can germinate unevenly. May want to sow in a mini block or propagation tray with inserts and transplant later.

Douglas Maple
Acer glabrum douglasii

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 6 months warm and 6 months cold in mesh bag, between layers of peat. Begin warm stratification in April and stratify naturally to sow the following April. Soak seed 24–48 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	To reduce stratification time, collect fresh seed in fall, put it directly into stratification before it is allowed to dry and go hard. Stratify naturally over winter to sow the following spring.

Flat Top Spirea

Spiraea betulifolia

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 2 months in mesh bag, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is very fine and matted together. Dry seed enough to aid in sowing it sparingly. Shearing improves diameter growth.

Hardhack

Spiraea douglasii

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 2 months in mesh bags, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Dense growth – responds well to bottom watering.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August. A vigorous grower – requires multiple shearing.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is very fine and matted together. Dry seed enough to aid in sowing it sparingly. Shearing improves diameter growth.

Mountain Alder

Alnus incana ssp. *tenuifolia*

PROPAGATION NOTES

<i>Seed pre-treatment</i>	2 months in plastic bag with tissue at 2°C; 24 hour soak prior to stratification
<i>Soil media</i>	100% peat
<i>Container</i>	styro 45/340 ml (615 B) – no smaller than 60/250 ml 515A
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times as required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm root; plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Vigorous grower; requires larger cavity to facilitate root and top growth and aid in effective irrigation. Very slow to cease top growth and become dormant in fall. Needs less nutrients than Sitka alder.

Ninebark

Physocarpus capitatus

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 4 months in mesh bag, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C Susceptible to post-emergence fungal attack (damping off).
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 25–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Attracts mites – check regularly beginning early. Treat immediately – predator mites can be effective, especially when used at early stages of infestation.

Nootka Rose

Rosa nutkana

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 3 months warm and 5 months cold in mesh bag, between layers of peat. Begin warm stratification in August and stratify naturally. Sow in fall or spring. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Collect fresh seed in late summer; put it directly into stratification before it is allowed to dry and go hard. Stratify naturally over winter to sow the following spring. Attracts aphids and mites.

Paper Birch

Betula papyrifera

PROPAGATION NOTES

<i>Seed pre-treatment</i>	No stratification required for most seedlots. Do not cover seed when sowing; some lots germinate better with light. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A) – best stock type based on trial with 615 and 415Ds
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C (lower germination temperature for northern seedlots)
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. Grow leaves from 3–5 cm in length. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times as required before mid-August. Use other means of height control when growing for lumber production.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Germinates rapidly within 5–7 days. Mist as required to ensure seed does not dry out. Responds favourably to blackout treatments similar to western redcedar.

Prickly Rose

Rosa acicularis

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 3 months warm and 5 months cold in mesh bag between layers of peat. Begin warm stratification in August and stratify naturally. Sow in fall or spring. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm diameter: 3–6+ mm root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Collect fresh seed in late summer, put it directly into stratification before it is allowed to dry and go hard. Stratify naturally over winter to sow the following spring. Attracts aphids and mites.

Red Elderberry

Sambucus racemosa

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify for 1 month warm and 4 months cold in mesh bags, between layers of peat, or can fall sow or stratify seedlot naturally outdoors. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50–75 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Attracts mites – check regularly beginning early. Treat immediately – predator mites can be effective, especially when used at early stages of infestation.

Red-osier Dogwood

Cornus stolonifera

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 4–6 months in mesh bag, between layers of peat, at 2°C or can fall sow or stratify seed naturally outdoors. Soak seed 24–48 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 45/340 ml (615A) or can try 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	If bottom watering, do not allow plant roots to stay saturated for prolonged periods of time.

Sitka Alder
Alnus sinuata

PROPAGATION NOTES

<i>Seed pre-treatment</i>	No stratification required; 24 hour soak prior to sowing
<i>Soil media</i>	100% peat
<i>Container</i>	styro 45/340 ml (615 B) – no smaller than 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50–75 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times as required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Vigorous grower; requires larger cavity to facilitate root and top growth and aid in effective irrigation. Responds well to mycorrhiza treatments. Very slow to cease top growth and become dormant in fall.

Thimbleberry

Rubus parviflorus

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 4–5 months in mesh bag, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Responds well to bottom watering.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August. May need to prune lateral growth as well to balance plant and ease watering.
<i>Seedling specs</i>	height: 20–40 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Attracts mites – check regularly beginning early. Treat immediately – predator mites can be effective, especially when used at early stages of infestation. Avoid overfertilization – leaves become large making irrigation difficult.

