Slugs in Pennsylvania: Research plans and progress

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A Major Challenge of Mid-Atlantic No till

- Slugs
  - ~50% of my extension phone calls in 2009 were on slug problems
  - Research appeared needed, so I naively waded into the slug world

Since 1990 corn yields in Pennsylvania have increased an average of 0.28 Mg ha^{-1} yr^{-1} (~200 lbs of stover per acre)

Slug working group: Grower survey (Winter 2010; ~80 responses)

- 82% think that slugs are the most challenging pest they face
- 92% had experienced “significant slug damage”

Most respondents rotate: corn/soy (25%) or corn/soy/wheat (12%)

- Slugs were most problematic in corn (72%) and soy (21%)
- 66% of growers routinely used cover crops
  - Cereal rye was most common [51%]), mostly before corn (28%)

Cover crops damaged by slugs:

- Cereal rye – 18%
- No damage to cover crops – 23%

Slug working group: Grower survey (Winter 2010; ~80 responses)

How often do you experience trouble with slugs in your crops?

a. Every year	20%
b. About every 2-3 years	48%
c. About every 4-5 years	13 %
d. Greater than every 5 years	13%

In which crops do you experience trouble with slugs?

a. Corn	82%
b. Soybeans	51%
c. Alfalfa	8%
d. Snap bean	8%
e. Small grain	5%

Slug working group: Grower survey (Winter 2010; ~80 responses)

Slug damage did not appear to be associated with:

- Soil type
- Fertilizer or manure use
- Pesticide use

Low to moderate confidence in management options:

- Metaldehyde
- Nitrogen sprays
- Row cleaners
- Pop-up fertilizer
- Varieties with early season vigor

Current research on slug management

1. Determine feeding preferences for slugs among crops, cover crops, and common weed species.
    a) Can cover crops or weeds help suppress slug populations and foster natural-enemy populations?
2. Identify natural enemies of slugs in PA soybean fields.
    a) What predatory insect species will eat various slug species?
3. Can minimal tillage help controlling slug populations?

Slug feeding preferences

Slugs: major determinants of grassland community composition

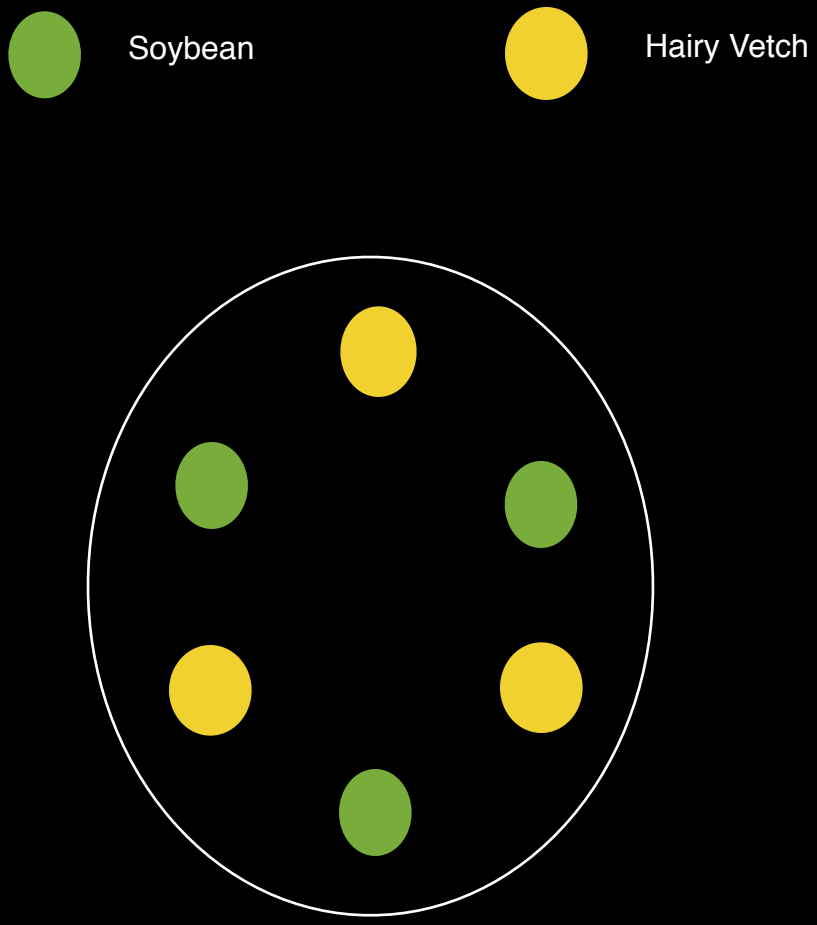
- Prefer to eat seedlings
- Have species preferences
  - Hard to interpret published results – variable methods

In some experiments, gray garden slugs preferred:

- Red and white clover
- Narrowleaf plantain
- Dandelion
- Shepherd's purse
- Lambsquarters

Can slightly weedy fields or underseeded crops help limit crop damage?

What are the feeding preferences for slugs among crops, various cover crop species, and common weed species?



