AUBURN UNIVERSITY- FOREST HEALTH COOPERATIVE

# FY 2016 ACCOMPLISHMENTS

## As presented to the Forest Health Cooperative Advisory Committee

**Dr. Lori G Eckhardt - Director**

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AUBURN UNIVERSITY - FOREST HEALTH COOPERATIVE

# FY 2016 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 2

- ***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 2

- ***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 4

- ***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 4

- ***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 6

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

Wood chemistry and disease resistance – SFWS, Forest Products Development Center. *Year 4

- ***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 4

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

## Objective 2. Recruit graduate students

There are three openings for a graduate students in the Coop:

1. Open - Quantifying the impact of pine decline in the southeastern United States

    - ***Accomplishments: Jessica Ahl (MS Student) starting August 2016.***

## 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:*** This project is currently in the establishment phase, during this past year the site was located, plots installed and baseline data collected. Biweekly insect collections and monthly tree growth measurements undertaken. The most virulent fungal isolate, required for the study, was determined and an inoculation pilot study is currently underway.

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

- ***Accomplishments: Trapping survey for woodwasps was completed in Tuskegee and Talladega National Forests, as well as in Auburn University's Solon Dixon Center. The samples collected in this survey were then analyzed. Wasp, fungi, and nematode isolates were molecularly identified to species.***

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

- ***Accomplishments: Measurement and data analysis for summer 2015 was completed. Spring 2016 inoculations and measurements have been completed. Data is being analyzed and manuscript/report is under preparation.***

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

- ***Accomplishments: Two families one susceptible and one tolerant to Grosmannia huntii and Leptographium terebrantis were chosen and seedlings were planted in moisture stress boxes. Three different levels of moisture***

***treatments: (a) drought (b) moderate drought and (c) normal moisture have been applied. The fungal inoculations completed. Final physiological and pathogenicity measurements will be done in August and September 2016. Data analysis and manuscript preparation will be completed in October 2016.***

Resistance of *Pinus taeda* families under artificial inoculations with native and non-native *Leptographium* species involved in premature mortality. Working with the Tree Improvement Cooperative to determine families to be tested for tolerance/resistance.

- ***Accomplishments: Year four screening and data analysis is complete. Families were chosen and sown at Rayonier nursery in Alabama for FY17.***

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

- ***Accomplishments: Summer inoculations completed and data analyzed. Spring inoculations completed and data being analyzed.***

Hylastes population dynamics and forest health evaluation in association with thinning and fertilization on new RW19 in Georgia – Funding through FHP and FHC.

- ***Accomplishments: Plots for the RW-19 study were identified in Spring of 2012, on land managed by Rayonier in Georgia. Study plots and insect traps were installed in the summer, and an initial ten weeks of insect data was collected pre-study thinning treatments. The insect traps were reinstalled after treatment application. Insect collections continued for one year once traps were reinstalled. Insect data analyzed. Crown rating, root excavation and resin sampling scheduled for July 2016.***

Evaluation of stand health in association with biomass removal and standard silvicultural practices – Funding through USFS National Forest System and Alabama Power.

- ***Accomplishments: Plots identified. Treatments complete. Insect traps installed February 2014-February 2016. Insect data analyzed. Research Report being written.***

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. Data currently being analyzed.***

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: Plots identified. Year one and two year sampling at Fort Benning and Eglin AFB completed. Sequencing underway at University of Mississippi.***

# 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 2016-1 and several currently being written which will be online before the end of the year.***
- Devkota, P. and Eckhardt, L.G. 2016. Variance in tolerance of different families of loblolly pine (*Pinus taeda* L.) to *Grosmannia huntii* and *Leptographium terebrantis.* Research Report 2016-01. Forest Health Cooperative, School of Forestry and Wildlife Sciences, Auburn University.

**Newletters** (Staff)

Newsletter distribution will be planned for March FY2016. Members are encouraged to submit articles.

- ***Accomplishments: A Spring2016 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 | Smith/Peaden | Nadel |
|---|---|---|---|
| **Phone calls** | **42** | **19** | **4** |
| **Letters** | **3** | **0** | **2** |
| **Emails** | **55** | **10** | **17** |
| **Site Visits** | **8** | **10** | **1** |
| **Diagnosis** | **31** | **2** | **6** |

**Short Courses**

Forest Health Short Course will be offered in odd years starting with FY2009. Not enough members signed up for the course in FY2009 or FY2011 and if there is enough interest, a Short Course in Forest Health will be planned for August 2017. (Staff)

- ***Accomplishments: A short course was held June 2012 at the request of membership with 35 participants. The next short course will be planned for summer 2015.***

# 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 FY15 Advisory Committee Meeting will be held the last week in July 2015 jointly with the Nursery Cooperative. 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 held in St. Simons Island on July 28-30, 2015. The business meeting was held December 3, 2015.***

**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 18 presentations and published 1 article on the subject of Forest Health.***

