AUBURN UNIVERSITY
SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

FY 2015 ACCOMPLISHMENTS

As presented to the Southern Forest Nursery Management Cooperative Advisory Committee
November 11 - 12, 2015

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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

Since the new soil fumigation rules went into effect in 2012 new fumigants that can be used in forest nursery have been primarily limited to combination of soil fumigants. Over the past couple years several nurseries have put in watch trials with Trifecta® (TE-3) (TE-3) (chloropicrin, telone and DMDS). TriEst would like to test another combination of fumigants that has been actively trialed on vegetables and also put in a watch trial at the Courtland nursery in VA. The results of this trial were described at last summer's Contact Meeting. We will establish a replicated trial at the Plum Creek Nursery in Jesup, GA as part of the Contact Meeting with this new product along with Trifecta® (TE-3) and methyl bromide. The data collected will include seedling quality, nematodes, weeds and trichoderma. (March 2015 – Dec 2016) (Starkey/Enebak)

- ✓ ***A four-acre soil fumigation trial was installed in March 2015 at the Plum Creek nursery in Jesup, GA as part of the Contact Meeting. Eight different soil fumigants were applied, either alone or in combination under TIF. These compounds included Treatment X, Telone, Chloropicrin (Pic+), AITC (allyl isothiocyanate) and DMDS (di-methyl di-sulfide) as well as TriFecta (DMDS, Pic+ and Telone) and MBr. Seedling germination counts were collected and soil fungi. End of season seedling characteristics information by soil treatment will be collected at the end of the growing season. Early empirical evidence suggests that weed control was lacking in some of the treatments. Final seedling information will be compiled into a Research Report in January 2016.***

Herbicide Trials

A number of herbicide trials will be installed to examine the effects of herbicides on specific weed pests and seedling quality. These will take into account the herbicide trials conducted in 2014. The following herbicide trials are planned.

- In response to initial positive results of the 2014 Marengo trial for black willow control in containers, a Marengo trial will be established in containers to include the testing of its effectiveness on multiple weeds. This study will be a rate and timing trial also measuring the ability to spray Marengo over the top of conifer seedlings in a number of container nurseries. These include Westervelt, IFCO, River Bend and South Carolina nurseries. (Payne/Enebak/Brooks)

- ✓ ***Accomplishments: This container study was established at IFCO's Moultrie, GA Nursery, Plum Creek's River Bend Nursery (MS) and the Westervelt Nursery near Eutaw, AL. Three rates of Marengo® were sprayed in a single application at 6-8 weeks post-sowing over the top of loblolly at River Bend and Westervelt and over the top of four pine species at IFCO. Initial counts of seedling density and willows per tray were made prior to spraying. At the River Bend Nursery, additional replications of loblolly in Styroblock trays were added to the study. Pine seedling quality and willow and weed control will be evaluated at the end of the growing season, with results compiled into a Research Report. Initial and recent visual inspections reveal very few willows present at any of the 3 nurseries; data on willow control will possibly be inadequate for this study and it may be repeated. Also, a two-year outplanting study with loblolly will be established near the Westervelt Nursery to determine any effect of Marengo® on seedling survival and growth.***

- Additional trials will be established in several bareroot nurseries to test the ability to spray Marengo™ over the top of conifer seedlings and control weeds in various soil types. These will be rate and timing trials in Jesup, GA, Camden, AL, Georgia Forestry Commission and the South Carolina Nurseries. The GFC requested that cedar be one of the species tested at its nursery. (Payne/Enebak)

- ✓ ***Accomplishments: This bareroot study was installed at Plum Creek's Jesup, GA and Pearl River (MS) Nurseries, Georgia Forestry Commission's Flint River Nursery, Tennessee Division of Forestry's East Tennessee Nursery and the Weyerhaeuser Nursery near Camden, AL. Loblolly, slash and cedar were sprayed over the top with three rates of Marengo® in a single application at 6-8 weeks post-sowing (except cedar, which was sprayed at 20 weeks post-sowing). Due to a complication in the study implementation, the Camden, AL installation was removed from the final study. The remaining 4 sites will be evaluated at the end of the growing season for seedling quality and weed control. Results will be included in the container Marengo® study Research Report.***

- Trials investigating the use of Pendulum® AquaCap™ to control black willow and other weeds in containers will be installed. Previous studies have shown that PAC is effective in weed control and is safe to spray at the time of sowing in bareroot nurseries. This study will test the ability of PAC to control willow and other weeds in containers and the production of herbicide galls on pines when applied to container media at the IFCO and Westervelt container nurseries. (Payne/Enebak)