Gray garden slugs significantly prefer:

Soybean	vs	Hairy vetch
Soybean	vs	Red Clover
Soybean	vs	Cereal rye
Soybean	vs	Triticale
Soybean	vs	Lambsquarters
Soybean	vs	Velvetleaf
Soybean	vs	Italian ryegrass
Corn	vs	Crimson clover
Corn	vs	Italian ryegrass
…	vs	…

Farmer-driven slug research project

(Lucas Criswell, Union County)

Observation: clean fields provide one food source – the crop

Farmer-driven slug research project

(Lucas Criswell, Union County)

Observation: clean fields provide one food source – the crop

Question 1: Can we provide an alternative food & take pressure off the crop?

1. Drilled a mix of rye and clover

Question 2: What role do insecticides play in slug control?

1. Sprayed Warrior

Farmer-driven slug research project

(Lucas Criswell, Union County)

Observation: clean fields provide one food source – the crop

Question 1: Can we provide an alternative food & take pressure off the crop?

Question 2: What role do insecticides play in slug control?

	No underseed	**Underseed**
No Insecticide	None	Underseed No insecticide
Insecticide	Insecticide No underseed	Underseed Insecticide

Farmer-driven slug research project

- Increasing diversity by underseeding corn with rye/clover
- Could kill underseeded crop in June

Farmer-driven slug research project

- Rye/clover planting took pressure off of corn
- Insecticide / natural enemy data still coming

Can we improve upon this effort? Put underseeded crop btwn rows?

An interseeder developed at PSU

- Greg Roth
- Bill Curran

To establish cover crops mid-season
(& apply fertilizer and herbicide)

Can we improve upon this effort? Put underseeded crop btwn rows?

Will test in 2012 for improving slug control

An interseeder developed at PSU

- Greg Roth
- Bill Curran

To establish cover crops mid-season (& apply fertilizer and herbicide)

Can we exploit slugs ability to feed on some weedy species

- Particularly seedlings
- Slugs will eat grass seedlings, lambsquarters, among other weed species

- Vary post-emergence glyphosate applications.
  - Applied 2, 3, 4, 5, or 6 wks post emergence.
    - > 4 wks post-emergence yield decrease ~ 0.75 bu/ac/day
- Assess slug damage and yield
- Balance weed control with possible benefits for slug control?

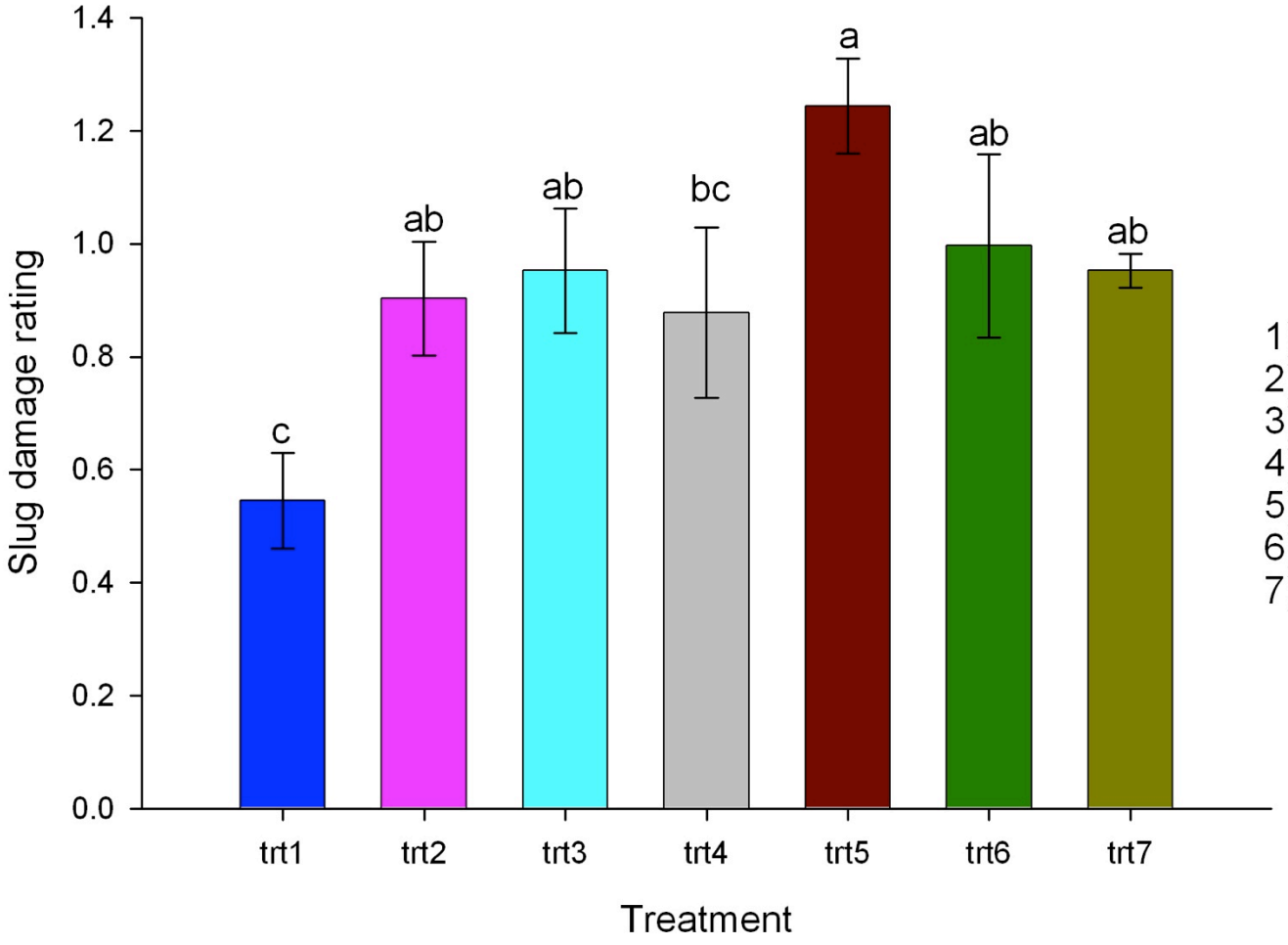
Can cover crops help suppress slug populations and foster natural-enemy populations?

