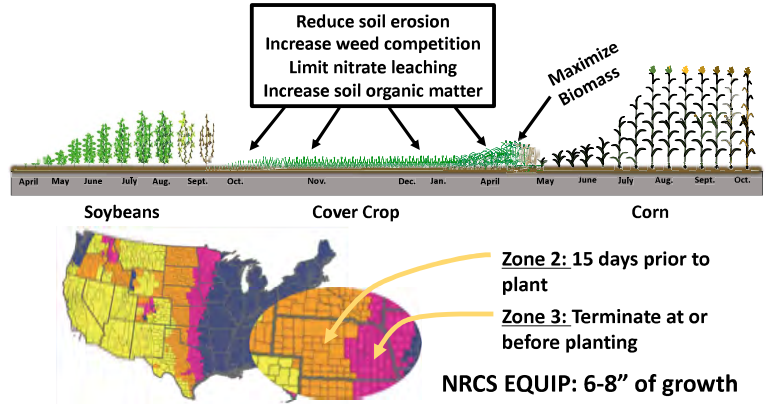


Cover Crop Systems

Soybean – Corn Rotations



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Insect Pest Considerations with Cover Crops

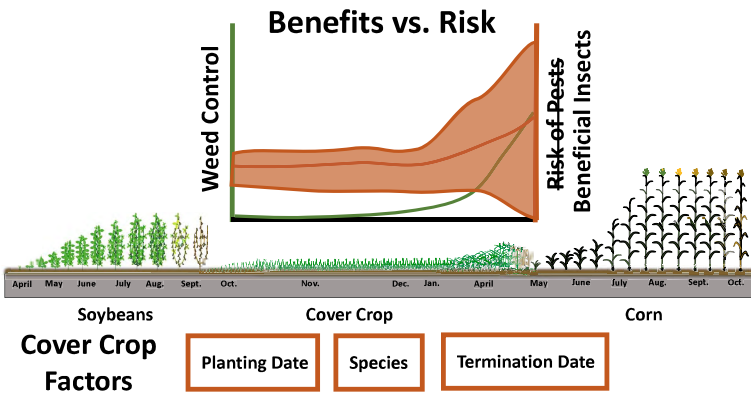
Justin McMechan, Assistant Professor
Crop Protection and Cropping Systems Specialist



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Cover Crop Systems

Soybean – Corn Rotations



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Cover Crops and Insects

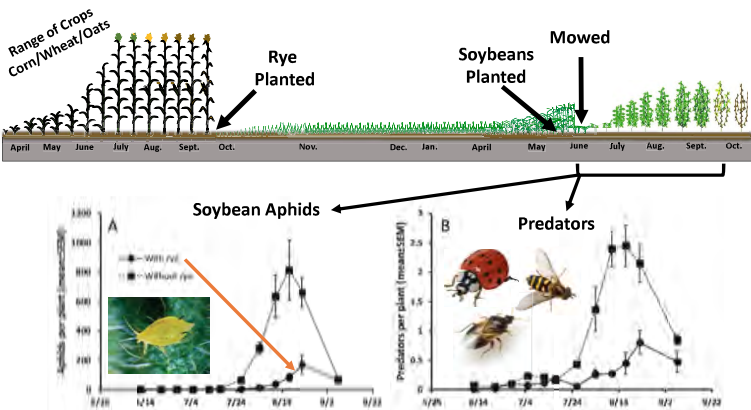
• Studies evaluating the influence of cover crops on insects

Beneficials	Pests
Predators House and Del Rosario 1989 Koch et al. 2015 Lundgren and Fergen 2010 Bottenberg et al. 2008 Leslie et al. 2017	Dunbar et al. 2016 Tillman et al. 2004 Smith et al. 1988 House and del Rosario 1989 Koch et al. 2017
Seed Feeders Dunbar et al. 2017	Increased risk of pests based on their ecology

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Beneficial Insects in Cover Crops

