A Brief Overview of the

JE Schroeder Seed Orchard and the Oregon Seed Bank

History of Tree Improvement in Oregon

- To facilitate the deployment of genetically superior forest tree species, tree improvement programs in the Pacific Northwest were initiated in the late 1950's.
- Tree improvement of Douglas-fir was the first to begin and is generally the most advanced program.
- Other commercially important tree species with active and long-standing tree improvement programs include western hemlock, western redcedar, and ponderosa pine.
- While wild seed collections once comprised almost all of the seedlings planted in the PNW, in the last 10 years, over 95% of the Douglas-fir seedlings have been derived from tree improvement programs.
- ***Some of the specific traits being improved through traditional breeding include:*** Increased growth rates, demonstrated adaptability to wide-ranging environmental conditions, increased insect and disease resistance, and increased resistance to animal browse.

The Schroeder Seed Orchard

- In 1973 in conjunction with first-generation tree improvement programs, ODF built the J.E. Schroeder Seed Orchard complex near St. Paul, Oregon with support from the USDA Forest Service.
- The ability to participate in a high-quality, cooperative seed orchard enabled many companies to participate in tree improvement areas where their seed needs could not have justified an independent program.
- These same benefits have been extended to family forest landowners.
- The Schroeder Seed Orchard is a unique public/private partnership that provides seed for a wide range of forest tree species in Oregon and Washington.
- The costs associated with running the orchard are incurred by members of each individual orchard and the overall goals of the orchard are determined by its members.
- ODF personnel are primarily responsible for the establishment, maintenance, and ongoing care of each orchard.
- Production of Schroeder tree seed under controlled orchard conditions is far more predictable than relying upon wild seed collections. Seed production in natural stands is erratic.

Main Species of Interest at Schroeder Seed Orchard

- **Douglas-fir** - Excellent coverage for western Oregon and southwestern Washington with both high and low elevation orchards.
- **Western hemlock** - 3 existing orchards (1 currently producing) with coverage for western Oregon (excluding Oregon cascades) with high and low elevation sources.
- **Western redcedar** - 3 existing orchards (1 currently producing) with coverage for western Oregon with coastal and inland sources.
- **Willamette Valley ponderosa pine** - 1 current orchard is highly productive meeting all current demands.

How Much Seed Does Schroeder Contribute to the Seed Supply in the PNW?

- With an annual average harvest of 3,000 bushels, Schroeder Seed Orchard consistently produces cones of Douglas-fir, western redcedar and western hemlock. The harvest in 2018 alone produced enough seed to produce almost 34 million seedlings.
- Since 2001, Schroeder has produced over 20,000 pounds of Douglas-fir seed which translates to about ¾ billion seeds. With current nursery practices, almost 300 million Douglas-fir seedlings can be grown.
- If landowners plant at 400 trees per acre, they would be able to reforest over 750,000 acres of land with this amount of Douglas-fir seed.

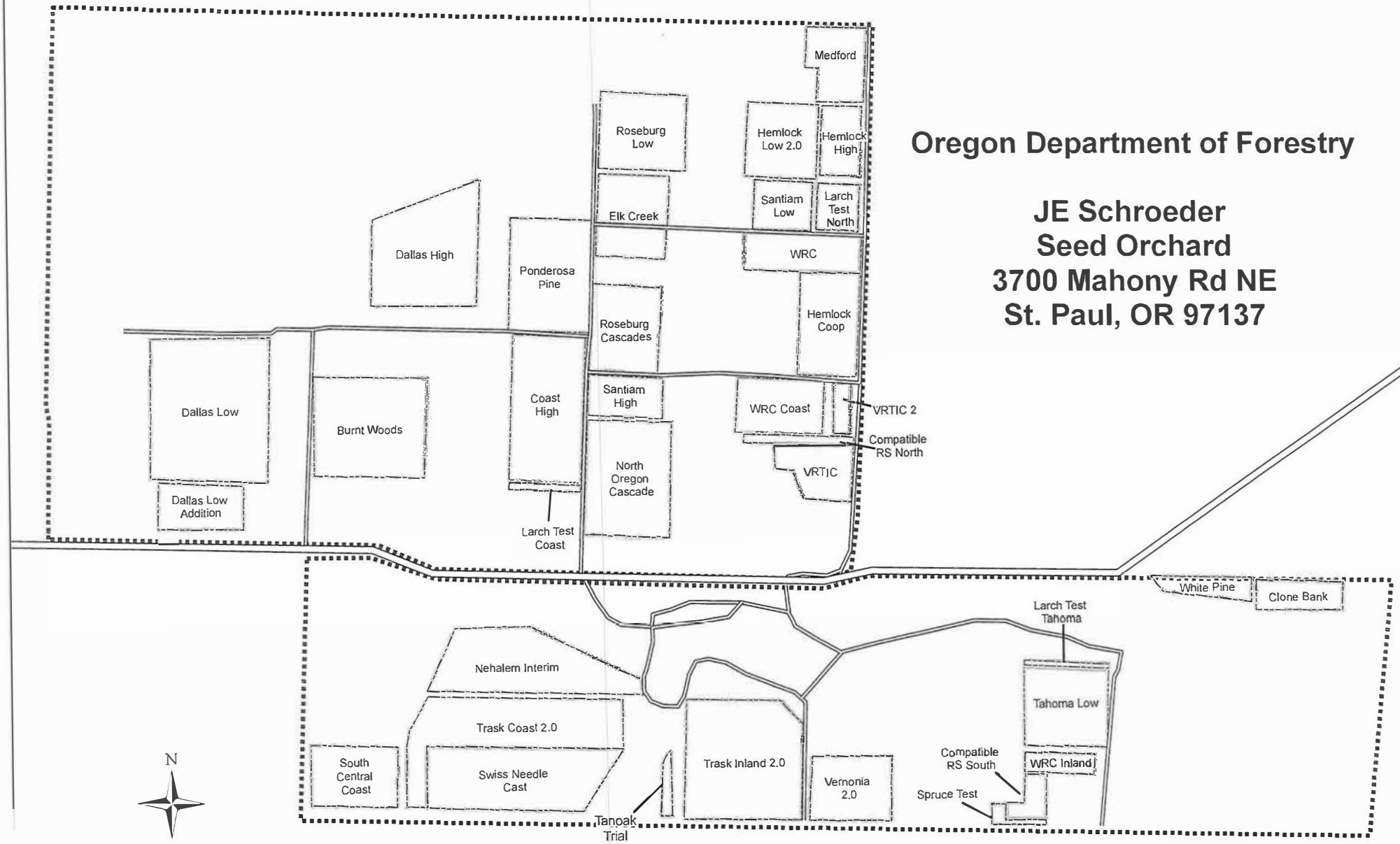
Financial value to Landowners of Schroeder Seed Production

- Tree improvement leads to increased growth of Douglas-fir trees during the growing cycle of a forest. This improved growth directly translates to additional wood volume produced on a per acre basis.
- For example, improved Douglas-fir seed at Schroeder has the potential to improve wood yields up to 50% per acre. A stand producing 30,000 board feet per acre with wild collections of seed could produce an additional 15,000 board feet per acre with improved seed.
- If you were to take the 15,000 BF per acre and multiply it by 750,000 acres of total seed produced since 2001, Schroeder seed has the potential to increase Douglas-fir timber production by **11 million MBF (1000 (M) board feet).**
- At today's market prices of approximately $800 per MBF, that translates to a potential increase in timber production of **$8.8 billion dollars**. This occurs simply by using improved seed.