Slugs have feeding preferences

- What cover crops do they dislike?
  - They like rye, wheat and barley
  - Dislike hairy vetch, crimson clover, forage radish, oats?


Can non-preferred crops help suppress slug populations?


Assessed slug damage (0-4 scale) on corn following cover crops:



1) Crimson clover + annual ryegrass
2) Annual ryegrass + triticale
3) Rye + oats
4) Rape + hairy vetch + rye
5) Tillage radish + vetch + rye
6) Radish + rye
7) Rye

Mechanical slug control (Sjoerd Duiker & John Tooker)

16-plot experiment at Rock Springs; established in Fall 2009

- 4 Treatments (shallow disking: 3” deep; similar to turbo till)
  1. No fall or spring disking
  2. Fall disking, no spring disking
  3. No fall disking, spring disking
  4. Fall & spring disking

Mechanical control experiment (Sjoerd Duiker & John Tooker)

Slug damage assessed on a 0-4 scale:
0 = no damage; **1** = 1 - 25%; **2** = 25-50%; **3** = 50-75%; **4** = 75-100%

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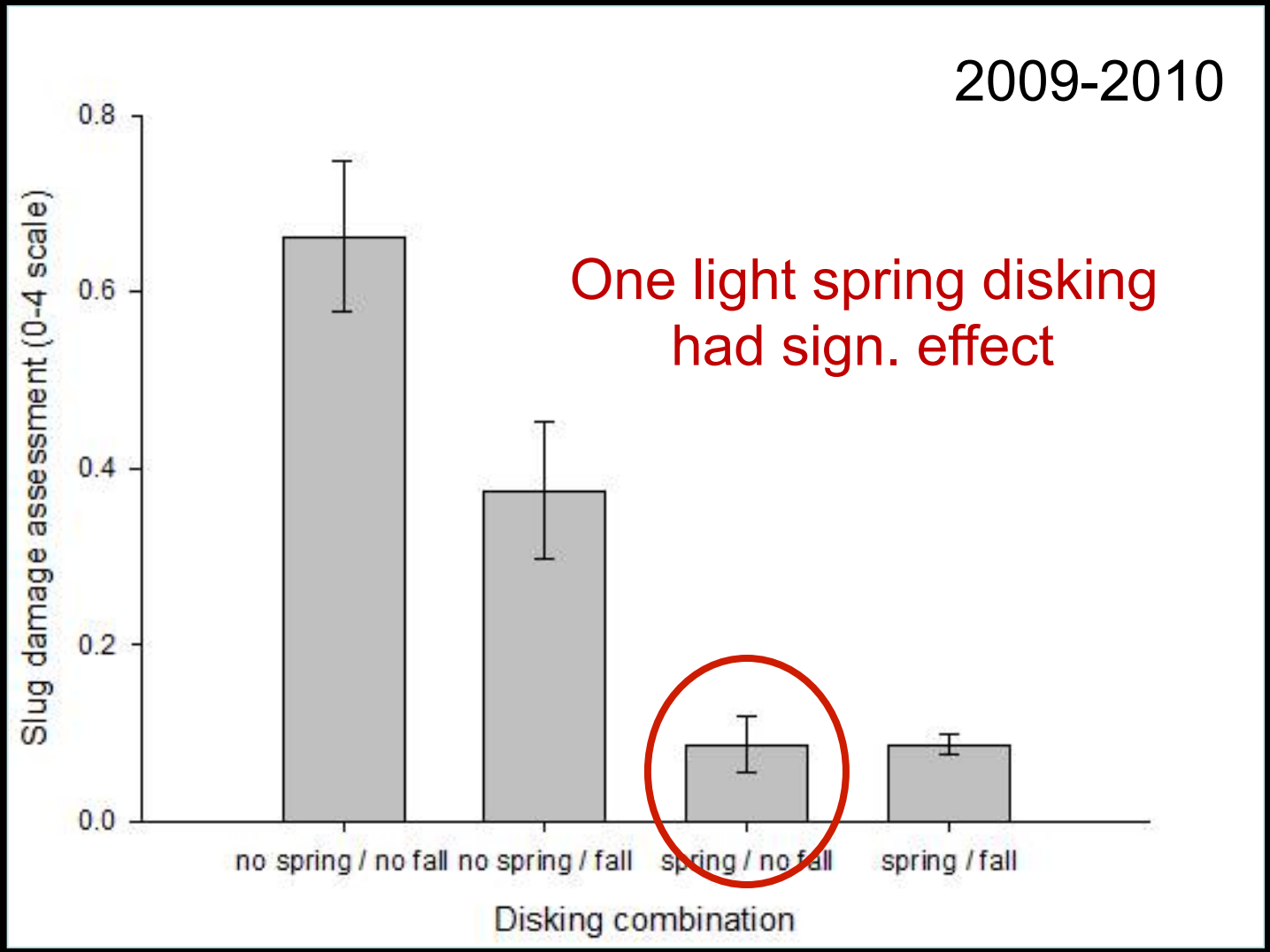