Soybean Aphid Control

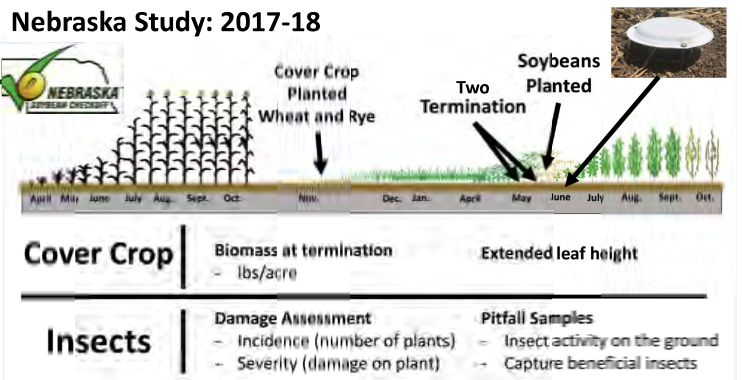


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Koch et al. 2015

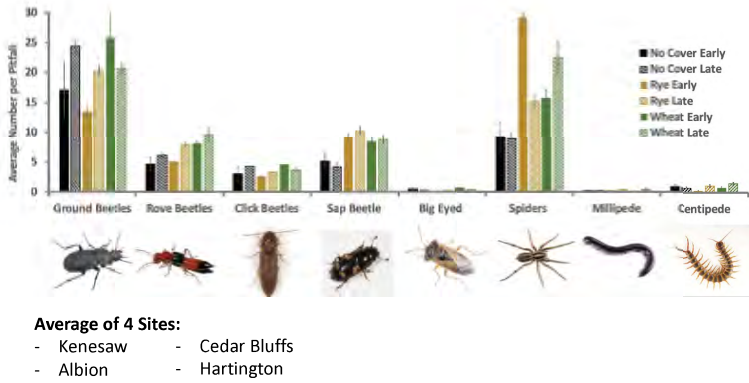
Pest and Beneficial Insects

Cover Crop Species and Termination Date



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Arthropods in Pitfall Traps



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Cover Crop and Insects

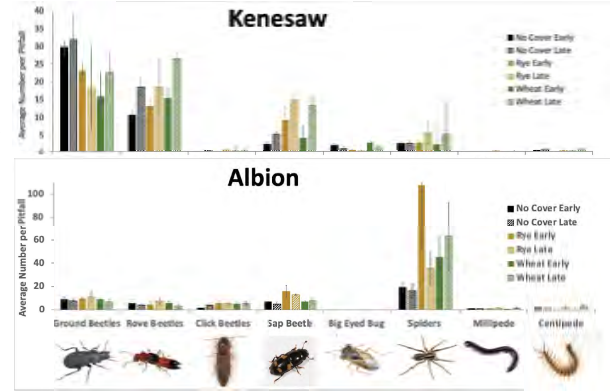
Site-to-Site Variability

Large differences between sites

Strong relationship with cover crop biomass

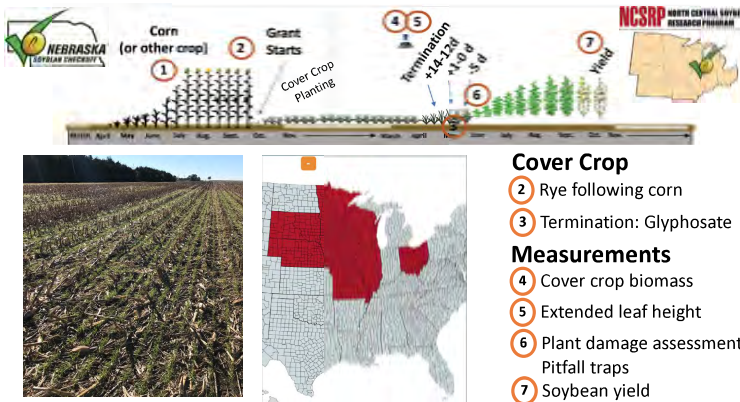
Other factors: Landscape History

*Little to no pest pressure



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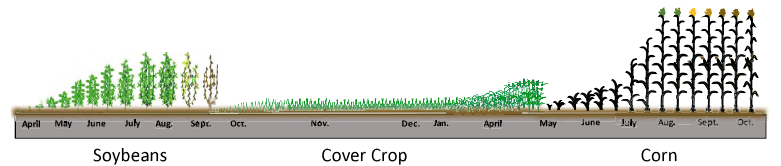
NCSRP – Mult-State Project



