

Sunflower Special Topics: Insect Pests of the Sunflower Root and Stalk



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Sunflower Insect Pests

- **Root Feeders:**

- Wireworms
- Cutworms

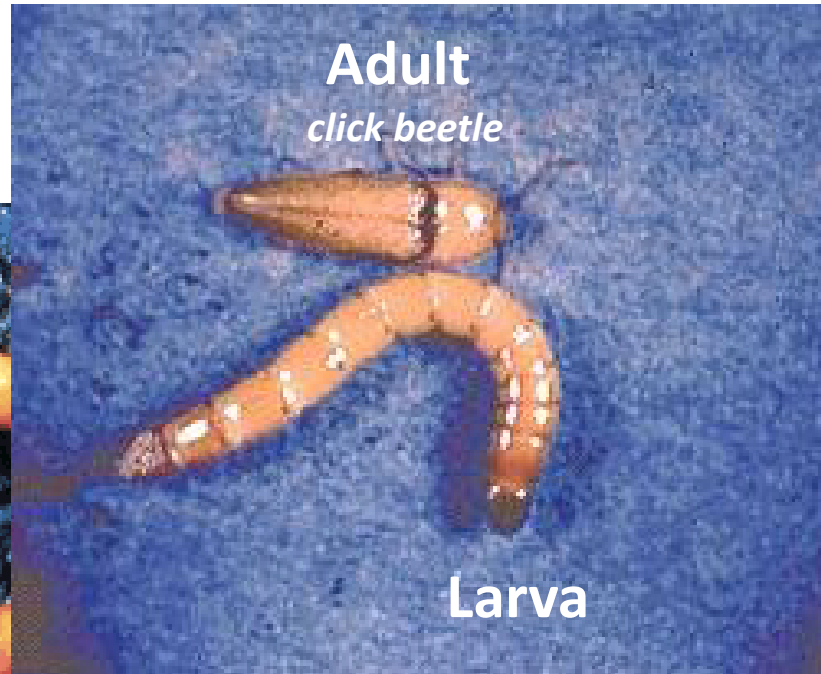
- **Stem Feeders:**

- Dectes stem borer
- Sunflower stem weevil
- Black sunflower stem weevil
- Sunflower maggot