- ✓ ***Accomplishments: PAC was tested at two rates on container loblolly and slash pine at IFCO's Moultrie, GA Nursery and on container loblolly at the Westervelt Nursery. In order to apply PAC at the time of sowing and to have treated trays on the benches at the time of willow seed dispersal, applications were made once per week on newly-sown trays for 6 consecutive weeks at IFCO and for 3 consecutive weeks at Westervelt. All trays were sprayed either on the day of sowing or one day after sowing. At the end of the growing season, each test will be evaluated for seedling tolerance to PAC, including gall formation in seedlings, and for willow and weed control. Willow and weed control information may be inadequate and the study may be repeated. Also, a two-year outplanting study with loblolly will be established near the Westervelt Nursery to determine any effect of PAC in container media on seedling survival and growth.***

- A greenhouse study will be established in Auburn, repeating the 2014 Pendulum® AquaCap™ soil type and temperature trial. This study was established to determine if soil type has an effect on the production of herbicide stem galls when temperatures are the same to separate the effects of soil x temperature. Design changes for better container drainage will be made to limit the negative effects of drainage problems. (Payne/Brooks)

- ✓ ***Accomplishments: Loblolly pine seedlings are being grown in one-gallon pots in two soil types (coarse and fine) in the SFNMC greenhouse in order to eliminate the temperature variable. Seedlings were sprayed with two rates of PAC at 6 weeks post-sowing to induce gall formation. Seedlings will be evaluated for gall formation and quality later in the year, and results will be written into a Research Report.***

- Morning glory control using selective herbicides in hardwood nurseries continues to be a problem. Trials testing the ability of herbicides registered to control morning glory in hardwoods will be installed focusing on the use of directed spray equipment in the East Tennessee Nursery with John Conn and the Georgia Forestry Commission Nursery with Jeff Field. (Payne/Brooks)

- ✓ ***Accomplishments: Established in pin oak at the East Tennessee Nursery, this study was installed with their shielded sprayer applying a single rate of Marengo® in single, double (3 weeks after initial treatment) and triple applications (3 weeks and 6 weeks after initial treatment). Weed counting plots were established and counted prior to the initial treatment. At the end of the year, pin oak seedlings will be evaluated for tolerance to Marengo® and weed counts will be made to evaluate weed control.***

- ✓ ***Accomplishment: A study to determine the effectiveness and safety of using Pendulum® AquaCap™ on small-seeded hardwoods was established at the East Tennessee Nursery. One rate of PAC was applied over buttonbush at 6 weeks post-sowing. Weeds were removed prior to spray application to mimic 'at sowing' bare bed conditions. Evaluations will be made later in the year on buttonbush tolerance to PAC and on weed control.***

  Additional study not included in the Work Plan Approved in November 2014.

- ✓ ***Accomplishment: A follow-up study to previous Pendulum® AquaCap™ trials was installed at Plum Creek's Jesup (GA) Nursery. PAC was applied at sowing to loblolly and slash seedbeds at two rates. This study will be evaluated at the end of the growing season for seedling quality and weed control.***

Fusiform Rust Control

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. 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. Seed 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 2015) (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.***

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. Phytosanitary certification is required by many importing countries before southern pine seed can be shipped from US producers. The proposed work is funded by US Forest Service Grant and will compare a multi-loci genetic marker system developed for rapid F. circinatum screening with the currently employed manual culture and isolation procedure used for phytosanitary certification of southern pine seed. 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. (Nadel/Enebak)

- ✓ ***Accomplishments: A rapid molecular technique, using specific primers, has been developed. The protocol has been optimized and currently used to screen the 162 seed lots collected from across the Southeastern US, representing 8 of the most commonly planted species. Using this technique, results indicate the detection of the pathogen in 14% of Loblolly, 10% of Slash, 17% of Shortleaf and 72% of Longleaf screened seed lots. Contact has been made with the International Seed Testing Association (ISTA) to ensure that the developed protocol is tested in accordance their certified screening protocols. For this purpose all collected seed lots are concurrently be screened using an ISTA approved and certified methods for comparison purposes. In accordance with the ISTA the detection limits for the rapid detection protocol was also determined. Preliminary results from this study indicate that the developed method was capable of detecting a single infected seed from a sample size of 400 seeds, for all pine species tested.***

Comparison of Red Seed Colorants Used in Sowing

As a result of previous seed treatment study showing a possible negative effect of some seed colorants a study of seed germination on loblolly, slash, shortleaf and longleaf pine using several commercially available red seed colorant products will be tested at Auburn examining both rate and total germination. Seed will receive an appropriate stratification prior to treatment and sowing (Dec 2014 – April 2015). (Starkey/Enebak)

