THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Insects Are Full of Surprises: Field Crop Gotchas in 2021

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OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

Topics

I. Fall armyworm

II. Asiatic garden beetle

III. Seedcorn maggot


Fall Armyworms
Curtis Young, OSU Extension©

NATION

'Unprecedented' outbreak of armyworms are destroying lawns across the US, often overnight

Christine Fernando USA TODAY

Published 4:35 p.m. ET Sep. 1, 2021 | Updated 8:42 a.m. ET Sep. 2, 2021

Fall armyworms marching through Indiana fields, decimating crops

by Selina Guevara, WSBT 22 Reporter | Friday, September 3rd 2021

WSBT 22 photo

Turf

Alfalfa

Clover hay

After mowing hay

Sporadic damage in…

- Other forages
- Double-cropped soybean
- Winter wheat

When has this happened in Ohio before?

- A few farmers we spoke with remember something like this when they were boys in the 1950s

= over 60 years ago

How did this happen?

- We get our fall armyworms as moths from the Southern US (can't overwinter in Midwest)
- We usually have a few fall armyworms in later summer; never infestations
- So what happened this year? A perfect storm.

What happened

1. Particularly high infestations in the southern US (regular problems with FAW)
2. The wrong weather patterns
3. Higher than usual temperatures in many areas

All at the same time…

Heavy FAW season in South

- Especially warm winter and spring
- Abundant rain

→Early weeds (good food)