The Oregon Seed Bank

- The Oregon Seed Bank was developed with the support of the USDA Forest Service and is managed by the Private Forests Division of the Oregon Department of Forestry.
- The Seed Bank has a wide variety of well-adapted forest tree seed sources available for planting throughout the state of Oregon.
- The Seed Bank holds seed in storage for all important forest tree species and sells to private nurseries that guarantee to provide seedlings preferentially to family forest landowners.
- A key mission of the Seed Bank is to ensure these genetically superior seeds are available to Oregon's family forest landowners.
- In addition, the Seed Bank has access to the most advanced disease resistant and rapidly growing seed sources from the most advanced tree improvement programs throughout the Pacific Northwest and makes this seed available to woodland owners throughout Oregon.
- Species available for purchase: genetically-improved Douglas-fir, western hemlock, and western redcedar, blister rust resistant western white pine, root-rot disease-resistant Port-Orford-cedar, ponderosa pine, noble fir, grand fir, incense cedar, Jeffrey pine, sugar pine, and Sitka spruce


Oregon Department of Forestry
JE Schroeder
Seed Orchard
3700 Mahony Rd NE
St. Paul, OR 97137
Medford
Roseburg Low
Hemlock Low 2.0
Hemlock High
Elk Creek
Santiam Low
Larch Test North
WRC
Dallas High
Ponderosa Pine
Roseburg Cascades
Hemlock Coop
Dallas Low
Burnt Woods
Coast High
Santiam High
WRC Coast
VRTIC 2
Compatible RS North
VRTIC
North Oregon Cascade
Dallas Low Addition
Larch Test Coast
White Pine
Clone Bank
Larch Test Tahoma
Nehalem Interim
Tahoma Low
Trask Coast 2.0
South Central Coast
Swiss Needle Cast
Trask Inland 2.0
Vernonia 2.0
Compatible RS South
WRC Inland
Spruce Test
N
© 2017 Google



Oregon Department of Forestry

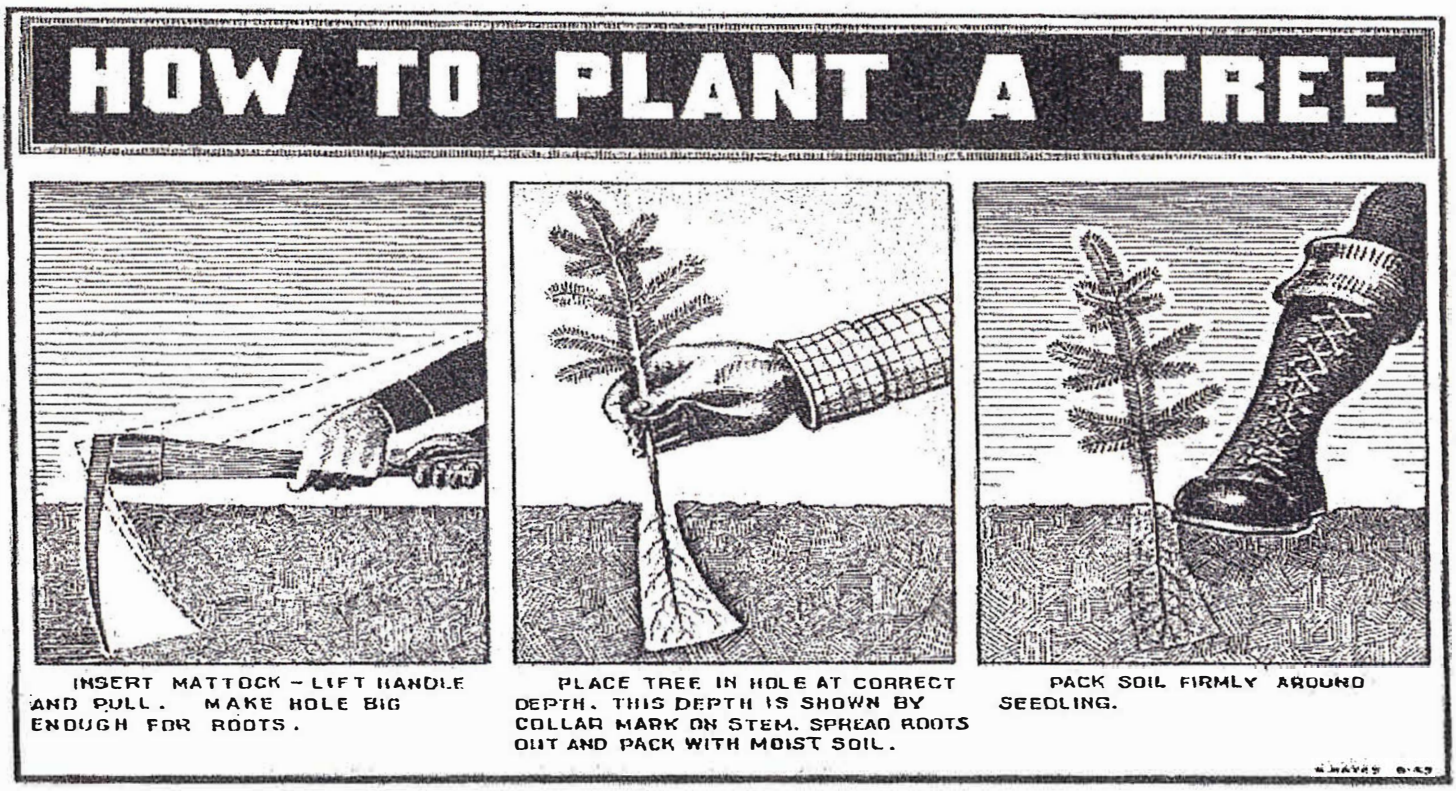
JE Schroeder Seed Orchard
3700 Mahony Rd NE
St. Paul, OR 97137

