Purdue University
Department of Entomology
Undergraduate Capstone
Project Summary

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Project Title:

Estimating the unseen: detectability of *Chrysobothris* Eschscholtz

Introduction

For this project, I used data collected from the Hardwood Ecosystem Experiment. This is a 100 year experiment currently in its ninth year of collection. The experiment is a framework for studying and measuring ecological responses to differing forest management techniques throughout Yellowwood State Park and Morgan-Monroe State Park in southern Indiana. There are nine units surveyed for the project, split into three even-aged, three un-even aged, and three control units. The even-aged units are split into two treatments, shelterwoods and clearcuts. Clearcuts are defined as a treatment areas where all woody stems greater than a foot in diameter are cleared out by a contracted logger. For the shelterwood treatments, all midstory and understory vegetation was removed, leaving only the canopy. For the patchcuts, single trees were selected and a 25.2 diameter circle around these trees were removed. In the control group, nothing was managed or altered. This data was used to measure the detectability of the wood-boring beetles in the genus *Chrysobothris.*

Materials and Methods

All specimens were caught on purple plastic sticky traps. The traps are approximately four feet long and six inches wide. Four purple traps are located in each of the units. They are covered with plastic and coated in Tree Tanglefoot™, which acts as a glue to catch the beetles. The purple traps are a visual cue. The purple color is attractive to the beetles and allows us to capture them.

Once the purple traps are brought into the lab the specimens were removed from the traps and the target genus was separated. The specimens were then cleaned using Histoclear™ in a sonicator and stored in 70% EtOH for identification.

Genital dissections were done on all specimens to ensure accurate identifications.

Hypothesis

The detectability of *Chrysobothris* will vary among different forest management treatments.

Prediction 1: The number of *Chrysobothris* specimens collected will increase after harvest.
Prediction 2: The number of *Chrysobothris* specimens collected will be higher in the clearcuts than the patchcuts and both of these will be higher than the shelterwoods.

Results

Table 1: Breakdown of number of species caught in each target year for this project.

Year	C.azurea	C.chlorocephala	C.cribraria	C.dentipes	C.Femorata complex	C.pusilla	C.rotundicollis	C.rugosiceps	C.sexsignata
2007	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
2009	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
2010	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**
2013	**3**	**1**	**2**	**1**	**48**	**0**	**5**	**7**	**34**
2014	**0**	**0**	**1**	**1**	**17**	**1**	**2**	**1**	**10**

The results in Table 1 show a lack of detectability from 2007-2010. This limits the analysis that can happen for the rest of the experiment. To continue to monitor trends, only *C. sexsignata* was analyzed for all treatments.

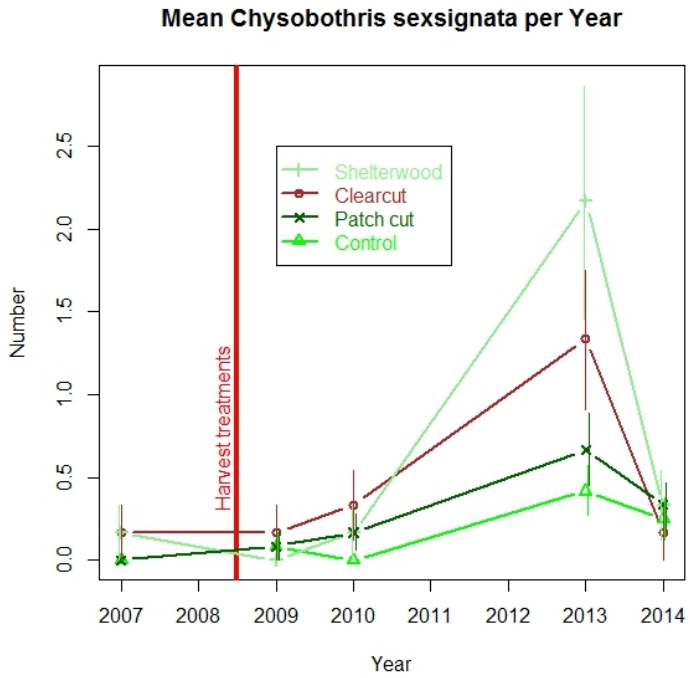

Figure 1: Mean number of *Chrysobothris sexsignata* caught per year per treatment. Figure 1 show us that we saw a spike in detectability in the year 2013, but not in any of the other years. The year 2007 was a control year with no cutting. The red line signifies the time of the cutting.

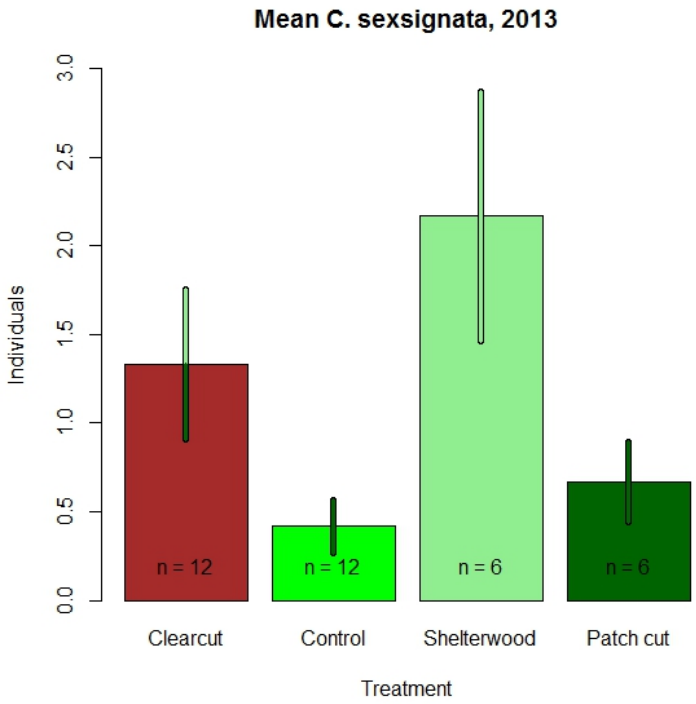

Figure 2: Mean number of *C. sexsignata* caught in each treatment in the year 2013. The shelterwood is the only treatment that is statistically different from the control and patchcuts.

Discussion

We observed variation in the different forest management techniques as outlined in our hypothesis. However, the observed results did not match our two predictions in the hypothesis section. In the first prediction, we expected to see an increase in *Chrysobothris* in the years directly after the cutting treatments were applied. The number of *Chrysobothris* collected did increase after the harvest; however, this increase was delayed several years. A possible explanation for this could be that the cutting created larval habitat and breeding sites for the beetles. This shows that the population took a few years to grow to a measurable. It was also expected that the number of *Chrysobothris* specimens collected will be higher in the clearcuts than the patchcuts and both of these will be higher than the shelterwoods. This is the opposite of what was found in the data. One reason for this could be that the clearcut traps became overgrown with vegetation over time. Despite our best efforts to keep the traps above the vegetation using rebar it was not always possible. This vegetation caused an obstruction in flight paths and actually decreased the visibility of the traps. The shelterwoods had almost no floor vegetation or midstory so the beetles could see the traps and detectability increased.

Sources

Kalb, Rebecca A., and Cortney J. Mycroft. *The Hardwood Ecosystem Experiment: A Framework for Studying Responses to Forest Management*. Tech. no. NRS-P-108. N.p.: United States Department of Agriculture, 2014. Print.