AUBURN UNIVERSITY- FOREST HEALTH COOPERATIVE

FY 2023 ACCOMPLISHMENTS

As presented to the Forest Health Cooperative Advisory Committee

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AUBURN UNIVERSITY - FOREST HEALTH COOPERATIVE

FY 2023 WORK PLAN

GOAL A: RESEARCH

Objective 1. Identify research projects

Mitigating Needle Blight: A growing Economic Threat to Pine Forests – Senate Appropriations – Proposal requested by Senator Shelby's office. $3,000,000 ($2,100,000 to Auburn). Year 1

- ***Accomplishments: Funded by USFS (Senate Appropriations)***

Sudden Oak Death (*Phytophthora ramorum*) Detection Survey (Stream Sampling) in AL and MS – FHM, USFS for all travel, supplies and laboratory technician. *Year 12

- ***Accomplishments: Refunded by USFS Forest Health Monitoring grant***

Wood chemistry and disease resistance – CFWE, Forest Products Development Center. *Year 11

- ***Accomplishments: Refunded by Forest Products Development Center***

Pinus related diseases and molecular aspects - Collaboration between SFWS and FABI – University of Pretoria South Africa for travel and supplies and a graduate student stipend at UP. *Year 10

Accomplishments: Funded by CFWE and FABI

Objective 2. Recruit graduate students

Three graduate students were hired in respect to the Senate Appropriations Grant through the USFS as follows: (1) Component 1 – MS student Emmanuel Nyarko; Component 2 – PhD student Jaden King and PhD student Sharmin Toa; Component 3 – PhD student Swati Singh; Component 4 – PhD student Gabriel Sylva and PhD student Temitope Folorunso.

Two graduate students were hired under the "Wood Chemistry and Disease Resistance" joint project with the Forest Products Development Center. Christian Caicedo working on a NIR project that compliments the Senate Appropriations Grant and Laura Neito working on decay fungi.

Objective 3. Initiate research projects: Determine location, cooperators, and set up research plots dependent upon projects chosen by the membership.

Mitigating Needle Blight: A growing Economic Threat to Pine Forests

- ***Accomplishments:*** A total of 14 forest health monitoring plots have been established in Alabama at two sites: South - Stallworth Property and Longleaf property in Chatom, Washington County, AL, and North - Osco Forest in Glover Property, Cullman AL., and there are plans to set up 8 more by 2024. *Component 1:* One MSc student, Emmanuel Nyarko, has been fully onboarded, trained, and working independently in the lab. As of now, 211 trees have had needles sampled for disease processing in sporulation chambers, on media and for PCR. *Component 2:* One Ph.D. student, Jaden King, working on component 2 has been fully onboarded, trained, and working independently in the lab. The second Ph.D. student. Sharmin Toa, has been hired and will start in August 2023. In March 2023, measurements for every tagged tree (n=1266) were collected, including height, diameter at breast height, tree cores, and site data. In May 2024, gas exchange, relative water content, and NIR were measured from 126 trees. Additionally, needles were harvested from 45 trees in May 2024 to grow in sporulation chambers and will be confirmed using PCR. In June 2023, resin samples were collected from 126 trees. In July 2023, crown ratings were assessed on all 1266 trees to evaluate the health and vitality of each individual tree crown. *Component 3:* One PhD student, Swati Singh was fully onboarded in Spring, 2023 and an undergraduate student working, Nathan Kurtz, joined the team this Summer to assist with data collection. Work is proceeding as planned. Swati carried out a comprehensive literature review on the use of remote sensing techniques, including reflectance spectroscopy, satellite imagery, airborne platforms, and unmanned aerial vehicles (UAVs), for brown spot needle blight (BSNB) detection and monitoring and we are refining this work. Swati and Nathan earned FAA Remote Pilot certification to operate drones for collecting remotely sensed data. Lidar and multispectral data were acquired with drones over the Summer at both sites. Multiple field visits between May and July were conducted, and a visit to south sites in August will complete the drone data collection for Year 1. These data are currently being processed to extract variables for subsequent analysis. GPS data were also gathered and are being cleaned and combined with tree measurements (field data) and will be used for further processing lidar point clouds for tree-level analyses. *Component 4:* The two Ph.D. students, Gabriel Silva and Temitope Folorunso, working on component 4 (each half time) have been fully onboarded, trained, and are now working independently in the lab. They have contributed substantially to field collections, worked on needle plating and fungal identification, have tested and identified molecular mechanisms for determining fungal species, and have begun testing for sequencing the fungal genomes.

GOAL B: TECHNOLOGY TRANSFER

Objective 1. Serve as a clearinghouse of information related to forest health issues.

Maintain and Update Forest Health Cooperative Web Site

The Forest Health Cooperative Staff will continue to update the Forest Health Cooperative website for use by Forest Health Cooperative Members. (Baldwin)

- ***Accomplishments:*** The website is currently being updated. Advisory agendas with each speaker's presentation will be available for Forest Health Cooperative Members. Changes in Forest Health Cooperative staff updated and current. Brown spot needle blight webpage launched and up to date.

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

Research Reports (Staff)

None produced FY23

Newsletters (Staff)

Newsletter distribution is planned for Spring 2024 (January). Members are encouraged to submit articles.

Objective 3. Provide a limited consultancy function to the membership in the area of forest health.