Patrick Beauzay, NDSU

Wireworms



Adult
click beetle

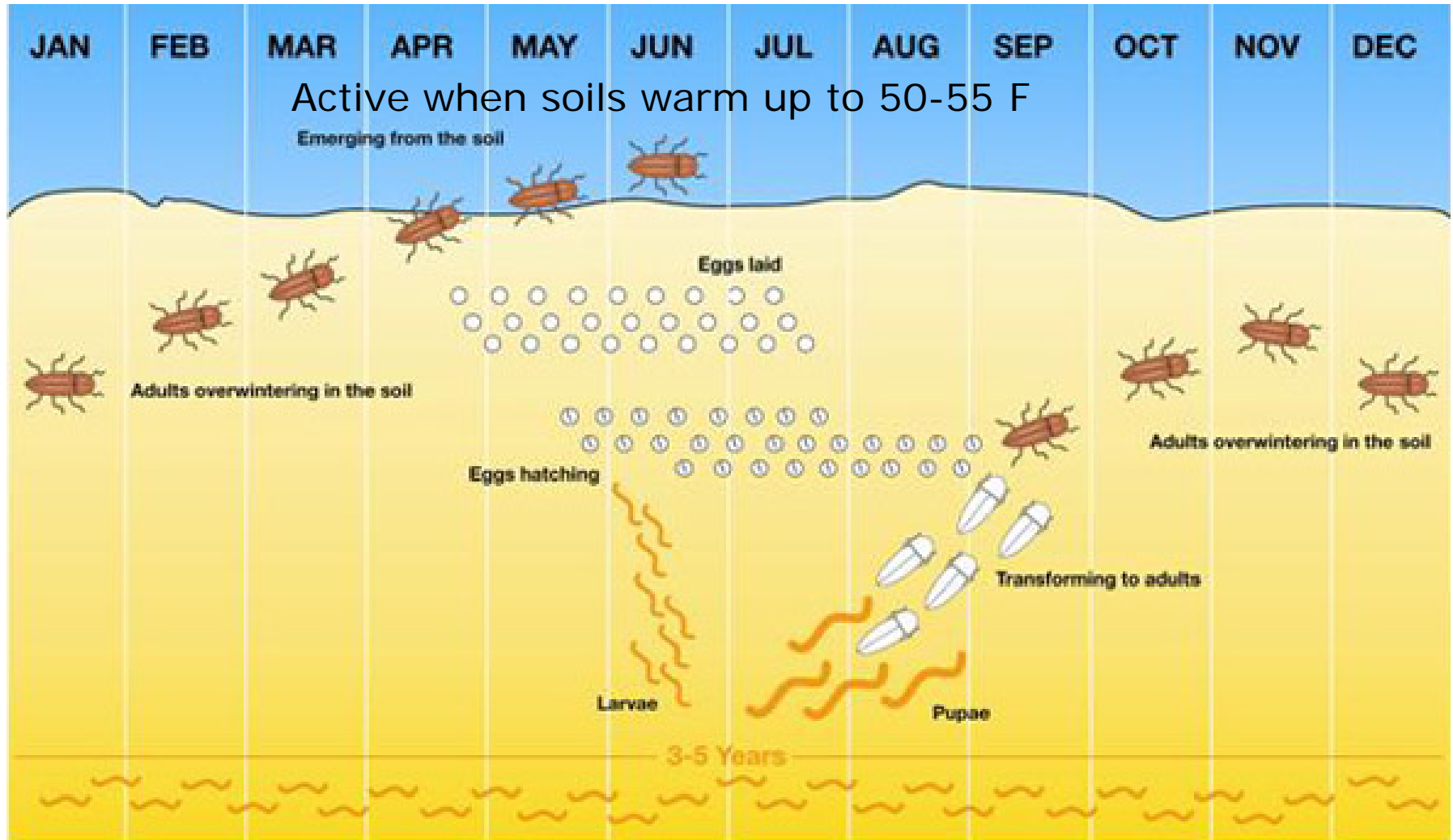
Larva



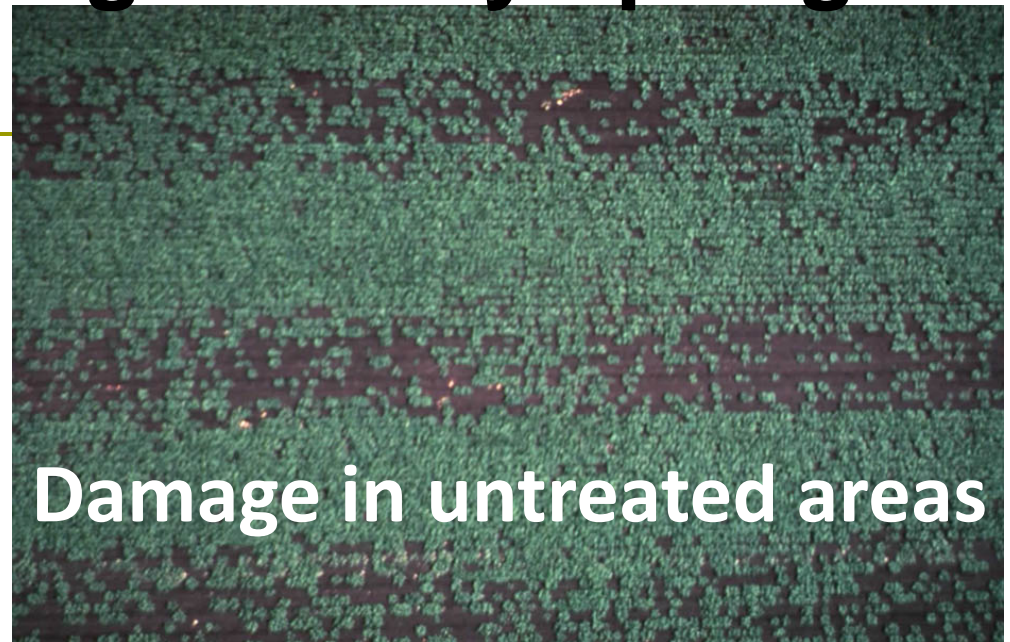
Adult
click beetle

- Larvae are 1/2 to 1 1/2 inches long
- straw colored, slender and hard
- 3 to 5 year life cycle
- Adult = click beetle

Wireworms Life Cycle



Wireworm Damage – Early spring



- Damaged plants appear wilted and die resulting in thin stands.
- Heavy infestations – bare spots and reseeded
- Decision to treat with insecticide must be made before planting
- History of wireworm



Wireworm Bait Station

Best use may be in the fall.
.. Check before freeze
OR put out in spring.



