Cogongrass: Does it affect root-feeding beetle populations and pine decline susceptibility?

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Imperata cylindrica (L.) Beauv

- Invasive, exotic, C4 grass
- Native to Southeast Asia region
- Introduced to Mobile, AL area circa 1911

http://oktibbehaextservice.blogspot.com/2010/10/oktibbeha-county-cattlemen-and-forest.html

Impacts of Cogongrass

http://www.fl-dof.com/forest_management/fh_invasives_cogon.html

- Outcompetes native vegetation
- Creates unfavorable fire behavior
- Displaces wildlife
- Forest impacts

Loblolly Pine Decline

- Increasingly important issue in Southeast
- Caused by a complex of abiotic and biotic stressors
- Stressed trees attract root-feeding bark beetles
- *Hylastes salebrosus, Hylastes porculus, Hylastes tenuis , Dendroctonus terebrans*
- *Hylobius pales, Pachylobius picivorus*

Fungal Associations

- Bark beetles vector wood staining fungi
  - *Leptographium terebrantis*
  - *Leptographium procerum*
  - *Leptographium serpens*
  - *Grosmannia huntii*
  - *Ophiostoma* spp.

http://www.fs.fed.us/r1-r4/spf/fhp/field_guide/37bstnspwd.htm

Project Approach

- Consists of two research components
- Component 1- Sallie Martin
  - Focuses on comparing insect diversity under commonly used vegetation management strategies in longleaf pine
- Component 2- Ben Brunson
  - Focuses on determining if cogongrass has an affect on the populations of root-feeding bark beetles that contribute to pine decline

Project Objectives

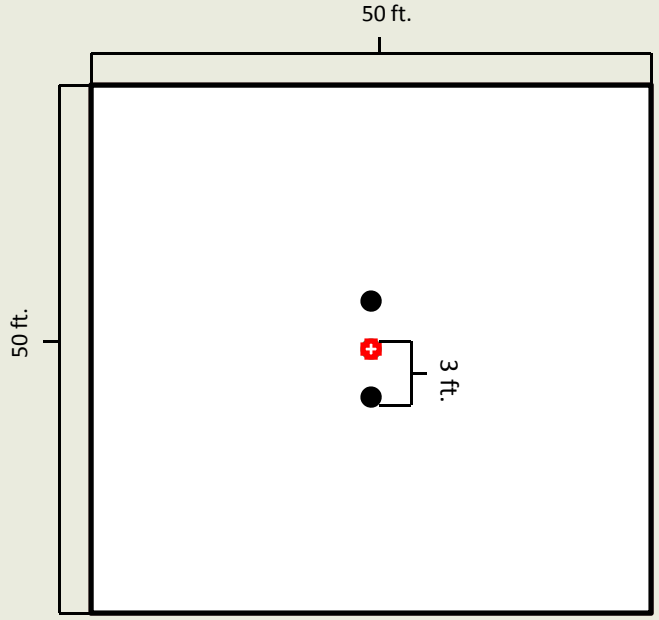
- Determine the impacts of cogongrass invasion on insect communities of Southeastern pine forests (Sallie)
- Determine how cogongrass management strategies used in pine ecosystems influence bark beetle diversity and abundance
- Determine whether cogongrass is interacting with the suite of insects that vector the fungi responsible for pine decline and is subsequently increasing the susceptibility of trees to pine decline