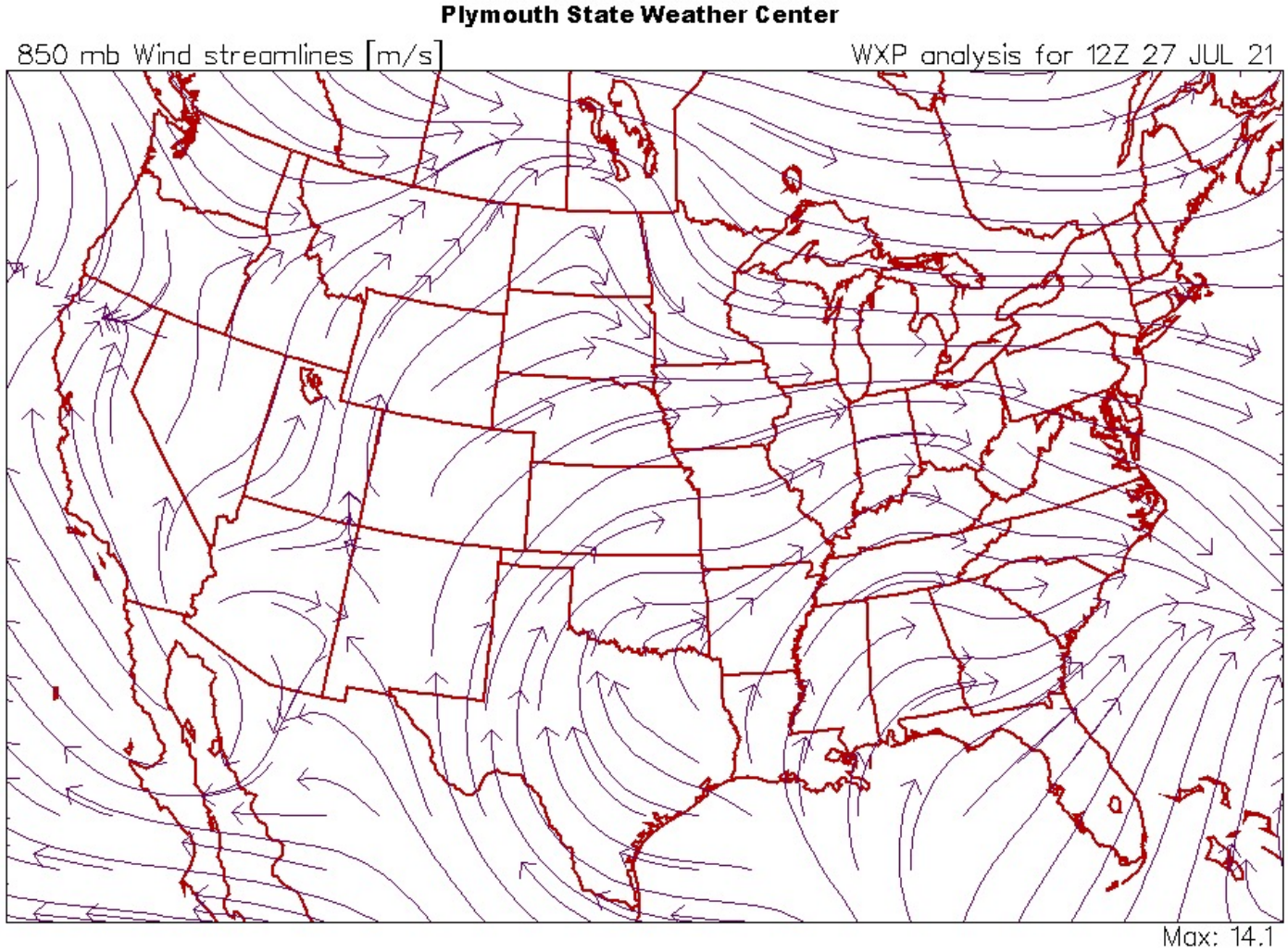
→Early population buildup

→Worse year than normal in South

Wrong wind patterns at the wrong time…

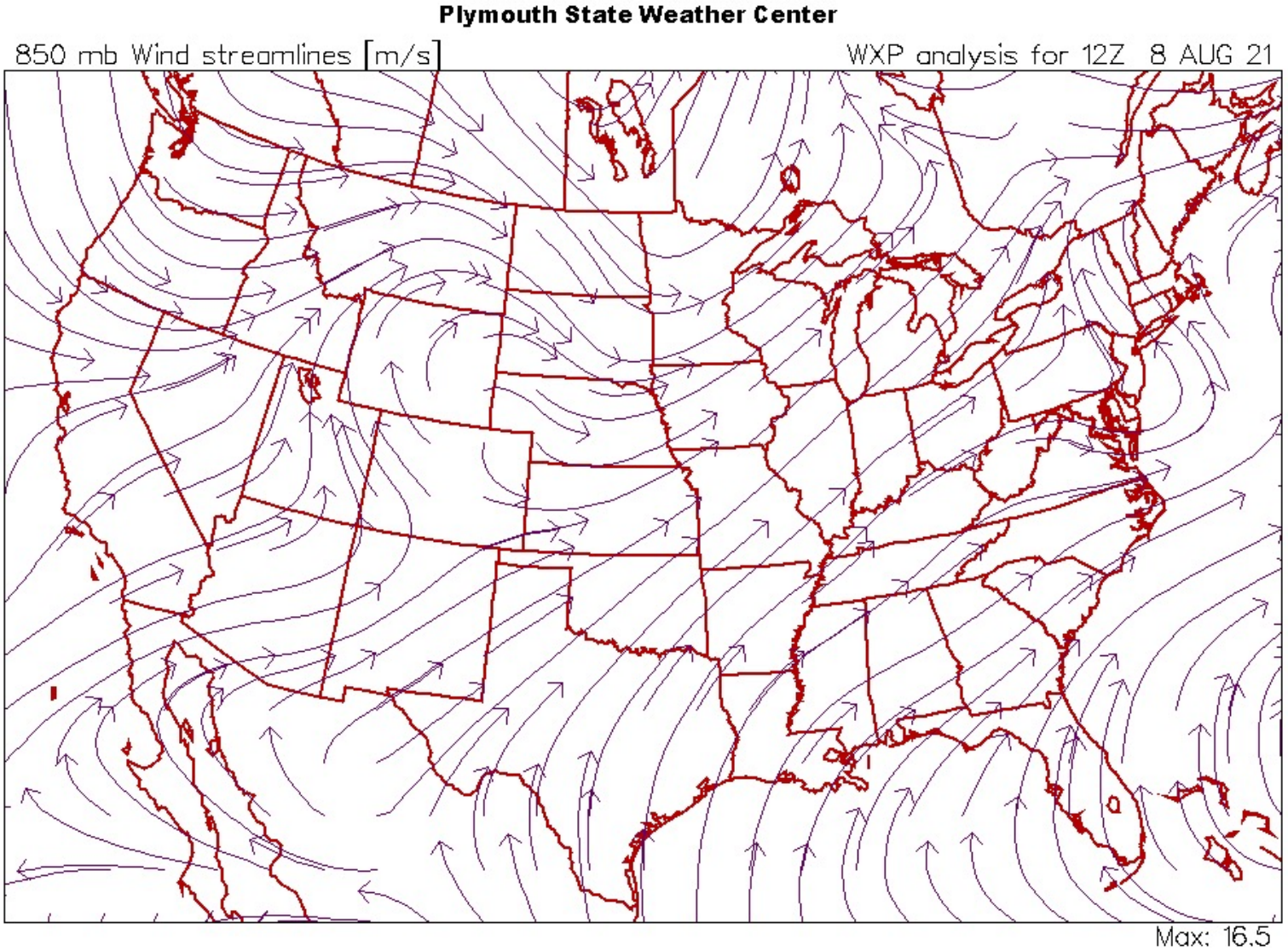
July 27

- Winds from the southcentral region likely brought the first batch of moths



Complex interaction between High in Illinois (weak), Low in N. Louisiana, and stationary front in TN Valley
At 850 mb (~4700ft) – Westerly flow with source primarily from the S. Central Plains. Courtesy of Aaron Wilson, OSU Climatologist