Oregon Dept. of Forestry J.E. Schroeder Seed Orchard	Orchard Membership (Nov 2016)																										
	ORCHARDS (25 Production, 1 Breeding)																										
	Douglas-fir																		W. Hemlock			W. Red Cedar			Other	
Members (Total = 23)	Burnt Woods	Coast High 2.0	Dallas High	Dallas Low	Medford	Nehalem/ SNC	North Oregon Cascades	Roseburg Cascades	Roseburg Elk Creek	Roseburg Low	Santiam High	Santiam Low	South Central Coast	Tahoma	Trask Coast 2.0	Trask Inland 2.0	Vernonia Add. 2.0	Vernonia Interim	Hemlock Low 1.5	Hemlock Low 2.0	Hemlock High 2.0	Western Redcedar	WRC Coastal	WRC Inland	Willamette Ponderosa	VRTIC/ N. Coast
Bureau of Land Management																				X							
Campbell Global														X					X								
FIA													X														
Fruit Growers Supply Company								X	X	X																	
Greenwood Resources															X				X	X							
Giustina Resources							X				X	X															
Hampton Affiliates		X		X		X									X	X	X		X	X	X						
Hancock Forest Management		X	X	X	X									X	X	X			X	X							
Lone Rock Timber Company								X	X	X			X														
Miami Corp.		X	X	X												X											
Muckleshoot														X													
Nestucca Forests LLC	X		X	X											X												
Oregon Dept. of Forestry [State Forests]	X	X				X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X		
ORM Timber Operating Company II, LLC															X	X			X								
OSU College Forests	X																										
Rayonier													X														
Rocking C Ranch									X																		
Seneca Jones Timber Company								X	X	X																	
Sierra Pacific Industries																	X										
Silver Butte Timber Company								X	X	X																	
Starker Forests	X														X	X				X							
Stimson Lumber Co.		X	X	X											X	X	X		X	X	X						
VRTIC/ North Coast Tree Improv Coop																											X

Private Forests Division

Sources of Native Forest Nursery Seedlings

November 2018



Cover illustration by Hugh Hayes August 1, 1914 - June 25, 2013
Following World War II Mr. Hayes worked for the Oregon State Department of Forestry in Salem, from 1945 until his retirement in 1993, drawing fire protection maps and safety cartoons, designing plans for guard stations and bridges, and illustrating field guides of Oregon trees.

Contents

Helping to meet the changing needs of family and non-industrial private forestland owners.

Published by the Oregon Department of Forestry, Private Forests Division with assistance from the USDA Forest Service, PNW Region, State & Private Cooperative Forestry.

Introduction

This publication is a service provided by the Oregon Department of Forestry to help meet the changing needs of family and non-industrial private forestland (NIPF) owners actively engaged in:

- Afforestation
- Reforestation
- Forest Management
- Tax Incentives
- Timber Production
- Riparian Management
- Forest Pest Management
- Watershed Enhancement
- Fish and Wildlife Habitat Improvement
- Marketing of Forestry Carbon Offsets, etc.

Published annually, this catalog helps landowners locate suitable tree stock to meet their unique and individual resource objectives.

This is just one of several valuable services that ODF provides to family and private non-industrial forestland owners. Other services include providing information and advice, technical assistance, and financial incentive guidance on: Forest Health Issues, Silvicultural Practices, and Land Stewardship Activities.

Reforestation is required under Oregon law if you harvest below stocking levels required by the Oregon Forest Practices Act. To learn more about stocking requirements or seed zone information, contact your local ODF Stewardship Forester (http://www.oregon.gov/ODF/Working/Pages/FindAForester.aspx).

In the last several years, seedling supplies have been very tight. We expect continued high demand and limited seedling supplies for those landowners who fail to plan ahead. We encourage forest landowners to begin plans to secure seedlings at least 2 years before harvest is completed. This should help assure seedlings are available when needed.

Please contact individual nurseries (see pages 11-13) for stock information, current seedling inventories and ordering procedures. You can learn more about each nursery by visiting their website or contacting them directly.

Nurseries growing seedlings for Family Forest Landowners can obtain seed from the Oregon Seed Bank. The Seed Bank supports Family Forest Landowners across the state of Oregon by providing them access to superior tree seed for their reforestation needs. Seed availability is updated annually to assure that the best seed sources and most current, genetically improved seed is available. Additional information is available at:

Oregon.gov/ODF/Working/Pages/Seed

Definition of Terms

Species:
The common types of native forest tree species in Oregon.

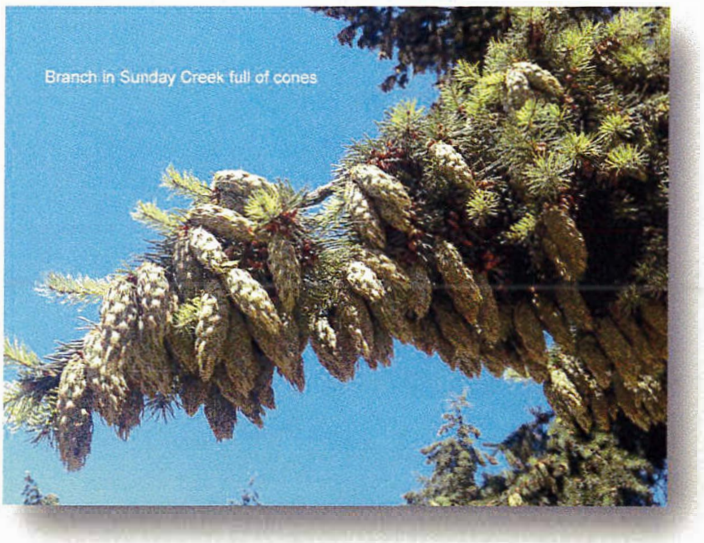
Seed Zone:
The area where seed was collected and can be safely outplanted. The risk of planting a seedling outside its seed zones varies depending on the species, site, climate, etc. Seed zone numbers correspond to the numbers shown on the maps on pages 14-17. Maps are provided for both seed zone classification systems commonly used in Oregon. Genetic research shows that the wider seed movement generally allowed by the 1996 seed zones poses little risk during reforestation.

Elevation Band:
The elevation where seed was collected and can be safely outplanted. Some nurseries present this as a range. Others present a single elevation value, which represents the top of the elevation range where seed was collected in 500-foot increments. For example, if the elevation is noted as 1,500', the seed came from 1,000-1,500 feet in the seed zone listed. It is important to follow elevational guidelines when selecting seed or seedlings.

Woods-Run Seed and Seedlings:
Wild or woods-run seed is collected from natural forest stands in a given seed zone and elevation. While woods-run seed can produce some trees with excellent genetic characteristics, on average, trees grown from these sources will be inferior to improved seedlings derived from decades of tree improvement.

Genetically-Improved Seedlings:
Formal tree improvement programs for Douglas-fir have existed for over 60 years in the Pacific Northwest. These testing programs have used traditional breeding techniques to identify appropriate seed sources and families that are widely adapted, fast-growing, have desirable growth forms, and can have improved disease or insect resistance. During the course of this testing, thousands of different families have been tested and the best families have been placed into seed orchards for seed production.

The cost of genetically-improved seedlings is often slightly higher than that of seedlings grown from wild or woods-run seed. However, the improved growth of the genetically-improved seedlings will more than offset these costs.



Above: Heavy Cone Crop on Douglas-fir at ODF's Schroeder Seed Orchard in St. Paul, OR.