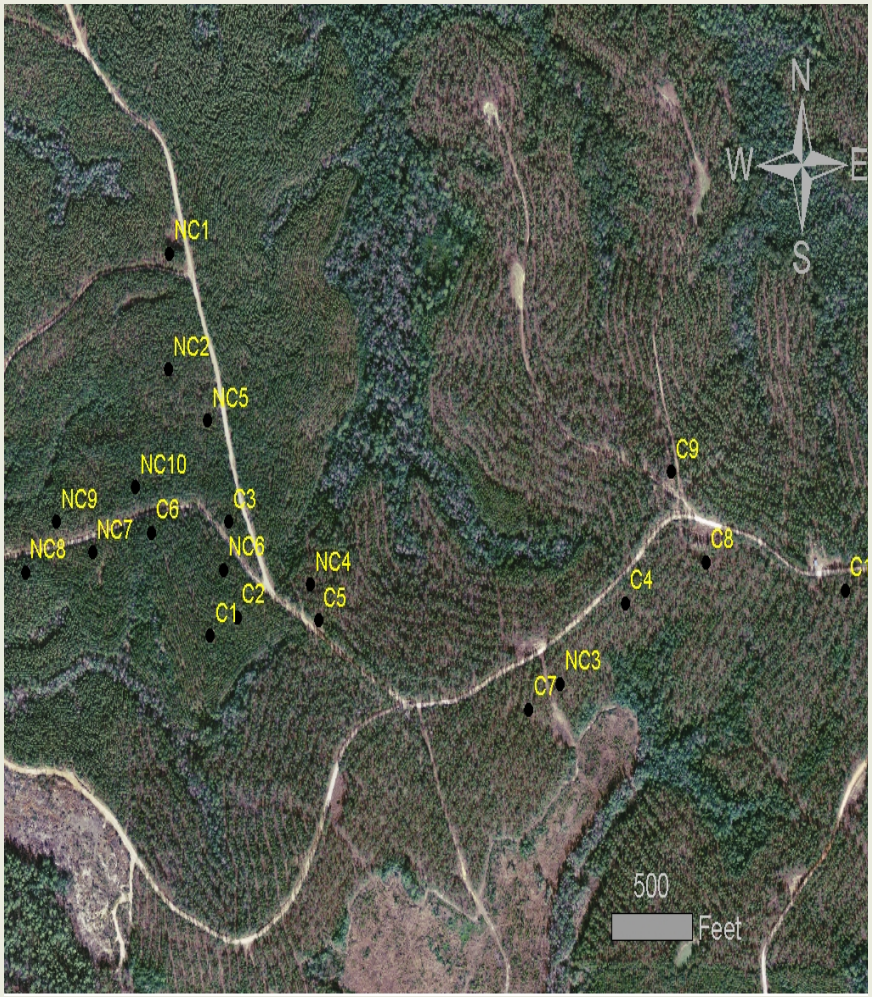
Project Design

- Research property located outside of State Line, MS
- Loblolly Pine Plantation on Westervelt property

Project Design

- 20 Research Plots
  - 10 plots containing cogongrass
  - 10 plots containing no cogongrass





Plots

Cogongrass

Non-Cogongrass

Project Design

Panel Trap

Pitfall Trap

Methods

Insect Sampling

- Bi-weekly collections
- Insects identified and counted from panel and pitfall
- 10% of pitfall insects “rolled” on media to check for fungi
- Same procedure for pitfalls located on Component 1 sites

Methods

Plot and Tree Data

- Tree assessment and vigor measurements for each plot
  - DBH
  - Height
  - Age
  - Growth Increment (5 and 10 year)
  - Basal Area
  - Crown Ratings
  - Foliage Sampling

Methods

Root Sampling

- Two-root excavation method*
  - 6 trees per plot (3 in year 1, 3 in year 2)
  - 2 roots per tree
  - Use of increment hammer to remove samples
- Samples will be plated on media to check for containment of fungi

*Ostrosina et. al., 1997 modified by Eckhardt et. al. 2007

Methods

Resin Sampling

- Pre-weigh tubes
- Install spout and tubes on selected trees
- Allow 24 hour period
- Post-weigh tubes
- Ocularly assess resin volume

Methods

Soil Sampling

- Three- 24 inch soil cores taken per plot
- Soil cores divided into 4 inch increments
- Bulk density and moisture content
- Nutrient analysis
- Three penetrometer readings per sample site

Soil Sampling

Plot and Tree Data

	Cogon	Non-cogon	P-value*
DBH	8.0	7.2	<0.0001
Basal Area	78	75	0.7599
Crown Ratio	43	41	0.0249
Crown Light	3	3	0.2846
Crown Position	2	2	0.3569
Crown Density	31	29	0.0788
Crown Dieback(%)	0.17	0	0.2795
Crown Transparency	26	26	0.4468

