

FHP SPECIAL TECHNOLOGY DEVELOPMENT PROGRESS REPORT

Project Status: Carryover funds are needed to complete this project in FY 2001.

Project Number: R2-1998-01

Project Title: Alternatives to Fumigation-II

Subject: Nursery Diseases

Project Objective: Enhance integrated pest management by developing new or fine-tuning alternative cultural and chemical regimes for production of high quality bare-root conifer seedlings at USDA-Forest Service and State nurseries, with minimal fumigation, especially without methyl bromide.

Brief description of Project: Building on the information learned from the previous nursery TDP (Alternatives to Fumigation, R6-93-01) and other work, nurseries in every Region (except 3 and 10) are participating in field comparisons of a variety of chemical and cultural treatments customized for each nursery. Treatments include use of bare fallowing, beneficial microorganisms, seed treatments, organic amendments, mulches, cover crops, tilling, solar heating, fumigants, herbicides, and changes in irrigation, fertilization, and sowing.

FHP Person Leading the Project: Jeri Lyn Harris, R2

Cooperators: R1 and R4, Robert James, Coeur d'Alene and Lucky Peak Nurseries

R2, Jeri Lyn Harris, Bessey Nursery

R5, Susan Frankel, Placerville Nursery

R6, Diane Hildebrand, J. Herbert Stone Nursery

Oregon State University, Jeff Stone

R8, Michelle Cram

R9, Toumey Nursery

NE Area, Joe O'Brien, Jill Pokorny

USDA FS, NC Station, Jenny Juzwik

ARS St. Paul, Raymond Allmaras

University of Minnesota, Neil Anderson, Cynthia Buschena

Minnesota, Badoura State Nursery

Wisconsin, Griffith State Nursery

Wisconsin, General Andrews State Nursery

Alabama Forestry Commission, Edward A. Hauss Nursery

Georgia Forestry Commission, Flint River Nursery

Bowater Newsprint, Carter Nursery, Chatworth, GA

Hendrix and Dale, Inc., Oxford, NC, Clarence Lemons

Southern Station, Stephan Fraedrich, David Dwinell

Auburn University, Alabama, Scott Enebak

Brief Description of Accomplishments and Results:

Western Nurseries:

Seedlings are growing under a wide variety of pre-sow soil treatments at Coeur d'Alene Nursery (r1), Bessey Nursery (R2), Lucky Peak Nursery (R4), Placerville Nursery (R5), and J. Herbert Stone Nursery (R6). Treatments include bare fallowing, solar heating, tilling with water shading, various fumigants and soil amendments including bio-control agents. Samples of seedlings from each treatment at each nursery were measured using Machine Vision at J. Herbert Stone Nursery. Morphology data is being analyzed for 1+0 seedlings from Coeur d'Alene Nursery, Bessey Nursery, Lucky Peak Nursery, and Placerville Nursery, and for 2+0 seedlings at J. Herbert Stone Nursery.

Samples of 2+0 seedlings from CDA, Bessey, Lucky Peak and Placerville will be lifted and shipped to J. Herbert Stone Nursery this winter for measurement by Machine Vision. After data are analyzed, cooperating plant pathologists will write a report for each nursery.

Soil samples were taken at sowing, and 1+0 density and morphology measured for a replicated study in Field K at J. Herbert Stone Nursery. Data will be analyzed this winter.

Southern Nurseries:

The effect of pre-plant treatments on seedling production and soilborne pests were evaluated for loblolly pine (*Pinus taeda*) at three forest nurseries. The field evaluations began in 1998 at Flint River and E. A. Hauss Nurseries. In 1999, Carter Nursery (GA) replaced E. A. Hauss Nursery. Soil treatments included 76% methyl bromide/33% chloropicrin at 350lb/ac (MC33), EPTC, chloropicrin at 150 and 300 lb/ac (CH150 and CH300), and chloropicrin in combination with EPTC (CH150E and CH300E). A soil treatment of metam sodium at 80 lb/ac with chloropicrin at 150 lb/ac was added to the Carter Nursery test. A seed treatment with the bacterium *Paenibacillus macerans* was evaluated with each soil treatment.

Fumigation and EPTC treatments did not significantly affect seedling density at the tree nurseries by the end of the 1999 growing season. At the Flint River Nursery in 1998, seedling root collar diameter was greater in the CH300 and CH150E treatments. No other differences in seedling size were observed among treatments in the first two years. Seedling density at the Hauss Nursery was greater in plots with the seed treatment compared with untreated seed. At the Carter Nursery, there were fewer seedling (2/sq. ft.) in the seed treatment plots, and at the Flint River Nursery, the seed treatment reduced seedling height in 1998 and 1999.