Definition of Terms

Stock Type:
There are two basic types of planting stock: bareroot and container-grown seedlings. Bareroot seedlings are sown and grown in nursery beds, lifted, and then sold without soil on the roots. Container grown or "plug" seedlings are normally grown in a greenhouse. The container's cavities are filled with growing medium and the seed is sown on top. Nurseries extract plug seedlings from containers before shipment.

There are many sizes and shapes of containers. Some nurseries also offer Plug+1 seedlings, which are grown in a greenhouse for 9-12 months, then transplanted into a bareroot nursery for one year.

For a discussion on the pros and cons of various stock types, seedling sizes, and containers, see the "**Guide to Reforestation in Oregon 2006**" by Robin Rose and Diane Haase (http://www.oregon.gov/ODF/Documents/WorkingForests/ReforestationGuide.pdf).

Age/ Container:
Bareroot seedlings are typically classified by the number of years grown in the nursery or transplant bed. The first digit in "1+0," "2+0," "1+1," etc., represents the number of seasons a seedling was grown in the nursery seedbed. "1+1" seedlings are two-year-old seedlings grown in a nursery bed for one season, then transplanted and grown in the nursery bed for a second season. The second digit is the number of seasons the seedling was grown in a transplant bed. "P+1" indicates a seedling was grown for one season in a container, plus one season in a transplant bed.

Container seedlings are also called "plug" seedlings. They are typically grown in a greenhouse in a variety of container sizes and extracted after one year. A styro-8 is a common container seedling size grown in a styroblock container of 80 cells with a cavity size of 8 cubic inches.

Disease Resistant:
Disease resistant western white pine, sugar pine, and Port Orford cedar seed is available. In addition, new genetic selections of Douglas-fir selected for swiss needle cast resistance have been made and grafted into orchards. Seed from these trees is now available at the Oregon Seed Bank. More information on disease resistant pine and Port Orford cedar is available on the web page of the USDA Forest Service Dorena Genetic Resource Center (www.fs.usda.gov/detail/r6/landmanagement/resourcemanagement/?cid=stelprdb5279775).

Price:
The cost per seedling vary by species, growing method, and the genetic value of the seed used to produce the seedlings. Seedlings are commonly sold as groups, not as individual seedlings. For example, if prices are quoted as $.30 each, cost for 100 seedlings would be expressed as $30/100 or cost for 1,000 seedlings would be $300/M.

Producing Improved Seed

Steps in the Production of Improved Seed

Genetically improved seed is generally derived through long-standing tree improvement programs. Seed is produced in highly-managed seed orchards. These orchards are managed with the overall objective of producing heavy, consistent, predictable cone crops at young ages to rapidly make the best genetically improved seed available for reforestation.

Above: Newly grafted Douglas-fir seedlings grown under greenhouse conditions. Trees are typically grafted in February or March and planted in the field in October.

Most seed is produced in clonal seed orchards consisting of desirable parent scion wood grafted on specially produced rootstocks. The type of production system is very analogous to fruit tree production systems where a given apple orchard may consist of different apple varieties such as golden delicious, red delicious, or honeycrisp apple varieties. Clonal seed orchards are much the same. Scionwood is grafted upon the selected rootstocks either under greenhouse conditions or directly in the field. If grafted in the greenhouse, grafted trees are generally grown for a period of 6 to 10 months before being planted in the field.

Once production of greenhouse grafted trees is completed, trees are shipped to the orchard site and planted once field conditions are suitable for establishment.

Above: Grafted Douglas-fir trees eight months following grafting ready for planting.

Orchard sites are typically intensively managed to promote rapid establishment and growth and high survival. Preplant site preparation and chemical site preparation treatments are used to eliminate competing vegetation. Soil physical conditions are improved with subsoiling and disking to create conditions favoring root growth. Planting usually occurs in October once fall rains have recharged soil moisture. In the second growing season, herbicide treatments are applied to the tree rows to direct water and nutrient resources to the new orchard trees rather than to competing vegetation. Trees are staked and pruned to promote rapid upright growth. During drought conditions (typically June until September) in first several growing seasons, trees are watered to reduce stress and promote growth. In the second and third growing season, nutrient amendments are added as needed to promote growth and accelerate flowering.

Producing Improved Seed

Given good growing conditions, trees are often large enough to enter into their reproductive phase by the 5th or 6th growing season. To assure early and consistent cone crops, young trees are stimulated to produce early cone crops through a combination of treatments including partial stem girdling and injection of gibberrilic acid. These treatments alter plant hormone levels and carbohydrate levels and flowering typically occurs in the next spring.

Left: Mature Douglas-fir orchard tree showing partial stem girdles created with a chainsaw to stimulate Flowering.

Young Douglas-fir orchard being stimulated with gibberiillic acid.

Following the initiation of flower stimulation treatments, orchards are typically stimulated at two -year intervals so cone crops are collected every two years. Once these orchards are mature, stimulation treatments often consist of partial girdling treatments alone without supplemental gibberellic acid injections.

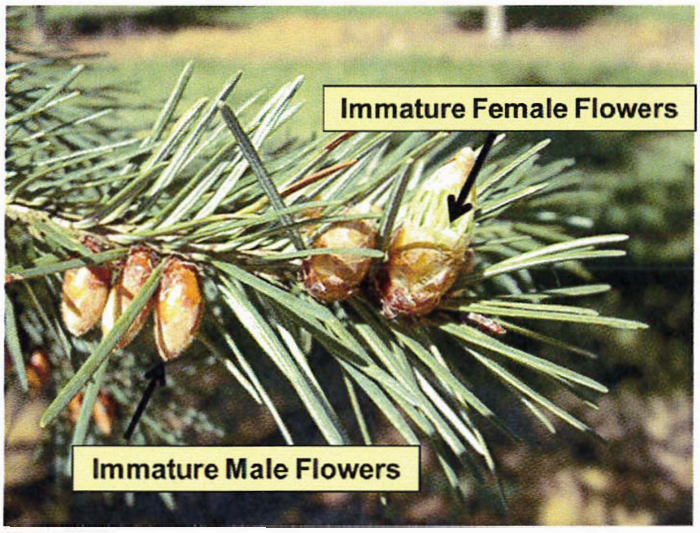
To assure high seed yields, cone crop must be protected from damaging insect pests. To reduce seed damage, registered insecticides are applied in the spring.

Douglas-fir cones typically ripen four to five months after flowering. For maximum seed yields, cones are harvested when seed are fully ripe, but before the cones begin to flare and disperse their seeds. After picking, cones are placed in well-ventilated drying sheds to reduce their moisture contents. After several weeks of drying, cones are shipped to processors and seed is extracted and returned. Proper storage conditions are important for long-term seed storage. Douglas-fir, ponderosa pine, and western hemlock seeds can be stored for decades without losing vitality.