- Recommend 10 to 12 stations per 40 acres
- Randomly placed in the field
- Time consuming . . .

Thresholds

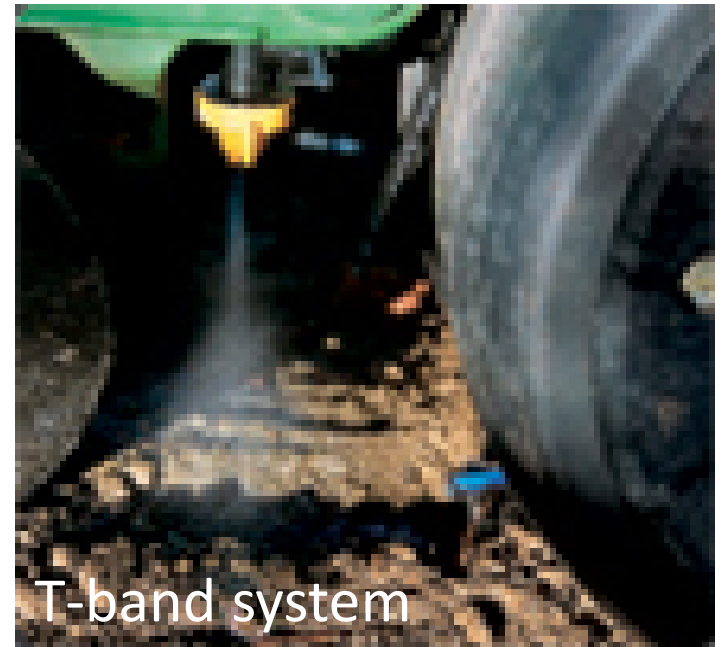
Soil Samples - 12 wireworms in 50 3x3 inch soil sample

Bait Stations - 1 or more wireworm / station

If more than one wireworm per trap, use soil insecticide (t-band or in furrow) or insecticide seed treatment!

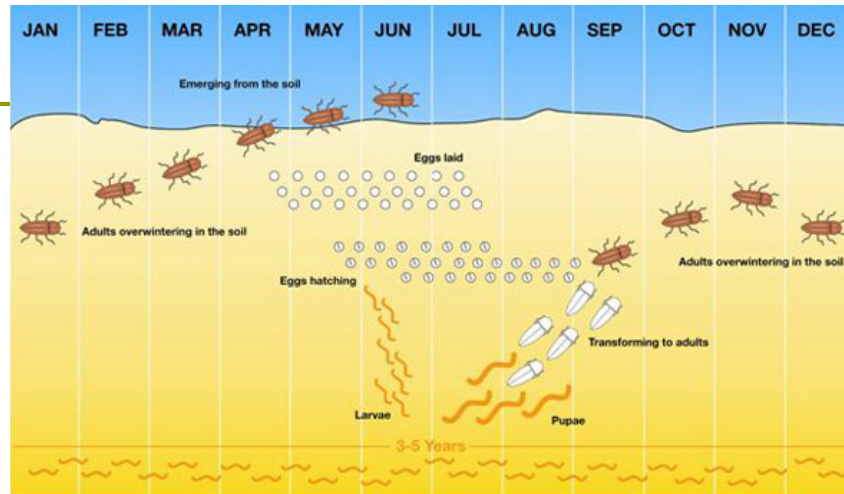


Insecticide treated seed



T-band system

Why are Wireworms Increasing?