August 6-12



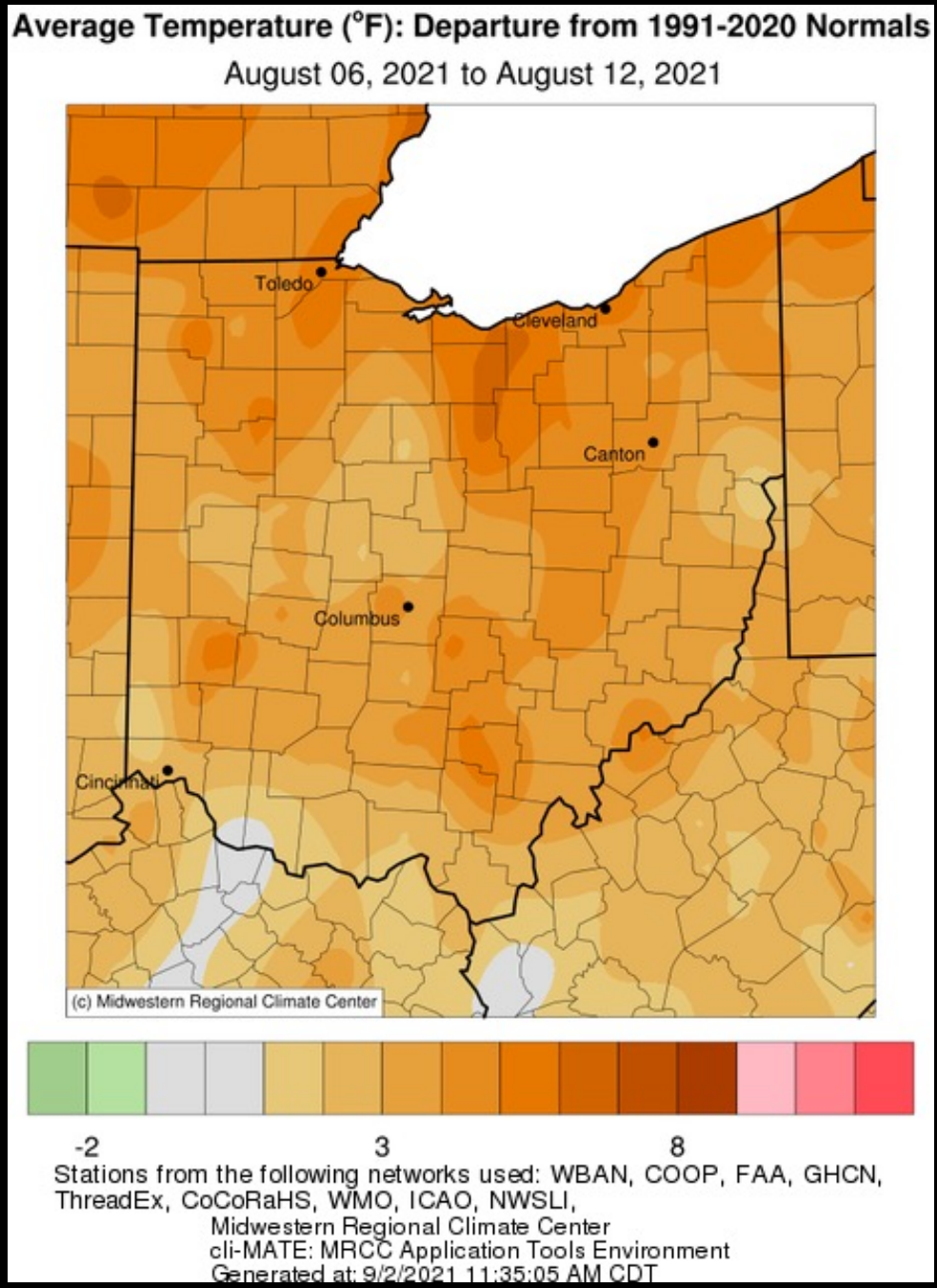
- Strong southerly and southwesterly flow aloft and at the surface for the next 6 days.

Strong High South of Ohio Takes Control for the next 6 days – courtesy of Aaron Wilson, OSU Climatologists

- Curtis Young, OSU Extension Educator:

"When I pulled my trap bottoms for the week of August 5-13…I found bunches of armyworm egg masses attached to my trap bottoms and fence"

Higher than average temperatures starting August 6



Fall armyworm biology

What are fall armyworms?