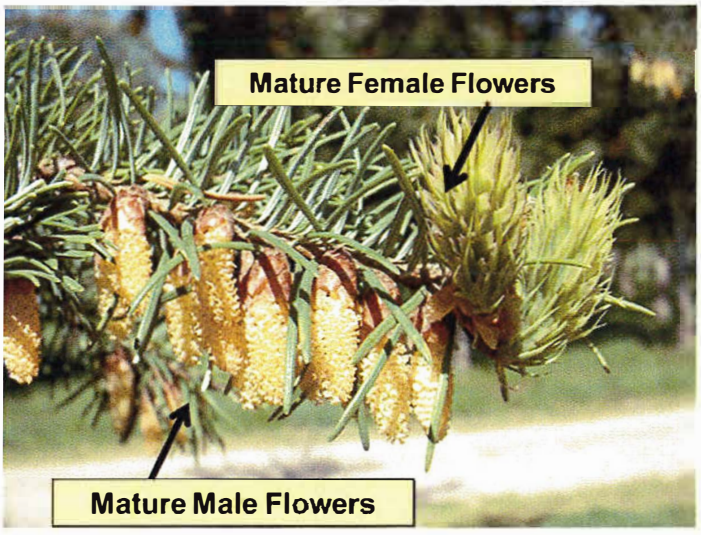
Above: Cone drying facility filled with newly collected cones at the Schroeder Seed Orchard in St. Paul, OR.

Producing Improved Seed

Flowering and Cone Development Processes in Douglas Fir



Above: Immature male and female flowers on Douglas-fir. At this stage, female flowers are not receptive and male flowers will not yet shed pollen.



Above: Mature male and female flowers on Douglas -fir. At this stage, female flowers are fully receptive and pollination can take place. Male flowers are actively shedding pollen.

Above: Mature Douglas-fir cones. At this stage of development, cones scales have opened and cones are actively shedding mature seeds.

Above: Fertilized Douglas-fir cones. At this stage of pollination is complete and cones become pendant. Male flowers are no longer shedding any pollen.

Selection of Seed Sources

The Role of Tree Improvement to Assure Healthy, Productive Forests:

When nurseries produce seedlings or landowners purchase these seedlings, one of the most important considerations is the genetics of the seed. The seed used to produce these seedlings can vary widely from wild seed collected from parents of unknown genetic composition to highly controlled pollinations between selected parents. To facilitate the deployment of genetically superior forest tree species, tree improvement programs in the Pacific Northwest were initiated in the late 1950's. Of the commercially important timber species, tree improvement of Douglas-fir was the first to begin and is generally the most advanced program. Other commercially important tree species with active and long-standing tree improvement programs include western hemlock, western red cedar, and ponderosa pine.

Benefits of Improved Seed

There are many potential benefits of using genetically improved seed. Production of this seed under controlled orchard conditions is generally far more predictable than relying upon wild seed collections. Under natural conditions, seed production can be highly variable and bumper seed crops often occur at erratic intervals interspersed with low seed production, and even years with complete crop failures. In addition, management of wild seed production areas and collection of seed from these stands can be challenging. These factors combined with uncertain growth, form and disease and insect susceptibility of these wild seed collections make reliance on these sources problematic. While wild seed collections once comprised almost all of seedlings planted in the Pacific Northwest, aggressive tree improvement efforts and the development of seed orchards to produce improved seed has dramatically changed the genetics of the trees being deployed. In the last 10 years, approximately 95% of the Douglas-fir seedlings produced in the Pacific Northwest for deployment west of the Cascades have been derived from some level of tree improvement with only 5% consisting of woods run seed collections.

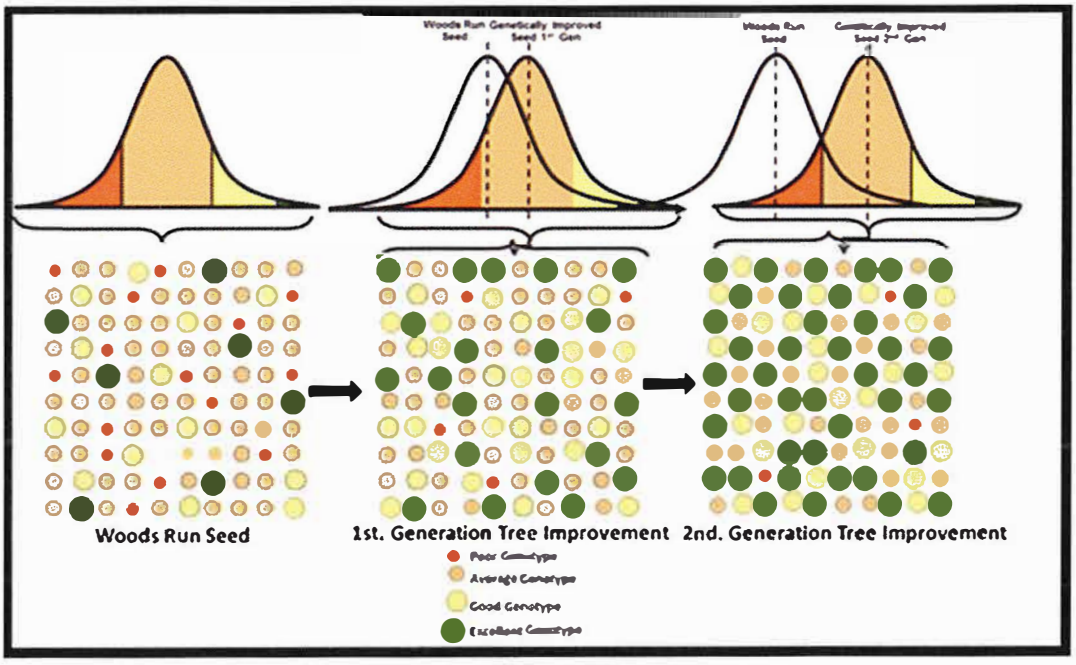
Specific advantages of improved seed include increased growth, improved insect and disease resistance, and for some seed sources, increased resistance to animal browse. Improved seed of Douglas-fir, western hemlock, and western red cedar selected for increased productivity is widely available for deployment in western Oregon. Disease resistance is also an important consideration for western white pine, sugar pine, and Port Orford cedar. For Sugar and western white pine, pine blister rust is an important disease that can kill or damage these species. Breeding work with both species has led to the development and production of seeds that will produce seedlings with increased levels of resistance to the disease. Resistance to *Phytophthora lateralis*, a root rot disease, is an important trait in Port Orford cedar that the USDA Forest Service has developed in their selections. The Oregon Seed Bank is able to purchase seed from these selections and this seed is made available to Family Forest Landowners through the Seed Bank.

Selection of Seed Sources

How Much Gain Can Be Achieved Through Deployment of Improved Seed?

Each cycle of a tree improvement program would be expected to shift the curve forward for the traits of interest. The relative proportion of good and outstanding trees relative to poor trees would increase. This shifting of performance level would be expected to occur in each subsequent tree improvement cycle. This shifting performance is illustrated in the figure below. In this case, each shift represents improvements from woods-run seed collections to first generation seed orchards to second generation seed orchards.

