AUBURN UNIVERSITY
SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

FY 2018 WORK PLAN

As Approved by the Southern Forest Nursery Management Cooperative Advisory Committee
November 8-9, 2017

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GOAL A: RESEARCH

Objective 1. Identify, test, evaluate, and promote the registration of cost effective pesticides for use in forest tree nurseries.

Methyl Bromide Substitution

We will continue to monitor the replicated Methyl Bromide substitution trial at Rayonier Elberta Nursery, AL. The data collected will include seedling quality, nematodes, weeds and Trichoderma levels prior to and 1-yr post fumigation. Data will be collected for the second growing season and treatment plots will be part of the 2018 Southern Forest Nursery Association's annual meeting to be hosted by Rayonier. Products tested included Etheyelenedinitril, Dominus, Vapam, Ally 33 and propylene oxide. (Nadel/Enebak)

Nursery Weed Control

Information will be gathered and appropriate trials developed and installed to examine methods of weed control by herbicide application, crop seed protection, and weed seed source containment. Several of these herbicide trials are continuations or expansions of trials currently in progress.

- *Weed seed source scouting for each nursery*: Participating nurseries will be scouted, using field visits, online maps or drones, to examine areas where weed seeds may be accumulating, in addition to identifying mechanical or cultural practices that may introduce or transport weed seeds. Any SFNMC member nursery may participate (Payne).

- *Herbicide safeners in hardwood*: The feasibility of using herbicide safeners as potential hardwood seed treatments will be explored. These safeners are chemical agents applied to seed or into herbicide tank mixes to reduce herbicide injury to desired plants without diminishing the herbicidal effectiveness in control of targeted weeds. Commercial safeners are currently used in corn, grain sorghum, rice, and wheat. If practicable, a trial using herbicide safeners on spring-sown hardwood species will be installed to determine tolerance of multiple hardwood species as well as effectiveness of weed control with

safeners (Payne/Brooks).

- *Pendulum®AquaCap™ High Rate in bareroot and container pine*: In response to concerns from nurseries about late summer weed problems, a follow-up study using the highest allowable labelled rate of PAC will be installed at sowing to measure seedling tolerance (herbicide gall formation) and longer-term (6 to 8 months) weed control. Bareroot loblolly and slash pine and container loblolly, longleaf, slash and shortleaf will be included. INSTALLATION OF THIS TRIAL IN EACH SPECIES IS DEPENDENT ON RESULTS OF 2017 TRIAL. (Payne/Enebak)

- *Marengo® in bareroot eastern red cedar*: A third-year study applying Marengo over-the-top of eastern red cedar seedlings will be installed at the Georgia Forestry Commission's Flint River Nursery. This trial will be used to confirm results of a 2015 study installed at this nursery in which cedar seedlings treated with Marengo® exhibited increased growth characteristics when compared to untreated seedlings. INSTALLATION OF THIS TRIAL IS DEPENDENT ON RESULTS OF 2017 TRIAL. (Payne/Enebak)

- *'New' Postemergent Herbicide Screening in bareroot pine*: A replicated screening study of several post-emergent herbicides for the control of sedges, grasses, and broadleaf weeds will be installed at member bareroot nurseries. Along with recommendations from AU College of Agriculture faculty, results of 2016 and 2017 trials will be used to determine inclusion of herbicides in the study. (Payne/Enebak)

- *Low rate glyphosate applications over the top of hardwood*: In an effort to identify safe herbicides for emerged weed control in hardwood nurseries, reviews of research of low rate applications of glyphosate in agricultural crops will be made. Sufficient positive results may lead to the design and installation of a study using low rate, over the top applications in multiple hardwood species in Coop member nurseries. (Payne/Brooks)

- *RonstarFlo® (oxadiazon)* in *bareroot and container pine*: As a result of increased incidence of annual sedge in member nurseries, a trial of pre-emergent applications of RonstarFlo® will be made in bareroot and container nurseries. Previous bareroot nursery trials in 1999, 2012, and 2013 showed no negative effect on loblolly pine seedling characteristics. Bareroot loblolly and slash pine and container loblolly, longleaf, slash and shortleaf will be included. INSTALLATION OF THIS TRIAL IS DEPENDENT ON RESULTS OF 2017 TRIAL. (Payne/Enebak)

- *RonstarFlo® (oxadiazon) over hardwood*: Interest in the use of RonstarG in postemergent applications in hardwood has been expressed following its past use. A trial using granular and liquid formulations of oxadiazon in applications after hand-weeding will be installed in one nursery. (Payne)

Fusiform Rust Control

A seed treatment study on loblolly will be done testing new chemistries in conjunction with the US Forest Service Rust Testing Laboratory in Asheville, NC. Two new fungicide treatment chemistries will be assessed in this study. Conifer seed (loblolly and slash) will be sown at Auburn into USFS container systems until germination at which time the seedlings will be treated prior to being challenged with basidiospores of fusiform rust. (April - Nov 2018) (Nadel/Enebak)

Nanocellulose/lignin impregnated with insecticides to control pine tip moth

Nanocellulose particles will be created and impregnated with imidacloprid, fipronil and/or emamectin benzoate. Particles will be dispersed over seedlings in a greenhouse (25 per treatment) with a sifter/spray. Seedlings (needles, stems, roots) will be sampled at various time points (weekly for 10 weeks). Tissues will be ground and analyzed to determine movement of pesticide through seedling tissues. (Persin/Eckhardt/Nadel)

Objective 2. Identify and develop economically feasible nursery cultural practices that enhance seedling quality.