- Neonicotinoid Seed Treatment (imidacloprid, clothianidin, thiamethoxam)
 - Provide excellent stand protection during spring
 - ✓ Repulsion
 - ✓ Short-term morbidity
 - Next spring, large and neonate wireworms were present and not significantly reduced from previous year

Vernon et al. 2009 J. Econ. Entomol. 102: 2126-2136

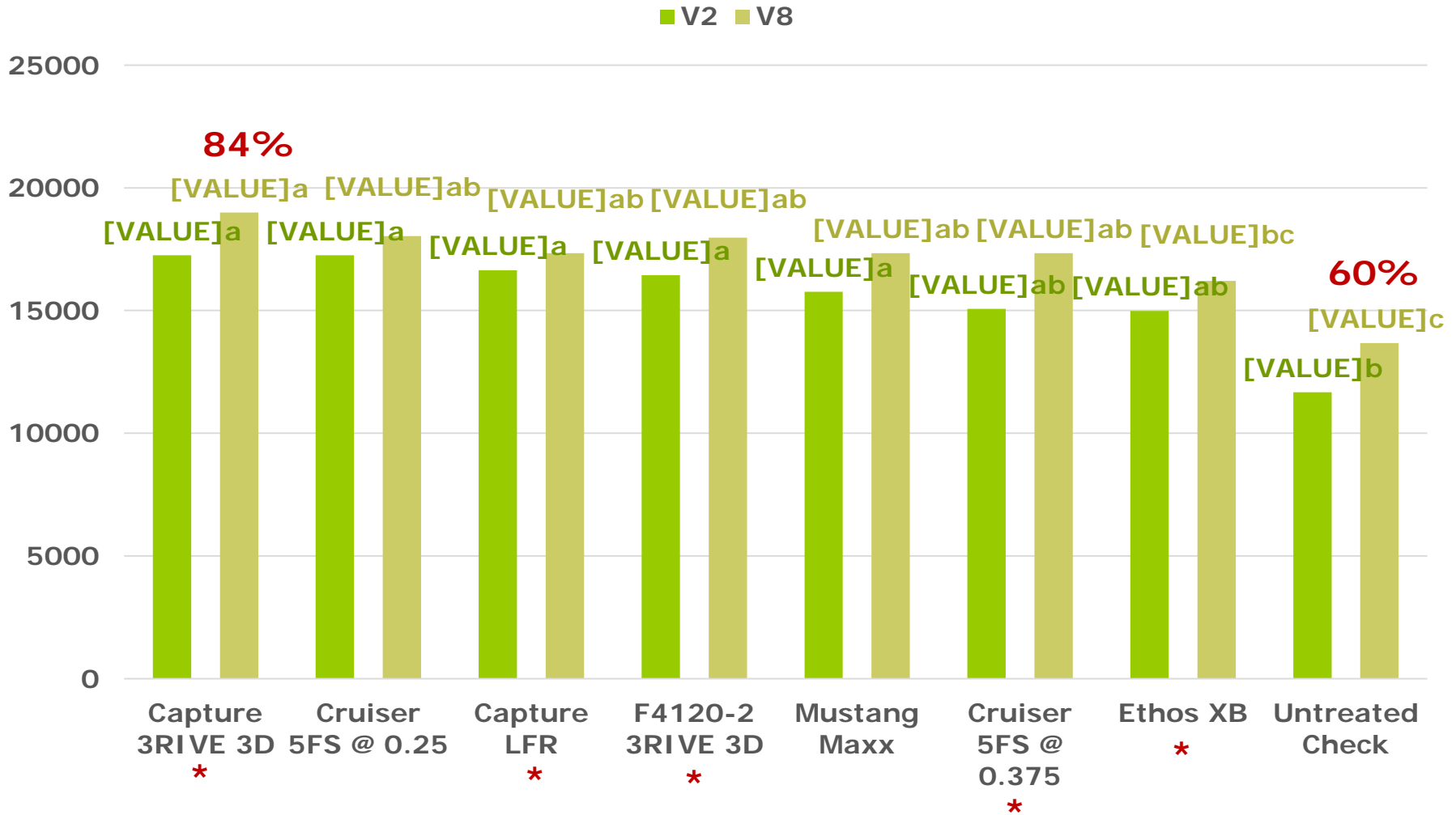
3RIVE 3D

CAPTURE
3RIVE 3D



- In-furrow foam system from FMC
- Cover more ground in less time with fewer water refills
- Saves water, fuel, labor and time

