

FOREST NURSERY RESEARCH UPDATE 1999

Edited by David L Wenny

Forest Nursery Research Update No 13
Idaho Forest, Wildlife and Range Experiment Station
University of Idaho

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Calendar Year 1999

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Forest Nursery Research Report No 13
of the
Forest Research Nursery
Department of Forest Resources
University of Idaho
Moscow, Idaho 83844-1137

This publication is issued as Contribution Number
899 of the Idaho Forest, Wildlife and Range
Experiment Station, College of Forestry, Wildlife and
Range Sciences,
University of Idaho, Moscow, 83844-1130.

FOREST RESEARCH NURSERY PERSONNEL

Faculty:

David L Wenny, PhD, Professor of Silviculture, Department of Forest Resources, and Director, Forest Research Nursery

Affiliate Faculty:

Robert L James, PhD, Plant Pathologist, USDA Forest Service; Forest Health Protection, Northern Region, stationed in Coeur d'Alene, Idaho.

Thomas D Landis, PhD, National Nursery Specialist, USDA Forest Service; Cooperative Programs, Central Point, Oregon.

Deborah S Page-Dumroese, PhD, Research Soil Scientist, USDA Forest Service, Rocky Mountain Research Station, Moscow, Idaho.

Current Staff:

R Kasten Dumroese, PhD, Research Scientist
Annette Leege-Brusven, MSc, Seedling Orders and Extension
Susan Morrison, BSc, Senior Nursery Technician

Graduate Students:

Christine Burchfiel
Connie Carpenter
Paz Ovalle
Donald Regan
Ben Rost
Daniel Swanson

RECENT AWARDS, RECOGNITION AND CONGRATULATIONS

Pitkin Scholarship

Daniel Swanson received the Pitkin Scholarship for both semesters in 1999 as he worked toward a Master of Science Degree under the direction of Dr. Wenny.

Swanson Completes Master of Science

Daniel Swanson defended his MSc “*The Chilling Optimum of Idaho and Arizona Ponderosa Pine Buds*” in December. Dan has been hired by Lawyer Nursery Inc. and will manage the company’s new container facility in Olympia, Washington.

Fulbright Scholar

Paz Ovalle, a Fulbright Scholar, has again received the Foster Scholarship – financial assistance she is using to complete her Master of Science degree under the direction of Dr. Wenny.

RESEARCH NURSERY AND USDA FOREST SERVICE INITIATE NEW JOURNAL AND INTERNET SITE

Native Plants Journal

Using a challenge grant from the USDA Forest Service, the Research Nursery is initiating the *Native Plants Journal*. The journal will focus on refereed research and general technical articles dealing with the growing and planting of native plants for conservation, restoration, landscaping, highway corridors, and so on. Kas Dumroese will serve as editor-in-chief of the publication, which will be published twice each year in full-color.

Native Plant Network

In conjunction with the *Native Plants Journal*, the Research Nursery also received funding from the USDA Forest Service to develop the Native Plant Network. The network, available on the Internet, will be a searchable database of native plant propagation protocols. Growers of native plants can search the database for information on how to grow specific plants, and upload, via a simple interface, their own successful protocols. The basic network should be available in summer of 2000.

RECENT NURSERY PUBLICATIONS 1999

The following titles and abstracts are research topics recently completed at the Nursery. Reprints can be obtained by writing: Editor, Idaho Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow, 83844–1130.

Visit the nursery web site at:

<http://www.uidaho.edu/seedlings>

THE WILD SIDE: WOODY PLANTS AND WILDLIFE – ENHANCING THE EXPERIENCE FOR NATURAL LANDSCAPES

R Kasten Dumroese

Landscape Design & Build, Supplement to Landscape & Irrigation 12(3):S23–S25.

Idaho Forest, Wildlife and Range Experiment Station
Contribution 875.

This extension article focuses on easy-to-complete landscape techniques that are wildlife-friendly. Discussion topics include landscaping to provide food, cover, and other appropriate habitat to encourage use by wildlife, especially birds.

