AUBURN UNIVERSITY- FOREST HEALTH COOPERATIVE

FY 2018 ACCOMPLISHMENTS

As presented to the Forest Health Cooperative Advisory Committee

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AUBURN UNIVERSITY - FOREST HEALTH COOPERATIVE

FY 2018 WORK PLAN

GOAL A: RESEARCH

Objective 1. Identify research projects

Quantifying the impact of pine decline in the southeastern United States – FHC and SFWS. *Year 4

- ***Accomplishments: Funded by FHC and SFWS***

Novel analytical tools for the selection of superior loblolly pine genotypes for improved plant health, fuels, and chemicals – SFWS, Forest Products Development Center and AU-IGP (Good to Great Grant). *Year 3

- ***Accomplishments: Funded by AU-IGP (Good to Great Grant)***

Seedling production and forest health in the Southeastern United States – in cooperation with the Southern Forestry Nursery Management Cooperative. *Year 5

- ***Accomplishments: Funded by NSF***

Testing of a rapid PCR Screening test for the presence of *Fusarium circinatum*, the causal agent of pitch canker on pine planting material – FHM for supplies, travel and postdoc. *Year 5

- ***Accomplishments: Funded by USFS Forest Health Protection grant.***

Sudden Oak Death (*Phytophthora ramorum*) Detection Survey (Stream Sampling) in AL and MS – FHM, USFS for all travel, supplies and laboratory technician. *Year 7

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

Wood chemistry and disease resistance – SFWS, Forest Products Development Center. *Year 6

- ***Accomplishments: Funded 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 6

- ***Accomplishments: Funded by SFWS and FABI***

Objective 2. Recruit graduate students

Currently there are no openings for a graduate students in the Coop.

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

Quantifying the impact of pine decline in the southeastern United States.

- ***Accomplishments:*** **The growth performance of the inoculated and control trees with in the experimental plots have been monitored and data such as radial growth, height growth, leaf area index, foliar nutritional analysis and total phenolic content has been assessed. Insects were collected biweekly and are being identified and processed (year one baseline collections have been completed). Microbial biomass, soil cores and foliar samples have been taken and are being processed.**

Ecology of siricids and fungal associates in southeastern pine forests: potential for biological control and competition.

- ***Accomplishments: Study complete and manuscripts being worked on and submitted. Research reports completed.***

Response of different loblolly pine families to *Leptographium terebrantis* and *Grosmannia huntii.*

- ***Accomplishments: Research reports completed. Manuscript submitted.***

Virulence of *Leptographium terebrantis* and *Grosmannia huntii* on loblolly pine families under drought stress.

- ***Accomplishments: Research reports completed. Manuscript submitted.***

Mature root inoculation of families from seedling screening study to look at reliability of seedling screening.

- ***Accomplishments: Research reports completed. Manuscript published.***

Wood chemistry and disease resistance – SFWS, Forest Products Development Center.

- ***Accomplishments: Families selected from the screening study and LGEPop on Plum Creek and Rayonier property. Trees harvested on Plum Creek and Rayonier property Spring 2014 and Spring 2015, processed in the forest products lab. Manuscripts being prepared and research reports being prepared.***

Identification of Climate Effects on Microbial Symbionts of Longleaf Pine - in collaboration with CERL personnel and University of Mississippi for all travel and supplies.

- ***Accomplishments: Manuscript submitted.***

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. (Eckhardt)

- ***Accomplishments: The website is updated. Advisory Agenda's with each speaker's presentation available for Forest Health Cooperative Members. Research Reports and Technical Notes are updated. Changes in Forest Health Cooperative staff updated and current.***

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

Research Reports (Staff)

We plan on producing Research Reports and Technical Notes in FY12 now that research projects are underway.

- ***Accomplishments: Research Report 2017-1 to 1017-6 and several currently being written which will be online before the end of the year.***
- Wahl, A.C. and Eckhardt, L.G. 2017. Flight phenology of *Sirex nigricornis* (Hymenoptera:Siricidae) and other woodwasps in Alabama. Research Report 2017-01. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.
- Wahl, A.C. and Eckhardt, L.G. 2017. *Deladenus* species associated with native siricid woodwasps in Alabama. Research Report 2017-02. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.

- Wahl, A.C. and Eckhardt, L.G. 2017. Effects of growth rate on *Amylostereum* spp. Fungus by terpenes. Research Report 2017-03. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.
- Wahl, A.C. and Eckhardt, L.G. 2017. Competitiveness of *Amylostereum* spp. fungi against *Leptographium* spp. fungi. Research Report 2017-04. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.
- Devkota, P. and Eckhardt, L.G. 2017. Intraspecific and inter-stocktype response of *Pinus taeda* L. to *Grosmannia huntii* and *Leptographium terebrantis.* Research Report 2017-05. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.
- Devkota, P. and Eckhardt, L.G. 2017. Intra-species variation in response of mature *Pinus taeda* families to root-infecting ophiostomatoid fungi. . Research Report 2017-06. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.

Newletters (Staff)

Newsletter distribution is planned for November FY2018. Members are encouraged to submit articles.

