AUBURN UNIVERSITY
SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

FY 2016 ACCOMPLISHMENTS

As presented to the Southern Forest Nursery Management Cooperative Advisory Committee
November 9 - 10, 2016

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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

No new studies have been recommended. A couple of watch trials were installed at member nurseries that used higher rates of MBr and propylene oxide as a soil fumigant. If needed, Nursery Cooperative staff can assist member nurseries in data analysis.

✓***Accomplishment: No new chemistries were introduced into forest-tree nurseries for the 2016 growing season.***

Herbicide Trials

Herbicide trials will be developed and installed to examine the effects of herbicides on specific weeds and on seedling quality. Several of these are further developments of herbicide studies installed in 2015.

- In response to insufficient weed pressure in 2015 and to acquire additional seedling tolerance information, a container trial will be repeated to test the effectiveness of Pendulum® AquaCap™ on black willow and other weed control, and to test pine tolerance to applications of PAC in container media. Applications will be made weekly during the sowing period to coincide with willow seed dispersal. (Payne/Enebak)

  ✓***Accomplishment: Now in the second year of this container trial, PAC was applied at two rates to newly-sown trays of loblolly, longleaf, shortleaf and slash pine at the IFCO Nursery in Moultrie, GA. Timing of sprays was coordinated with estimated willow seed dispersal, so weekly applications were made on each species in order to accumulate as many willow seeds as possible in the studies. In October, counts of willow and other weeds, weed identification, seedling survival and seedling quality measurements were made. This data will be used to evaluate container seedling tolerance to PAC and its***

effectiveness in willow and weed control. In contrast to the 2015 installation of this trial, adequate willow and weed populations were present in 2016 to evaluate control with PAC. Results of this trial will be included in a Research Report.

- Two outplanting studies will be installed at Westervelt (AL) and the IFCO nursery/orchard (LA) using container loblolly seedlings: one study will include seedlings treated with Marengo® during the 2015 growing season and the second will include seedlings treated with Pendulum® AquaCap™ during the 2015 growing season. Both studies will be used to compare survivability to non-treated seedlings. The nursery /orchard outplanting site in Louisiana will be part of the Southern Forest Nursery Association meeting nursery tour. (Payne/Enebak)

  ✓Accomplishment: The Marengo® outplanting studies were established near the Westervelt (AL) Nursery and at the IFCO (LA) nursery in December 2015. The PAC outplanting studies were installed at the same times and locations. Field layouts and planting were done by nursery and SFNMC personnel. Maintenance of tests was performed by nursery personnel through the 2016 growing season. In late 2016, measurements of survival and growth will be made, with results included in the PAC and Marengo® Research Reports. The tests will continue to be grown for an additional year to augment first-year data.

- A study testing multiple post-emergent herbicides for the control of broadleaf weeds, grasses and sedges will be installed at member nurseries of various soil types. These herbicides have been identified by AU Department of Crop, Soil and Environmental Sciences faculty as potential control agents for member nurseries' identified weed problems but have not yet been tested by the Nursery Cooperative. Possible herbicides include penoxsulam, florasulam and trifloxysulfuron. Pine seedling tolerance and herbicidal effectiveness will be measured. (Payne/Enebak)

  ✓ Accomplishment: The 18 installations of this study were placed at K&L Forest Nursery (GA), Georgia Forestry Commission's Flint River Nursery, the Weyerhaeuser Nursery near Camden, AL and ArborGen's Nursery near Selma, AL. Low rate applications of three post-emergent herbicides, florasulam used as Defendor™, penoxsulam used as Grasp®, and trifloxysulfuron used as Envoke®, were made at sowing and in over-the-top single applications at 8, 13 and 16 weeks post-sowing in loblolly and slash pine. Visual inspections through the spring and summer revealed stunting of seedlings in applications made at sowing, particularly in the penoxsulam study. Installations were evaluated for weed control in September 2016, and seedling quality from each treatment plot will be evaluated in November as nurseries are in position for lifting. Results will be compiled into a Research Report. As results of seedling tolerance are evaluated, decisions to repeat trials with certain herbicides will be made.