Individual and Organized Contacts

An on-going activity is handled as individual situations as cases arise. (Staff)

	Eckhardt	Baldwin
Phone calls	**28**	**1**
Letters	**1**	**26**
Emails	**68**	**36**
Site Visits	**15**	**2**
Diagnosis	**72**	**74**

Short Courses

Forest Health Short Course will be offered in odd years. A Short Course in Forest Health will be planned for October/November 2023 if there is interest. (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 FY24 Advisory Committee Meeting will be held in the last week of July 2022. A 2-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. (Eckhardt/Baldwin/Bowersock).

- ***Forest Health Advisory Meeting FY24 being held*** **Aug 2-3, 2023**
- ***Forest Health Advisory Meeting FY23 being held*** **July 26-27, 2022**
- ***Forest Health Advisory Meeting FY22 being held*** **November 10-11, 2021**
- ***Forest Health Science Meeting FY21 was held*** **June 23, 2021 (Virtual)**
- ***Forest Health Advisory Meeting FY21 was held*** **November 10, 2020 (Virtual)**

Forest Health Cooperative Membership

The Forest Health Cooperative staff should make an effort to recruit new members. (Staff)

- ***Two new members: Campbell Global and The Wilcox Foundation***
- ***Looking for new members.***

Update the Cooperative Membership Directory

An on-going activity. (Baldwin/Eckhardt)

- ***Accomplishments: Membership directory updated and loaded onto website.***

Objective 2. Increase the visibility and effectiveness of the Cooperative as a source of information on issues related to forest health.

Presentations at Meetings

Forest Health Cooperative staff will continue to be encouraged to participate as a speaker or attendee in regional and national meetings. (Staff)

- ***Accomplishments:*** Forest Health Cooperative Staff gave 2 presentations and published 1article on the subject of Forest Health***.***

1. Eckhardt, L.G. 2023. Brown Spot Needle Blight in Alabama. AFA Connect Webinar Series, Alabama Forestry Association, Montgomery, AL (**Invited*)***
2. Eckhardt, L.G. 2022. Pests and pathogens of urban trees. Raising Trees Webinar Series, AECS, Auburn University (**Invited**)

Publications

Forest Health Cooperative staff are encouraged to publish research results in scientific journals. (Staff)

Published, in press or accepted:

1. Mensah, J., Sayer, M. A. S., Nadel, R. L., Duwadi, S., Fan, Z., Carter, E.A. and Eckhardt, L.G. 2022. Effect of *Leptographium terebrantis* and drought on foliage, new root dynamics, and stemwood growth in *Pinus taeda* L. Forests https://doi.org/10.3390/f13081335

In Revision:

1. Carter, E.A., Brunson*, B.A., Loewenstein, N.J., Enloe, S.F., Held, D.W., and Eckhardt, L.G. Soil and foliar characteristics of loblolly pine stands impacted by cogongrass in Mississippi. For Ecol Mgmt
2. Ahl*, J.B. and Eckhardt, L.G. Identifying fungal spores on a pine bark beetle with hyperspectral interferometry. Agric For Entol
3. Datta, D., Eckhardt, L. and Brodbeck, A. Forest Health Highlight: Diplodia Tip Blight Identification and Control. Alabama Cooperative Extension System

In Review:

1. Mensah, J. K., Sayer, M. A. S., Nadel, R. L., Matusick, G., & Eckhardt, L. G. Foliar nutrients response of *Pinus taeda* L. to *Leptographium terebrantis* infection. For. Sci.
2. Mensah, J. K., Sayer, M. A. S., Nadel, R. L., Matusick, G., & Eckhardt, L. G. Effect of *L. terebrantis* on the production of defensive chemical compounds. For. Path.
3. Menanyih, S.A., Cale, J., and Eckhardt, L.G. Allelochemical production from loblolly seedlings inoculated with ophiostomatoid fungi. Fungal Ecology
4. Wahl*, A.C., Nadel, R.L., Slippers, B. and Eckhardt, L.G. Effects of growth rate on *Amylostereum* spp. For Path
5. Duong, T.A., de Beer, Z.W., Wingfield, B.D., Eckhardt, L.G., and Wingfield, M.J. Phylogeny and taxonomy of species in the *Grosmannia huntii* complex. Fungal Biology
6. Eckhardt, L.G., Duong, T., Marincowitz, S., de Beer, Z.W., and Wingfield, M.J. Ophiostomatoid fungi associated with rostrums of wild pig (*Sus scrof*), including two new species. Fungal Biology

Extramural Funding of Forest Health Cooperative Projects

Forest Health Cooperative staff will continue to be encouraged to locate and generate extramural funding opportunities directly related to forest health. (Staff)

- ***Accomplishments*:** Forest Health Cooperative Staff were awarded the following grants totaling $1,173,066.58

- Sudden Oak Death (*Phytophthora ramorum*) Detection Survey (Stream Sampling) in AL and MS – FHM, USFS for all travel, supplies, and laboratory technician $47,000
- Collaboration between SFWS and FABI – University of Pretoria South Africa to work on *Pinus* related diseases and molecular aspects. $5,000 per participant (*extend 3 more years 2022-2025*)
- Wood chemistry and disease resistance – SFWS and Forest Products Development Center $105,000
- Mitigating Needle Blight: A growing economic threat to pine forests – USFS (through Senate Appropriations from Senator Shelby) for travel, supplies, graduate students and technicians $2,100,000 (Y1 – $1,016,066.58; Y2 – $840,738.80; Y3 $483,151.46)