- ✓ ***Accomplishments: The seed treatment CF Clear did not negatively impact the germination of either slash or longleaf pine seed. The use of a seed polymer as a seed coat during the treatment process, such as CF Clear, offers some distinct advantages over latex. Seed polymers are formulated to adhere to seed and protect other seed***

treatments that have been applied. The powered dyes were harder to apply to pine seed than the liquid dyes. The use of Becker Underwood Red as a seed colorant reduced germination over the non-treated seed in 4 of the 5 seedlots tested. The liquid dye from Chromatech, "Chromatint Red X_3353 Dispersion" dramatically reduced germination in all seedlots. The Prism Scarlet from Precision Lab had consistently good germination. Like all new products, small seedlot tests should be conducted in each nursery situation.

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. 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 – Dec 2015) (Starkey/Enebak/Via)

- ✓ ***Accomplishments: Separation of seedling families by treatments after freezing was possible through clustering using a random sample of 400 treated seedlings. Principal Component analysis indicates a general pattern of moving in one direction and then back in the other direction with freezing duration due to complex changes in sugar concentration with freezing duration. In addition, we were able to predict the time of freeze when wavelengths associated with cellulose, hemicellulose, and lignin based functional groups. 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.***

Controlled Release Fertilizers in Container Seedlings & Nutrient Status

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 will be seeded with different numbers of prills and seedlings returned to Auburn throughout the season for analysis. Nutrient status will be measured on seedlings treated with various numbers of prills 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: Materials and study were provided to the nurseries listed. This fall seedlings will be collected from each of those cooperating nurseries for quality measurements and nutrient analysis Seedlings from at least two nurseries will be outplanted and monitored for one growing season.***

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.

Longleaf Pine Understory Plant Propagation and Establishment

The Nursery Cooperative was approached by the Forest Service to determine new and operational techniques for the propagation and establishment of longleaf pine understory plant species using herbicides. The following trials within this project will be conducted but will not use Nursery Cooperative Funds. A bioassay of imazapyr will also be conducted to determine when it is safe to sow longleaf seed after the application of imazapyr. A variety of plants such as tomato, cucumber, lettuce, cabbage, and sorghum will be sown along with longleaf seed. When both the longleaf seed and one of the other seeds both successfully germinate, then that other plant will be the indicator species that land managers can use to determine if the chemical content of the soil is at acceptable levels to sow longleaf seed. (Barnwell/Enebak)

- ✓ ***Accomplishments: Of the six species tested, there was a wide range of symptomology and plant growth. Those that were too tolerant of the herbicide or too susceptible to herbicide levels in the soil included tomato, cucumber and lettuce. Those plants that need some tweaking to use as a bioassay include radish and cabbage as these species exhibited symptoms but the cause could not be clearly identified. Of the six plants tested, the one that clearly resulted in an imazapyr soil detection system was sorghum. When exposed to soil containing imazapyr the sorghum will turn purple indicating the presence of the chemical in the soil.***

Container seedling extraction system

Nursery Cooperative staff will query container seedling producers for parameters desired with respect to a machine container seedling extraction system. With this information, staff will examine systems used in vegetable/forestry extraction systems to determine design and costs of a system that could be used for various container systems used in the southern United States (Enebak/Starkey).

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

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

Container Longleaf Root Configuration

Spatial root growth formation from containers used in the southern US following outplanting is not known and has been at times a point of heated discussion. To examine root formation we have constructed 12"x 12"x12" plexiglass boxes with an interior grid of 1" x 1" x 1" fishing line. In the top/middle of each box a 6-month old longleaf pine ready for outplanting will be placed in the middle of each box and maintained in the greenhouse under normal water and fertilizer requirement. Root growth will be examined, quantified and photographed at the end of the study. Five containers selected for this study are representative of those used in the south including Styroblock/Copperblock 415B, IFCO 128, Steuve FT135, Steuve FT128 and LTF 128". There will be 4 replications of each container type. This study will be established in November 2014 – May 2015 (Starkey/Enebak)

- ✓ ***Accomplishments: This longleaf root grown study was completed in April 2015. Several presentations of the results have been made at the 2015 Center for Advanced Forestry Systems and Joint Contact Meeting in St. Simons, GA. The results from the both the longleaf (2105) and loblolly(2014) container type will be written up in a Research Report released to members this winter.***

Comparison of loblolly root development in Ellepot® and Pioneer® container trays.

