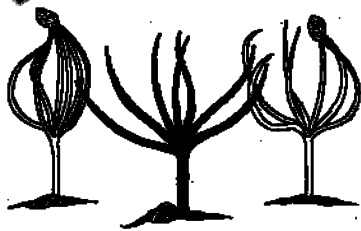


University of Idaho

Center for
Forest Nursery
and Seedling
Research



Activity Update No. 17 (2006-07)

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Director's summary

Many changes abound at the University of Idaho Center for Forest Nursery and Seedling Research (CFNSR). Since my arrival this spring, I have been able to establish research trials; develop a new course in Forest Regeneration, which will be a requirement for the Forest Resources degree; recruit two undergraduate summer interns; and start three new graduate students: two Master's students, Kayla Traver (BS Oregon State 2007) and Nathan Robertson (BS Montana State 2006), and one doctoral student, Rob Keefe (BS New Hampshire 2001, MS Idaho 2003). So, the future looks good! Since the 27th Intermountain Container Seedling Growers Association Meeting in Salem, OR last fall, we have been busy representing the CFNSR. Annette Brusven attended the Eighth Biennial Exotic Conifer Conference and Field Day in Coeur d'Alene, ID. Sue Morrison, Don Regan, and I attended the joint meeting of the Western Forest and Conservation Nursery Association and the Forest Nursery Association of British Columbia in Sidney, BC, Canada. Finally, we have also launched a biennial newsletter, meant to keep our stakeholders up to date with our activities. Please contact me if you have any questions or comments by email at asdavis@uidaho.edu or by phone at 208.885.7211.

Keep growing,

A handwritten signature in black ink, appearing to be 'ASD' followed by a flourish.

Anthony S. Davis, PhD
Assistant Professor and Director
Center for Forest Nursery and Seedling Research

Nursery team and awards

Anthony S. Davis, Director
Annette Brusven, Seedling Sales and Extension Associate
Susan Morrison, Greenhouse Coordinator
Donald Regan, Seed Specialist
Robert Keefe, Graduate Research Assistant
Nathan Robertson, Graduate Research Assistant
Kayla Traver, Graduate Research Assistant

In 2007, Sue Morrison was deservedly honored with a University of Idaho Outstanding Employee Award. This award honors non-faculty staff who are believed to be outstanding by their co-workers and/or supervisor, based on quality of service, initiative, exceptional effort, and interpersonal relationships. Congratulations Sue!

Jeremy Pinto, a PhD student under the supervision of Dr. John Marshall (Department of Forest Resources), received the 2007-08 Frank Pitkin Scholarship in support of his research entitled "The influence of container choice on dry site outplanting success of ponderosa pine seedlings: an evaluation of physiological response and performance potential."

Recent publications and presentations

Propagation protocols

As we prepare to resume hosting duties for the Native Plant Network Propagation Protocol Database, we also are showing a commitment to its continued growth by documenting all protocols used at the Pitkin Forest Nursery. This is intended to share available propagation techniques with other growers.

Publications

1. **Davis, A.S.**, D.F. Jacobs and K.E. Wightman. 2007. Organic matter amendment of fallow forest tree seedling nursery soils influences soil properties and biomass of a sorghum cover crop. *Tree Planters' Notes* 52: 2-6.
2. **Davis, A.S.** and D.F. Jacobs. 2007. Tropical afforestation and reforestation strategies to conserve biological diversity and increase global and local benefits. Abstract *in*: Proceedings of the IUFRO Conference on Forest Landscape Restoration. Korean Forest Research Institute, Korean Forest Society, USDA Forest Service. 268 p.
3. Jacobs, D.F., **A.S. Davis** and R.K. Dumroese. 2007. Nursery cultural techniques to facilitate restoration of koa (*Acacia koa*) competing with exotic kikuyu grass (*Pennisetum clandestinum*) in a dry tropical forest at Pu'u Wa'a Wa'a Hawai'i. Abstract *in*: Proceedings of the IUFRO Conference on Forest Landscape Restoration. Korean Forest Research Institute, Korean Forest Society, USDA Forest Service. 268 p.
4. Salifu K.F., D.F. Jacobs, R.A. Rathfon, **A.S. Davis** and Z.K.D. Birge. In press. Performance of *Quercus rubra* and *Quercus alba* seedlings on abandoned mine lands in southern Indiana. In Graves D., Angel P., Davis V. and J. Burger, eds., Proceedings of the 2nd Annual Appalachian Regional Reforestation Initiative (ARRI) Workshop.
5. Dumroese R.K., D.F. Jacobs, **A.S. Davis**, J.R. Pinto and T.D. Landis. In press. An introduction to subirrigation in forest and conservation nurseries and some preliminary results of demonstrations. *In*: Riley L.E., R.K. Dumroese and T.D. Landis, technical coordinators. National proceedings, forest and conservation nursery associations—2006. Fort Collins (CO): USDA Forest Service, Rocky Mountain Research Station. Proceedings.