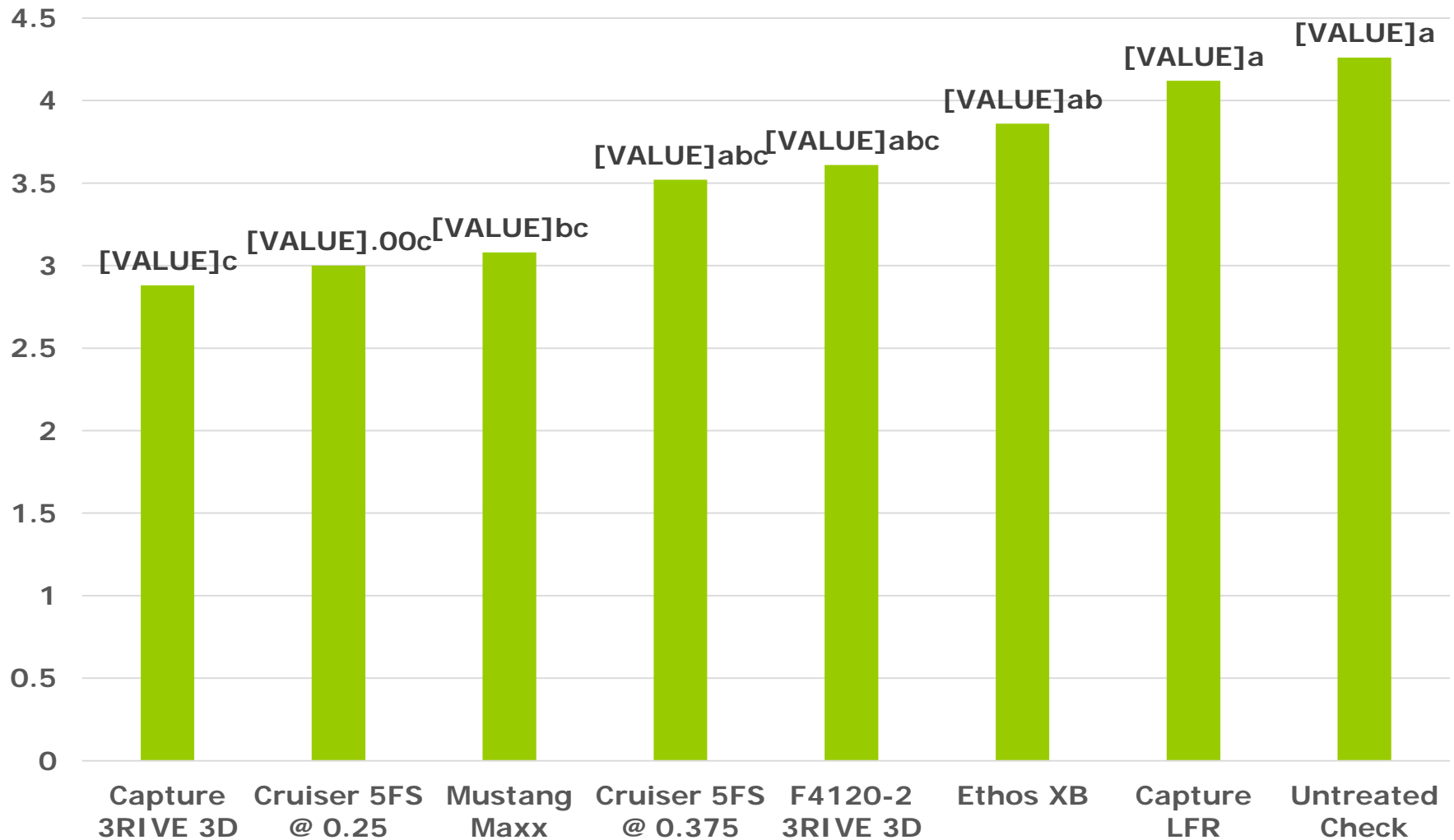
Treatment Means for Plant Population at Location 1, 2017



