Implications of Cover Crops for Crop and Insect Management ... the good, the bad, and the ugly

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Cover Crops can have positive attributes that you are all well aware of including ...

- Erosion control
  - Prevention of water / nutrient / pesticide runoff
- Soil health (organic matter, fertility)
- Weed control and/or a reduction in herbicide use
- Resources for pollinators
- A nursery for natural enemies
- Payments to growers

The type of cover crop and when it is controlled (killed) relative to the planting date can have a huge impacts on the risks and benefits
Integrating Cover Crops and Herbicides for Weed Management

Drake Copeland and Dr. Larry Steckel (University of Tennessee)
Reduced Tillage and Cover Crops

Generally increases diversity of the arthropod community.
It’s not all peaches and cream
(diversity is not always a good thing)

There are potential problems with cover crops, particularly in the South, where they may serve as a nursery for insect pests

- Reduced tillage and cover crops provide a great environment for insects ... they just love hiding in there ... and also some non-insect pests like spider mites, slugs and voles
- Inherent challenges with establishing stands
Cover crops can be a green bridge ... we have problems in no-till that we don’t have in tilled soil
The Examples I am Going to Show are Worst Case Scenarios

Long-standing IPM recommendation - destruction of cover crops or winter vegetation should be accomplished at least 3-4 weeks prior to planting crop to reduce the potential insect problems.

If it ain’t brown don’t put seed in the ground.
Observations on Pea Leaf Weevil in Soybean

Often abundant in fields behind Austrian winter field pea (Austrian peas)
  ◦ In some cases, it’s been a BIG PROBLEM
  ◦ They can also be a problem after vetch and probably clover

Larvae feed on nodules, and adults feed on foliage

Can be controlled with labeled insecticides but they continue to come out of cover crop residue for an extended period, resulting in multiple applications
Wheat and Vetch Cover Crop
Pea Leaf Weevil in Tennessee, 2017

No Insecticide Seed Treatment

Imidacloprid
Cover Crops and Insecticide Seed Treatment
Jackson, 2017

Imidacloprid | Untreated | Untreated | Imidacloprid
Seed Treatments Help (e.g., Don Cook, MSU)

Cruiser

NipsIt Inside

Acceleron

Not Treated (- 38 B/A)

Acceleron

Poncho
Tennessee, 2015
TCAH behind legume or legume/grass cover

Threecornered alfalfa hopper
Cover crops

Threecornered alfalfa hopper in soybean following vetch or Austrian winter peas

Slugs, slugs, slugs in no-till fields with high residue and where cover crops were used

Etc.
Corn Behind Austrian Winter Field Peas Cover Crop, Arkansas, 2013

Planted Green

Gus Lorenz (University of Arkansas)
Typical stink bug damage to seedling corn

Planted “green”
Stink bug damage to developing ears
Corn Behind Cereal Cover Crop, Arkansas, 2014

Looks Good!

Looks Bad!
The Midwest

Increased incidence and injury from true armyworm following rye
Things to Consider if Using a Cover Crop

Avoid the “green bridge” (i.e., burn down early)

Otherwise:
- Consider the type of cover crop (avoid matching the crop if possible)
- Use an **Insecticide Seed Treatment**
  - Higher rates in corn (or in-furrow application)
- Consider a near-planting foliar **insecticide treatment**
- **Scout** fields early and often ... have a game plan with your consultant/crop scout
- Follow good **IPM** practices for other pests
Yield Increase from an Neonic Seed Treatment
Compared with non-treated plots (Mid-South)

<table>
<thead>
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<th>Crop</th>
<th>Average Increase</th>
<th>Number of Trials</th>
<th>Gross Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>101 Lbs. Lint/Acre</td>
<td>67</td>
<td>$70</td>
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<tr>
<td>Corn</td>
<td>11.8 Bushels/Acre</td>
<td>91</td>
<td>$47</td>
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<tr>
<td>Soybean</td>
<td>2.0 Bushels/Acre</td>
<td>170</td>
<td>$20</td>
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</tbody>
</table>

Meta-analysis of replicated insecticide trials done from 2005-2014 (AR, LA, MS, TN)

North et al., Mississippi State University
Soybean Response to Insecticide Seed Treatment

Bushels/Acre (2005 – 2014, N = 170)

AR +1.68
LA +3.05
TN +1.05
MS +2.48
What About Slugs in Cover Crops?

- Residue and a food source is the problem
  - Will be worse behind high residue crops
  - Cover crops often keep the soil cool and moist
- Scout intensely the first 2 weeks after planting
- Baits are effective
  - Metaldehyde (Deadline MP), Iron phosphate
  - Insecticides don’t work
  - Baits are not cheap and require some planning
  - Can you use row cleaners?

Will an IST make slugs worse ... and should I care?
You can scout for them
We’ve Just Talked About a Few Pests

There’s a lot of potential for “weird stuff” … this is called job security for entomologists!

We don’t really know enough about how cover crops will change IPM
Some Prognostication About Cover Crops

- Latitude is inversely related to insect diversity (including pests), and there are more and varied kinds of fun as you get closer to the equator
  - i.e, Expect worse pest problems associated with cover crops in the South
- Cover crops will increase the value of at-planting insecticides and good IPM practices
  - Potential threat of introducing “weeds” to production fields
  - What about plant pathogens (seedling diseases in particular)?
Again ... There are Positives for Cover Crops

Cereal Rye/Cotton
- Thrips suppression
- Water conservation
- Weed suppression
Pesticide contamination of water is a hot-button issue
... and for Water Quality

- Regardless of any increase in insecticide use, I would expect cover crops to be a net benefit in terms of pesticide or fertilizer run-off
  - Less movement of water and soil to peripheral, non-crop areas
  - We are already managing seedling pests with seed treatments and foliar pesticide applications in many field crops
No Worries With This

Using an insecticide in a crop (like a neonicotinoid seed treatments) will not result in toxic levels of insecticides in the nectar or pollen of a subsequent cover crop

• Despite words of caution in NRCS and other literature, this is a non-issue for pollinators visiting the flowers of cover crops (really a non-issue for the treated crop)

• Bee-attractive cover crops are a benefit to pollinators ... let’s do our best not to spray insecticides when cover crops are flowering
  o Clovers, Austrian winter peas, rape/mustard, and vetch are very attractive to bees
UTcrops News

- UTcrops.com
- UT Variety Trials
- Soy Search
- UT Pest Guides
Questions?