- ***Accomplishments: A Spring2017 Newsletter was sent to all Forest Health Cooperative Members, approximately 20 on the mailing list.***

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

Individual and Organized Contacts

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

	Eckhardt	Mendez	Nadel
Phone calls	**30**	**6**	**1**
Letters	**1**	**0**	**0**
Emails	**55**	**23**	**1**
Site Visits	**6**	**3**	**0**
Diagnosis	**25**	**8**	**1**

Short Courses

Forest Health Short Course will be offered in odd years starting with FY2009. A Short Course in Forest Health will be planned for August 2019. (Staff)

- ***Accomplishments: A short course was held August 15-16 at the request of membership with 45 participants. The next short course will be planned for summer 2017 if there is interest.***

GOAL C: COOP DEVELOPMENT

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

Advisory Committee Meeting

The FY18 Advisory Committee Meeting will be held the last week in June 2018. 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/Bowersock).

- ***Forest Health Advisory Meeting was held in Auburn on October 23-24, 2017.***

Forest Health Cooperative Membership

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

- ***Looking for new members.***

Update the Cooperative Membership Directory

An on-going activity. (Bowersock/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 43 presentations and published 6 article on the subject of Forest Health.***

*Mensah, J.K., Sword Sayer, M. A., Nadel, R. L, Matusick, G., Fan, Z., and Eckhardt, L.G. **2018**. Physiological response of naturally regenerated *Pinus taeda* L. saplings to four levels of

stem inoculation with *Leptographium terebrantis*. International Congress of Plant Pathology, Boston, MA

*Mensah, J., Nadel, R.L., Matusick, G., Sayer, M.A.S., Carter, E.A., and Eckhardt, L.G. **2018**. Quantifying the impact of pine decline in the southeastern United States. Center for Advanced Forestry Systems 2017 Industrial Advisory Board Meeting, Burlington, VT

*Mensah, J.K. and Eckhardt, L.G. **2018**. Susceptibility and tolerance of loblolly pine to Leptographium terebrantis: Student Research Symposium, Auburn University, Auburn, AL

*Duwadi, S., Nadel, R., Carter, E.A., Feng, Y., Eckhardt, L.G. **2018**. The response of soil microbial biomass to inoculation due to plant pathogenic fungus, *Leptographium terebrantis* in loblolly pine stand. This is Research: Student Symposium, Auburn University, Auburn, AL

*Ahl, J.B., Nadel, R. and L.G. Eckhardt, L.G. **2018**. What is insect diversity like in a mature loblolly pine stand? This is Research: Student Symposium, Auburn University, Auburn, AL

*Mensah, J.K., Sword Sayer, M. A., Nadel, R. L, Matusick, G., Fan, Z., and Lori G. Eckhardt, L.G. **2018**. Pathogenicity of *Leptographium terebrantis* to saplings of *Pinus taeda* L.: Efficacy of the toothpick inoculation approach. American Phytopathological Society, 95th Southern Division Meeting, Fayetteville, AR

*Ahl, J.B., Eckhardt, L.G. and Beach, J.M. **2018**. Can you identify spores of fungal species on coleopteran with hyperspectral interferometry? Southeastern Society of American Foresters, Pine Mountains, GA

*Duwadi, S., Nadel, R., Carter, E.A., Feng, Y., Eckhardt, L.G. **2018**. Response of soil microbial biomass to soil moisture content in loblolly pine (*Pinus taeda*) stand. Southeastern Society of American Foresters, Pine Mountains, GA

*Mensah, J.K., Sword Sayer, M. A., Nadel, R. L, Matusick, G., Fan, Z., and Lori G. Eckhardt, L.G. **2018**. Pathogenicity of *Leptographium terrebrantis* to saplings of *Pinus taeda* L.: Efficacy of the toothpick inoculation approach. Southeastern Society of American Foresters, Pine Mountains, GA

Eckhardt, L.G. **2018**. Native pathogens affecting *Pinus* species in the southeastern United States. CTHB Meeting, Forest and Agricultural Biotechnology Institute. University of Pretoria, Pretoria, South Africa.

Devkota, P., and Eckhardt, L.G. **2018**. The response of loblolly pine families to root-feeding bark beetle vectored fungi. Southern Forest Nursery Association Meeting, Pensacola, FL

*Duwadi, S., Carter, E.A., Nadel, R., Feng, Y., and Eckhardt, L.G. **2017.** Effect of soil moisture on soil microbial biomass in loblolly pine (*Pinus taeda*) stand. Soil Science Society of America. Tampa, FL

Eckhardt, L.G. **2017**. Forest insect and diseases. Forestry Invitational Training Workshop. Auburn, AL

Eckhardt, L.G. **2017**. Complexity of recent pine tree losses in southern forests. Chambers County Forestry Planning Committee Meeting, Lafayette, AL

Eckhardt, L.G. **2017**. Bark beetles 101. Alabama Forestry Commission Workshop: Are your trees dying? Landowners Meeting, Marengo County, Linden, AL

Eckhardt, L.G. **2017**. Forest pests and diseases. Alabama Teachers Conservation Workshop. Auburn, AL