Trembling Aspen

Populus tremuloides

PROPAGATION NOTES

<i>Seed pre-treatment</i>	No stratification required. Do not cover seed when sowing – needs light to germinate.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D) – best stock type based on trial with 615 and 515s
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times as required before mid-August. Caution: Does not respond well to heavy shearing.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm root; plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Germinates rapidly within 3–5 days. Mist as required to ensure seed does not dry out. Watch for disease on leaves – susceptible to <i>Venturia tremulae</i> . Can use Daconil 2787 @ 40 ml/11 l H ₂ O/100 m ²

Common Juniper

Juniperus communis

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 3 months warm and 5 months cold in mesh bag between layers of peat. Begin warm stratification in August and stratify naturally. Sow in fall or spring. Soak seed for 24–48 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/125 ml (412A) or can try 77/170 ml (415D)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	not required
<i>Seedling specs</i>	height: 10–20 cm; diameter: 2–3+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November.
<i>Grower's notes</i>	May want to try a 1 hour seed soak in 35% H ₂ O ₂ to clean and soften coats prior to stratification. Grows slowly – may want to group with other slow growers and water less. Try rooting cuttings.

Mock Orange

Philadelphus lewisii

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 5 months in mesh bag, between layers of peat, at 2°C. Fall sow or stratify seed naturally outdoors. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. A heavy water user – intolerant of drought stress.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is very fine and matted together. Dry seed enough to aid in sowing it sparingly. Shearing improves diameter growth.

Ocean Spray

Holodiscus discolor

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 4–5 mths in mesh bag, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C Intolerant of approaching 30°C germination temp.; can use shade cloth.
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Heavy water user – responds well to bottom watering.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 25–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is very fine and matted together. Dry seed enough to aid in sowing it sparingly. Shearing improves diameter growth.

Red Stem Ceanothus

Ceanothus sanguineus

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Put seed into 88°C H ₂ O and let cool. Soak for 24 hours prior to stratification. Put in mesh bag, place between layers of peat. Stratify for 2 months at 2°C.
<i>Soil media</i>	100% peat or try a more porous media. Try 5–10% coarse fir sawdust.
<i>Container</i>	styro 77/125 ml (412A) or try 77/170 ml (415D)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Does not respond well to bottom watering. Watch for signs of fertilizer burn. Try raising pH to 6.5 or reducing fertilizer nutrient levels.
<i>Pruning/shearing</i>	not required
<i>Seedling specs</i>	height: 10–25+ cm; diameter: 3–5+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November.
<i>Grower's notes</i>	Likes dryer soil conditions – may want to use a coarser media. Grows slowly – may want to group with other slow growers and water less often.

Saskatoon
Amelanchier alnifolia

P R O P A G A T I O N N O T E S

<i>Seed pre-treatment</i>	Clean seed with 5–10% H ₂ O ₂ for 15 min. Stratify 4 months in a plastic bag with perlite at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 60/250 ml (515A) or try 77/170 ml (415D).
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed subject to excessive moulding. May have to clean with H ₂ O ₂ again. Watch for disease on leaves. Identify and treat if necessary – could cause cessation of top growth.

Snowberry

Symphoricarpos albus

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 4 months warm and 6 months cold in mesh bag, between layers of peat. Begin warm stratification in June and stratify naturally. Sow in June or spring. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/125 ml (412A) or 77/170 (415D)
<i>Sow date</i>	April 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August
<i>Seedling specs</i>	height: 15–25 cm; diameter: 2–4+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	May want to try rooting cuttings.

Snowbrush

Ceanothus velutinus

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Put seed into 88°C H ₂ O and let cool. Soak for 24 hours prior to stratification. Put in mesh bag, place between layers of peat. Stratify 4–5 months at 2°C.
<i>Soil media</i>	100% peat or try a more porous media. Try 5–10% coarse fir sawdust.
<i>Container</i>	styro 77/125 ml (412A) – no larger to start
<i>Sow date</i>	April –May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Does not respond well to bottom watering. Watch for signs of fertilizer burn. Try raising pH to 6.5 or reducing fertilizer nutrient levels.
<i>Pruning/shearing</i>	not required
<i>Seedling specs</i>	height: 10–25+ cm; diameter: 3–5+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November.
<i>Grower's notes</i>	Likes dryer soil conditions – may want to use a coarser media. Grows slowly – may want to group with other slow growers and water less often.

Soopolallie

Sheperdia canadensis

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Clean seed with 5–10% H ₂ O ₂ for 15 min. Stratify 5 months in a plastic bag with perlite at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat. May need more porous media – try 5–10% coarse fir sawdust.
<i>Container</i>	styro 77/125 ml (412A) – no larger to start
<i>Sow date</i>	April–May 1
<i>Temperature</i>	Prefers cooler temp. germination: 20°C day/15°C night; growing: 15–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles. Does not respond well to bottom watering. Watch for signs of fertilizer burn. Try raising pH to 6.5 or reducing fertilizer nutrient levels.
<i>Pruning/shearing</i>	not required
<i>Seedling specs</i>	height: 15–25+ cm diameter: 2–4+ mm root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November.
<i>Grower's notes</i>	Seed subject to excessive moulding. May have to clean with H ₂ O ₂ again. Likes dryer soil conditions – may need a coarser media. Grows slowly – may want to group with other slow growers and water less often. Attracts mites.