Presentations

1. **Davis, A.S.** What is new at the University of Idaho Center for Forest Nursery and Seedling Research? Joint meeting of the Western Forest and Conservation Nursery Association and the Forest Nursery Association of British Columbia. Sidney, BC, Canada, 17-19 September 2007.

2. **Regan, D.J.** Effects of container size and copper treatment on the growth and survival of outplanted western white pine seedlings. Joint meeting of the Western Forest and Conservation Nursery Association and the Forest Nursery Association of British Columbia. Sidney, BC, Canada, 17-19 September 2007.
3. Dumroese, R.K., **A.S. Davis** and D.F. Jacobs. Inoculating *Acacia koa* with Bradyrhizobium and applying fertilizer in the nursery. Forestry Short Course V, Restoration of Degraded Lands. USDA Forest Service, Institute of Pacific Islands Forestry. Hakalau National Wildlife Refuge, HI, USA, 16 August 2007.
4. **Davis, A.S.**, R.K. Dumroese and D.F. Jacobs. Nursery cultural techniques to facilitate restoration of *Acacia koa* competing with exotic kikuyu grass in a dry tropical forest. Forestry Short Course V, Restoration of Degraded Lands. USDA Forest Service, Institute of Pacific Islands Forestry. Pu'u Wa'awa'a, HI, USA, 15 August 2007.
5. **Davis, A.S.** and D.F. Jacobs. Physiological and morphological responses of *Quercus rubra* seedlings to mid-summer photoperiod manipulation during nursery culture. North American Forest Biology Workshop, Bloomington, IN, USA, 20-23 May 2007.
6. Jacobs, D.F., **A.S. Davis**, B.C. Wilson, R.K. Dumroese, R.C. Goodman and K.F. Salifu. Artificially-induced short-day treatment during culture of *Pseudotsuga menziesii* seedlings alters dormancy release and transplant root proliferation at varying rhizosphere temperatures. North American Forest Biology Workshop, Bloomington, IN, USA, 20-23 May 2007.
7. **Davis, A.S.** and D.F. Jacobs. Tropical afforestation and reforestation strategies to conserve biological diversity and increase global and local benefits. IUFRO Conference on Forest Landscape Restoration, Seoul, Korea, 14-16 May 2007.
8. Jacobs, D.F., **A.S. Davis** and R.K. Dumroese. Nursery cultural techniques to facilitate restoration of koa (*Acacia koa*) competing with exotic kikuyu grass (*Pennisetum clandestinum*) in a dry tropical forest at Pu'u Wa'a Wa'a Hawai'i. IUFRO Conference on Forest Landscape Restoration, Seoul, Korea, 14-16 May 2007.
9. **Davis, A.S.** and D.F. Jacobs. Nursery blackout influences seedling morphological and physiological parameters. Special research seminar, Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB, Canada, 11 April 2007.
10. **Davis, A.S.** The green gardener: environmental awareness. Fundy Garden Club, Saint John, NB, Canada, 4 April 2007.

Current research summaries

As part of our 2007 summer intern program, each intern completed an independent research project. Justin Schmal's work focused on interim measurement of an ongoing research project of Anthony S. Davis and R. Kasten Dumroese aimed at examining nursery cultural practices of western larch seedlings. Phillip Woolery evaluated the use of chlorophyll fluorescence as a potential non-destructive, rapid evaluation technique for dehydration stress in American chestnut seedlings. Ryan Woods, a graduate student at Purdue University, is conducting research on mid-rotation silviculture of hardwood stands, with Anthony S. Davis as a collaborator. Improving seed germination through stratification is an important research service, and Don Regan investigated differences in germination rates for three species of interest to regional growers. Summaries of the aforementioned research are below.