The level of improvement that occurs in each cycle of tree improvement is important to all forestland managers and owners. These gains can be quantified for characteristics such as height, diameter, or volume growth. Ye and Jayawickrama (2006) estimated that deployment of Douglas-fir derived from first generation seed orchards would result in volume gains of approximately 50% at age 15 compared to plantations established using woods-run seed. They further estimated that use of second generation seed would result in further volume gains of 25% compared to first generation seed and use of third generation seed could result in further volume gains of approximately 22% compared to second generation seed. Volume gains of this magnitude can illustrate why the overwhelming percentage of Douglas-fir seedlings planted in the Pacific Northwest are derived from improved seed.



Graphic Representation of the Gains Possible Through Each Round of Tree Improvement from Woods Run Seed to 1st Generation Selections to 2nd Generation Selections. Each Round of Tree Improvement Results In Better Stands Being Planted on the Landscape.

Selection of Seed Sources

How Much Does Genetically Improved Seed Cost?

While genetically-improved seed is often more expensive on a pound-to-pound basis, in actuality, improved seed represents a relatively small component of the entire cost of reforestation. Woods-run Douglas-fir typically sells for $75 to $150 per pound when it can be obtained for a given deployment area. Genetically improved Douglas-fir seed can cost between $300 and $1,200 per pound depending upon level of tree improvement and seed scarcity. While this seems dramatically higher, there are approximately 40,000 Douglas-fir seeds per pound. Using these figures, unimproved Douglas-fir seed will cost 0.19¢ to 0.38¢ per seed ($1.90 to $3.80 per thousand seeds). In comparison, improved Douglas-fir seeds will cost 0.76¢ to 1.50¢ per seed ($7.60 to $15.00 per thousand seeds). Compared to total reforestation costs, the percentage cost increases attributable to use of improved seed is even lower. Given the large growth increases attributable to improved genetics, more rapid site occupancy and grown closure, and other potential positive attributes such as increased insect or disease resistance, use of genetically superior seed sources are one of the best options available when reforestation decisions are being made.

Above: Young, vigorous Douglas-fir seed orchard in the middle of the 3rd growing season following planting at the Schroeder Seed Orchard complex in St. Paul, OR.

Ten-year old Roseburg Low Elevation Orchard at Schroeder Seed Orchard Complex with heavy cone crop. This young orchard produced over 800 bushels of cones in the 3 acre orchard in its' second harvest and illustrates heavy seed production possible in young, well-managed seed orchards.

Genetically improved Douglas-fir seedlings on right side of photo vs. woods-run seedlings on the left side of photo.

Forest Seedling Nurseries

Aldrich Berry Farm & Nursery, Inc.
190 Aldrich Rd
Mossyrock, WA 98564-9609
Phone: (360) 983-3138
Fax: (360) 983-8588
Email: galdrich@tds.net
Web: aldrichberryfarm.com

Althouse Nursery
8576 Rogue River Hwy
Grants Pass, OR 97527
Phone: (541) 592-2395
Email: plants@althousenursery.com
Web: althousenursery.com

Brooks Tree Farm, Inc.
9785 Portland Rd NE
Salem, OR 97305-9721
Phone: (503) 393-6300
Fax: (503) 393-0827
Email: office@brookstreefarm.com
Web: brookstreefarm.com

Champoeg Nursery, Inc.
9661 Yergen Rd. NE
Aurora, OR 97002
Phone: (503) 678-6348
Fax: (503) 678-4348
Email: info@champoegnursery.com
Web: champoegnursery.com

CTUIR Tribal Native Plant Nursery *(shrubs)*
73820 Highway 331
Pendleton, Oregon 97801
Phone: (541) 278-8525
Web: tribalnativeplants.com
Email: tribalnativeplants@gmail.com

Drakes Crossing Nursery
19774 Grade Rd SE
Silverton, OR 97381-9425
Phone: (503) 873-4932
Fax: (503) 873-4933
Email: info@drakescrossingnursery.com
Web: drakescrossingnursery.com

Fernwood Nursery
909 S. Stage Rd
Medford, OR 97501
Phone: (541) 857-8577
Fax: (541) 857-8577
Email: fernwoodnursery@yahoo.com
Web: fernwoodnursery.biz

Fir Run Nursery
17901 150th Ave E #765
East Orting, WA 98360
Phone: (253) 221-3238
Email: firrun@msn.com
Web: firrunnursery.com

Heritage Seedlings, Inc. *(shrubs)*
71st Ave. SE
Salem OR 97317
Phone: (503) 585-9835
Email: sales@heritageseedlings.com
Web: heritageseedlings.com

IFA Nurseries, Inc.
9450 SW Commerce Circle, Ste 370
Wilsonville, OR 97070
Cell: (541) 556-8907
Email: sakehurst@ifanurseries.com
Web: ifanurseries.com

Forest Seedling Nurseries

Kintigh's Mountain Home Ranch
38865 E. Cedar Flat Rd.
Springfield, OR 97478
Phone: (541) 746-1842
Fax: (541) 746-1842
Email: KMHRtree@aol.com
Web: kintighs.com

Klamath Forest Nursery
Green Diamond Resource Co.
7680 Happy Hollow Lane
Bonanza, OR 97623
Phone: (541) 545-6432
Fax: (541) 545-6886
Email: Jeff.Dixon@GreenDiamond.com

Lava Nursery, Inc.
5301 Culbertson Dr.
Parkdale, OR 97041
Phone: (541) 352-7303
Fax: (541) 352-7325
Email: lavanursery@aol.com

Lawyer Nursery, Inc.
6625 Montana Hwy 200
Plains, MT 59859
Phone: (800) 551-9875
Fax: (406) 826-5700
Email: trees@lawyernursery.com
Web: lawyernursery.com

Lewis River Nursery
2821 NE 434th St
Woodland, WA 98674
Phone: (360) 225-6455

Lewis River Reforestation
1203 NW Hayes Rd.
Woodland, WA 98674
Phone: 360-225-6357
Fax: 360-225-1307
Email: bruces@lrrinc.com
Web: www.lrrinc.com

Pitkin Forest Nursery, Univ of Idaho
PO Box 441137
Moscow, ID 83844-1137
Phone: (208) 885-3888
Fax: (208) 885-6564
Email: abrusven@uidaho.edu
Web: seedlings.uidaho.com/Store/

Plant Oregon *(shrubs)*
8677 Wagner Creek Rd
Talent, OR 97540
Phone: (541) 535-3531
Fax: (541) 535-2537
Email: dan@plantoregon.com
Web: plantoregon.com

Plants of the Wild
P.O. Box 866
Tekoa, WA 99033-0866
Phone: (509) 284-2848
Fax: (509) 284-6464
Email: Kathy@plantsofthewild.com
Web: plantsofthewild.com/welcome/

The Plantworks, LLC
69465 Lantz Lane
Cove, OR 97824-8208
Phone: (541) 963-7870
Email: plantworks@oregontrail.net
Web: theplantworksllc.com