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Cover Crop and Insects

Insect Pest Risk



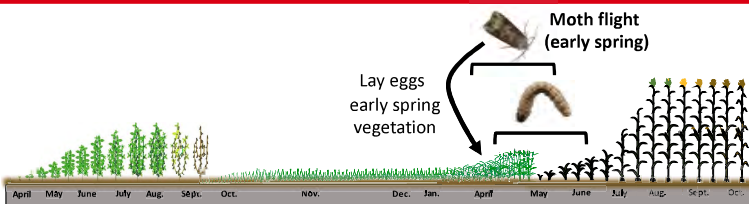
Source of Risk for Pests

- Host range spans cover crop and cash crop
- Suitable overwintering site
- Termination of cover crop drives insect into cash crop

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Cover Crop and Insects

Black Cutworm



Scouting Corn:

- Leaf damage
- Wilted plants
- Cut stalks
- 3-5% damaged

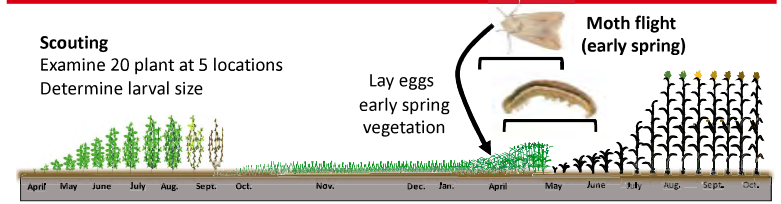


Cumulative Degree Days	Black Cutworm Stage	Black Cutworm Activity
0 (Eggs)	Significant Moth Capture	Egg hatch
91-311	1st-3rd instar	Leaf feeding
312-364	4th instar	Cutting begins
365-430	5th instar	Cutting begins
431-640	6th instar	Cutting slows
641-959	Pupa	No feeding

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Cover Crop and Insects

True Armyworm



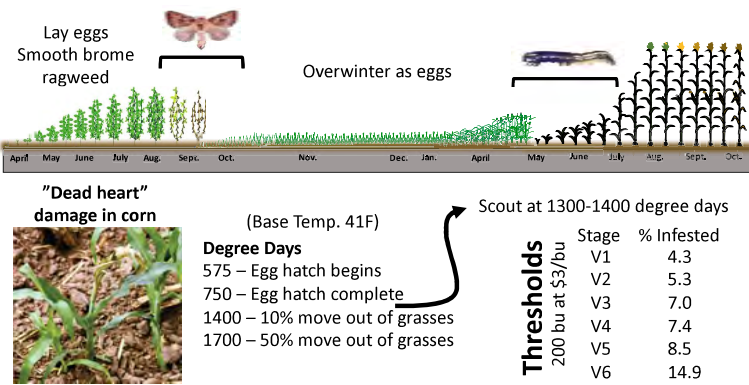
Scouting
Examine 20 plant at 5 locations
Determine larval size



- Larvae feed at night
- Feed for 3 weeks
 - 80% of consumption occurs in 6th instar
- Control
 - 25% or more of plants are damaged
 - Difficult if larvae are >1 inch
- A number of predators, parasitoids, fungi and viruses
 - Cool/Wet weather favors armyworm

