AUBURN UNIVERSITY
SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

FY 2017 WORK PLAN

As approved by the Southern Forest Nursery Management Cooperative Advisory Committee
November 9-10, 2016

AUBURN UNIVERSITY
SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

FY 2017 WORK PLAN

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 establish a 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 post fumigation. Data will be collected for two growing seasons and treatment plots will be part of the 2018 Southern Forest Nursery Association's annual meeting to be hosted by Rayonier. Products to be tested include Etheyelenedinitril, Dominus, Vapam, Ally 33 and propylene oxide. (Nadel/Enebak)

Herbicide Trials

Herbicide trials will be developed and installed to examine the effects of herbicides on seedling quality and on targeted weeds as reflected in our recent problem weed survey. Several of these are further developments of herbicide studies installed in in previous years.

- Pendulum®AquaCap™ on containerized pine: To gain additional seedling tolerance and targeted weed control information, a third-year container trial will be installed to test the tolerance of 4 pine species in container media to applications of PAC and the effectiveness of PAC on black willow and other weeds. Applications will be made weekly during the sowing period to coincide with willow seed dispersal. (Payne/Enebak)

- Pendulum®AquaCap™ and Marengo® outplanting studies: The four outplanting studies currently in place at Westervelt (AL) and IFCO (LA) nurseries will be continued for one additional growing season to gain additional data. Measurements from these studies will be used to compare survivability and growth of treated to non-treated container loblolly pine seedlings. Outplanting test maintenance is provided by cooperating nursery staff; measurements will be made by either nursery or SFNMC staff. (Payne/Enebak)

- Marengo® in bareroot eastern red cedar: A follow-up trial applying Marengo over-the-top of eastern red cedar seedlings will be established 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. (Payne/Enebak)

- Pendulum®AquaCap™ second application timing trial: In response to concerns from multiple bareroot nurseries over reoccurrence of spurge in late summer (after PAC application was made at sowing), a timing trial of PAC will be installed at several nurseries of varying soil types. This study will be used to determine if PAC applications made at sowing and again at 8, 10, or 12 weeks post-sowing will result in herbicide gall formation or have other effects on seedling quality. A similar timing trial with PAC was made in 2013 without an at-sowing PAC application. (Payne/Enebak)

- 'New' herbicides screening study: A replicated screening study of multiple (up to 20) pre- and post-emergent herbicides for the control of sedges, grasses, and broadleaf weeds will be installed at member nurseries of various soil types to target specific weed problems. Using our recent problem weed survey, faculty of AU Department of Crop, Soil and Environmental Sciences will identify herbicides to include. These herbicides have not yet been tested by the SFNMC but are presently used in either turf or agricultural settings. Pine seedling tolerance and herbicidal effectiveness will be measured. In addition, second-year trials of any of the 4 herbicides tested in 2016 may be installed after seedling quality data are analyzed to quantify seedling tolerance. One of these 4 new herbicides (sulfentrazone) may be used in an additional trial targeting annual sedge. (Payne/Enebak)

- RonstarFlo® (oxadiazon) study targeting annual sedge (*Cyperus compressus*): As a result of increased incidence of annual sedge in both bareroot and container nurseries, a trial of pre-and post-emergent applications of RonstarFlo®, alone and in combination with other preemergent herbicides, will be made. In 2012 and 2013 trials using RonstarFlo®, bareroot pine seedlings exhibited tolerance to the herbicide with good sedge control. (Payne/Enebak) Try this on small set of container loblolly also?

- A survey of member nurseries will be made to document historical and current use of Goal® (oxyfluorfen) products in weed control regimens. This survey is relevant due to the presence of weeds that appear to be more resistant to Goal® in a limited number of our member nurseries.