PRT Oregon
31783 South Meridian Rd.
Hubbard, OR 97032
Phone: (503) 651-3266

76928 Mosby Creek Rd.
PO Box 1060
Cottage Grove, OR 97424
Phone: (541) 942-5516
Email: Tiffany.Roddy@prt.com
Web: prt.com

Forest Seedling Nurseries

***Saplings LLC** (consultant)*
16464 SW Brookman Rd.
Sherwood, OR 97140
Phone: (503) 805-1222
Email: mike@mysaplings.com
Web: mysaplings.com

Scholls Valley Native Nursery, LLC
4036 NW Half Mile Lane
Forest Grove, OR 97116
Phone: (503) 624-1766
Fax: (503) 624-2766
Email: sales@schollsvalley.com
Web: schollsvalley.com

Silvaseed Company
P.O. Box 118
Roy, WA 98580
Phone: (253) 843-2246
Fax: (253) 843-2239
Email: inquiries@silvaseed.com
Web: silvaseed.com

USDA Forest Service J. Herbert Stone Nursery
2606 Old Stage Rd.
Central Point, OR 97502
Phone: (541) 858-6100
Email: jbjustin@fs.fed.us
Web: https://rngr.net/resources/directory/usdaforestservice-jherbertstonenursery

WACD Plant Materials Center
16564 Bradley Rd
Bow, WA 98232
Phone: (360) 757-1094
Email: pmcsales@gmx.com
Web: wacdpmc.org

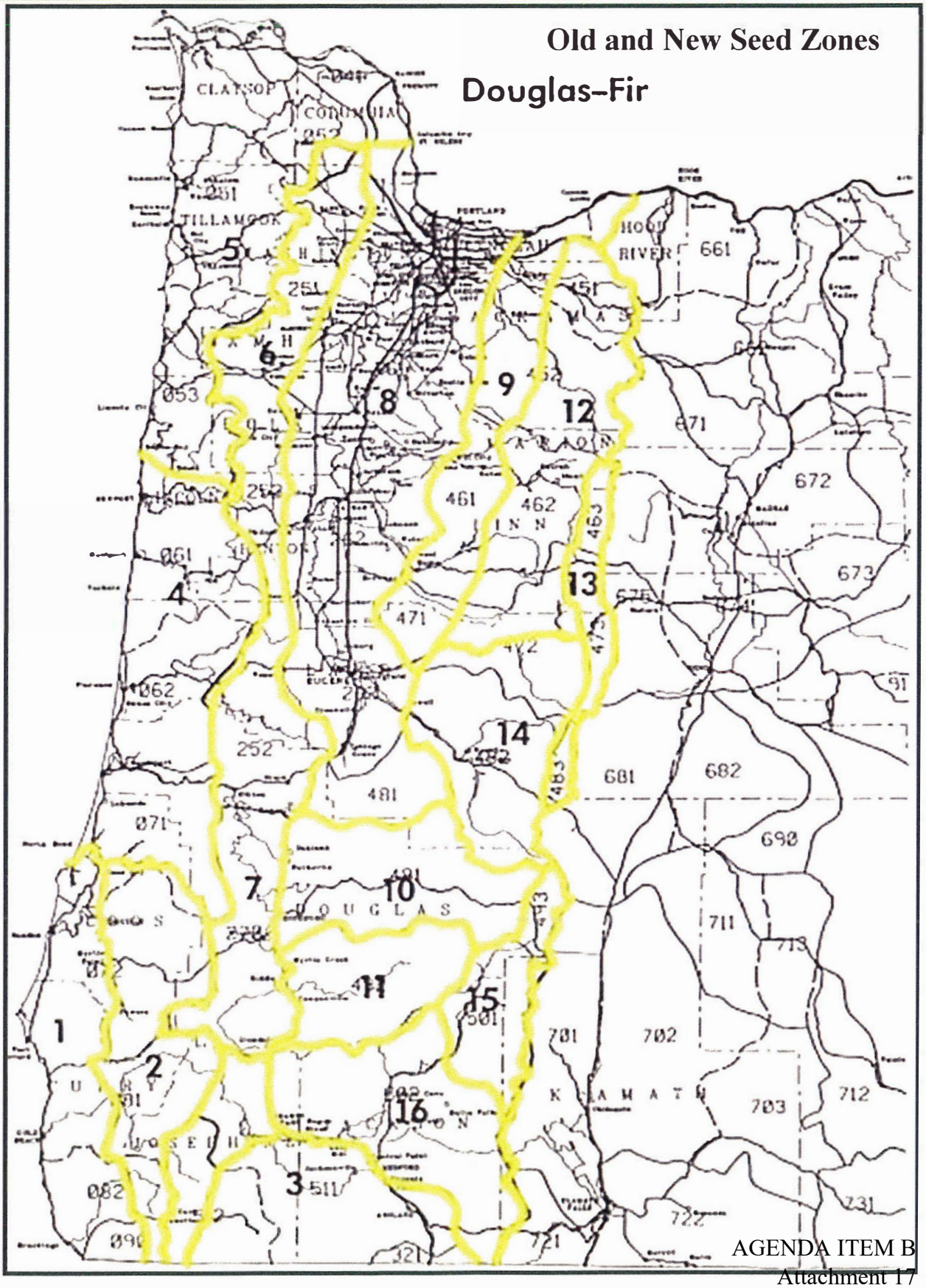
Webster Forest Nursery, WA DNR
9805 Blomberg St SW
PO Box 47017
Olympia, WA 98504-7017
Phone: (877) 890-2626
Fax: (360) 664-0963
Email: bill.taylor@dnr.wa.gov

Willamette Seedling Nursery
23625 S. Mulino Rd
PO Box 728
Canby, OR 97013
Phone: (503) 263-6850
Fax: (503) 263-3872
Email: cparsons@canby.com

Above: Grand fir (*Abies grandis*) 1+0 container seedling.