The effect of fumigation with chloropicrin and methyl bromide on soilborne *Pythium* and *Fusarium* spp. varied among the nurseries. In general, fumigation reduced populations of these fungi. Plant parasitic nematodes were reduced by all fumigants following fumigation at Carter Nursery. Currently, non-fumigated plots at Flint River Nursery are experiencing a significant disease outbreak. Isolation from soil and damaged seedlings has yielded a binucleate *Rhizoctonia* spp., as well as *Pratylenchus* and *Longidorus* nematode spp.

Nutsedge was seldom found in the fumigated soil at Flint River Nursery in 1998. By 1999 only the CH300 treatments had less nutsedge than the controls. EPTC had no effect on nutsedge at Flint River

Nursery. At the Hauss Nursery, plots treated with EPTC or MC33 had no nutsedge, while the control plots and chloropicrin plots without EPTC did contain some nutsedge.

Northeastern Area Nurseries:

Final assessments of the alternative and the control cultural regimes on 1-0 black walnut production at a Minnesota nursery began in late September 1999. Morphological data were obtained for seedling samples collected from the study fields. *In situ* soil cores collected for determining rate of water infiltration in the study fields were processed, i.e. saturated hydraulic conductivity measurements were made. Lastly soil resistances to penetration (post-treatment evaluation) were also measured in September 1999. Significant differences in core indices were found between the alternative and the control treatment fields. Resistances to penetration after treatment were clearly lower in the alternative field soils compared to the control soils.

Final assessments of the alternative and control cultural regimes on 2-0 white pine seedling production at a Minnesota and a Wisconsin nursery have recently commenced. Soil resistances to penetration were determined for all study fields (two in Minnesota; three in Wisconsin). *In situ* soil cores were collected for after infiltration evaluation; and *Fusarium* spp. populations in the vertical profile of the fields are currently being determined. Soil moisture levels and soil irrigation events were also monitored during the summer months in all fields. Seedling samples will be collected from all fields in October 2000 and various morphological parameters measured. In addition, all *in situ* soil cores (post-treatment samples) will be processed during winter 2000-01 and saturated hydraulic conductivity values recorded.

Data for both black walnut and white pine fields will be summarized during winter 2000-01. Appropriate analyses will be conducted on the data sets and a final report on the findings prepared and submitted by September 30, 2001.

Documentation: not yet available

First Year Funded: FY 1998

Year Scheduled to End: FY 2000.

Actual Year to End: Year products will be delivered, FY 2001

Products and Due Dates Identified in the Original Proposal: Participating nurseries will be provided summary records/reports of the comparisons of the experimental treatments. Cooperators will also compile a joint summary report for all the Western, Southern, and Northeastern Area nurseries after data analyses are completed in 2001.

Status of Products: in progress

Does the Region/Area consider progress on this project to be acceptable, and if not, what corrective measures are planned? Progress is acceptable in each Area.

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH END OF FY 2000:

Please make a reasonable effort to provide information about funds and contributions from other sources by indicating the source(s) and amount or value of contributions. This information is helpful in order to communicate the effectiveness of this program in leveraging opportunities and fostering collaboration and ultimately to encourage continued availability of future funding for the program.

Fiscal Year	STDPfunding	Contributions	Source organization
1998	\$44,600 West	\$50,000.	Federal nurseries
		\$ 8,700.	OSU
	\$29,400 South	\$11,500.	local FHP
			program funds
		\$13,000.	Auburn Coop
		\$45,000.	FIDR
\$21,000 NEArea		\$10,800.	UMN
		\$14,000.	FHP, FIDR
Total FY 98	\$95,000	\$153,000.	

Fiscal Year	STDPfunding	Contributions	Source organization
1999	\$43,000 West	\$50,000.	Federal nurseries
		\$14,195.	OSU
	\$38,300 South	\$11,500.	local FHP
			program funds
		\$13,000.	Auburn Coop
		\$45,000.	FIDR
\$43,000 NEArea		\$10,800.	UMN
		\$14,000.	FHP, FIDR
Total FY 99	\$124,300	\$158,495.	

Fiscal Year	STDPfunding	Contributions	Source organization
2000	\$47,400 West	\$50,000.	Federal nurseries
		\$14,195.	OSU
	\$35,000 South	\$11,500.	local FHP
			program funds
		\$14,536.	Auburn Coop
		\$40,500.	FIDR
\$28,000 NEArea		\$10,800.	UMN
		\$14,000.	FHP, FIDR
Total FY 00	\$110,400	\$155,531.	

FUNDS CARRIED OVER FROM FY 1999 to FY 2000

West: \$ 0 South: \$0 Northeastern Area: \$0

All Carryover funds are needed for completion of the project in FY 2001.

Post-Project Technology Support: The products from this project will not require continued support. Cooperating nurseries will implement their desired, best treatments.