Mechanical control experiment (Sjoerd Duiker & John Tooker)

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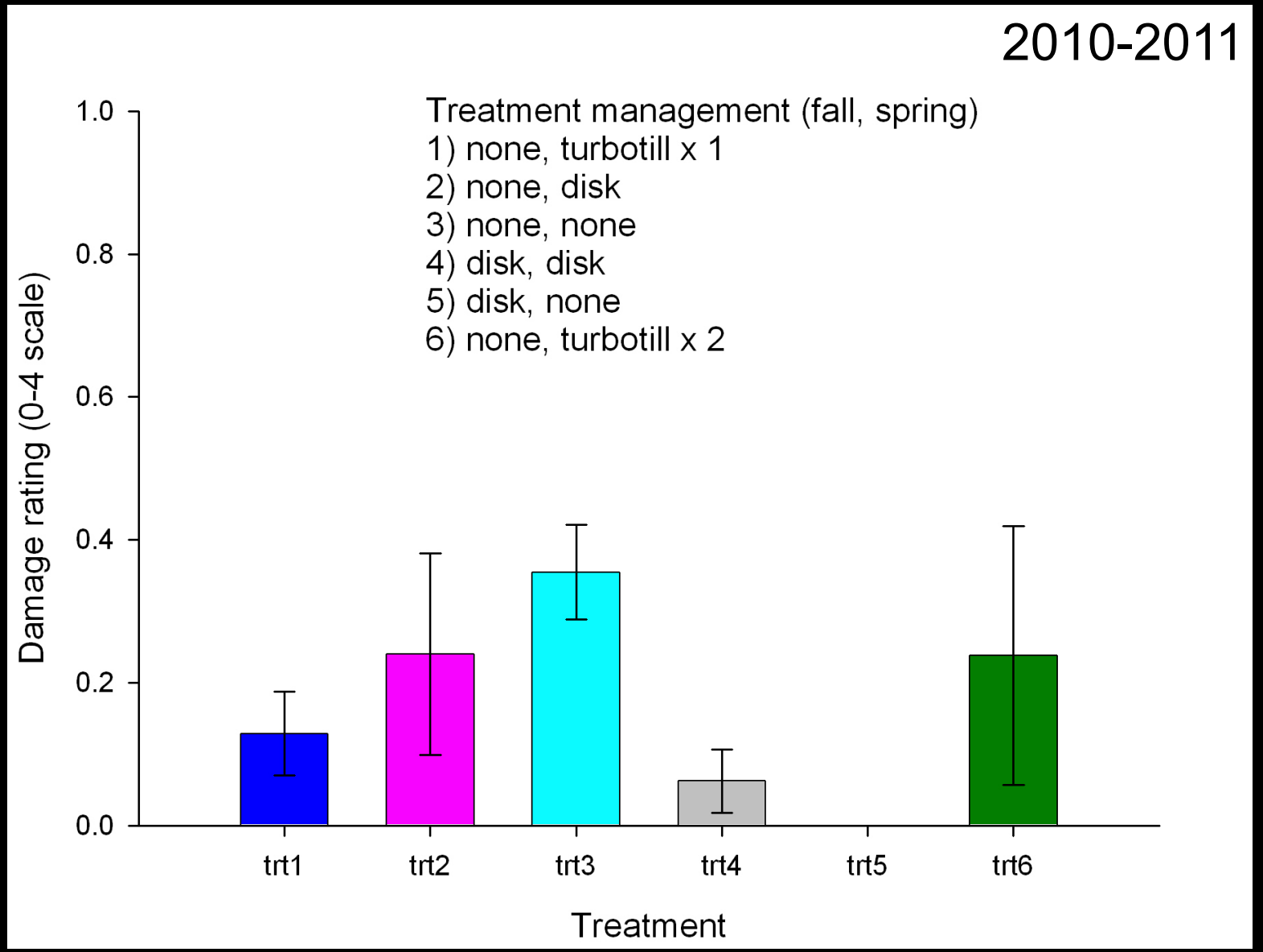

Other slug experiments attempts that need repeating

In collaboration with Jeff Graybill (Extension Educator, Lancaster Co.):

Exp. 1: Testing the influence of

- Row cleaners
- Pop-up fertilizer
- Nitrogen sprays
- Metaldehyde

Exp. 2 – Testing the infleunce of

- Pop-up fertilizer
- Ammonium sulfate
- Nitrogen sprays
- Lannate LV

Slug web portal and reporting tool

- Could be an extension resource presenting best management practices (Mid-Atlantic)
- Information on biology, images of slugs and damage
- Provide a home for a grower survey on slugs

Doug Miller
Dept. of Geography
Director, Center for Environmental Informatics

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PestWatch

http://www.pestwatch.psu.edu/

pestwatch

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ABOUT US

TIMELY TIPS

Timely Tips is an innovative IPM tool designed to increase communication, and deliver timely information on new and reoccurring pests.