- There are several armyworm species (e.g., true armyworm, beet armyworm, yellowstriped armyworm)
  - True armyworm is an occasional Ohio pest of small grains early in the season

Fall Armyworm

Spodoptera frugiperda

Latin for "lost fruit"

Distribution

- Native to tropical regions: freezes kill
- Overwinters in US only in southern Florida and Southern Texas
- Adult moths disperse to other states during the summer
  - Usually only becomes a pest in southern or southeastern states

Feeding Range

- Broad host range
- Prefers grassy plants
- But will eat other things at need – alfalfa, clover, soybean, corn, each other…
- A potential threat to late-summer crops and fall seedings of winter wheat

Life Cycle

- About 30 days during the summer
  - About 2 weeks spent as caterpillars
- About 60 days in the spring and fall
- Variable number of generations depending when they arrive in an area

Fall Armyworm Lifecycle

Eggs(2-5 days)

Larva (14-21 days)

Pupa (9-13 days)

Adult (10-21 days)

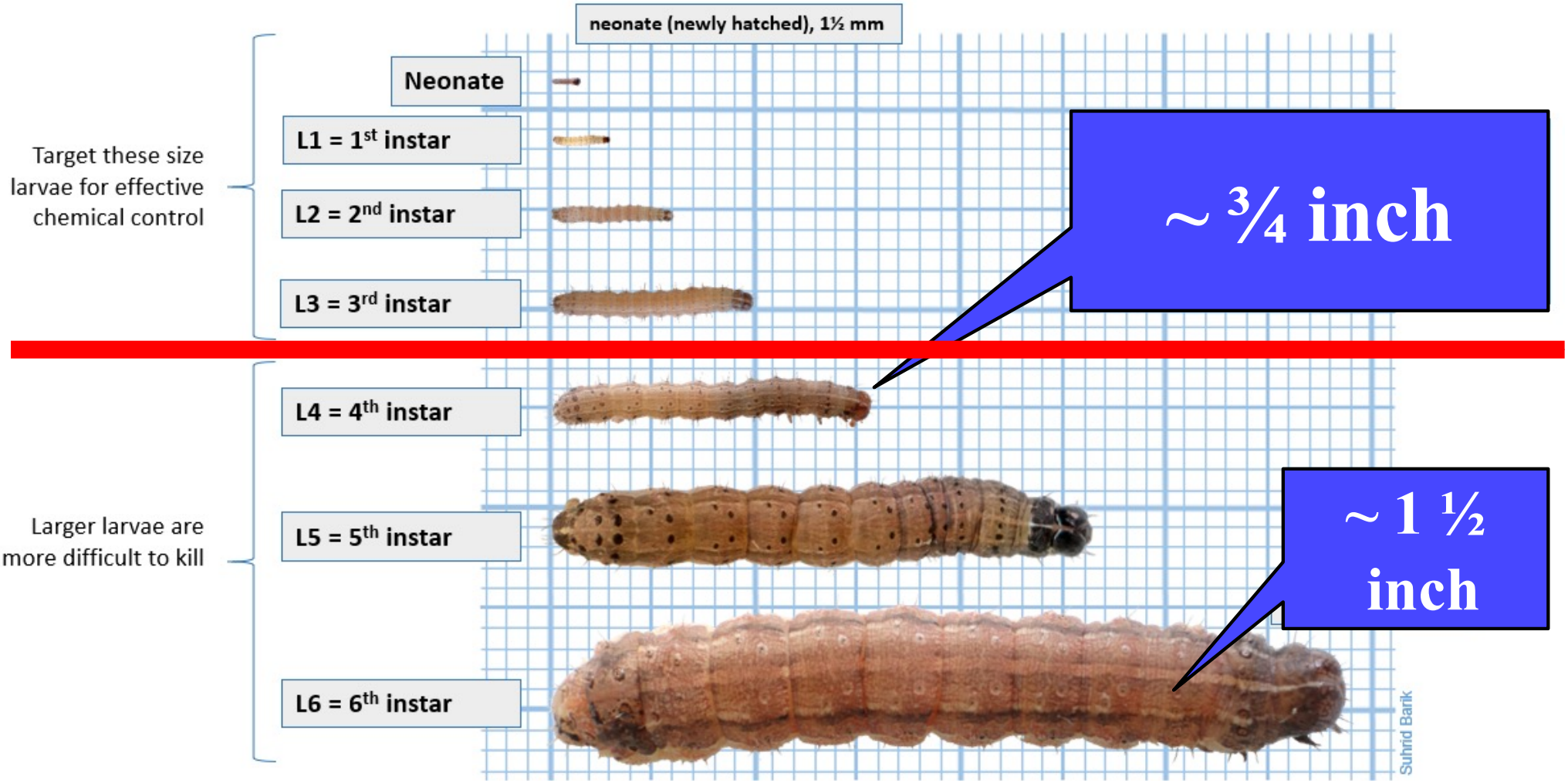


Fall armyworm egg masses

Eggs of the fall armyworm hatching

Photo by James Castner, University of Florida

Six Growth Stages (Instars)



