

Additional Resources



SEED INFORMATION DATABASE

Society for Ecological Restoration (SER)



SPECIES REVIEWS

USDA Forest Service



PLANT PROPAGATION PROTOCOLS

University of Washington, ESRM 412 Students



WOODY PLANT SEED MANUAL

USDA Forest Service



PROPAGATION PROTOCOLS

Reforestation, Nurseries, & Genetic Resources (RNGR)



NATIVE PLANT TIPS, GUIDES, & FUN FINDS

Oxbow Farm & Conservation Center



Seed Storage Longevity **GUIDE**

Explore seed storage behavior with this practical reference shaped by over a decade of growing 143 native species from seed at Oxbow, alongside a comprehensive review of trusted literature. Find resources for continued learning on the back.

Seed Storage Types

ORTHODOX

- Capable of being dried to very low moisture levels
- May be stored in a freezer or refrigerated
- Storage life of 5-10 years under optimal conditions with minimal loss of viability

INTERMEDIATE

- Tolerates drying, but may require higher residual moisture than orthodox types
- Best refrigerated
- Viable 2-5 years, often depending on the specific species

RECALCITRANT

- Cannot tolerate drying and must remain fresh
- Generally unsuitable for long-term storage
- If not sown immediately, refrigerate in gas-permeable containers and prevent drying



Best Practices

- Match storage temperature to the seed storage type
- Store fully dried orthodox seeds in moisture-impermeable containers or with a moisture absorber
- Seeds with a relatively high water content remain metabolically active and should be stored in gas-permeable containers to reduce the risk of seed death or spoilage

Determining Seed Storage Type

SEED TRAIT	LIKELY ORTHODOX	LIKELY INTERMEDIATE OR RECALCITRANT
TYPICAL HABITAT	Non-wetland species, especially those in arid climates	Wetland or riparian species
PRE-GERMINATION CLIMATE	Mature seeds experience dry or freezing conditions	Mature seeds <i>do not</i> experience dry or freezing period
SEED MATURATION SEASON	All seasons excluding spring	Spring
GROWTH HABIT	Forbs and shrubs <i>excluding alliums and graminoids</i>	Trees
SEED BANK	Persistent	Transient
DORMANCY	Any dormancy requirement	Non-dormant
MATURE SEED MOISTURE CONTENT	Seeds naturally dry when shed	Seeds with high moisture content (30–70%) when shed
SEED SIZE	Not typically indicative	Very large or extremely small



Camassia spp.



Anaphalis margaritacea



Corylus cornuta



Dicentra formosa

Western Washington Native Seed Storage Types

ORTHODOX

Abies grandis
Achillea millefolium
Achlys triphylla
Alnus rubra
Alnus viridis ssp *sinuata*
Amelanchier alnifolia
Aquilegia formosa
Arbutus menziesii
Arctostaphylos columbiana
Arctostaphylos uva-ursi
Armeria maritima
Aruncus dioicus
Balsamorhiza deltoidea
Boykinia elata
Caltha leptosepala
Camassia leichtlinii
Camassia quamash
Campanula rotundifolia
Clarkia amoena
Collomia grandiflora
Cornus nuttallii
Cornus stolonifera (sericea)
Cornus unalaschensis
Delphinium menziesii
Delphinium nuttalli
Delphinium nuttallianum
Delphinium troliifolium
Dodecatheon hendersonii
Erigeron speciosus
Erythranthe guttata
Erythronium grandiflorum
Erythronium oregonum
Erythronium revolutum
Frangula purshiana
Fraxinus latifolia
Gaillardia aristata

Gilia capitata
Grindelia integrifolia
Heuchera chlorantha
Heuchera micrantha
Hydrophyllum tenuipes
Iris tenax
Lilium columbianum
Lomatium dissectum
Lomatium nudicaule
Lomatium utriculatum
Lupinus latifolius
Lupinus polyphyllus
Lupinus rivularis
Mahonia (Berberis) *aquifolium*
Mahonia (Berberis) *nervosa*
Mentha canadensis
Monardella odoratissima
Nothochelone nemorosa
Oemleria cerasiformis
Pedicularis groenlandica
Penstemon ovatus
Penstemon serrulatus
Physocarpus capitatus
Pinus ponderosa
Plectritis congesta
Potentilla anserina
Prunella vulgaris
Pseudotsuga menziesii
Ribes bracteosum
Ribes divaricatum
Ribes lacustre
Ribes sanguineum
Rosa gymnocarpa
Rosa nutkana
Rosa pisocarpa
Rubus leucodermis

Rubus parviflorus
Rubus pedatus
Rubus spectabilis
Rubus ursinus
Sambucus cerulea
Sambucus racemosa
Sedum divergens
Sedum lanceolatum
Sedum oregonum
Sedum spathulifolium
Shepherdia canadensis
Sidalcea hendersonii
Sidalcea oregana
Sisyrinchium californicum
Sisyrinchium idahoense
Sorbus sitchensis
Spiraea douglasii
Spiraea splendens (densiflora)
Stachys cooleyae
Taxus brevifolia
Tellima grandiflora
Tiarella trifoliata
Tolmiea menziesii
Toxicoscordion venenosum
Tsuga heterophylla
Urtica dioica
Vaccinium deliciosum
Vaccinium membranaceum
Vaccinium ovalifolium
Vaccinium ovatum
Vaccinium parvifolium
Viburnum edule
Viola adunca
Viola glabella

INTERMEDIATE

Actaea rubra
Allium acuminatum
Allium cernuum
Anaphalis margaritacea
Carex inops
Crataegus douglasii
Danthonia californica
Deschampsia cespitosa

Elymus glaucus
Festuca roemerii
Fragaria chiloensis
Fragaria vesca
Fragaria virginiana
Gaultheria shallon
Koeleria macrantha
Madia elegans

Philadelphus lewisii
Polemonium carneum
Prunus emarginata
Rhododendron macrophyllum
Rhododendron menziesii
Sagittaria latifolia

RECALCITRANT

Acer circinatum
Acer glabrum
Acer macrophyllum
Asarum caudatum
Corylus cornuta

Dicentra formosa
Fritillaria affinis
Lysichiton americanus
Picea sitchensis
Quercus garryana

Salix lasiandra (lucida)
Salix sitchensis
Streptopus amplexifolius
Trillium ovatum