Seed Zone Maps

Seed Zone Maps



Seed Zone Maps

WESTERN RED CEDAR

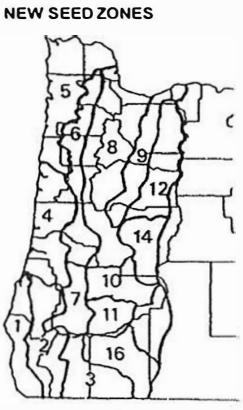
WESTERN HEMLOCK

SITKA SPRUCE

GRAND FIR

INCENSE CEDAR

SUGAR PINE

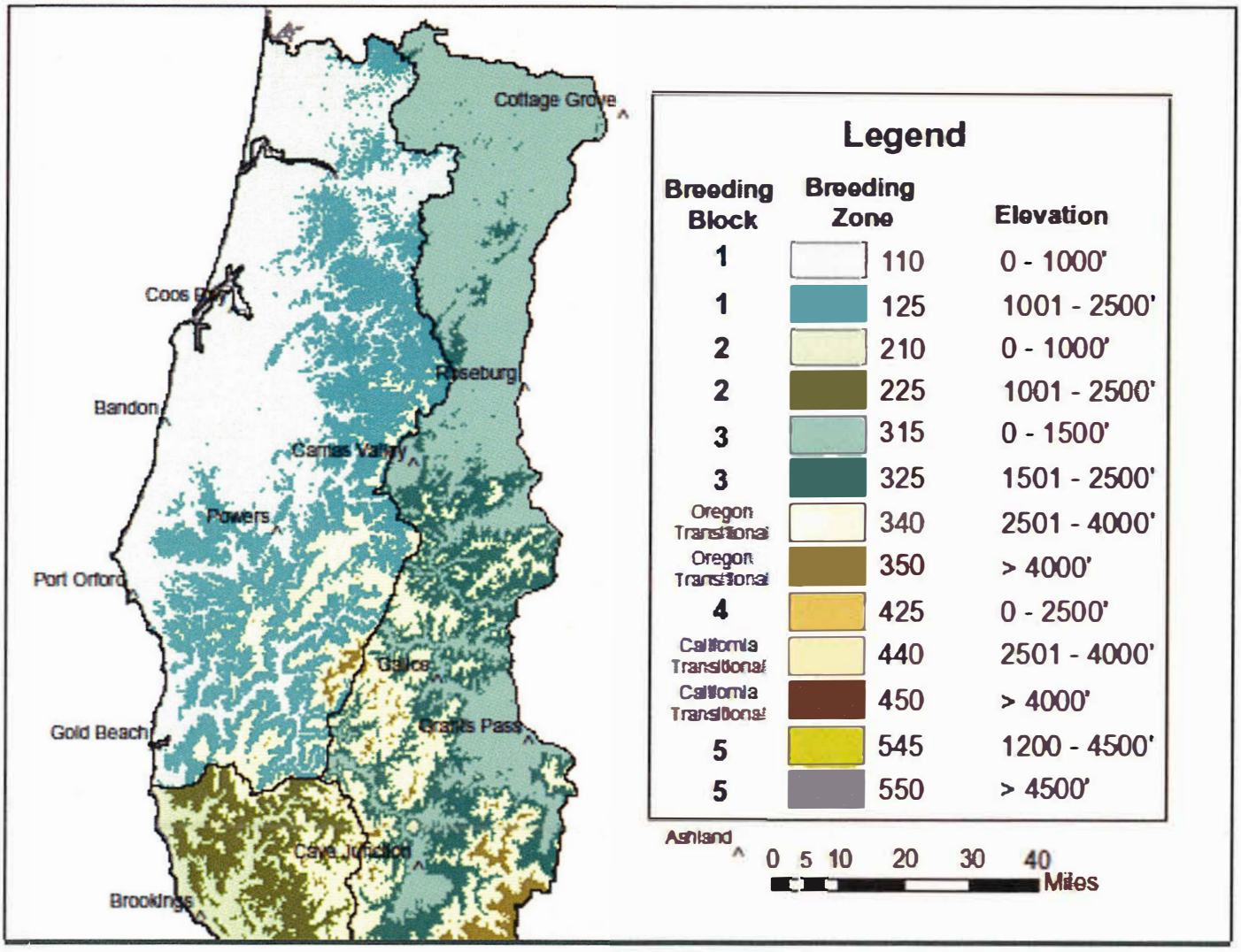


DOUGLAS FIR

PONDEROSA PINE

WESTERN WHITE PINE

Port-Orford-cedar JR13 Breeding Zones



Additional Resources

Seedlings:

- **Forest Seedling Network (FSN)**
  http://www.forestseedlingnetwork.com
- **Saplings**—Seedling Orders for Small Landowners
  http://www.mysaplings.com/
- **Private Forest Lands Network**—a refrigerated storage facility located in La Grande, Oregon. This facility can be used to store forest seedlings and shrub vegetation for your stream enhancement, riparian plantings, and wind break projects.
  https://www.facebook.com/PrivateLandsForestNetwork

Seed:

- **Oregon Seed Bank**
  The Seed Bank supports Family Forest Landowners across the state of Oregon by providing them access to superior tree seed for their reforestation needs.
  http://www.oregon.gov/ODF/Working/Pages/Seed.aspx

Publications:

- ***Guide to Reforestation in Oregon***, by Robin Rose and Diane Haase, 2006, OSU, OFRI, ODF
  http://www.oregon.gov/ODF/Documents/WorkingForests/ReforestationGuide.pdf

Websites:

- **Know Your Forest**—Resources for Small Landowners
  http://www.knowyourforest.org/
- **Oregon Department of Fish & Wildlife**
  http://www.dfw.state.or.us
- **Oregon Department of Forestry, Private Forests Program**
  http://www.oregon.gov/ODF/Working/Pages/default.aspx
- **Oregon Association of Nurseries—Nursery Guide**
  http://nurseryguide.com/
- **Oregon Forest Industry Directory**
  http://www.orforestdirectory.com/
- **OSU Forestry Extension Program**
  http://extensionweb.forestry.oregonstate.edu/index.php
- **Oregon Watershed Enhancement Board**
  http://www.oregon.gov/OWEB
- **USDA Forest Service Dorena Genetic Resource Center**
  http://www.biologydir.com/dorena-tree-improvement-center-info-5490.html
- **USDA Natural Resources Conservation Service**
  http://www.or.nrcs.usda.gov/
- **ODF Stewardship Forester Listing Lookup**
  http://www.oregon.gov/ODF/Working/Pages/FindAForester

Reforestation...

Planting a new forest.

Step 1: Planning

Planning to reforest your property should take place before harvest begins. Site conditions will determine which seedling species and seedling size to order.

Legal Requirements

The landowner must replant within 24 months after a clear-cut or heavy partial cut. Planting requirements range from 200 trees per acre for most of western Oregon to 100-125 trees per acre for dry pine sites in eastern Oregon. By the end of the sixth year, the trees must be "free-to-grow" (healthy and above surrounding vegetation).

Step 2: Ordering

Order seedlings no later than the fall before planting season. Select the proper seedling, species, seed zone, and size for each site. Douglas-fir (western Oregon) and ponderosa pine (eastern Oregon) are common species, but there is a lot of variation. Please contact your local ODF office for information specific to your site.

Step 3: Planting

Once the site is prepared and the seedlings have been ordered, planting can take place from December through March (later for snow-bound sites). Proper handling of seedlings from the nursery through planting is critical, as is the planting technique. Plant more than the minimum number of trees per acre to allow for seedling losses.

Reforestation Crews can be hired to reforest your property. Contact your local ODF office for a list of local crews.

Step 4: Free-to-grow

Inspect the seedlings each year to ensure that they are alive and are free-to-grow. Vegetation control and additional tree planting may be necessary for the next 5 years after planting.

Additional Resources:

Reforestation Guidance
www.oregon.gov/ODF/Working/Pages/Replanting.aspx

Oregon State University Forestry Extension
http://extensionweb.forestry.oregonstate.edu/index.php

Forest Seedling Network
www.forestseedlingnetwork.com

Seedling Orders for Small Landowners
http://www.mysaplings.com/