Identification

"Brown moths" – requires some expertise

Caterpillars can come in different colors

Look for the inverted Y

Look for the four prominent dots on the tail-end

Natural enemies

- Parasitoids (in their year-round locations)
- Ground beetles
- Soldier bugs (predatory stink bugs)
- Birds, rodents, skunks, etc.
- Fungal and viral diseases

- These are often not sufficient to prevent outbreaks in a bad year

Management (field crops)

- Much easier to kill when small (less than ¾ inch)
  - Many standard one-chemical insecticides will work well enough at this point (e.g., Warrior, etc.)
  - BUT, growing evidence of resistance in some strains to some go-to pyrethroids

Management (field crops)

- Bigger caterpillars (more than ¾ inch) eat *a lot more, a lot faster*
  - 75% of all feeding happens in last growth stage (6th instar), over a 3-6 day window

- Bigger caterpillars are harder to kill
  - Many standard one-ingredient insecticides may NOT work very well
  - Multiple modes of action may help

Treatment *Guideline*

- No researched thresholds in Ohio
- Rule of thumb: 3 or more caterpillars per square foot
- These caterpillars are nocturnal – scout at dusk or dawn

Pasture and forage

- Monitor with a sweep net
- If hay is close to harvest, harvest ASAP
- If most are large (1 to 1.5 inches) control is likely too late

Pasture and forage

- If most are smaller…Try for good initial knockdown *and* residual control
  - Mix modes of action

Pasture and forage

- Knockdown
  - Pyrethroids (Mustang Maxx, Karate, Warrior II)
- Mix with a residual
  - Diflubenzuron (Dimilin) or methoxyfenozide (Intreprid), insect growth regulators that work best on small caterpillars; residual ~ 7-10 days, but won't provide good control after rain
  - Chlorantraniliprole (Prevathon, Beseige); expensive, but rainfast; up to 21 days residual at highest rate

Soybeans

- Especially soybean near grassy habitats or with lots of grassy weeds

- Under high pressure situations, go-to products include the diamides (chlorantraniliprole: Prevathon, Vantacor, Besiege); or Intrepid Edge (5 oz).

Fall Crops

- We saw a (smaller) next-generation in Ohio
  - Warmest October on record since late 1800s
- Fall crops that were potentially at risk – saw at least some economic damage in each of these
  - Winter wheat
  - Fall cover crops
  - Alfalfa

What to do at end-season in an outbreak year?

- Plant as late as possible
  - Cool weather slows development of caterpillars
  - First freeze (even light) will kill them quickly
- Scout new plantings regularly
  - Watch for small caterpillars – Just a few? Many?
  - Watch the weather forecast – Cool day or night temps? Is a frost expected?
- Abundant caterpillars, warm forecast → spray them small

Will we see it again?

- Climate changes may encourage more frequent outbreaks in the Midwest
  - Warmer, wetter winters and springs in the South → larger populations
  - Strong weather patterns → transport to Midwest
  - Hotter temperatures in Midwest → more favorable environment

