Southern Forest Nursery Management Cooperative™

FY 2023 WORK PLAN

As approved by the Advisory Committee of the Southern Forest Nursery Management Cooperative

November 2-3, 2022

FY 2023 WORK PLAN

GOAL A: RESEARCH

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

Fusiform Rust Control

A seedling treatment study will be conducted on loblolly and slash, to retest chemistries that were found to be effective in controlling fusiform rust at the US Forest Service Rust Testing Laboratory in Asheville, NC. The fungicides tested in 2022 were Mural® (Azoxystrobin, Benzovindiflupyr), Postiva™ (Pydiflumetofen, Difenoconazole), and Miravis® Neo (Azoxystrobin, Propiconazole, Pydiflumetofen). Seed 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 2023). (Newell/Payne)

Based on the results for the field testing of Protect™ DF, chemical companies will be engaged to discuss labelling for use in forest nurseries. The companies that make the active ingredients Trifloxystrobin (Compass®) and Propiconazole + Trifloxystrobin (Stratego®), which were found to be effective in 2019-2020 studies, will also be engaged for either a Local Needs (24-C) label or full label following Proline's site and species verbiage for fusiform rust. (Newell)

Mycorrhizal Colonization of Seedlings Treated with Fungicides to Control Fusiform Rust: Seedlings treated with Protect™ DF in field trials will be examined for the presence (incidence) and quantity (severity) of mycorrhizal root tips at the end of the growing season. Data on the incidence and severity by treatment will determine if the fungicide has any effect on the ability of the seedling to form mycorrhizal relationship with the important symbiont. (Newell/Payne)

In vitro Trials Using Fungicides Identified for Rust Control on Other Nursery Pathogens: Agar plates amended with various rates of fungicides will be challenged with *Rhizoctonia* spp., *Lecanosticta acicola* and *Fusarium circinatum* to determine if they control the three other common foliage diseases in nurseries; Rhizoctonia Blight, Brown Spot Needle Blight and Pitch Canker. This would include the new chemistries tested for the control of fusiform rust: Protect™ DF, Compass®, and Stratego®. (Newell)

Nursery Weed Control

At the recommendation of SFNMC member nurseries, trials will be designed and installed to investigate weed control methods, including use of herbicides in bareroot and container growing systems. Several trials proposed are continuations or expansions of trials currently in progress:

- **Large-scale Post-emergent Herbicide Trial Targeting Yellow Nutsedge in Bareroot Pine:** Replicated trials of Vexis® (pyrimisulfan) post-emergent herbicide will be conducted in multiple bareroot pine nurseries. This herbicide specifically targets nutsedge but is not currently labeled for conifer nurseries. Rates of ½X, 1X, 2X, and 4X (if required by

manufacturer) will be applied in trials at several member nurseries in multiple pine species. Rates and timing will be consistent on all installations. Data collected from these trials may be used by the manufacturer to request Section 24(c) Special Local Needs labels in the states where SFNMC member nurseries are located. (Payne/Newell)

- **Vexis® Outplanting Trial:** Loblolly and Slash pine seedlings treated with Vexis® in one 2022 trial will be lifted and outplanted in a replicated trial by rate and timing on the campus of Auburn University, at the Southern Forest Nursery Management Cooperative's Trophotron. Seedling survival and growth at the end of the 2023 growing season will be measured to determine if the herbicide has any deleterious effects on seedling growth. (Payne/Newell)

- **Large-scale post-emergent herbicide trial targeting yellow nutsedge in bareroot hardwoods:** Replicated trials of Vexis® (pyrimisulfan) post-emergent herbicide will be conducted in multiple bareroot hardwood nurseries. This herbicide specifically targets nutsedge but is not currently labeled for hardwood nurseries. Rates of ½X, 1X, 2X and 4X (if required by manufacturer) will be applied in trials at several member nurseries in multiple hardwood species. The timing will be consistent on all installations. Data collected from these trials will be used by the manufacturer to request Section 24(c) Special Local Needs labels in the states where SFNMC member nurseries are located. (Payne/Newell)

Nematicide Trial

A trial using Reklemel™ active (fluazaindolizine) which is a non-fumigant, chemical nematicide discovered and developed by Corteva Agriscience. Reklemel is the first sulfonamide nematicide, a chemical group different from other commercial nematicides. Its mode of action appears different from all other currently available nematicides, including the traditional fumigants, organophosphates and carbamates and the newer active ingredients, such as fluopyram, fluensulfone and tioxazafen. Reklemel has excellent activity on root-knot nematodes and many other important plant-parasitic nematode species. It has a favorable environmental profile and is biologically compatible with beneficial insects, including pollinators and a wide range of beneficial soil organisms. This compound has yet to reach the market; if material cannot be obtained, the trial will move to the 2024 field season. (Newell/Payne)

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

Seedling Counting/Measuring

Researchers at AU's Biosystems Engineering Department will continue to examine and develop a system to count seedlings for inventory using new technologies for a stand-alone robotic machine. Nursery Cooperative funds will not be used on this project, but there is $2,500 available annually from a USDA-funded grant to cover cooperative staff travel to assist Drs. Bao and McDonald in this process. (Bao/Newell/McDonald)

Nanocellulose/Lignin Impregnated with Insecticides on Seedlings

Based on the results obtained from the 2021 sampling using imidacloprid and prothioconazole, we propose to repeat the treatment in 2023 to confirm that the active ingredient remains within the plant tissue. The method of treatment will use both conventional (injection) and prills on slash and loblolly pine. Potted seedlings will be established in the greenhouse and challenged with 0, , injection, Modification 1, and Modification 2. The level of modification determines the "slow release" of the material from the prills. Seedling tissue samples will be collected 6-, 12-, and 18-months post treatment to determine the extent of release and the time lag of release. (Newell/Peresin/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 Outplanting Success