Eckhardt, L.G. **2017**. Bark beetles 101. Alabama Forestry Commission Workshop: Are your trees dying? Landowners Meeting, Oxford, AL

*Essien, C, Via, B.K., Cheng, G., Gallagher, T., McDonald, T. and Eckhardt L. **2017**. Applying discriminate analysis and acoustic tool to assign loblolly pine families into susceptibility classes. International Nondestructive Testing and Evaluation Symposium. Madison, WI

Publications

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

*Piculell, B.J. Nelson, C.D., Roberds, J., Eckhardt, L.G., and Hoeksema, J.D. (*Accepted*) Genetically determined fungal pathogen tolerance and soil variation influences ectomycorrhizal traits of loblolly pine. Ecology and Evolution

Eckhardt, L.G. **2018**. Loblolly Pine Decline (sidebar, Chapter X). In: (eds.) *The Conifer Compendium*. American Phytopathological Society Press, USA.

*Devkota, P., Nadel, R.L., and Eckhardt, L.G. **2018**. Intra-species variation of mature *Pinus taeda* in response to ophiostomatoid fungi. Printed online first http://onlinelibrary.wiley.com/doi/10.1111/efp.12415/full Forest Pathology. (*In Press*).

*Essen, C., Via, B.K., Gallagher, T., McDonald, T., and Eckhardt, L.G. **2018**. Distance error for determining the acoustic velocity of standing tree using tree morphological, physical and anatomical properties. Printed online first https://doi.org/10.1007/s13196-018-0208-3 Journal of the Indian Academy of Wood Science (*In Press*).

*Acquah, G., Via, B.K., Fasina, O., Adhikari, S., Billor, N., and Eckhardt L. **2018**. Estimating the basic density and mechanical properties of elite loblolly pine families with near infrared

spectroscopy. Printed online first https://academic.oup.com/forestscience/advance-article/doi/10.1093/forsci/fxx009/4916890?guestAccessKey=dda83216-c452-4e85-a640-fec2ef9745a5 Forest Science (*In Press*).

*Essien, C., Via, K.B., Acquah, G.E., Gallagher, T., McDonald, T., Wang, X. and Eckhardt, L.G. **2017**. Effect of genetic sources on the anatomical, morphological, and mechanical properties of 14-year-old genetically improved loblolly pine families selected from two sites in the southern United States. Printed online first https://link.springer.com/article/10.1007/s11676-017-0584-3#citeas. Journal of Forest Research (*In Press*).

*Essen, C., Via, B.K., Gallagher, T., McDonald, T., and Eckhardt, L.G. **2017**. Sensitivity tools to variation in equilibrium moisture content of small clear samples of loblolly pine (*Pinus taeda*). Printed online first https://doi.org/10.1007/s13196-017-0202-1. Journal of the Indian Academy of Wood Science (*In Press*).

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 $935,500.***

- Eckhardt and Bernard. 2019. *Pinus* related diseases (molecular aspects) and *Sirex*. SFWS and FABI – University of Pretoria South Africa for travel and supplies - $30,000.
- Eckhardt and Enebak. 2018. Sudden Oak Death – *Phytophpora ramorum* surveys - $36,000.
- Eckhardt and Wingfield. 2018. *Pinus* related diseases and molecular aspects. SFWS and FABI – University of Pretoria South Africa for travel and supplies and a graduate student stipend at UP - $30,000.
- Via and Eckhardt. 2017. Wood chemistry and disease resistance. SFWS - $5,000.
- Eckhardt and Enebak. 2017. Sudden Oak Death – *Phytophpora ramorum* surveys - $36,000.
- Eckhardt, Nadel, Matusick, Sword, Carter. 2017. Quantifying loblolly pine decline – FHC and SFWS – SFWS portion $60,000
- Eckhardt and Bernard. 2016. *Pinus* related diseases (molecular aspects) and *Sirex*. SFWS and FABI – University of Pretoria South Africa for travel and supplies - $30,000.
- Eckhardt and Enebak. 2016. Sudden Oak Death – *Phytophpora ramorum* surveys - $34,000.
- Enebak and Eckhardt. 2014. Testing of a rapid PCR Screening test for the presence of *Fusarium circinatum*, the causal agent of pitch canker on pine planting material – FHM - $150,000.

- Enebak and Eckhardt. 2014. Seedling production and forest health in the Southeastern United States – NSF-CAFS - $300,000 ($150,000 to FHC).
- Eckhardt. 2014. Root disease model – SFWS - $64,500.
- Hoeksema and Eckhardt. 2014. Mycorrhizal fungal colonization and disease resistance – SFWS and University of Mississippi - $25,000.
- Via and Eckhardt. 2014. Wood chemistry and disease resistance. SFWS - $5,000.
- Eckhardt and Wingfield. 2015 *Pinus* related diseases and molecular aspects. SFWS and FABI – University of Pretoria South Africa for travel and supplies and a graduate student stipend at UP - $30,000.
- Via and Eckhardt. 2015. Novel analytical tools for the selection of superior loblolly pine genotypes for improved plant health, fuels, and chemicals – IGP - $100,000.