Topics

I. Fall armyworm

II. Asiatic garden beetle

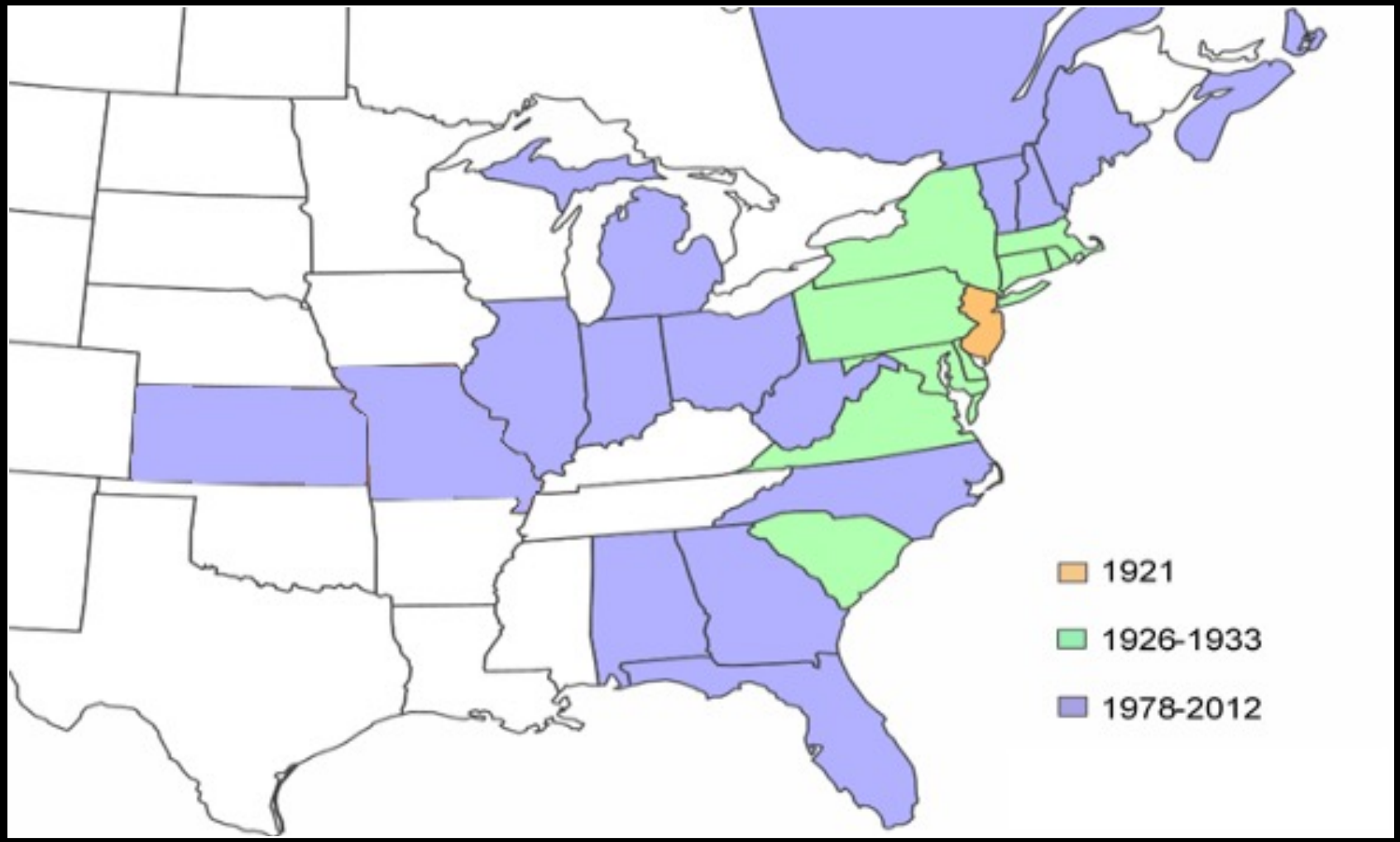
III. Seedcorn maggot

Asiatic Garden Beetle – a native of China & Japan

Discovered in New Jersey, 1921

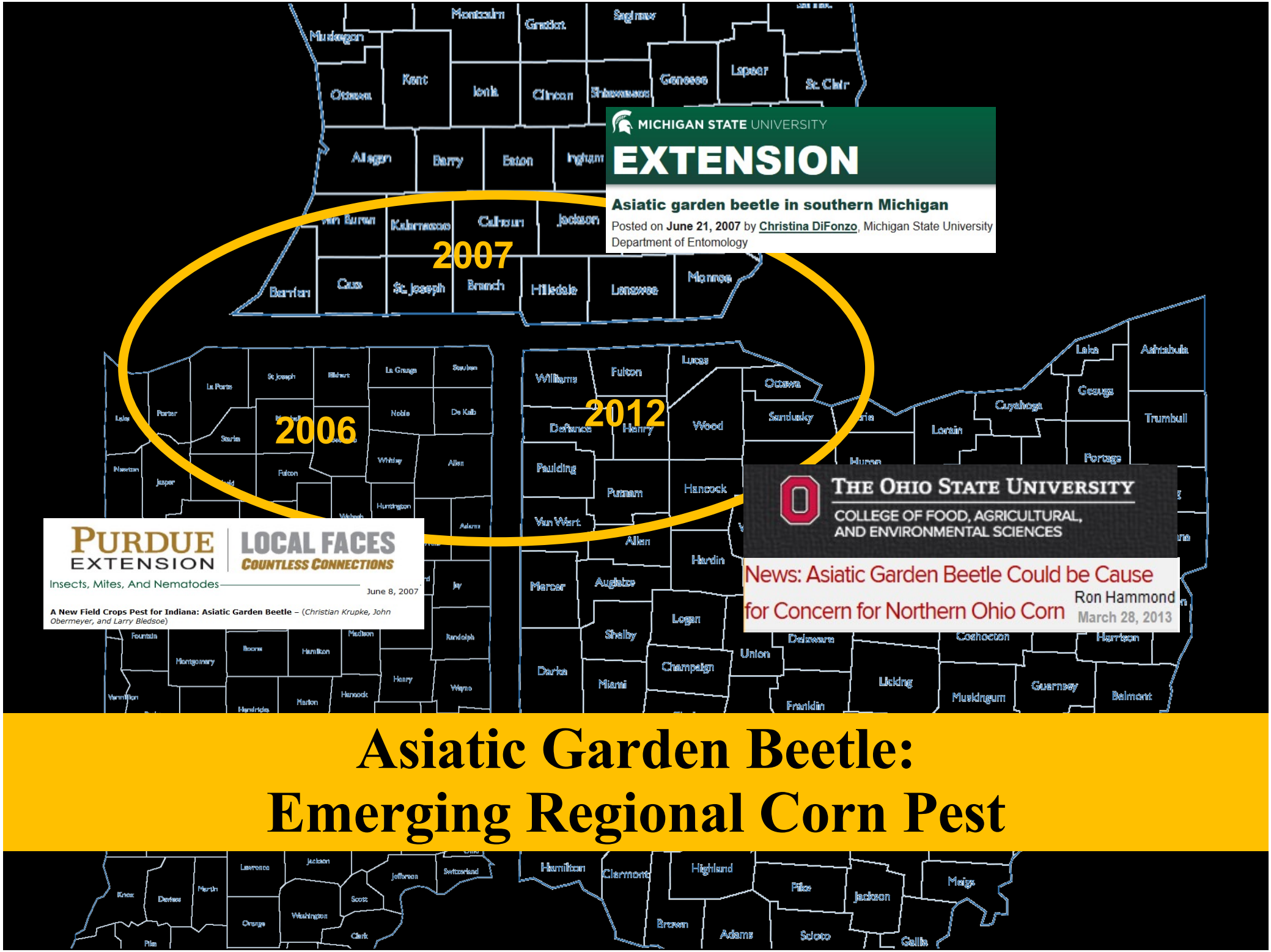
"gave promise of becoming a serious pest"