This is a manufacturer sponsored study ($2500). 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. (March – Dec 2015) (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.***

Comparison of Seedling Root Gel Materials

A nursery has requested a comparison study examining different root gel formulations on root coverage and seedling survival after outplanting. (Dec 2014 – March 2015) (Starkey)

- ✓ ***Accomplishments: This study was completed and the data and recommendations were provided to the nursery for the new root gel formulation.***

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.***

- ✓ ***Accomplishments: There were no contacts or requests made to Nursery Cooperative staff by EPA, USDA or APHIS in FY 2015.***

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

In collaboration with our US Forest Service partners and with input from Nursery Cooperative membership, Dr. McNabb and Nursery Cooperative staff will identify authors for the missing chapters of the Hardwood Manual with a final publication date of December 2015. (McNabb/Enebak/Bowersock)

- ✓ ***Accomplishments: No progress has been made with this project. This Hardwood Manual, revision, funded entirely by USDA Forest Service, edited by Dr. Ken McNabb has yet to be completed. The 12 Chapter manual is missing three entire chapters and needs 3 other chapters re-written. With Ken McNabb retiring at the end of 2015, this project's completion is doubtful.***

Update of Nursery Label Book

The Nursery Pesticide Label Book on the Nursery Cooperative's website will be completed 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.***

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 FY15.***

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)

- ✓ ***Accomplishments: The website is updated with Contact Meeting & Advisory Agenda's with each speaker's presentation available for Nursery Cooperative Members. Research Reports and Technical Notes are updated and are "searchable" by topics. Changes in Nursery Cooperative staff updated and current.***

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 March 2015. The Nursery Cooperative will share $60,000 annually with the Forest Health Cooperative in FY 16 that will go towards Dr. Tom Starkey's salary.***

- ✓ ***Accomplishments: The last year of a 3-yr proposal submitted to the USFS to compare the multi-loci genetic marker developed for a rapid screening process for pitch canker was approved for $63,000. This project will end September 30, 2016.***

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 1/2 day program will be held in conjunction with the Forest Health Cooperative in Georgia with the Plum Creek nursery in Jesup, GA hosting the nursery tour in June/July 2015. The agenda will cover presentations by Nursery Cooperative and Forest Health Cooperative staff on current research activities and results. Details will be worked out with Kyle Owens and Doug Sharp with meeting information outlined in the Spring 2015 Newsletter. (Enebak/Bowersock)

- ✓ ***Accomplishments: The 2015 Nursery Cooperative Contact meeting was held on July 28-30, 2015 in St. Simons, GA with Plum Creek hosting the nursery tour at Jesup, GA. This was the first joint meeting of the Forest Health Cooperative and the Southern Forest Nursery Management Cooperative, both of which operate out of the Forest Health Dynamics Laboratory at Auburn University. The meeting was attended by 30 Nursery Cooperative members and 20 Forest Health Cooperative Members. Nursery Cooperative staff presented information to the entire group on new soil fumigant chemistries, weed control in native plant production systems, a rapid pitch canker identification tool and the exciting results of using Near Infrared (NIR) scanning to identify freeze injury in seedlings. Forest Health staff presented information on the virulence of the fungi associated with Pine Decline, the emerging threats of non-native invasive weeds and the potential effects of Sirex Wood Wasp. The field trips at this meeting included a tour of the Jesup Plum Creek Nursery that had an MBr alternative fumigation trial installed with some new compounds, herbicide trials containing Marengo and PAC and a new irrigation system. In addition, Plum Creek's McKinnon Seed Orchard was toured along with the silvicultural demonstration trials. The end of meeting poll results were mixed with each group (cooperative) indicating that the other's research group was not relevant to their needs.***

Research Reports (Staff)

We plan on producing Research Reports and Technical Notes in FY15.

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

- ***RR 15-01. Effect of timing and rate of Marengo (indaziflam) applications on weed control and tolerance to loblolly, longleaf, slash and shortleaf pine seedlings grown in containers. Enebak and Payne.***

- ***RR 15-02. A modified method for calculating a partial soil water retention curve to help in irrigation during the growing season. Starkey, Brooks and Spolidorio.***

- ***RR 15-03. Evaluation of Sumagrow as a biological soil amendmenet/inoculant for the production of loblolly and slash pine. Starkey and Enebak.***

- ***15-04 Effect of Terracyte®Pro and Ecotec® Applications on Moss Control and Tolerance to Container-Grown Frasier Fir Seedlings. Payne and Enebak.***

- ***15-05 The Use of Seed Polymers and Seed Colorants as Seed Treatments for Southern Pines. Starkey and Enebak.***

- ***TN 15-01. Forest tree seedling production in the southern United States for the 2014-2015 planting season. Enebak.***

- ***MA 15-01. Length of time that tarp is left on nursery beds post fumigation may affect soil fumigation performance. Enebak.***