- Morning glory and other broadleaf weeds in hardwood nurseries continue to be a problem. Trials testing the ability of herbicides to control weeds with directed spray applications in hardwoods will be installed as equipment is available. (Payne/Enebak)

  ✓Accomplishment: No herbicide trials using directed spray applications were installed due to scheduling conflict with member nursery.

  Additional studies not included in the FY 2016 Work Plan approved in November 2015:

  ✓Accomplishment: A third year installation of the original 2014 Marengo® trial for willow control in container production systems was completed at the IFCO Nursery in Moultrie, GA, in order to confirm results from previous studies of lower plug weights of treated seedlings. Three rates of Marengo® were sprayed over-the-top of longleaf, loblolly, slash and shortleaf seedlings at 6 weeks post-sowing of each species. Willow and weed counts, weed identification, and percent fill of trays were recorded prior to spray application in the spring and again in October. Seedling quality of samples from each installation was measured in October. Additional seedlings from each speciesXrate combination were placed in aerated tanks in October to quantify root growth potential. Results from these RGP tests will be available in November, with all results included in a Marengo® Research Report.

  ✓Accomplishment: In response to requests for control options for goosegrass, a trial of the pre- and post-emergent herbicide sulfentrazone, used under the name Dismiss, was established at one bareroot nursery in loblolly and slash pine. Applications of a low rate of the herbicide were made at sowing and post-sowing at 8 weeks only, 13 weeks only, at 8 and 13 weeks, and at 16 weeks only. Plots were evaluated for weed control in September 2016, although few weeds were present with no goosegrass present in the entire study. Seedling quality from each treatment plot will be evaluated in November when the nursery is in position for lifting. Results will be compiled into a Research Report. As results of seedling tolerance are evaluated, a decision to repeat this trial will be made, as sulfentrazone is listed as controlling or suppressing many of the sedges, grasses and broadleaf weeds that appear mid-season in member nurseries.

Fusiform Rust Control

A seed treatment study on loblolly will be done 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. 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 2016) (Starkey/ Enebak)

- ✓ ***Loblolly and slash pine seedlings were treated 5 rates of Proline, standard Bayleton and water check to determine the lowest effective rate to control fusiform rust when used as a seed treatment prior to sowing. Bayleton and non-treated seed were included as a positive and negative control. Treated seed were sown at the USFS Rust Testing Laboratory and 6 weeks post sowing were challenged with 30,000 basidiospores of Cronartium quercuum f.sp fusiforme. Seedlings were then cared for by USFS staff and the amount of infection determined by treatment recorded in October. Effects of reduced seed-treatment rates on infection will be compiled into a Research Report.***

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*

Pitch canker caused by *Fusarium circinatum* is an economically important disease occurring on 47 pine species worldwide. 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)

- ✓ ***Accomplishments: The molecular protocol developed to rapidly screen for the presence of Fusarium circinatum in pine seed and seedlings has been submitted to the ISTA for review and approval. Pitch canker screening of seedlot and seedling samples is now a service available to members. In collaboration with SFWS staff we have been able to recently acquire a real time PCR machine that will enable us to now work on quantifying the actual seed infestation using molecular method.***

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 June 2016. 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. (June 16 – Dec 2017) (Starkey/Enebak/Via)

- ✓ ***Accomplishments: With this initial data, we were able to secure $44,000 from SFWS to support a PhD student for 2 yrs to examine this process in more detail. After the first student backed-out of the stipend and a delay in the application process for a second student, we will begin on this project January 2017.***

Controlled Release Fertilizers in Container Seedlings & Nutrient Status

This study will be repeated for a second year using the same protocol as this last year. The use of long-term controlled release fertilizers (CRF) (> 14-18 months) will be examined in the production and nutrient status of container seedlings over time. Examples of CRF would be #2 Polyon 16-5-11 and Multicote coated urea. Container sets at IFCO will be seeded with different numbers of prills and seedling nutrient status analyzed at the end of the season. Other participating nurseries will be asked to incorporate a sample of both fertilizers in a small portion of their media by hand. Nutrient status will be measured on seedlings treated with various fertilizers and examined for foliar nutrients after outplanting. Nurseries interested in participating in the experiment include IFCO, River Bend, North Carolina Forestry Commission and Westervelt. (Starkey/Enebak).