- 2010 Timely Tips
- 2009 Timely Tips
- 2008 Timely Tips
- 2007 Timely Tips
- 2006 Timely Tips

Midwest Pest Information

- Midwest IPM Newsletters and Pest Fact Sheets
- Midwestern Corn Earworm Migration Forecasts and Pyrethroid Resistance Assays

Data providers

- University of Delaware IPM program
- University of Illinois Hybrid Disease Nursery Reports
- University of Maine Cooperative Extension
- Maryland Department of Agriculture, University of Maryland, and Future Harvest-CASA
- University of Massachusetts Extension IPM Program
- New Jersey IPM program
- New York IPM program and Cornell Extension
- Eastern Shore Crop Pest Advisory

Pestwatch is a northeastern regional view over space and time of dynamic information useful for managing insects or diseases.

Data providers create the human infrastructure powering this network.

Insect population information includes field-collected measurements of pheromone catches, black-light traps, or modeled estimates based on temperature-accumulations.

Comments/Questions?

Slide 24 of 25 100%

Slug web portal and reporting tool

Brown Marmorated Stink Bug Portal

http://stinkbug-info.org/

STINKBUG-INFO.ORG

The Insect | Management | Commodities | Image Gallery | Map Tools | Forum | About | Login | Admin | Register

The Insect

The Brown Marmorated Stink Bug

Description

Contribute

Report Brown Marmorated Stink Bug Sightings

Explore

Explore Brown Marmorated Stink Bug Sightings

Resources

Fact Sheet
PSU Entomology Cooperative Extension

The Brown Marmorated Stink Bug

Halyomorpha halys

The brown marmorated stink bug (BMSB), an insect not previously seen on our continent, was apparently accidentally introduced into eastern Pennsylvania. It was first collected in September of 1998 in Allentown, but probably arrived several years earlier. As of September 2010, Halyomorpha halys has been recorded from the following 37 counties, although it is probable that they are in all counties:

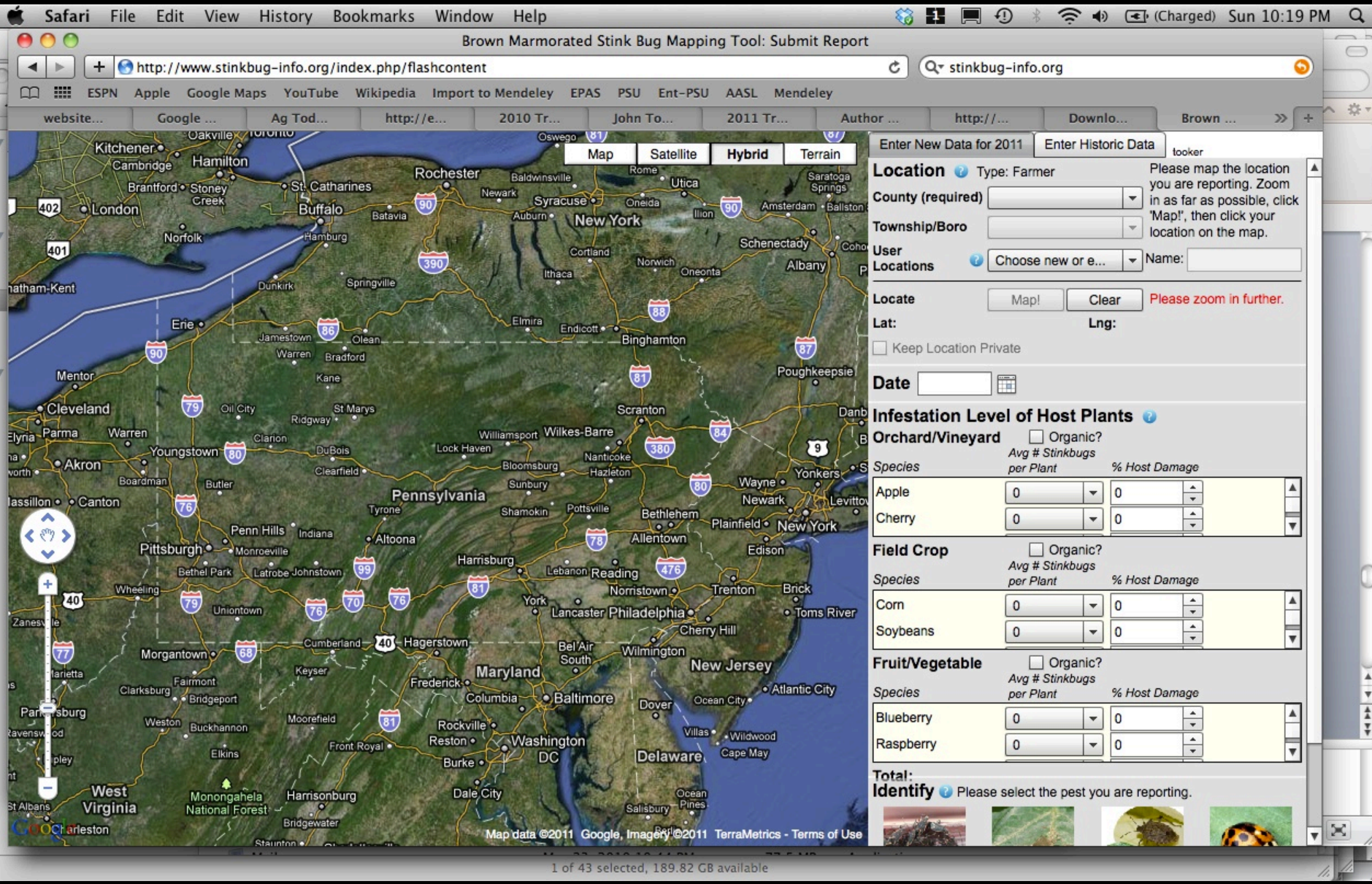
Figure 1: PA counties with recorded presence of brown marmorated stink bug