Influence of nursery cultural practices on western larch seedling development*

J.L. Schmal, P.O. Woolery, A.S. Davis, R.K. Dumroese

Western larch (*Larix occidentalis* Nutt.) seedlings are in high demand due to their importance in post-fire restoration and reforestation following timber harvests. Although western larch has been grown in container nurseries for a long time, seedlings usually surpass target morphological specifications midway through the growing season, and the imbalance of root to shoot ratio can undermine the outplanting success of western larch. Manipulation of common nursery cultural practices such as date of sowing and nutritional regimes was used to manipulate seedling growth and development. The effects that alteration of

sow date and nutritional regime had on seedling height and root-collar diameter at the midpoint of the growing season were investigated. Later sowing date and reduced nutrition rate decreased seedling growth and may allow for meeting target specifications, while target height was achieved quickly with early sowing and high nutrition rate. In addition, cultural practice manipulations had little effect on net photosynthetic assimilation and intrinsic water use efficiency. We hope this information is used to inform seedling growers and users of options that will help develop a growing regime for western larch that will ensure that target seedling specifications are met so that the outplanting success of western larch may be improved.

Evaluation of chlorophyll fluorescence as an indicator of dehydration stress in American chestnut seedlings*

P.O. Woolery, J.L. Schmal, A.S. Davis

The effect of dehydration on three-month-old American chestnut (*Castanea dentata* (Marsh.) Borkh.) seedlings was studied by measuring the chlorophyll fluorescence (F_v/F_m) of four different irrigation regimes during a period of four days. Irrigation was withheld for 0, 24, 48 or 72 hours for each treatment and F_v/F_m measurements were taken after each irrigation. Piecewise regression analysis indicated that differences in F_v/F_m among the different treatments occurred only after the third day of the experiment when the plugs dried down to 30% of their saturated weights. After the treatments reached the 30% dry down point, F_v/F_m values dropped dramatically. The dramatic drop in F_v/F_m indicates that chlorophyll fluorescence does not have enough resolution to be a useful tool as a dehydration stress indicator but does highlight the short-term dehydration resilience of photosystem II in American chestnut seedlings.

Effects of density reduction on stand structure and growth response in pole-size hardwood stands⁺

R.L. Woods, D.F. Jacobs, A.S. Davis, R. Meilan

During spring 2007, 60 and 75 percent residual stocking treatments were implemented in five stands in the Hoosier National Forest in Indiana that were clearcut harvested during the period of 1975-1979. The 60 percent treatment increased the relative oak frequency per acre in all stands except one which contained no oak component prior to thinning. The 75 percent stocking treatment showed marginal increases in relative oak frequency. Increases in relative frequency for yellow-poplar and black cherry were greater in 60 percent treatment plots than in 75. Conversely, 75 percent treatment plots had nearly twice the relative frequency of other hardwoods compared to that of the 60 percent plots. Mean diameter distribution in the 60 percent plots showed a greater increased diameter shift than that of the 75 percent plots. Continual monitoring of stem quality and understory dynamics will allow for informed decision making in management of these high-value hardwood stands.

Seed stratification experiments

D.J. Regan

Bitter cherry (*Prunus emarginata*), Nootka rose (*Rosa nutkana*), and Oregon grape (*Mahonia aquifolium*) seeds were stratified under three conditions (cold stratification, warm stratification followed by a cold stratification, and a no-stratification control) in an effort to improve germination. Treatments were replicated three times. Four seeds were sown per cell for the bitter cherry and two per cell for each of the Nootka rose and Oregon grape. Overall germination was poor, with no tangible difference between stratification treatments, and no germination from control seeds for any species. Investigation of stratification requirements for improved germination of native species will continue at the CFNSR.

* Abstract from the 2007 Society of American Foresters National Convention

⁺ Abstract from the 2008 Central Hardwood Forests Conference