- ✓ ***Accomplishments: The initial trial results revealed that prior to outplanting the Polyon and Multicote treatment RCD were significantly greater than that of the nursery fertilization control. This trend has continued following outplanting. The two rates of each CRF incorporated with the same container set revealed that all rates of Polyon and Multicote were visually greener and larger than the standard nursery control. Results from these two trials will be repeated in 2016 in addition to being outplanted so as to observe growth differences during seedling establishment.***

Monitoring the hardening off of seedlings

The hardening off of seedlings typically begins with the reduction of irrigation and fertilizer. However, occasionally seedlots that have not reached their target standards are "pushed" into the early fall. If these seedlings have not been properly hardened before shipping, they may suffer freeze injury in the nursery or field that can effect establishment and growth. Monitoring the dry weight fraction of the terminal leader is a method used in colder climates before seedlings are subjected to freezing temperatures. The results have been variable. To our knowledge, this method has not studied for southern species. The dry weight fraction of the terminal leader will be monitored every two weeks beginning in early October until January and correlated with temperatures and foliar analysis. (Starkey/Enebak)

- ✓ ***Accomplishments: No progress was made with this proposal this year.***

The effect of a new formulation of Thiram on loblolly pine germination

Last April, a nursery that treats their seed with Thiram reported a significant reduction in germination on their loblolly pine with a new Thiram formulation. This January we will do a seed treatment and germination study in the greenhouse comparing the two formulations of Thiram. (Starkey/Enebak)

- ✓ ***Accomplishments: It appears that the SIGNET® 480FS (Thiram) from NUFARM is affecting geotropism of the seedling radical causing the inability of the seed to properly send the radical down into the soil. However, the phototropism is still working causing emerging seedling to try to erect itself. Based on these results, this product should not be used as a seed treatment on loblolly pine seed until we have a more complete picture of what is occurring to the radical. Management Alert 16-01 contains more information.***

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, 2 nurseries will be flown over the growing season and the data analyzed to examine the effects of nursery practices on seedling productivity. (McDonald/Starkey/Enebak)

- ✓ ***Accomplishments. In April of 2016 some exploratory work using UAS to generate a time series of visible and near-infrared images, tracing the growth and establishment of seedlings at Arborgen's SuperTree nursery near Shellman, GA. The proposal was to conduct flights five times throughout the growing season with the first flight occurring immediately after sowing, but before full germination, and the final flight right before lifting. At each growth stage, two flights were conducted, the first utilizing a Trimble UX5 outfitted with a 24 mega-pixel camera allowing for the generation of high-resolution imagery as well as the creation of 3-dimensional point clouds. The second flight was with Sensefly's eBee Ag carrying a Sequoia multi-spectral camera taking images in the visible as well as the near-infrared part of the light spectrum. The high-resolution visual imagery that was created during each flight allowed for a quick visual analysis of the entire nursery. Since the imagery was high-resolution, it was possible to zoom in closely and look at problematic areas, identifying spots within the nursery that may require additional attention***.

The availability of prills for PTM use in container seedling production.

Nursery Cooperative staff will determine the feasibility of fiprinol in prills as a delivery method for insect control in container seedlings. (Brooks/Starkey/Enebak)

- ✓ ***Accomplishments. No progress was made with this project this growing season.***

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

The effect of central terminal leader integrity on root growth following outplanting

In a good year, seedlings that have been outplanted will begin new root growth within six weeks of outplanting. Last year a number of outplanted seedlings were examined from stands having poor seedling performance. There was a consistent correlation in a lack of root growth for those seedlings that had a visibly dead central terminal leader. This study will examine the root growth associated with outplanted seedlings with a central terminal leader and with a central terminal leader that has been killed. This study will be partially done in Plexiglas boxes in the greenhouse and also in the stress facility, in addition to seedlings planted in the Trophotron. (Starkey/Enebak)

- ✓ ***Accomplishments: A three levels of planting stress study was undertaken. A low stress (exposed to moderate temperatures and were watered), moderate stress (amount of water was regulated but seedlings were exposed to ambient temperatures) and stressed (no supplemental water and exposed to ambient temperatures). For the study every second seedling had its growing tip burned. Study revealed water and temperature stress had an effect on root and shoot development. Burning the tip resulted in significantly less root weight, shoot weight, new root growth and fewer new white tips when compared to the unburned control. Tip dieback due to freeze injury / drought, significantly affects root growth infield and could also affect survival.***

Comparison of loblolly root development in two types of Ellepot container trays.