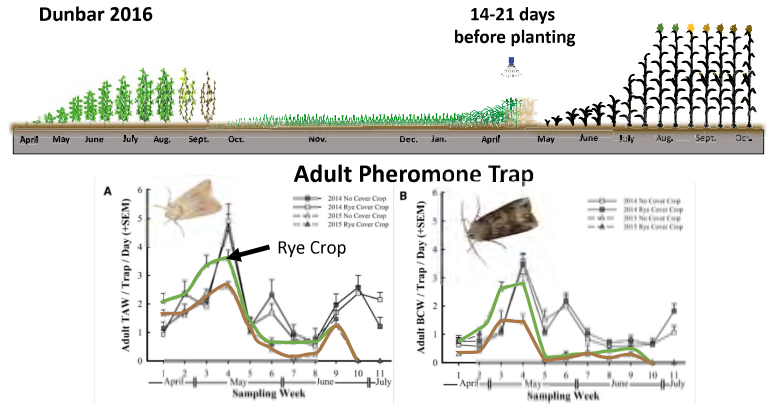
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Cover Crop and Insects Common Stalk Borer



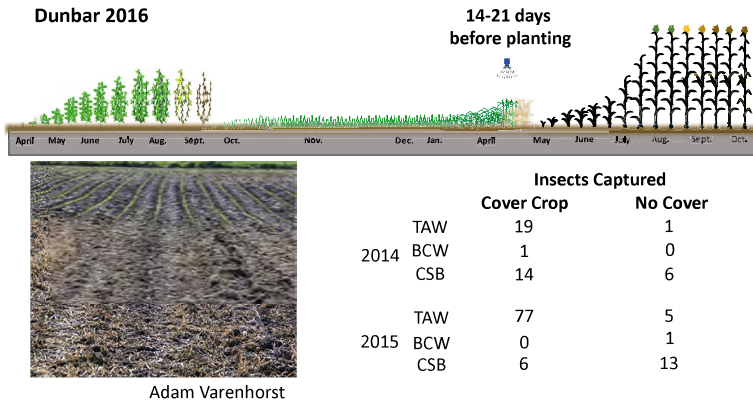
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Cover Crop and Insects True armyworm and Black Cutworm



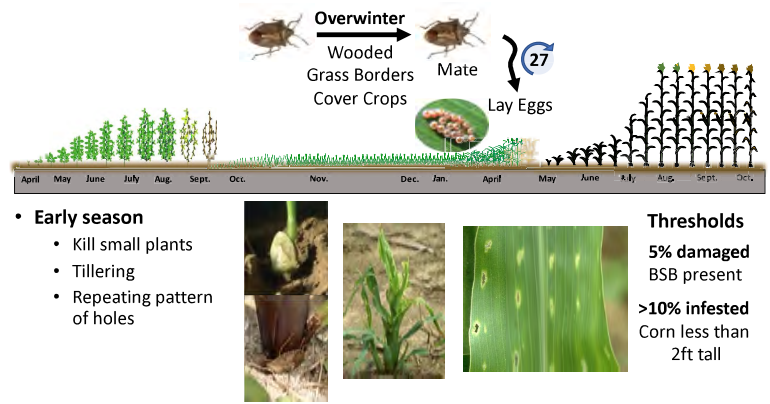
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Cover Crop and Insects True armyworm and Black Cutworm



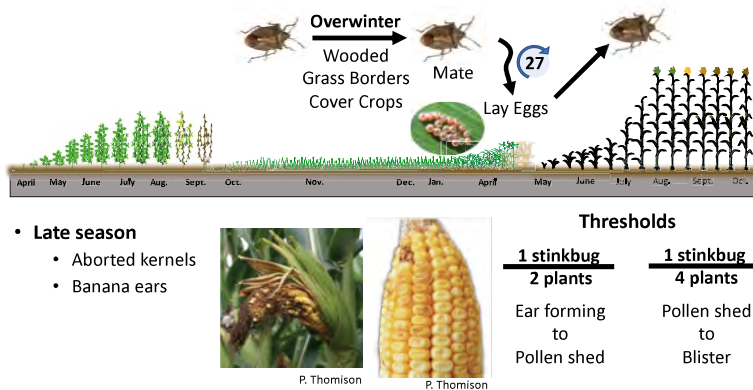
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Cover Crop and Insects Stinkbugs