- Eckhardt, L.G. **2016**. Forest health of southern pines. Pine Mountain and War Eagle Chapters of the Society of American Foresters, Oxbow Meadows, Columbus, GA
- Eckhardt, L.G. **2016**. Forest health of southern pines. Southeastern Society of American Foresters Annual Meeting, Auburn, AL
- *Cole, A.B., Slippers, B., Liebold, A., and Eckhardt, L.G. **2016**. Effect of growth rate on *Amylostereum* spp. fungus by terpenes. Advisory Council Meeting, SFWS, Auburn University Auburn, AL
- *Devkota, P., and Eckhardt, L.G. **2016**. Variation in Tolerance of *Pinus taeda* Families to Ophiostomatoid Fungi *Grosmannia huntii* and *Leptographium terebrantis*. Advisory Council Meeting, SFWS, Auburn University Auburn, AL
- *Cole, A.B., Slippers, B., Liebold, A., and Eckhardt, L.G. **2016**. Effect of growth rate on *Amylostereum* spp. fungus by terpenes. This Is Research: Student Symposium, Auburn, AL
- *Devkota, P., and Eckhardt, L.G. **2016**. Variation in Tolerance of Mature *Pinus taeda* Families to Root Infesting Fungi *Grosmannia huntii* And *Leptographium terebrantis.* This is Research: Student Symposium 2016, Auburn University, Auburn, AL

- *Devkota, P., and Eckhardt, L.G. **2016**. Variation in Tolerance of *Pinus taeda* Families to Ophiostomatoid Fungi *Grosmannia huntii* and *Leptographium terebrantis*. Advisory Council Meeting, SFWS, Auburn University Auburn, AL
- *Essien, C., Via, B.K., Cheng, G., Gallagher, T., McDonald, T. and Eckhardt, L. **2016**. Assessing the Sensitivity of Acoustic Tools to the effect of Moisture Content in Estimating Acoustic Velocity and Modulus of Elasticity of Loblolly Pine (*Pinus taeda*) families. This is Research: Student Symposium 2016. Auburn University, Auburn, AL
- *Acquah G. E., Via B.K., Eckhardt L.G., Fasina O. O. and Billor N. **2016**. Near infrared based partial least squares regression models for predicting the strength and basic density of disease tolerant *Pinus taeda* families. Forest Products Advisory Board Meeting, Auburn, AL
- *Essien, C., Via, B.K., Cheng, G., Gallagher, T., McDonald, T., Wang, X. and Eckhardt, L. **2016**. Acouto-mechanical response of fourteen year old suppressed loblolly pine (*Pinus taeda*) to variation in wood chemistry, microfibril angle and density. Forest Products Advisory Board Meeting, Auburn, AL
- *Essien C, Via BK, Cheng G, Gallagher T, McDonald T and Eckhardt L. **2016**. Are Acoustic tools sensitive to moisture variations in juvenile wood of loblolly pine families? Forest Products Advisory Board Meeting, Auburn, AL
- *Essien, C., Via, B.K., Cheng, G., and Eckhardt, L. **2016**. Effect of tracheid length and chemistry on acoustic velocity in determining the strength properties of juvenile wood of loblolly pine families. Forest Products Advisory Board Meeting, Auburn, AL
- *Devkota, P., and Eckhardt, L.G. **2016**. Variation in tolerance of *Pinus taeda* families to ophiostomatoid fungi *Grosmannia huntii* and *Leptographium terebrantis*. Advisory Council Meeting, SFWS, Auburn University Auburn, AL
- *Cole, A.B., and Eckhardt, L.G. **2016**. Effect of growth rate on *Amylostereum* spp. fungus by terpenes. Advisory Council Meeting, SFWS, Auburn University Auburn, AL
- *Acquah G. E., Via B.K., Eckhardt L.G., Fasina O. O. and Billor N. **2016**. Rapid assessment of disease tolerant *Pinus taeda* families for strength, chemical and bioenergy applications using near infrared spectroscopy. Southeastern Society of American Foresters Annual Meeting, Auburn, AL
- *Essien, C., Via, B.K., Eckhardt, L., Cheng, Q., Gallagher, T., McDonald, T., and Wang, X. **2016**. Acouto-mechanical response of fourteen year old suppressed loblolly pine (*Pinus taeda*) to variation in cellulose, hemicelluloses, lignin, microfibril angel and density. Southeastern Society of American Foresters Annual Meeting, Auburn, AL
- *Cole, A.B., and Eckhardt, L.G. **2016**. Effect of growth rate on *Amylostereum* spp. fungus by terpenes. Southeastern Society of American Foresters Annual Meeting, Auburn, AL
- *Devkota, P. and Eckhardt, L. **2016**. Susceptibility of various mature loblolly pine (*Pinus taeda* L.) families to root infecting fungi. Southeastern Society of American Foresters Annual Meeting, Auburn, AL

**Publications**

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

> Matusick, G., *Walker, D., *Hossain, M., Nadel, R.L., and Eckhardt, L.G. 2016. Comparative behavior of root disease pathogens in stems and roots of *Pinus* species. Fungal Biology. Published first online: DOI: 10.1016/j.funbio.2015.12.007.

**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 $656,500.***

- Eckhardt, Nadel, Matusick, Sword, Cater. 2015. Quantifying loblolly pine decline – FHC and SFWS – SFWS portion $60,000
- 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 Enebak. 2015. Sudden Oak Death – *Phytophpora ramorum* surveys - $36,000.
- 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.