Development of a rapid screening test for the presence of *Fusarium circinatum*

We will continue to obtain approval by the International Seed Testing Association (ISTA) as a seed screening method that can then be enforced as an alternative to the current blotter paper method used by seed certification companies, disease diagnostic laboratories and plant inspection agencies. (Nadel/Enebak)

Modeling container seedling development

This will be a collaborative project with the Plantation Management Research Cooperative, University of Georgia. We aim to model growth and carbohydrates in container grown pine seedlings over time. The model uses temperature and water availability to predict plant size, and plant carbohydrates levels (Nadel/ Montes).

Soil stabilizer trials

Three soil stabilizers (H.B Fuller, Tailored Chemical Systems, Soil Tech) will be tested at both Jessup and Elberta Nurseries. The application rates to be tested are 4:1, 7:1, 10:1. (Nadel/Payne)

Seedling growth/root vigor trials.

Two products reported to increase seedling growth and vigor will be examined for their reported efficacy. These include Radiate and Megafol and will be tested at Jessup nursery. (Nadel/Payne)

Objective 3. Develop methodologies to minimize the environmental impact of nursery cultural practices while maximizing their effectiveness including the development of integrated pest management programs.

Hardening off practice of reducing water availability and its impact on root heath

Root heath and root hydraulic conductivity is of importance to outplanting success. With this study we aim to determine whether the hardening off practice of reducing water availability, prior to the lifting of seedlings, may inadvertently (in warmer winters) increase the vulnerability of seedlings to develop embolisms. As roots play a significant role on whole plant water transport, embolized roots will increase drought vulnerability for outplanted seedlings. Some southern pine species have moderate embolism resistance, however, the majority of studies were undertaken on mature trees. Little is thus known about root vulnerability to cavitation for loblolly seedlings undergoing water stress. As there is no direct comparisons at the seedling stage at a particular site we aim to determine whether there is any potential genetic variation to embolism resistance within loblolly. Nutrient levels of the seedlings will also be monitored overtime. (Nadel/ Samuelson).

Objective 4. Further define the "optimal seedling" so as to maximize the cost effectiveness of artificial regeneration forestry systems.

Chilling Hours and Seedling Storability

Determine the impact of ethylene management on increasing seedling storability and its impact on chilling hours through a one molecule inhibitor of ethylene (1-MCP). Increased Ethylene production has been shown to reduce the growth and survival of several agricultural crops. The AgroFresh Inc. 1-MCP product inhibits the production of ethylene (due to the blocking nature of the molecule) and successfully used in fruit production and storage increasing yields and survivability of such crops. There are potential opportunities for the forestry industry to use such a product to increase survivability. This study we aim to determine what impact the 1-MCP molecule will have of ethylene production of seedlings and whether such a product could aid in increasing seedling storability and out planting success. (Nadel/ Enebak)

GOAL B: TECHNOLOGY TRANSFER

Objective 1. Serve as a clearinghouse of information related to nursery production and tree planting.

Methyl Bromide

In collaboration with MBr manufacturers, the Methyl Bromide Industry Panel (MBIP), the Chloropicrin Manufactures Task Force (CMTF) and applicators, the Nursery Cooperative staff will continue to keep abreast of EPA actions and/or possible legislative initiatives that may affect the future availability of soil fumigants. We will continue to inform the membership through the Advisory Committee to keep the membership knowledgeable of these activities

The Nursery Cooperative staff will continue to keep abreast of activities related to the Quarantine pre-shipment (QPS) process. We will inform the membership of any EPA initiatives and continue to work with the AF&PA, the Crop Protection Council, USDA and APHIS to provide input and influence the QPS process if necessary.

The Nursery Cooperative staff will continue to work with the AF&PA, and USDA to inform and influence the EPA deliberations regarding pesticide regulation as it pertains to the soil fumigation re-registration decisions that were released in spring 2013. (Nadel/Enebak)

Drone use for seedling quantification

There is a need to develop software that will be capable of counting the number of seedlings in a nursery once images have successfully been captured by a drone that has flown the nursery.