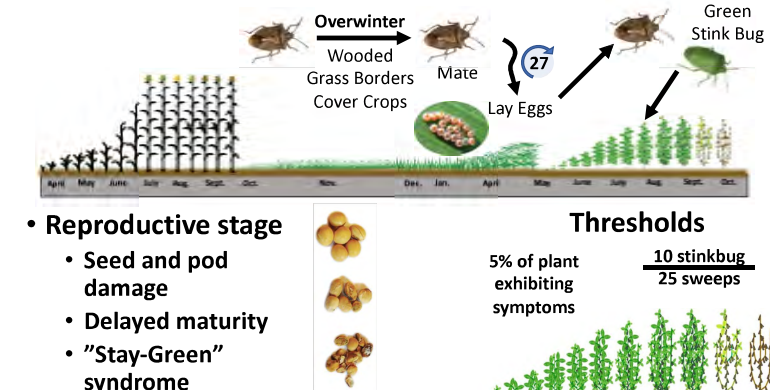
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Cover Crop and Insects Stinkbugs



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Cover Crop and Insects Stinkbugs

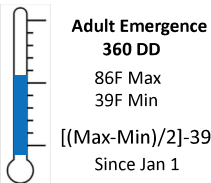


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Cover Crop and Insects Seed Corn Maggot



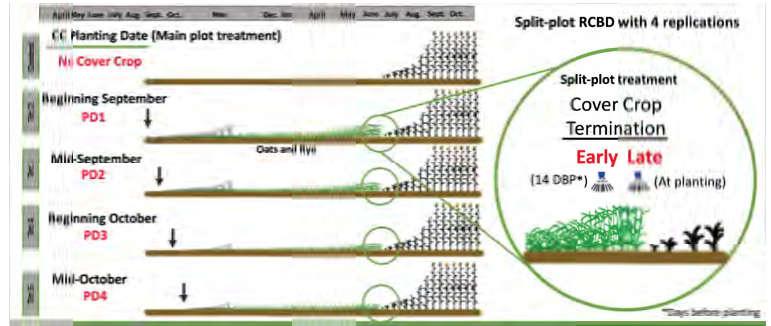
- **Increased risk**
 - Proximity to feedlot
 - Cold temperatures
- **Damage**
 - Unemerged plants
 - Weak seedlings



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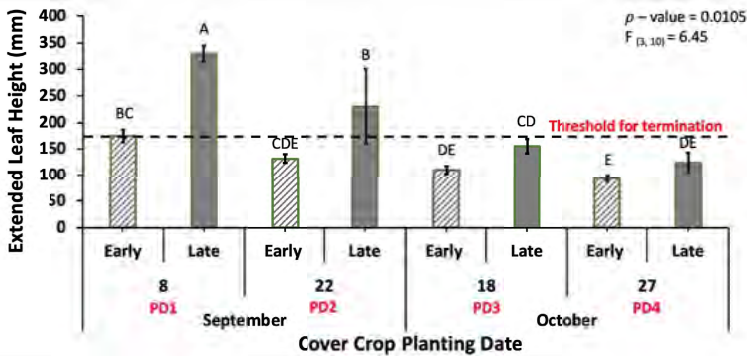
Planting Date and Termination

Gabriela Inveninato Carmona, M.S. Student Entomology
USDA NIFA 2017-67013-26256 (Lead PI: Dr. Chris Proctor)



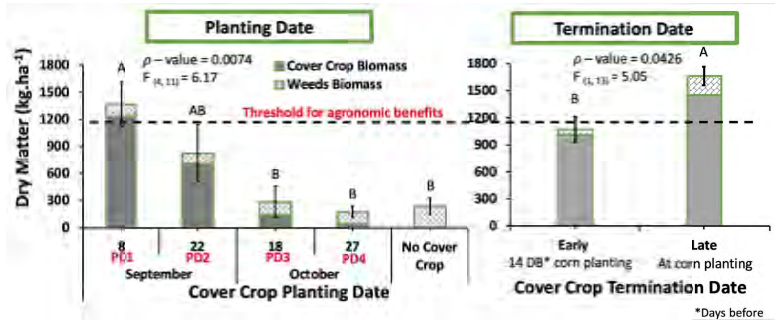
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Cover Crop Extended Leaf Height