Following our trial reported in Research Report 21-04 that suggests loblolly pine does not have a mechanism to refill embolized xylem conduits, we propose to further investigate the impacts of nursery drought hardening practices on the physiology and outplanting success of loblolly pine. We intend to examine multiple drought hardening routines with quantitative measures to determine an optimal strategy to achieve proper drought condition seedlings. (Newell/Payne)

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

Impact of Genetics on Cold Hardiness

In collaboration with the Tree Improvement Program at North Carolina State University, as well as the Forest Products Development Center at Auburn University, we want to assess the impact that genetics has on cold acclimation and freeze tolerance. Building on from the collaborative research project undertaken at the Nursery Cooperative in which we showed near infrared spectroscopy to monitor variations in soluble sugars after cold acclimation, we wish to assess whether this model be used for various genetic families of Loblolly pine. The primary focus of this research for 2023 is to ensure that the model verification of the various sugars measured by NIR in 2022 is completed by the Forest Products Development Center at AU. (Newell/Via)

Impacts of Genetics on Freeze Damage as Measured by Chlorophyll Fluorescence

In collaboration with the Tree Improvement Program at North Carolina State University, we want to assess the ability of using chlorophyll fluorescence to ascertain the degree of immediate damage caused by sub-freezing temperatures as well as the ability to predict future damage and survival. This will be accomplished by challenging 3 genotypes of known freeze tolerance with an experimental freeze mimicking natural freeze events that occur in the region and examining the changes in chlorophyll reflectance. (Newell/Heine - NCSU)

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 the 2013. (Newell/Payne)

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. (Newell/Payne)

Labeling of Nursery Pesticides

Using information gained from the herbicide, fungicide, insecticide and nematicides, Nursery Cooperative staff will work with registrants, EPA, USDA and State Plant Protection agencies to obtain labels, special use, (24-C), or full label status for member states. This includes the new chemistries tested for the control of fusiform rust: Protect™ DF, Compass®, and Stratego®. (Payne/Newell)

Maintain and Update Nursery Cooperative Website

The Nursery Cooperative staff will continue to update the Nursery Cooperative website for use by Nursery Cooperative members. (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 site license for the seedling production survey. (Staff)

SFNMC Certificate for Members

As part of the benefits to members, Nursery Cooperative staff will continue to supply member nurseries with a "Certificate of Nursery Cooperative Grown" that can be placed on their seedling boxes/bags each season to market their seedlings as meeting a list of best-management practices. (Newell/Bowersock)

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

Contact Meeting

The 2023 Southern Forest Nursery Management Cooperative Contact Meeting will be conducted as a 3-day program in July 2023 in Lake Charles, La., with IFCO serving as host. The agenda will cover presentations on current Nusrery Cooperative research activities and results, as well as trials and experiments installed at the Evans nursery as part of the nursery tour. Details will be worked out with nursery members, with meeting information outlined in the Spring 2023 Newsletter. Planning ahead, the 2024 SFNMC Contact Meeting will be held in conjunction with the Southern Forest

Nursery Association in Arkansas, with the Arkansas Forestry Commission serving as host. (Newell/Bowersock/Payne)

Information Sheets

"A Closer Look" is an outreach document for the SFNMC. This information sheet on pests/diseases will be produced biannually and will become the centerpiece for each newsletter. (Staff)

Research Reports

We plan on producing Research Reports and Technical Notes in FY23 that document all research conducted by the Nursery Cooperative. All publications will be disseminated to Nursery Cooperative members. (Staff)

Newsletters

Newsletter distributions are planned for Spring and Fall of 2023. 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 handled as individual situations for each Nursery Cooperative member organization as cases arise during the growing and planting season. (Newell/Payne)

Seedling Production Survey

The Nursery Cooperative staff will continue the seedling production survey initiated in FY03. The same questionnaire will be used to obtain production figures for the 2022 to 2023 planting season. The survey will be sent out in June 2023. (Newell/Bowersock)

Nursery Customer Meeting Presentations

Over the past several years, as schedules and travel permits, Nursery Cooperative personnel have participated in 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. Thirty-minute presentations such as "*Why Did My Seedlings Die*?" and "*The Ten Commandments of Seedling Survival*" are presentations the staff have made. (Staff)

Short Course

Having just completed the 2022 Nursery Management Short Course, we will send out a request in January 2023 to gauge interest of members and availability of speakers. If enough interest is shown (10+ attendees), we will offer another short course in September 2023. (Staff)

GOAL C: COOPERATIVE DEVELOPMENT

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

Advisory Committee Meeting

The FY24 Advisory Committee Meeting will be held on November 1-2, 2023. A two, half-day meeting will be planned to cover FY23 Accomplishments, FY23 and future budget, and the FY24 Work Plan. (Newell/Payne/Bowersock)

Nursery Cooperative Membership

The Nursery Cooperative staff will continue to recruit new members among those nurseries that will benefit from activities of the Nursery Cooperative. This includes the Florida Division of Forestry, PRT in Atmore, Ala., and Kentucky State Nursery. There is also discussion with non-nursery production members to include an Associate status. (Staff)

Update the Cooperative 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 is 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 results outlined in annual Research Reports and Technical Notes in scientific journals after a period of 2-3 years have elapsed. (Staff)

Extramural Funding of Nursery Cooperative Projects

Nursery Cooperative staff is 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 to broaden and strengthen research ties that can benefit seedling production. (Staff)