It is also recorded from many other states such as:

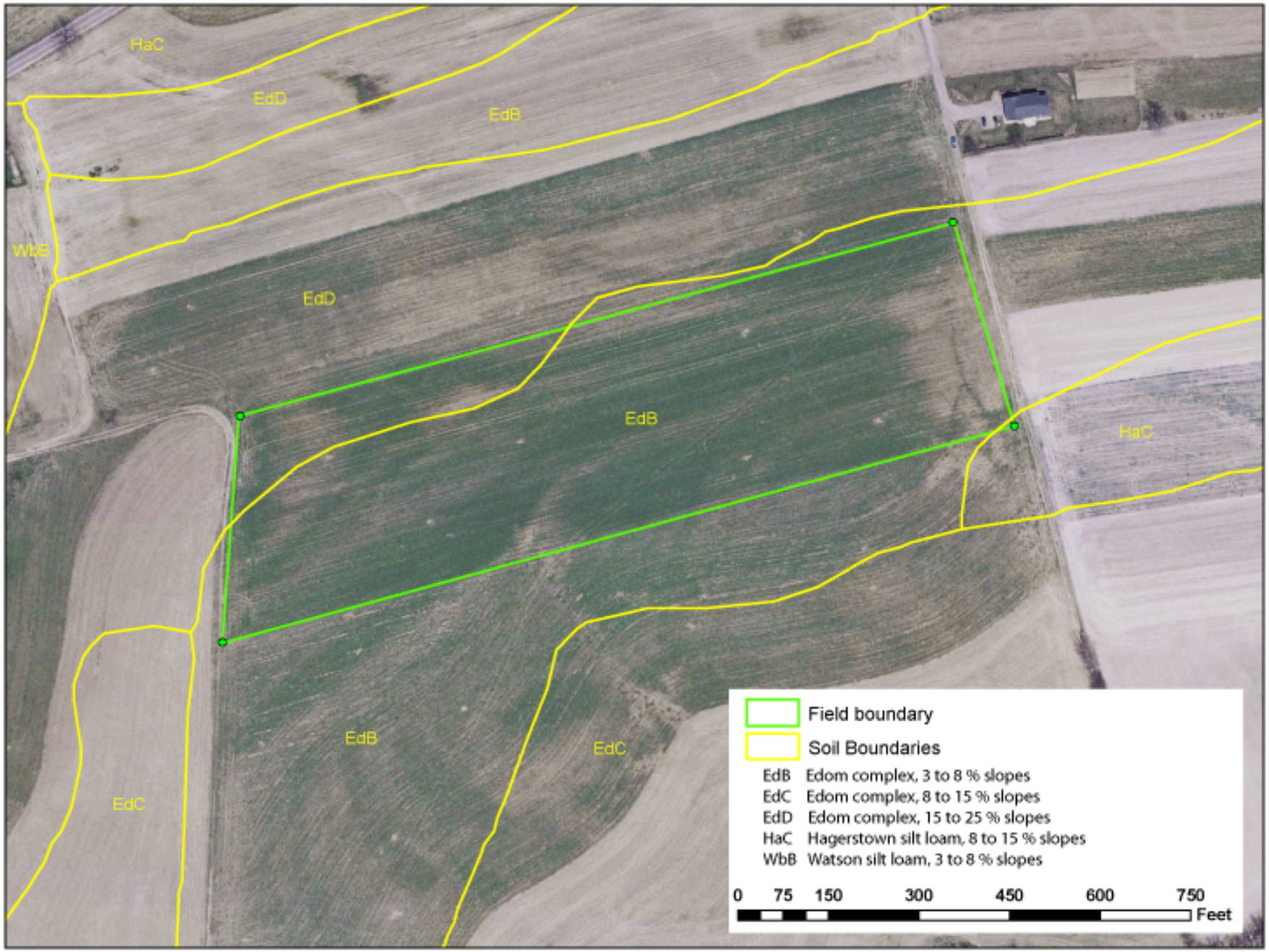
Slug web portal and reporting tool

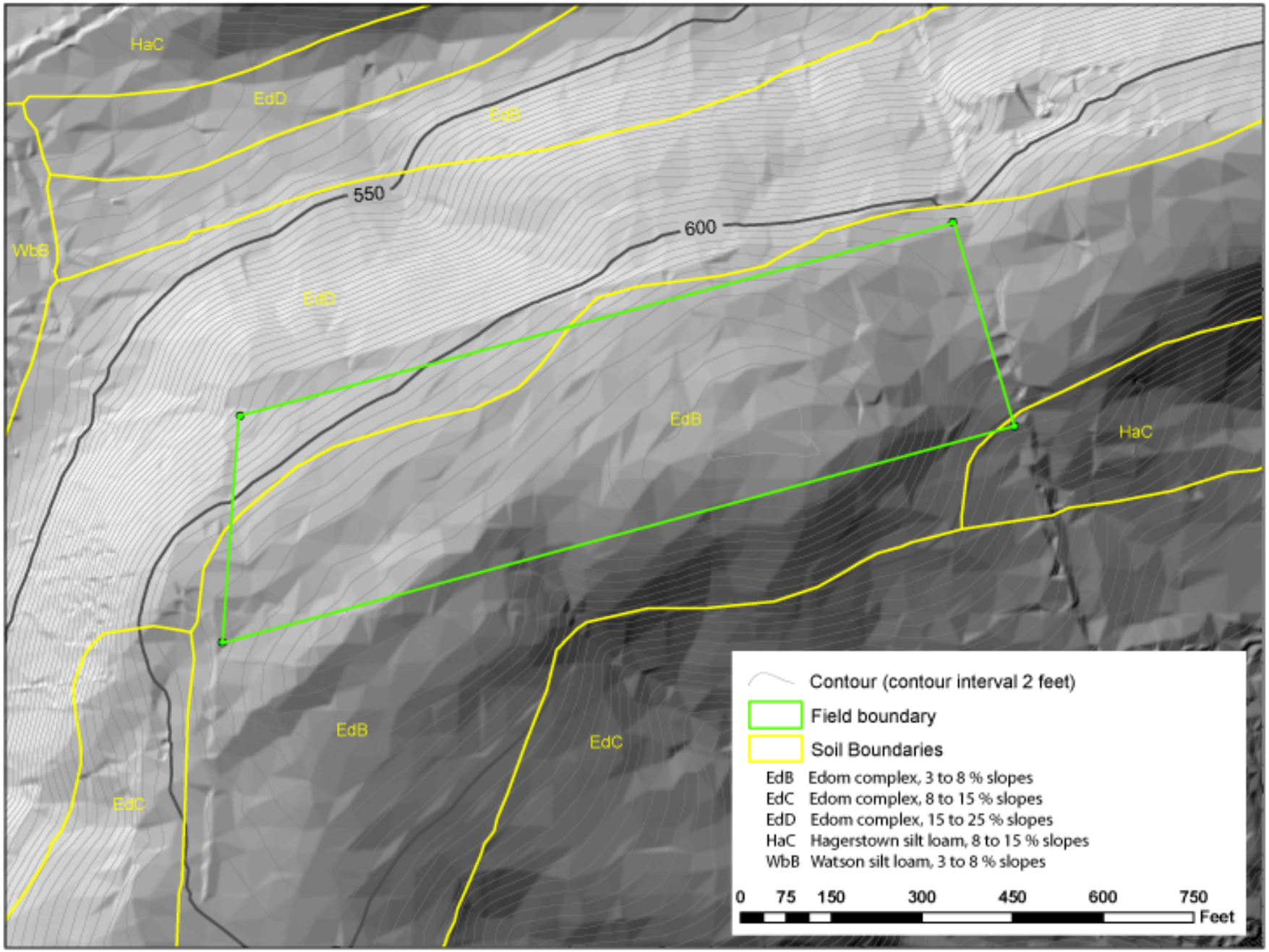
- Could be an extension resource presenting best management practices (Mid-Atlantic)
- Information on biology, images of slugs and damage
- Provide a home for a grower survey on slugs
- Get growers to report locations of slug problems
- Correlate slug problems with soil features