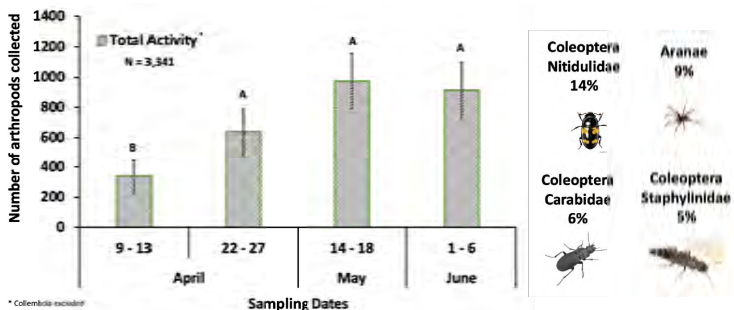
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Cover Crop Dry Matter



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Arthropod Activity



No significant pest pressure (~1% severity and incidence)

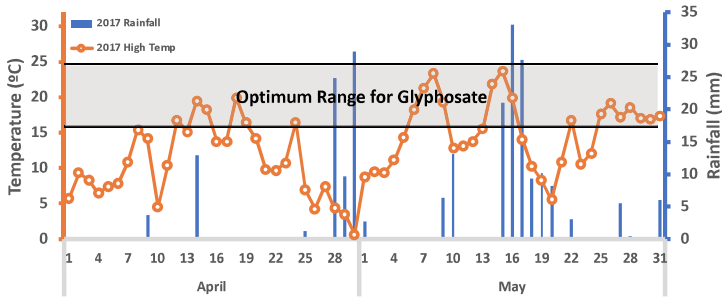
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Wheat Stem Maggot New Pests of Cover Crops

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Spring 2017: Situation

- Cold, wet spring



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Wheat Stem Maggot Field Reports

Field Reports: May 23rd, 2017

- Corn plants exhibiting
 - Dead heart symptoms



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Cover Crops and Insects Wheat Stem Maggot

Field Issue Reports: May 23rd, 2017

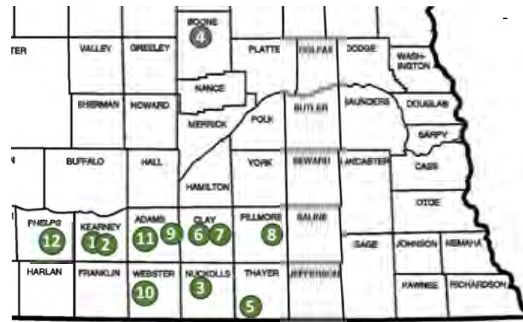
- Corn plants exhibiting
 - Dead heart symptoms
 - Tillering
- Dissected plants
 - Maggots typically found within 2 inches of growing point
 - Feeding channel increased in width from top to bottom of plant



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Cover Crops and Insects Wheat Stem Maggot

2017 Field Reports



Isolated Fields
- Northeast Nebraska
- 2005 and 2015

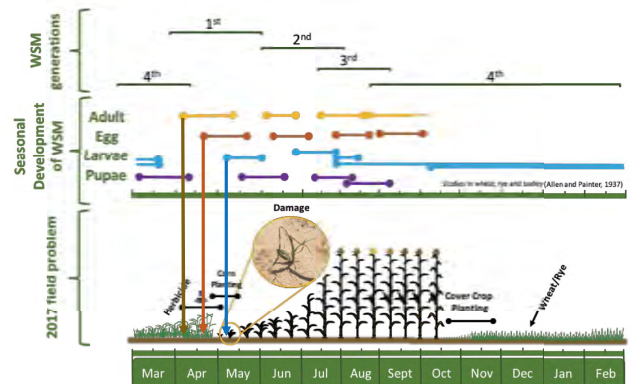
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Field Issue: Characteristics