Newsletters

Newsletter distribution will be planned for March and September 2015. Members are encouraged to submit articles and organizational updates. (Staff)

- ✓ ***Accomplishments: A Spring 2015 and Fall 2015 Newsletter was sent to all Nursery Cooperative Members in March and September with 93 on the mailing list. Topics included:***

2015 Contact and Advisory Mtg
Nursery Production Survey
Seed Dye Treatments & Germination
Eucalyptus Planting
Nursery 101: Snake Oils
Safety First
Container Root Morphology
CAFS Update
Nursery 101: Plant Hormones
Know Weeds: Teaweed
Nursery Management Shortcourse
QPS
Rapid PCR Screening
Leadership 101
Know Weeds: Morning glory
New Insecticides
IUFRO Meeting Update
Survival of Eucalyptus
Nursery Updates

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)

- ✓ ***Accomplishments: The following numbers of contacts were made with Nursery Cooperative members.***

	Starkey	Payne	Enebak
Phone calls	**38**	**52**	**27**
Letters	**37**	**0**	**0**
Emails	**52**	**138**	**42**
Site Visits	**29**	**31**	**3**
Diagnosis	**37**	**5**	**13**

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 2014 to 2015 planting season. The survey will be sent out in June 2015. (Enebak/Bowersock)

- ✓ ***Accomplishments: A mailing list that included 84 nurseries was mailed in May 2015 throughout the southern US to gauge seedling production for the 2014-2015 planting season. Data was compiled and put into Technical Note 15-01 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: Two on-site presentations of "The Ten Commandments of Seedling Survival" were made to nursery cooperative membership customers' base.***

Short Course

The Nursery Cooperative will conduct a short course in Auburn for nursery personnel based on nursery request that will go out in January 2015. The Short course would be in September 2015. (Staff)

- ✓ ***Accomplishments: The Nursery Cooperative staff, along with 5 invited speakers conducted a 3.5 day Nursery Management Short course at Auburn University from September 8-11, 2015. The short course was attended by 38 nursery cooperative staff. Those in attendance were awarded 20 Continuing Education Credits from SAF.***

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 FY14 Advisory Committee Meeting will be held on November 11-12, 2015. 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 11-12, 2015, 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)

- ✓ ***Accomplishments: The K&L Forest Nursery joined the Southern Forest Nursery Management Cooperative for FY 16. Efforts continue with discussions with Tim Sheenan of Kentucky, Warren Bryant of White City Nursery and an Associate Membership with The American Chestnut Foundation, who has a need for nursery-grown American Chestnut seedlings.***

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 2015.***

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)

- ✓ ***Accomplishments: Nursery Cooperative staff at Auburn University presented 2 talks on nursery related topics to regional and local groups. Topics and Titles are listed below:***

  - **Enebak, S.A. and Starkey, T.E. 2015. MBr Alternative Research in the southern United States. IUFRO, Joint meeting Foliage, shoot and stem disease of forest trees and Diseases and Insects in forest Nurseries" Meeting in Uppsala, Sweden. June 8-13, 2015.**

  - **Starkey, T.E. and Enebak, S.A. 2015. Root development and morphological comparisons of container-grown longleaf pine and subsequent productivity after establishment. Center for Advanced Forestry Systems. May 18-21, 2015. Asheville, NC.**

Publications

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

- ✓ ***Accomplishments: Nursery Cooperative staff at Auburn University published 4 manuscripts on nursery related topics in national and international journals. Titles and journals are listed below:***

- **Starkey, T.E.; Enebak, S.A.; South, D.B. 2015. Forest seedling nursery practices in the Southern United States: bareroot nurseries Tree Planters' Notes. 58(1): 4–17.**

- **Starkey, T.E.; Enebak, S.A.; South, D.B. 2015. Forest seedling nursery practices in the Southern United States: container nurseries Tree Planters' Notes. 58(1): 18-26.**

- **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 In press, pg. 1 – 10. DOI 10.1111/ppa.12380**

- **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 In press, February 70 (2)**

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 2nd 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.***

- ✓ ***Accomplishments: The 3rd year of a 3-yr proposal to the US Forest was funded in July 2015. This project has funded Dr. Ryan Nadel's research to develop a rapid ID system for the confirmation of Fusarium circinatum.***

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 and presented Nursery Cooperative information at the 2015 Annual CAFS meeting in Asheville, North Carolina, May 18-21, 2015.***

- ✓ ***Accomplishments: Coordinated joint Nursery Cooperative and Forest Health Cooperative Contact Meeting held in St. Simons, Georgia, July 27-30, 2015***