THE CHILLING OPTIMUM OF IDAHO AND ARIZONA PONDEROSA PINE BUDS

Daniel Swanson

University of Idaho Master of Science Thesis

I determined the number of chilling hours (chilling optimum) necessary for rapid bud break for two provenances of ponderosa pine: *Pinus ponderosa* var. *ponderosa* Laws. and *Pinus ponderosa* var. *scopulorum* Engelm. Container seedlings were grown at an Idaho nursery one year, during which seedlings acquired natural chilling hours (temperatures < 5 °C). Seedlings gained additional chilling hours (temperatures < 5 °C) while stored in one of two treatments (refrigerated or frozen). As chilling hours accumulated, seedlings were transferred into a growth chamber (20 °C day / 9 °C night / 14 hr photoperiod). Days to bud break and bud elongation were monitored every two days. Bud break was defined as when the bud scales separated and new needles emerged 2 mm beyond the terminal bud. Days to 50% bud break decreased inverse exponentially with accumulated chilling hours in the nursery from 74 days to 23 days, and optimum chilling was reached at 1900 chilling hours (79 days) for Idaho and Arizona seedlings combined. Number of days to bud break were similar ($p > 0.05$) between the two provenances throughout greenhouse-chilling accumulation, but Idaho seedlings broke bud significantly faster ($p < 0.05$) following refrigerated and frozen storage. Seedling cold hardiness values ranged from -6 °C in August to -34 °C in December, at which time maximum cold hardiness was reached. Refrigerated seedlings for each provenance broke bud faster ($p < 0.05$), were less cold tolerant ($p < 0.05$), and therefore were less quiescent than associated frozen seedlings. These results may assist nursery managers choosing storage times and temperatures for ponderosa pine.

EXTERNALLY-SUPPORTED NURSERY RESEARCH IN PROGRESS

Growing woody plants in containers using exponential fertilization.

Investigators: Dumroese RK; Wenny DL.
Requested Amount: \$13,500
Project Term: October 1998 – December 1999
Grantor: USDA Agriculture Research Service, Pacific West
Area Horticultural Crops Research Laboratory

Abstract — We are comparing growth of *Potentilla fruticosa* and *Juniperus virginiana* cultured with incorporated controlled release fertilizer or liquid fertilizer following an exponential model. Using exponential fertilizer in production of landscape plants may help ameliorate nitrogen discharge from nurseries.

An evaluation of saw dust-amended peatmoss for growing ponderosa pine seedlings in containers.

Investigators: Dumroese RK; Wenny DL.
Requested Amount: \$4100
Project Term: March 1998 – July 1999
Grantor: Intermountain Container Seedling Growers' Association

Abstract — We will compare irrigation frequency and growth of ponderosa pine seedlings grown in 1:1 peat moss:vermiculite medium or 7:3 peat moss:sawdust medium. Medium with sawdust is about 30% less expensive than the traditional peat moss:vermiculite medium, but there is concern over nitrogen inavailability to seedlings caused by the C:N ratio of the sawdust-amended medium.

Do nursery cultural practices reduce genetic diversity of western white pine from bulked seed orchard collections? What are the effects on blister rust resistance?

Investigators: Dumroese RK; Mahalovich MF; Wenny DL.
Requested Amount: \$16,280
Project Term: July 1997 – October 2001
Grantor: Inland Empire Tree Improvement Cooperative,
Western White Pine Working Group

Abstract — We will evaluate the success of 21 families of western white pine to germinate and reach acceptable size during nursery production, examining the impacts of seed pretreatments, thinning, and interfamilial competition on the number of seedlings produced from each family. Subsequent seedlings will be tested for blister-rust to see if

nursery practices inadvertently select against or for certain resistance mechanisms.

Opportunities to improve western larch planting stock: reducing plagiotropism and increasing apical dominance in rooted cuttings.

Investigators: Wenny DL; Herbert S; Fins L; Edson JL.
Grant Amount: \$69,905
Project Term: September 1996 – October 1999
Grantor: McIntire-Stennis

Abstract — Rooted cuttings from juvenile ortets may develop plagiotropic or shrub-like habit. Our objectives are to examine the roles of gravity, light, and growth regulators in the expression of abnormal growth and form and to identify greenhouse practices that will promote the development of normal habit.

Micropropagation of *Collomia mazama* for re-introduction at Crater Lake, Oregon.

Investigators: Edson JL; Baldwin C; Wenny DL; Leege-Brusven A
Grant Amount: \$5000
Project Term: September 1996 – September 1999.
Grantor: USDI National Park Service

Abstract — Our objective is to propagate this species by shoot culture *in vitro* from stock plants selected from the wild and seed collected from controlled reproduction in the greenhouse. Plantlets will be reintroduced to the rim of Crater Lake.

Interactions among copper-coated containers, hot water cleaning and *Fusarium* root disease.

Investigators: Dumroese RK; James RL; Wenny DL.
Grant Amount: \$7135
Project Term: March 1995 – May 2000
Grantor: Idaho Department of Lands

Abstract — Our study objective is to monitor *Fusarium* inoculation accumulation through five growing seasons of Douglas-fir. We will compare the effects of copper-coated containers and container cleaning in hot water.

Increasing survival and growth of ponderosa pine (*Pinus ponderosa*) and western white pine (*Pinus monticola*) seedlings through the use of controlled release fertilizer capsules.