Present AGB Distribution



Became a grub pest of turf (or adult pest of ornamentals, vegetables, small fruit)

Asiatic garden beetle feeding on butterfly bush at night
Photo: P. Shrewsbury, UMD



Asiatic Garden Beetle: Emerging Regional Corn Pest

Asiatic garden beetle damage in Ohio corn

Amy Raudenbush

Asiatic Garden Beetle

Maladera castanea

Scarab; annual white grub

Biology

Asiatic garden beetle life cycle in Ohio

egg and 1st instar

2nd and 3rd instars

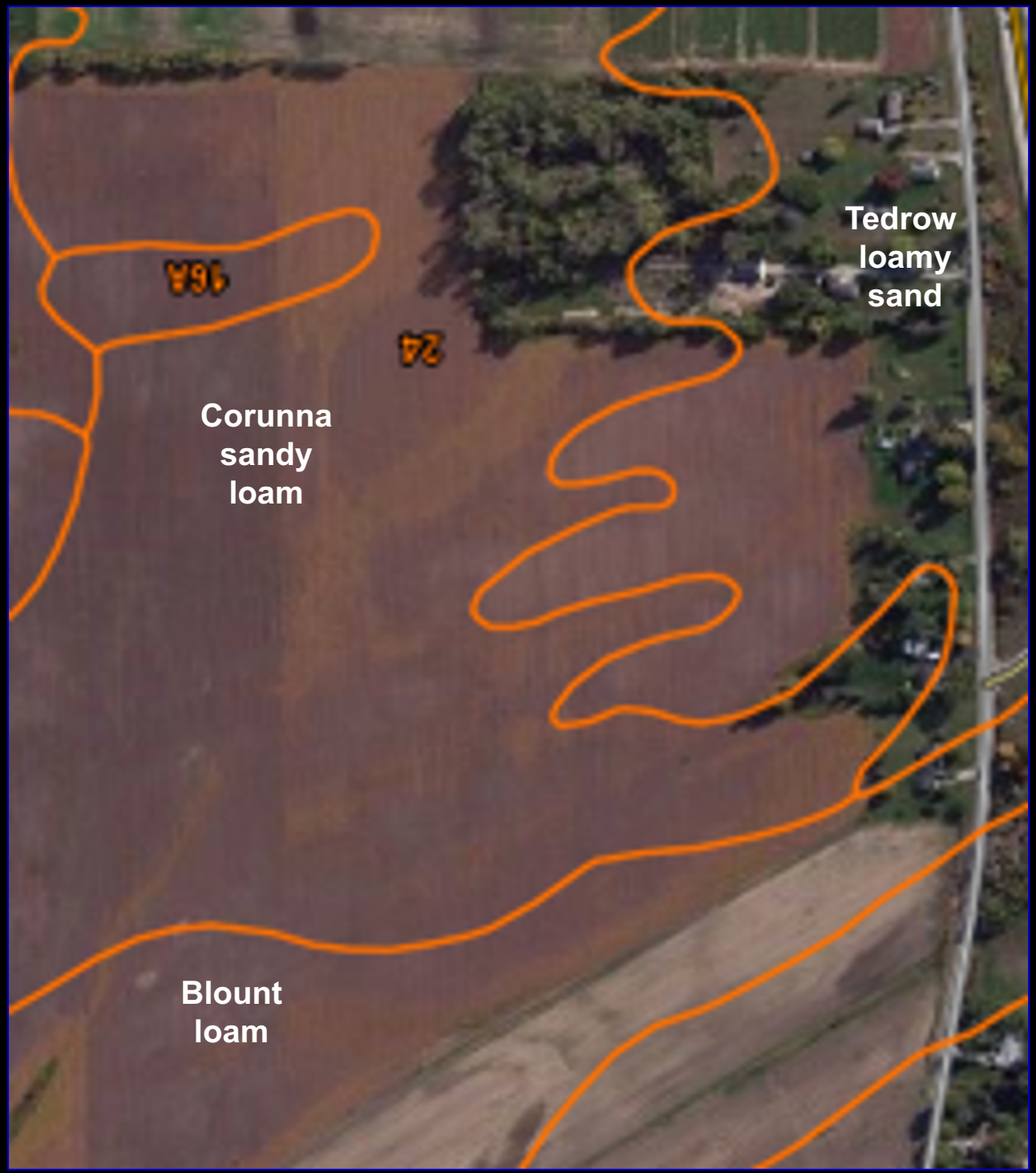
pupae and adults

AGB Grub ID

- enlarged ‘bulb’ near the jaws
- ‘bitey’ behavior; very active

third instar

- AGB is worst in *sandy soils*



Soil map


AGB
Damage

Other crops with AGB Damage

Soybean

Alfalfa

Wheat

Potato

~$1 million loss in SW Mich (2016)

Symptoms and Damage

- Stunted plants
- Plant stand loss (up to 40%+)
- Financial loss from re-planting
- Indirect yield loss from late replant timing

Sampling

Grub sampling

- golfcup cutter
- standardizes sampling

Management

- Thresholds – none available!
  - We are currently researching this
  - *Provisionally*, 1-2 grubs per cup-cutter sample
- Few management choices

Management

- What **doesn't** work:
  - low or moderate neonic seed treatment rate (250, 500)
  - high (1250) seed treatment rate under high AGB pressure
  - most in-furrow products at labeled rates
  - tillage (minor suppression)

Management

- Jury is still out:
  - Spraying R3 soybeans one year to kill adults and reduce egg (to protect corn the next year)
- Problem: infestations aren't predictable
  - we don't yet have a good way to predict which fields the adults are colonizing

Management

- Trying:
  - Different at-planting products and formulations at different rates
  - Relying heavily on lab tests right now to determine toxicity of different products against AGB

Preliminary Results, At-Plant Insecticide Efficacy

- Bifenthrin-only products *do not work*

Preliminary Results, At-Plant Insecticide Efficacy

- Bifenthrin-only products *do not work*

- Chlorethoxyfos is *very effective*
  - Index (AMVAC) – chlorethoxyfos+bifenthrin liquid
  - SmartChoice (AMVAC) – chlorethoxyfos+bifenthrin granules
  - both work well at lowest labeled rate

- Chlorethoxyfos is an organophosphate, very toxic
- Index (liquid) requires an injection system (Dosatron or Raven) – in-furrow only (no banding)
- SmartChoice requires a closed handling/application system (Smartbox) in-furrow only

Management

- What else helps
  - planting late – as late as possible
- Trying:
  - biological control – naturally occurring entomopathogenic nematodes

Looking for…

- Farmers with a history of AGB problems willing to plant some strip-trials to test different products, or R3 soybean sprays
  - Contact Kelley Tilmon, Tilmon.1@osu.edu or Chris DiFonzo, difonzo@msu.edu

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Seedcorn maggot
(*Delia platura*)

https://www.youtube.com/watch?v=p5mPonCbMVg

Seedcorn maggot, key points

- Adults (flies) are attracted to decaying organic matter, lay eggs in soil

- Eggs hatch to maggots which feed early on seeds (corn, soybean)

Seedcorn maggot, key points

- Damage is early in the season
- Poor emergence, skips in rows
- Most common in fields where green cover crop or manure is tilled in 7-10 days before planting
- Insecticidal seed treatments are effective control


Insecticide Seed-Treated
Untreated

- Very early planting in cold soils, with a long time to germination, frequent rain → can reduce efficacy of seed treatments

A special thanks to…

- All of my southern colleagues who provided emergency information on fall armyworm to help Midwest farmers deal with this once-in-a-generation problem

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Thank You

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