Spreading Dogbane

Apocynum androsaemifolium

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Stratify 2 months in mesh bag, between layers of peat, at 2°C. Soak seed for 24 hours prior to stratification.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/170 ml (415D)
<i>Sow date</i>	May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	soft tissue prune one or more times if required before mid-August. Spreads out – may have to prune lateral growth.
<i>Seedling specs</i>	height: 30–60 cm; diameter: 3–6+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Seed is small – sow sparingly to reduce thinning. Dry seed enough to aid in sowing it sparingly. Grows vigorously – do not overfertilize.

Sumac
Rhus glabra

PROPAGATION NOTES

<i>Seed pre-treatment</i>	No stratification required. Treat with H ₂ SO ₄ for 15–30 min. Soak 24 hours prior to sowing.
<i>Soil media</i>	100% peat
<i>Container</i>	styro 77/125 ml (412A)
<i>Sow date</i>	April – May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	may not be required
<i>Seedling specs</i>	height: 15–25 cm; diameter: 2–4+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November. Wait for leaves to drop.
<i>Grower's notes</i>	Fairly slow growing – may want to group with other slow growers and water less.

Tall Oregon-grape

Berberis aquifolium

PROPAGATION NOTES

<i>Seed pre-treatment</i>	Soak for 24 hours prior to stratification. Put in mesh bag and place between layers of peat. Stratify 4–5 months at 2°C.
<i>Soil media</i>	100% peat or try a more porous media
<i>Container</i>	styro 77/125 ml (412A) or try 77/170 ml (415D)
<i>Sow date</i>	April – May 1
<i>Temperature</i>	germination: 24°C day/20°C night; growing: 18–20°C
<i>Daylength</i>	20 hours
<i>Greenhouse</i>	for germination and early growing, then grow outdoors
<i>Fertigation</i>	enough balanced nutrition to provide healthy growth. 30–50 ppm N 1–2 times/week. This may be done by overhead or bottom watering. Dry down soil between cycles.
<i>Pruning/shearing</i>	not required
<i>Seedling specs</i>	height: 10–20+ cm; diameter: 2–5+ mm; root plug: firm
<i>Lift and cold store</i>	same procedure as conifers. Lift around mid-November.
<i>Grower's notes</i>	Likes dryer soil conditions – may want to use a coarser media. Grows slowly – may want to group with other slow growers and water less often.

Suggested reading

Agriculture and Agri-Food Canada. 1996. Report of the PFRA Shelterbelt Centre. Prairie Farm Rehab. Admin., Indian Head, SK.

Dirr, M. and C.W. Heuser. 1987. The reference manual of woody plant propagation. Varsity Press, Portland, OR.

King County Department of Public Works. 1994. Northwest native plants, identification and propagation for revegetation and restoration projects. Surface Water Manage. Div., Seattle, WA.

Marchant, C. and J. Sherlock. 1984. A guide to selection and propagation of some native woody species for land rehabilitation in British Columbia. B.C. Min. For., Victoria, B.C. Research Rep. 84007-HQ.

Rose, R., C.E. Chachulski and D.L. Haase. 1996. Propagation of Pacific Northwest native plants: A manual. Oreg. State Univ., For. Publ. Office, Corvallis, OR.

U.S. Department of Agriculture. 1974. Seeds of woody plants in the United States. Washington, DC. Forest Service Handb. No. 450.

Young, J.A. and C.G. Young. 1992. Seeds of woody plants in North America. Dioscorides Press, Portland, OR.

Young, J.A. and C.G. Young. 1986. Collecting, processing and germinating seeds of wildland plants. Timber Press, Portland, OR.

<i>Index of common names</i>	alder, mountain 8	ninebark 9
	Sitka 15	ocean spray 20
	aspen, trembling 17	Oregon-grape, tall 28
	birch, paper 11	rose, Nootka 10
	ceanothus, red stem 21	prickly 12
	chokecherry 4	saskatoon 22
	dogbane, spreading 26	snowberry 23
	dogwood, red-osier 14	snowbrush 24
	elderberry, blue 3	soopolallie 25
	red 13	spirea, flat top 6
	hardhack 7	sumac 27
	hawthorn, black 1	thimbleberry 16
	juniper, common 18	twinberry, black 2
	maple, Douglas 5	
	mock orange 19	