* P-values equal to or less than 0.05 are significant

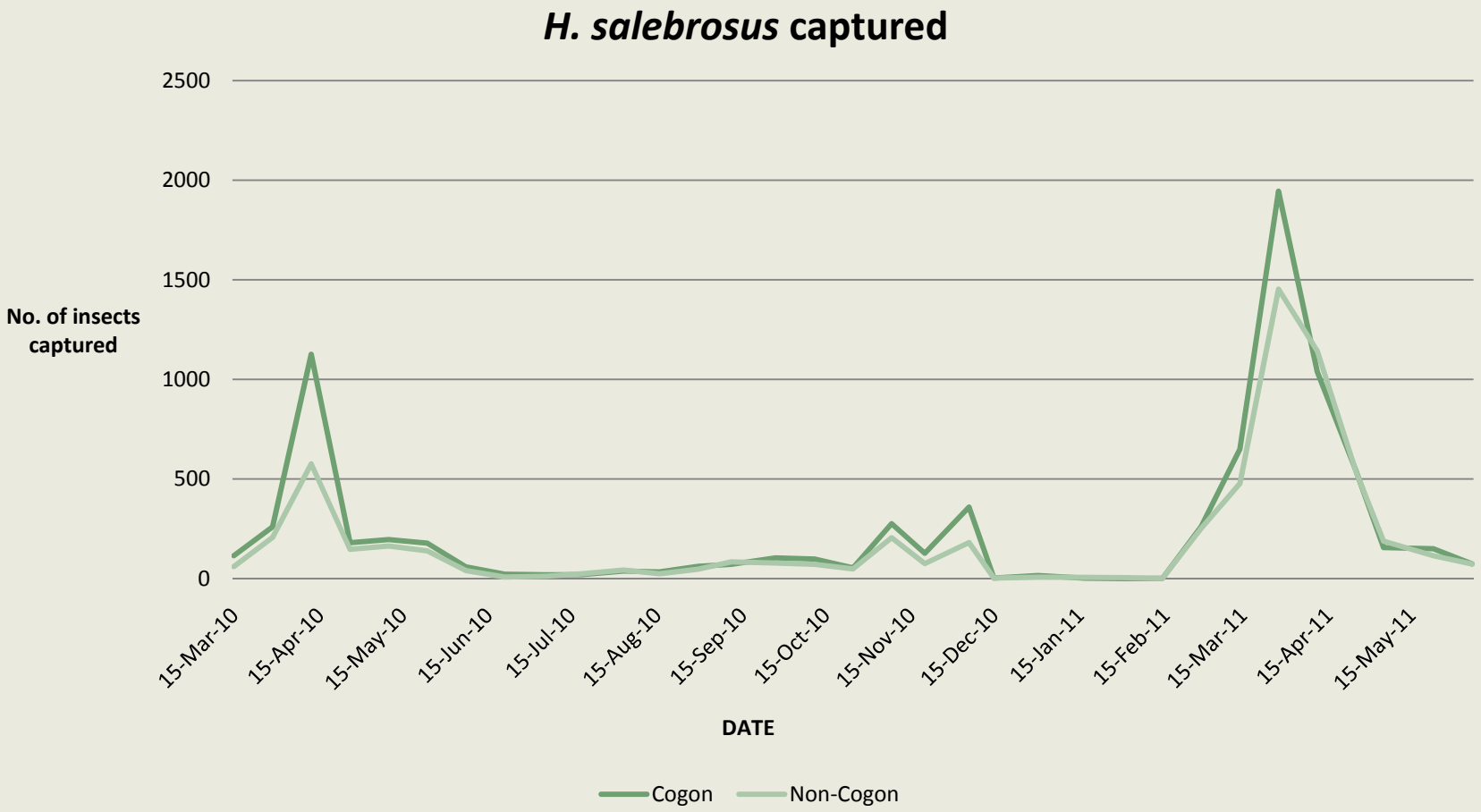
Resin Data

- Avg. Weight - 1.97 grams
- Avg. Volume - 1.88 mL

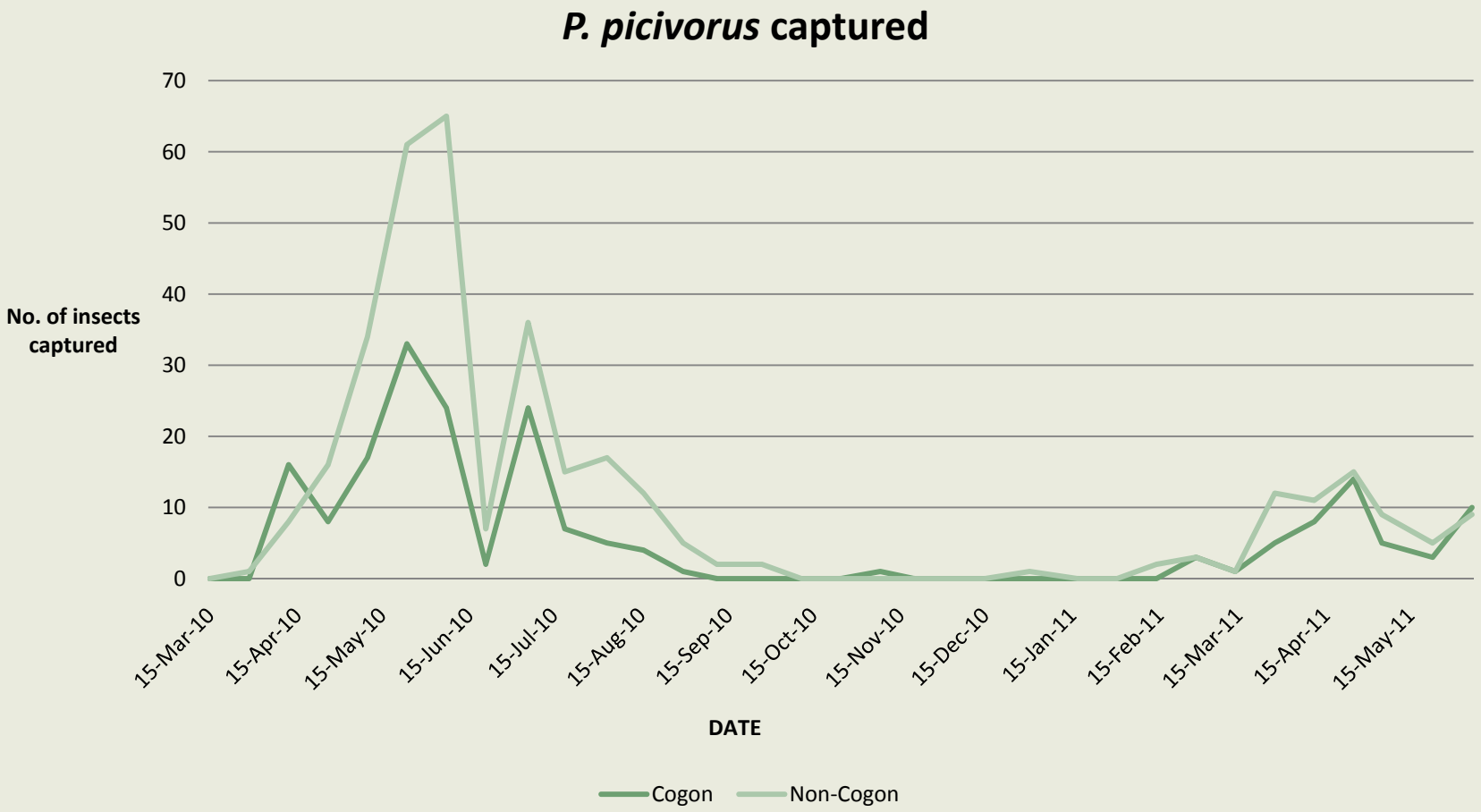
	Cogon	Non-Cogon	P-value*
Weight	1.87	2.08	0.5855
Volume	1.82	1.93	0.7688

* P-value at or below 0.05 is significant

Population Trends



Population Trends



Population statistics

Insect	Cogon	Non-Cogon	P-value*
D. terebrans	483	309	0.2042
H. porculus	703	560	0.2856
H. salebrosus	8238	6497	0.5627
H. tenuis	559	583	0.8877
P. picivorus	191	349	0.1380
H. pales	224	129	0.2233

* P-values less than or equal to 0.05 are significant

Fungal Isolates Data

	BTB	HPO	HS	HT	HP	PP	Total
Total Rolled	26	96	260	107	42	107	638
Total Fungal Isolates	7	7	17	7	17	6	61
% Insects Infected	27	7	7	7	10	6	10

BTB – *Dendroctonus terebrans*, HPO – *Hylastes porculus*, HS – *Hylastes salebrosus*, HT – *Hylastes tenuis*, HP – *Hylobius pales,* PP – *Pachylobius picivorus*

* Ophiostomatoid isolates have been stored on slants for identification to species.

Progress

- Current Progress
  - 33 of 52 insect collections
  - Resin sampling
  - First year root sampling
  - Crown rating
  - Soil sampling
- Future Progress
  - Collect tree core data
  - Continue insect collection trips
  - Collect second year root samples
  - Collect foliage sample

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Questions?