Investigators: Regan D; Wenny DL.
Grant Amount: \$13,000 and \$2500
Project Term: December 1999 – May 2001
Grantor: Potlatch Corporation and Idaho Department of Lands

Abstract – We will grow seedlings with and without controlled release fertilized (CRF) in the greenhouse and then outplant them to forest sites. In the greenhouse, measurements of height, root collar diameter (RCD), root growth, cold hardiness, biomass, and foliar nutrient concentrations from each species/treatment combination will be taken after the first growing season. We will also determine by weight the amount of fertilizer released from CRF capsules after 1 season in the greenhouse and the accuracy and precision of commercially-mixed CRF's. After the first growing season in the field, survival, height, and RCD will be measured.

Growth and ectomycorrhizal formation of container-grown ponderosa pine seedlings inoculated with *Rhizopogon vulgaris* at different nitrogen and phosphorous fertilization levels.

Investigators: Rost B; Wenny DL.
Grant Amount: \$20,114
Project Term: December 1999 – May 2001
Grantor: Boise Cascade, Washington Region

Abstract - Our research will evaluate the effects of nitrogen and phosphorus fertilizer levels on mycorrhizal formation and seedling growth of container-grown ponderosa pine seedlings. Using a Boise Cascade seedlot, and basidiospores of *Rhizopogon vulgaris* from Forest Mycorrhizae Applications of Grants Pass, Oregon, I will develop a model for fertilizer levels that will yield consistent ectomycorrhizal root systems. This is a factorial design with 24 treatments, 4 nitrogen and 3 phosphorous levels and 2 levels of inoculation (inoculated and non-inoculated). In conjunction, we will grow 17,760 seedlings for a production scale field test of *Rhizopogon vulgaris*. These seedlings will be planted operationally on Boise Cascade sites that are old homestead locations.

NURSERY FUNDED RESEARCH IN PROGRESS

The chilling optimum of idaho and arizona ponderosa pine buds.

Investigators: Swanson D; Wenny DL.
Grant Amount: \$35,000
Project Term: September 1997 – December 1999

Abstract — We will determine the chilling requirement of ponderosa pine seedlings from 2 provenances (Idaho and Arizona) by looking at the number of days to bud break for a range of chilling hour (<5°C) accumulation. Seedlings were grown in a greenhouse and transferred to a growth room with a controlled thermoperiod and photoperiod. Our objective is to determine how genetic differences and different chilling hour sums affect bud break speed.

Effects of light on root growth in the early establishment phase of western larch (*Larix occidentalis*) and Douglas-fir (*Pseudotsuga menziesii*).

Investigators: Ovalle P; Wenny DL.
Grant Amount: \$25,000
Project Term: September 1997 – June 2000

Abstract — We will transplant quiescent Douglas-fir and western larch and grow them in a controlled environment. Our objective is to observe whether current photosynthesis and/or stored carbohydrates are required for root initiation and elongation in an evergreen (Douglas-fir) and deciduous (western larch) conifer. Our results may have implications for outplanting success.

Seed production rates and the importance of microsite on germination and survival of high-elevation lodgepole pine (*Pinus contorta* var. *latifolia*) in northeastern Utah

Investigators: Carpenter MC; Wenny DL.
Grant Amount: \$18,000
Project Term: May 1999 – June 2001

Abstract — Lodgepole pine (*Pinus contorta*) generally is a species that readily populates forested areas subjected to disturbance (i.e. fire, clearcutting). However, several clearcut areas in the Ashley National Forest of northeastern Utah have failed to naturally regenerate although they are surrounded by an available seed source. Our study, in conjunction with the U.S. Forest Service's Rocky Mountain Research Station, examines two possibilities for this failure to regenerate. The first looks at the quality and quantity of available seed by conducting germination tests and determining the number of viable seeds

produced by each tree sampled. The second aspect of this study examines the effect of microsite on seed germination and survival. Seeds were placed onsite and provided protection from mammal and bird predation, had their microclimates modified by means of plastic cones, or were provided no protection or microclimate modification. Germination and survival rates were determined approximately 1 year after placement on the site in an effort to find a relationship between microsite characteristics and seed and seedling mortality.

Determining seed germination requirements for 12 Palouse Prairie wildflowers

Investigators: Burchfiel C; Wenny DL.
Grant Amount: \$35,000
Project Term: May 1999 – June 2001

Abstract — We will determine the germination requirements of 12 Palouse Prairie wildflowers. By placing the seeds of each species into 5 different cold stratification durations with and without light, the optimum conditions for germination will be determined. Our objective is to establish instructions for nursery growers to propagate these plants from seeds.