This is a manufacturer sponsored study. The design of these container trays/systems are very different than more traditional container sets requiring more intensively management irrigation. Seedling quality will be evaluated. These containers are being used in South America. The first phase of this study last year was to compare seedling quality and RGP. This next year we will place seedlings in out Plexiglas boxes and examine root morphology. (Starkey)

- ✓ ***Accomplishments: This study began in April 2015, is still underway and will be complete in April 2016. Due to the difficulty in extraction, the Pioneer trays have been excluded from part of this study. Seedling quality will be completed at the end of the growing season with three treatments, two Ellepot® types and control. Final measurements will be taken and information released to the membership in early January 2017.***

Chilling Hours and Seedling Storability.

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).

- ✓ ***Accomplishments. No progress was made with this project this growing season.***

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. (Starkey/Enebak)

- ✓ ***Accomplishments: Nursery Cooperative staff participated in 2 conference calls with the MBIP and the CMTF on soil fumigation rules. Nursery Cooperative staff continue to survey members each fall and spring as to their soil fumigation operations. Soil***

fumigation use, rates, compounds and issues are being compiled for inclusion on the soil fumigation REDs including Telone, which appears to have a lower toxicity ranking than previously reported. These, and other changes, will be part of the new labels, scheduled to appear in 2020.

- ✓ ***Accomplishments: There was one contact made to Nursery Cooperative staff by USDA in FY 2016 with respect to MBr use under the QPS process of the Montreal Protocol. There was concern that QPS use was "increasing" in forest-tree nurseries. Data supplied by member nurseries indicate that MBr rates have been constant with alternative ai's increasing.***

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)

- ✓ ***Accomplishments: The collection and listing of herbicides, insecticides and fungicide labels continues. Labels for herbicides, Insecticides and Fungicides were linked to an Excel Spreadsheet that is available on the Nursery Cooperative Web Page.***

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 will make one last attempt to identify authors for the missing chapters of the Hardwood Manual. If they cannot be completed, we will post the completed chapters on the Nursery Cooperative Web Site for member access. (McNabb/Enebak/Bowersock)

- ✓ ***Accomplishments: After a 5-yr hiatus, progress has been made with this project. This Hardwood Manual, revision, funded entirely by USDA Forest Service, edited by Dr. Ken McNabb is back on track. Newly hired Carolyn Pike, USFS – Area Regenerations Specialist out of Purdue University has picked up this process. New authors have been identified for the missing chapters and Ken McNabb has come out of retirement to serve as senior editor. This project's completion is slated for 2017.***

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/Starkey)

- ✓ ***Accomplishments: There were no pesticides used in forest-tree nursery production systems that were up for EPA review in FY16.***

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)

- ✓***Accomplishment: A compilation of herbicide Research Reports from 1979 to 2016 was developed and distributed to nursery members in paper format at the 2016 Contact Meeting, and also made available as a searchable Excel spreadsheet to interested nursery personnel. This list allows for searches by herbicide common and trade name, weed type, and species tested. (Payne)***

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)

- ✓ ***Accomplishments: The Nursery Cooperative is in year last year of 5-yr agreement to share seedling production data under a Cite License. For an annual fee of $10,000, seedling production data will be given to USFS Washington Office for them to use in their planning and reporting programs. Funds are used towards Elizabeth Bowersock's salary to compensate for her time.***

