# Effects of Cover Crop and Extended Rotation on Pest Communities

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## Abstract

Managing pest injury is an important component for agronomic production. Pests of agriculture, including arthropods, plant diseases, and weeds, have the potential to significantly reduce crop yields. Integrative Pest Management (IPM) combines multiple management strategies, such as chemical applications of pesticides and crop rotation, with knowledge of pest ecology to manage pest pressure in an economically and environmentally viable way. Crop rotations can disrupt the lifecycle of many pests and limit pest abundance. Cover crops can improve pest suppression by providing habitat for natural enemies of insects and competition for weeds. We measured how cover crops and crop rotation affect pest comminutes at six different CSCAP locations. Our hypothesis is that phases of a corn-soybean rotation grown with a cover crop will experience lower pest pressure. To test this hypothesis, we measured the assemblage of insects and arthropods, foliar plant disease pressure and composition of the weed seed bank. Insect and arthropod communities were measured using an array of methods, including black light trapping, sweep netting, Pherocon AM sticky traps, and pit fall traps. All locations were scouted for soybean aphids, *Aphis glycines*, using the speed scouting technique. Percent ground cover, presence and severity of foliar disease, and the composition of the weed seed bank within plots were measured. Data were collected at 2 locations in Iowa and Wisconsin and 1 location in Illinois and Missouri. We will continue to test our hypotheses for these pests during the next 4 years of the CSCAP project.

## Introduction

Pests have the potential to greatly affect agricultural production

Pests can include, Arthropods:
- *Diabrotica virgifera virgifera*, western corn rootworm
- *Aphis glycines*, soybean aphid
- *Cerotoma trifurcata*, bean leaf beetle

Plant Pathogens:
- *Cercopora zeae-maydis*, gray leaf spot in corn
- *Septoria glycines*, Septoria brown spot in soybean
- *Cercospora sojina*, frogeye leaf spot in soybean

Weeds:
- *Abutilon theophrasti*, velvetleaf
- *Setaria faberi*, giant foxtail

Integrative Pest Management (IPM) combines muultiple pest control methods with knowledge of pest ecology to manage pests in an economically and environmentally sound way

Two examples of IPM strategies include 1) crop rotations and 2) cover crops

## Hypothesis

Crop rotation and cover crops will lower pest pressure

## Acknowledgments

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## Data Collection

**Cover Crops**

Two locations (Fig. 1)
1. Boone, IA
2. Gilmore City, IA

Four treatments
- Corn with rye cover crop
- Corn without rye cover crop
- Soybean with rye cover crop
- Soybean without rye cover crop

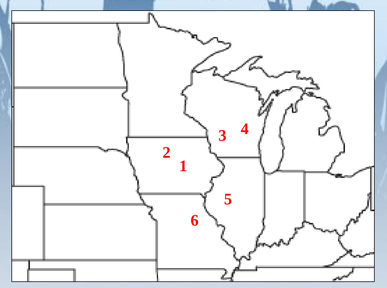


Fig. 1 Map of the six sampled locations

These sites were visited 5 times between June and September

**Extended Rotations**

Four locations (Fig. 1)
3. Lancaster, WI
4. Arlington, WI
5. Monmouth, IL
6. Jefferson City, MO

Six treatments in each Wisconsin site
- Continuous corn
- Corn in a two-year rotation
- Soybean in a two-year rotation
- Corn in a three-year rotation
- Soybean in a three-year rotation
- Wheat in a three-year rotation


Rye cover crop planted in Boone, IA

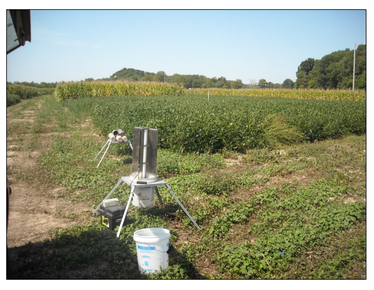
Four treatments in Illinois and Missouri sites
- Continuous corn
- Corn in a two-year rotation
- Continuous soybean
- Soybean in a two-year rotation


Extended rotation in Arlington, WI

These sites were visited 3 times between July and September

**Pest Measurements:**

**Arthropods**
- Pherocon AM sticky traps
- Pitfall traps
- Black light trapping
- Sweep netting
- Speed scouting (for *A. glycines*)


Black lighting at Jefferson City, MO

**Plant Diseases**

At each location, data collection occurred in early September for incidence and severity of corn and soybean foliar diseases

**Weeds**

Soil cores were collected by project collaborators from each location to measure the composition of the weed seed bank

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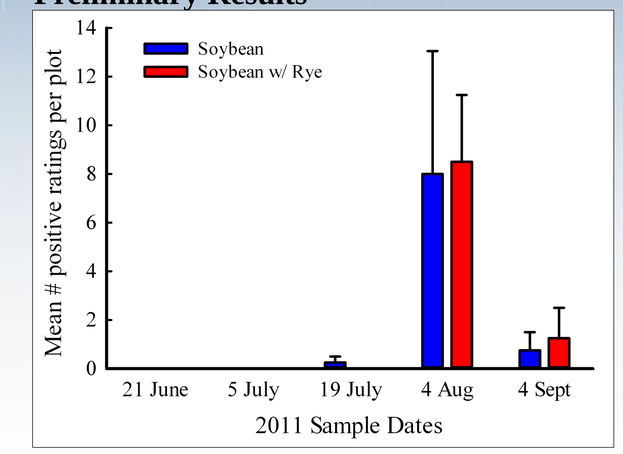
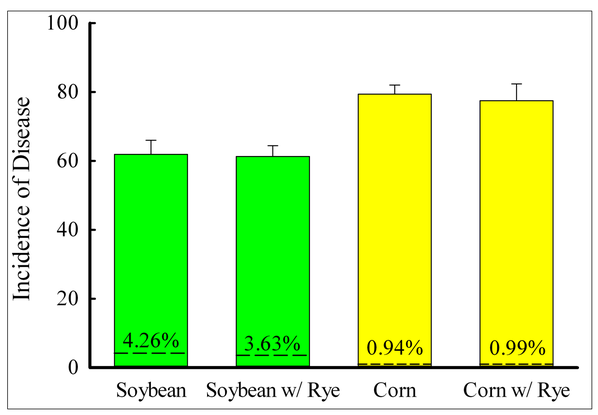
## Results

In 2011 we collected :
- 948 sticky traps
- 948 pitfall traps
- 22 black light samples
- 316 sweep net samples
- 140 speed scouting measurements

**Preliminary Results**




Results from speed scouting for *A. glycines* in soybean plots at Gilmore City, IA. More than 11 positive ratings within a plot indicate that the population has reached economic threshold and treatment is recommended. Three plots reached this level during our 4 Aug sampling.




Results from plant disease scouting in soybean and corn plots at Gilmore City, IA. Bar height indicates the incidence of (or the percentage of infected plants) Septoria brown spot in soybean plots and gray leaf spot in corn plots. The dashed line and value within each bar represent the average severity of those pathogens within each treatment.

## Future Directions

Process the 2011 data

Continue to test these hypotheses for these pest for the next 4 years of the CSCAP project

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