Fusiform Rust Control

A seed treatment study on loblolly will be done testing new chemistries in addition to using various rates of Proline® in conjunction with the US Forest Service Rust Testing Laboratory in Asheville, NC. Current label rates for Proline® as a seed treatment on conifer seed were based on the use of tridimefon activity. Label rates for others agronomic seeds are 10-100 x less ai per unit of treated seed. The ability to identify the lowest effective rate for Proline® use on conifer seed will decrease pesticide usage. Any potentially new fungicide seed treatment chemistries will also be assessed in this study. Conifer seed (longleaf, loblolly and slash) will be treated in Auburn and then sown into USFS container systems until germination at which time the seedlings will be challenged with basidiospores of fusiform rust. (April - Nov 2017) (Nadel/Enebak)

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 continue testing this new method on conifer seed and seedlings for the presence of the pitch canker fungus and aim to have this new technology adopted and approved 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. SFWS staff will focus on equipment grants that would allow the purchase of a qPCR such that the system could be used to quantify seed infestation. (Nadel/Enebak)

Using Near Infrared (NIR) to Detect Freeze Injury in Loblolly Pine

Near-infrared Spectroscopy (NIR) was originally developed for use in the pharmaceutical industry and is now used in agriculture, and chemical manufacturing. Recently this technique has found a use in identifying different species of Eucalyptus. Initial testing in both bareroot and container loblolly pine that represents a base line for freeze tolerance (e.g. 7-56, Atlantic Coast, Marion County) will be done with a laboratory NIR machine to develop a baseline for non-injured tissue. Two years of funding has been secured from SFWS to bring on a PhD student, who has been identified and is starting on the project in January 2017. Seedlings will then be subjected to various levels of exposure to freezing temperatures to determine if freeze injury can be detected. If successful, we will try to obtain a portable NIR instrument which has been successfully used in forestry. (Jan – Dec 2017) (Enebak/Via)

Controlled Release Fertilizers in Container Seedlings & Nutrient Status

This study will be repeated for a third year using the same protocol as this last year, but focussed on application rates. The use of long-term controlled release fertilizers (CRF) (> 14-18 months) at different rates will be examined in the production and nutrient status of container seedlings over time. An example of a CRF would be #2 Polyon 16-5-11. Container sets of participating nurseries will be seeded with different numbers of prills by incorporating a sample of the fertilizer, at different rates, in a small portion of their media by hand. Nutrient status will be measured on seedlings treated with various fertilizer rates and examined for foliar nutrients after outplanting. Nurseries interested in participating in the experiment include IFCO, Bellville, River Bend, North Carolina Forestry Commission and Westervelt. (Nadel/Enebak)

Literature search on bareroot seedling nutrient loading

A literature search will be undertaken to determine whether any research has been undertaken on nutrient loading of bareroot seedlings, without the resulting excess foliage flushing. (Nadel/ Enebak)

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.

The use of drones: Unmanned Aerial Vehicles (UVAs) in seedling production

Working with the Department of Bioscience in the College of Agriculture, UVAs will be flown over the growing season and the data analyzed to examine the effects of nursery practices on seedling productivity in a continuation and confirmation of the 2016 data collection. The ability to count the number of seedlings in a container nursery is imperative. This study will focus on determining the correct software to be used to count individual seedlings from the images obtained from UVAs (McDonald/Enebak/Nadel)

Test alternative fipronil chemistries for use in seedling production

Nursery Cooperative staff will test alternative fipronil chemistries as an alternative to PTM. (Enebak)

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). Several types of stresses (such as temperature, moisture and nutrient stress) induce ethylene production. 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 (during lifting and storage of seedlings) 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)

A meta-data analysis (statistical analysis of data across multiple studies) will be attempted to determine if there is a link to the number of chilling hours seedlings are exposed to and their ability to survive storage after outplanting. (Enebak/Loewenstein)

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)

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 missing chapters of the Hardwood Manual. (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, etc) 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 2-3 day program will be held in in South Carolina. ArborGen's SuperTree Nursery in Blenheim, SC will serve as the host and conduct the nursery tour. Working with Gary Nelson, 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 during the week of July 10, 2017. Details will be worked out with Gary Nelson with meeting information outlined in the Spring 2017 Newsletter. (Enebak/Bowersock)

Research Reports (Staff)

We plan on producing Research Reports and Technical Notes in FY17.

Newsletters

Newsletter distribution will be planned for March and September 2017. 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 2016 to 2017 planting season. The survey will be sent out in June 2017. (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, we will hold off for a year or two and revisit the course again in January 2017. The Short course would be in September 2017. (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 FY18 Advisory Committee Meeting will be held on November 9-10, 2017. 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)