- ✓ ***Accomplishments: A proposal that used Nursery Cooperative funds as a match/leverage for Center for Advanced Forestry Systems (CAFS) was approved in April 2016. The Nursery Cooperative will share $60,000 annually with the Forest Health Cooperative in FY 17 that will go towards Dr. Ryan Nadel's salary.***

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 1/2 day program will be held in conjunction with the Southern Forest Nurserymen's Association Meeting in Louisiana, with IFCO hosting the nursery tour in July 18-21, 2016. The agenda will cover presentations by Nursery Cooperative staff on current research activities and results. Details will be worked out with George Hernandez and Jim Tule (IFCO) with meeting information outlined in the Spring 2016 Newsletter. (Enebak/Bowersock)

- ✓ ***The 2016 Nursery Cooperative Contact meeting was held on July 18 in conjunction with the Southern Forest Nursery Association biennial meeting in Lake George, LA***

with IFCO and Campbell Timberlands hosting the nursery tours. The meeting was attended by 43 Nursery Cooperative members and over 120 members of the Southern Forest Nursery Association. Nursery Cooperative staff presented information to the entire group on soil fumigant usage rates over time, weed control and a rapid pitch canker identification tool that is ready for members to participate on. The field trips at this meeting included a tour of the Campbell Global bareroot nursery in Jasper, TX with a demonstration of the UAV capabilities conducted by the Biosystems Engineering Department at Auburn University. Dr. Christian Brodbeck and his team have been flying the Shellman Nursery all summer, gathering information on crop production over the growing season. In addition to the tour in Texas, we also had an opportunity to visit Evans Seed Orchard / Container Nursery operated by IFCO in DeRidder, LA. Special thanks to Tim Stewart and Wayne Bell for their efforts to host the group.

Research Reports (Staff)

We plan on producing Research Reports and Technical Notes in FY16.

- ✓ ***Accomplishments: Nursery Cooperative staff produced 5 Research Reports and 1 Technical Note that covered the following topics.***

- ***RR 2016-01 Herbicide tolerance of native plant seedlings in nursery production systems. Enebak and Barnwell.***
- ***RR 2016-02 Weed control and herbicide tolerance of established seed production areas of native plant species. Enebak and Barnwell.***
- ***RR2 016-03 Pendulum® Aquacap™ (pendimethalin) applications on weed and willow control and tolerance to bareroot and container-grown loblolly and slash pine and buttonbush. Payne, Brooks and Enebak.***
- ***RR 2016-04 Effect of rate of over-the-top applications of Marengo® (indaziflam) on weed control and tolerance in bareroot and container-grown pine seedlings and of timing of directed spray Marengo® (indaziflam) applications on weed control and tolerance in pin oak. Payne, Brooks and Enebak.***
- ***RR 2016-05 Effect of soil types and temperature of Pendulum® Aquacap™ applications on gall formation in container-grown loblolly pine seedlings. Payne and Enebak.***
- ***RR 2016-06 Seedling quality and root architecture of loblolly and longleaf pine container seedlings. Starkey and Enebak.***

- ***TN 15-01. Forest tree seedling production in the southern United States for the 2015-2016 planting season. Enebak.***

- ***MA 16-01. Seed germination concerns when using Signet 480FS (Thiram) from Nufarm Chemicals. Enebak.***

Newsletters

Newsletter distribution will be planned for March and September 2016. Members are encouraged to submit articles and organizational updates. (Staff)

2016 Contact and Advisory Mtgs
Nursery Production Survey
Controlled Release Fertilizers
Herbicide Trials
Leadership 101-Millenials
Nursery 101 Cytokines
20 yrs ago (1996)
Know Weeds – Goose Grass
CAFS Update
Pesticide & QPS Updates
Drones – UAV's
Seedling Quality Analysis
Pitch Canker Screening
Tom Starkey - Retires
Chemical Corp. Mergers
Know Weeds - Annual Sedge

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. (Starkey/Enebak)

	Starkey	Payne	Enebak	Nadel
Phone calls	**28**	**40**	**21**	**6**
Letters	**17**	**0**	**0**	**3**
Emails	**22**	**280**	**31**	**20**
Site Visits	**9**	**48**	**3**	**6**
Diagnosis	**7**	**1**	**8**	**12**

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 2015 to 2016 planting season. The survey will be sent out in June 2016. (Enebak/Bowersock)

- ✓ ***Accomplishments: A mailing list that 54 nurseries was mailed in May 2016 throughout the southern US to gauge seedling production for the 2015-2016 planting season. Data was compiled and put into Technical Note 16-01 which will be mailed to all participating nurseries.***

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.