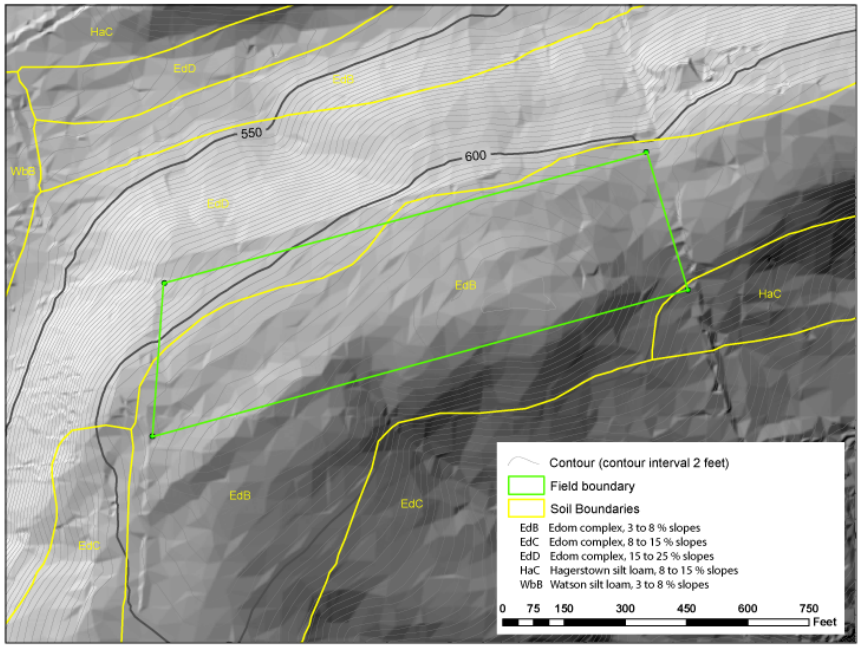
Slug portal and reporting tool…




Field boundary
0 150 300 600 900 1,200 1,500
Feet


HaC
EdD
EdB
WbB
EdD
EdB
HaC
EdB
EdC
EdC
Field boundary
Soil Boundaries
EdB Edom complex, 3 to 8 % slopes
EdC Edom complex, 8 to 15 % slopes
EdD Edom complex, 15 to 25 % slopes
HaC Hagerstown silt loam, 8 to 15 % slopes
WbB Watson silt loam, 3 to 8 % slopes
0 75 150 300 450 600 750
Feet