Field	Cover Crop			Corn Planting	Cover Crop to Corn*	Symp. Plants	WSM Recovered**	Larval Size (mm)
	Species	Planting	Termination					
1	Rye	Mid-Oct	May 2 nd	Apr. 22 nd	+10d	4 to 23%	9/30	2-6mm
2	Rye	Mid-Oct	May 2 nd	Apr. 24 th	+12d	0 to 8%	8/21	3-6mm
3	Wheat	Fall	Apr. 19 th	Apr. 14 th	+4d	50 to 60%	4/25	4-7mm
4	Rye	Oct. 22 nd	May 4 th /5 th	Apr. 23 rd /24 th	+14d	1 to 3%	12/15	5-6mm
5	-	-	-	-	-	30 to 40%	7/25	4-6mm
6	Wheat	Nov. 5 th -11 th	Apr. 18 th	Apr. 17 th	+1d	7 to 29%	4/20	2-4mm
7	Wheat	Oct. 20 th	Apr. 18 th	Apr. 17 th	+1d	1 to 5%	4/21	3-5mm
8	Rye	Nov.	Apr. 24 th	Apr. 22 nd	+2d	8 to 33%	5/20	5-6mm
9	-	-	-	-	-	2 to 11%	10/20	4-6mm
10	Wheat	Fall	Apr. 8 th and May 10 th	Apr. 27 th	+13d	4 to 27%	2/15	7mm
11	Wheat	Fall	Apr. 24 th	Apr. 18 th	+6d	28 to 40%	7/21	5-6mm
12	Wheat	Fall	Apr. 28 th and June 7 th	Apr. 28 th	+9d	0 to 4%	0/17	-

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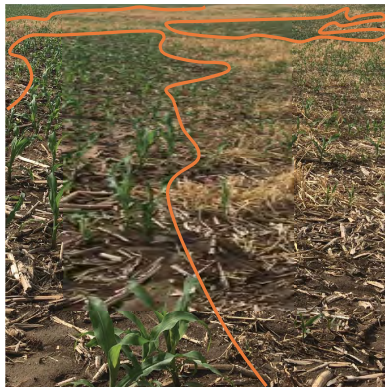
Field Issues and WSM Ecology



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Cover Crops and Insects Current Hypothesis

- Wheat stem maggot eggs laid in fall or early spring on wheat or rye cover crop
 - In larval development stage at time of cover crop termination
 - Larvae moved to corn to complete development



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Cover Crops and Insects Wheat Stem Maggot

- Yield impacts
 - Not clearly defined
 - Tillering will reduce yields
 - Competition between plants
- Fields with cover crop planted in patches
 - ~30 bu yield loss (50% of plants infested)



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WSM Management in Cover Crops

- Seed treatments
 - Trial naturally infested in 2015
 - No signs of control against WSM with highest rate of clothianidin
- Tank mixing insecticide at termination
 - Time of death and movement of WSM between cover crop and corn is not known
 - Unlikely to have enough residual insecticide
 - Kills beneficial insects
- Grazing
 - Little to no effect as maggots feed at the base of plant
- Terminate cover crop 14 days prior to planting

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Summary

- Impacts of insects from cover crops
 - Cover crop species
 - Management practices (termination timing and method)
 - Environmental factors
- Scout fields to avoid significant losses
- Spraying cover crops with insecticide will likely eliminate beneficial insects

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On-Going Cover Crop Studies

- Cover crop species and termination date study
 - *Julia Nogueira Campus, M.S. Entomology Student*
 - Cover crop species: wheat, rye and triticale
 - Termination timing: Four spring application around planting
- Cover crop and insecticide use study
 - *Gabriela Inveninato Carmona M.S. Entomology Student*
 - Tank-mixed vs. delayed insecticide application
 - Impact on pest and beneficial insects

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Thank You

What questions
do you have?



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