- ✓ ***Accomplishments: There were no requests for special one-on-one meetings or presentations with member organizations in FY16.***

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 offered 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 FY16 Advisory Committee Meeting will be held on November 10-11, 2016. 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)

- ✓ ***Accomplishments: Nursery Cooperative Advisory Meeting will be held in Auburn on November 9-10, 2016, Workplan, Accomplishments and Budget will be shared with membership.***

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)

✓Accomplishment: Provided membership information to one nonmember nursery exhibiting at the national Association of Consulting Foresters conference in June 2016, however, no new members joined for FY16.

Update the Coop Membership and Nursery Directories

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

- ✓ ***Accomplishments: Nursery Cooperative Membership Directories were updated and sent to Cooperative Members in October 2016.***

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)

✓***Accomplishment: Nursery Cooperative staff at Auburn University presented 3 talks on nursery related topics to regional and local groups. Topics and Titles are listed below:***

- **Attended and represented SFNMC at the national Association of Consulting Foresters conference in June and at the Forest inSight conference in October. (Payne)**

- **Starkey, T.E. and Enebak, S.A. 2016. Root development and morphological comparisons of container-grown longleaf pine and subsequent productivity after establishment. Center for Advanced Forestry Systems. April 25-28, 2016. Pensacola, FL.**

- **L.G. Eckhardt, R.L. Nadel, E.A. Carter, M.A.S. Sayer and G. Matusick. 2016. Quantifying the impact of pine decline in the southeastern United States. April 25-28, 2016. Pensacola, FL.**

Publications

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

- ✓ ***Accomplishments: Nursery Cooperative staff at Auburn University published 5 manuscripts on nursery related topics in national and international journals. Titles and journals are listed below:***

- **Harper, R.A., Hernández, G., Arseneault, J., Woodruff, K.J., Enebak, S.A., Overton, R.P and Haase. D.L. 2016. Forest Nursery Seedling Production in the United States; Fiscal Year 2015. Tree Planters' Notes 58:60-64.**

- **Levendis, W., Barlow, B., Kush, J. and Enebak, S.A. 2016. Site suitability for shortleaf pine restoration in the eastern Alabama fall line region, pgs 429-432. In: Proceedings of the 18th biennial southern silvicultural research conference. Eds: Schweitzer, C.J., Wanye, K., and Oswalt, C.M. Gen. Tech. Rep. SRS-212.**

- **Matusick G., Nadel R.L., Walker D.M., Hossain M.J. and Eckhardt L.G. (2016) Comparative behavior of root pathogens in stems and roots of southeastern Pinus species. Fungal Biology 120, pg. 471 – 480. DOI 10.1016/j.funbio.2015.12.0007**

- **Poona N., van Niekerk A., Nadel R.L. and Ismail R. (2016) Random forest (RF) wrappers for waveband selection and classification of hyperspectral data. Applied Spectroscopy 70 (2), pg.322 – 333. DOI 10.1177/0003702815620545**

- **Roux J., Germishuizen I., Nadel R., Lee D.J., Wingfield M.J and Pegg G.S. (2015) Risk assessment for Puccinia psidii becoming established in South Africa. Plant Pathology 64, pg. 1326 – 10335. DOI 10.1111/ppa.12380**

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)

- ✓ ***Accomplishments: The Southern Forest Nursery Cooperative and the Forest Health Cooperative jointly was awarded a 3nd year of a 5-yr proposal period of which $60,000/year that will be used to direct Nursery Cooperative and Forest Health Cooperative research.***

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.

- ✓ ***Accomplishments: Attended, served as meeting hosts and presented Nursery Cooperative information at the 2016 Annual CAFS meeting in Pensacola, FL April 25-28, 2016.***