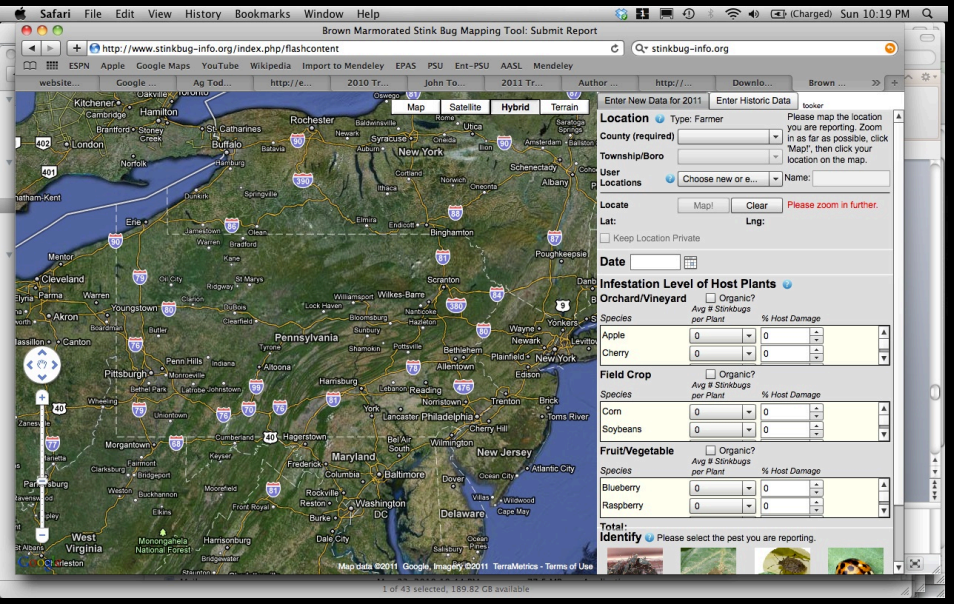

HaC
EdD
EdB
550
600
WbB
EdD
EdB
HaC
EdB
EdC
EdC
Contour (contour interval 2 feet)
Field boundary
Soil Boundaries
EdB Edom complex, 3 to 8 % slopes
EdC Edom complex, 8 to 15 % slopes
EdD Edom complex, 15 to 25 % slopes
HaC Hagerstown silt loam, 8 to 15 % slopes
WbB Watson silt loam, 3 to 8 % slopes
0 75 150 300 450 600 750
Feet

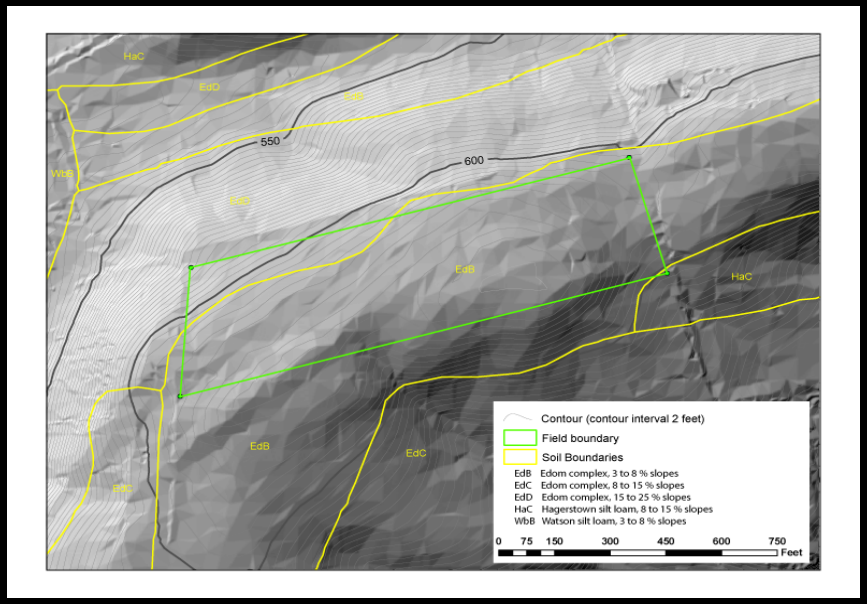


Soil mapping slug infested fields

- Could reveal environmental correlates
  - Slopes (exposure to sunlight)
  - Soil types
  - Soil textures
- GIS could add information on residue, temperature, moisture

Slug portal and reporting tool…





Website could:

1. Supply information for growers
2. Gather information via:
   a. Survey
   b. Reports of slug infestations

Questions?

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