Update of Nursery Label Book

The Nursery Pesticide Label Book on the Nursery Cooperative's website will be updated to include recent additions of herbicide, insecticide and fungicide labels. (Brooks/Enebak)

Revision of Ag Handbook 473, Hardwood Nursery Guide (Hardwood Manual)

In collaboration with the US Forest Service and with input from Nursery Cooperative membership, Dr. McNabb and Nursery Cooperative staff and Carolyn Pike, of the USFS, Purdue will complete the Hardwood Manual in FY18. (McNabb/Starkey/Bowersock)

Re-registration of Nursery Pesticides

The Nursery Cooperative staff will continue to follow the re-registration process for pesticides currently under review under the Food Quality and Protection Act (FQPA) used in seedling production and will provide information to the necessary regulatory agencies (USDA, APHIS, EPA) when necessary. (Enebak/Nadel)

Maintain and Update Nursery Cooperative Web Site

The Nursery Cooperative staff will continue to update the Nursery Cooperative website for use by Nursery Cooperative Members and increase the "searchable" status of the Cooperative's data and reports. (Bowersock)

Leveraging Nursery Cooperative Data

The Nursery Cooperative staff will continue to stress the importance of Cooperative membership and when possible, leverage Cooperative information for grant proposals and data cite license for the seedling production survey. (Staff)

Objective 2. Efficiently and regularly transfer the results of cooperative research to the membership.

Contact Meeting

The Nursery Cooperative Contact meeting will be conducted as a ½ day program will be held in conjunction with the Southern Forest Nursery Association's biennial meeting in Pensacola, FL on Monday July 16, 2018. The SFNA meeting will kick off on Monday evening, and run through Thursday July 19, 2018. Rayonier's Nursery in Elberta, AL will serve as the host and conduct the nursery tour as part of the SNFA meeting. Working with Mark Davis, cooperative trials will be install as part of the outreach component of Nursery Cooperative research. The agenda will cover presentations by Nursery Cooperative staff on current research activities and results. Details will be worked out with Mark Davis and the SFNA Planning Committee with meeting information outlined in the Spring 2018 Newsletter. (Enebak/Bowersock)

Research Reports (Staff)

We plan on producing Research Reports and Technical Notes in FY18.

Newsletters

Newsletter distribution are planned for March and September 2018. Members are encouraged to submit articles and organizational updates. (Staff)

Objective 3. Provide a limited consultancy function to the membership in the area of nursery seedling production and outplanting.

Individual and Organization Contacts

An on-going activity and is handled as individual situations within each organization within the Nursery Cooperative as cases arise during the growing and planting season. (Nadel/Enebak)

Seedling Production Survey

The Nursery Cooperative staff will continue the seedling production survey initiated in FY 03. The same questionnaire will be used to obtain production figures for the 2017 to 2018 planting season. The survey will be sent out in June 2018. (Enebak/Bowersock)

Nursery Customer Meeting Presentations

Over the past several years as schedules and travel permits, Nursery Cooperative personnel have participated customer (internal and external) meetings at nurseries in an effort to encourage and improve customer relations and educate nursery customers on seedling planting and successful plantation establishment. 30-minute presentations such as "*Why Did My Seedlings Die*?" and "*The Ten Commandments of Seedling Survival*" are presentation the staff have made.

Short Course

With the Nursery Cooperative's short course in Auburn in September 2015, and a large demand that could not be conducted in September 2017, we will begin organizing a Short Course to be offered in September 2018. (Staff)

GOAL C: COOP DEVELOPMENT

Objective 1. Provide for the continual relevancy and efficiency of the Cooperative research and technology transfer programs.

Advisory Committee Meeting

The FY19 Advisory Committee Meeting will be held on 30 October – 1 November 2018. A 2, half-day meeting will be planned. If there are any meetings that conflict with this time frame, let us know and we can try and accommodate Advisory Members. (Enebak/Bowersock)

Nursery Cooperative Membership

The Nursery Cooperative staff will make an effort to recruit new members among those nurseries that will benefit from activities of the Nursery Cooperative. (Staff)

Update the Coop Membership and Nursery Directories

An on-going activity with an updated directory distributed annually to each member. (Bowersock)

Objective 2. Increase the visibility and effectiveness of the Cooperative as a source of information on issues related to seedling production and plantation establishment.

Presentations at Meetings

Nursery Cooperative staff will continue to be encouraged to participate as a speaker or attendee in regional and national meetings related to artificial regeneration. (Staff)

Publications

Nursery Cooperative staff is encouraged to publish research results in scientific journals. (Staff)

Extramural Funding of Nursery Cooperative Projects

Nursery Cooperative staff will continue to be encouraged to locate and generate extramural funding opportunities directly related to artificial regeneration. (Staff)

Interaction with other Research Cooperatives

The Nursery Cooperative staff will make efforts to interact, attend, work with other regional and national forest research Cooperatives in an attempt to broaden and strengthen research ties that can benefit seedling production. (Staff)