Seeding rate = 22,650 seeds per acre

* Not labeled in sunflowers

Treatment Means for Wireworm Root Injury Rating at Location 1, 2017



Cutworms

Lepidoptera: Noctuidae



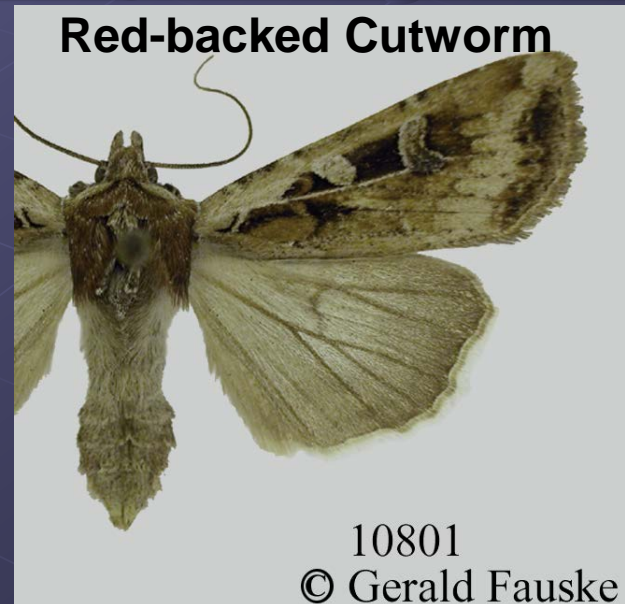
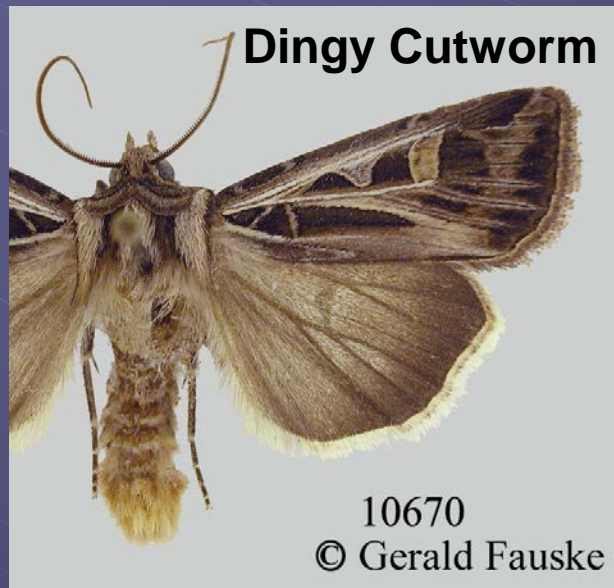
- Early season pest on seedlings
- Attack many crops = sunflower, canola, corn, sugarbeets, ...
- Increasing due to reduced tillage, ...

Cutworm Adults

● Adult (Family Noctuidae)

- Miller moths
- Very robust, stout bodies
- Brown or black moths showing various spots or stripes in shades of gray, brown, black or white
- 1.25-1.5 inch wingspan

● <http://www.ndsu.nodak.edu/ndsu/ndmoths/>



Cutworm Larvae

● Larvae

- Stout, smooth, soft-bodied, plump caterpillars
- Brown to tan to pink, green or gray and black
- 1.25-2 inches long when mature
- Life stage that causes crop injury!
- Chewing mouthparts



Life Cycle of Cutworm

One generation per year



Larval Feeding!



Overwinter as partially mature larvae or eggs

Adults lay eggs

Damage often notice FIRST

- Bare spots
- Wilted plants
- Worst on southern side of hill
- Low spots
- Reduced plant stand
 - Increase weed problems
 - Reduced yield
 - Fewer larger heads in sunflowers causing lodging, slow dry down and weedy field



Crop Injury

- Adult and larvae are active at night
- Difficult to scout for!
- Injury plants in 4 major ways:
 - Solitary surface cutworms
 - Black, Bronzed, Clay-backed, Dingy cutworms
 - Climbing species
 - Variegated, spotted, W-marked cutworms
 - Subterranean species
 - Pale western and glassy cutworms
 - “Marching” in great numbers
 - Army cutworms

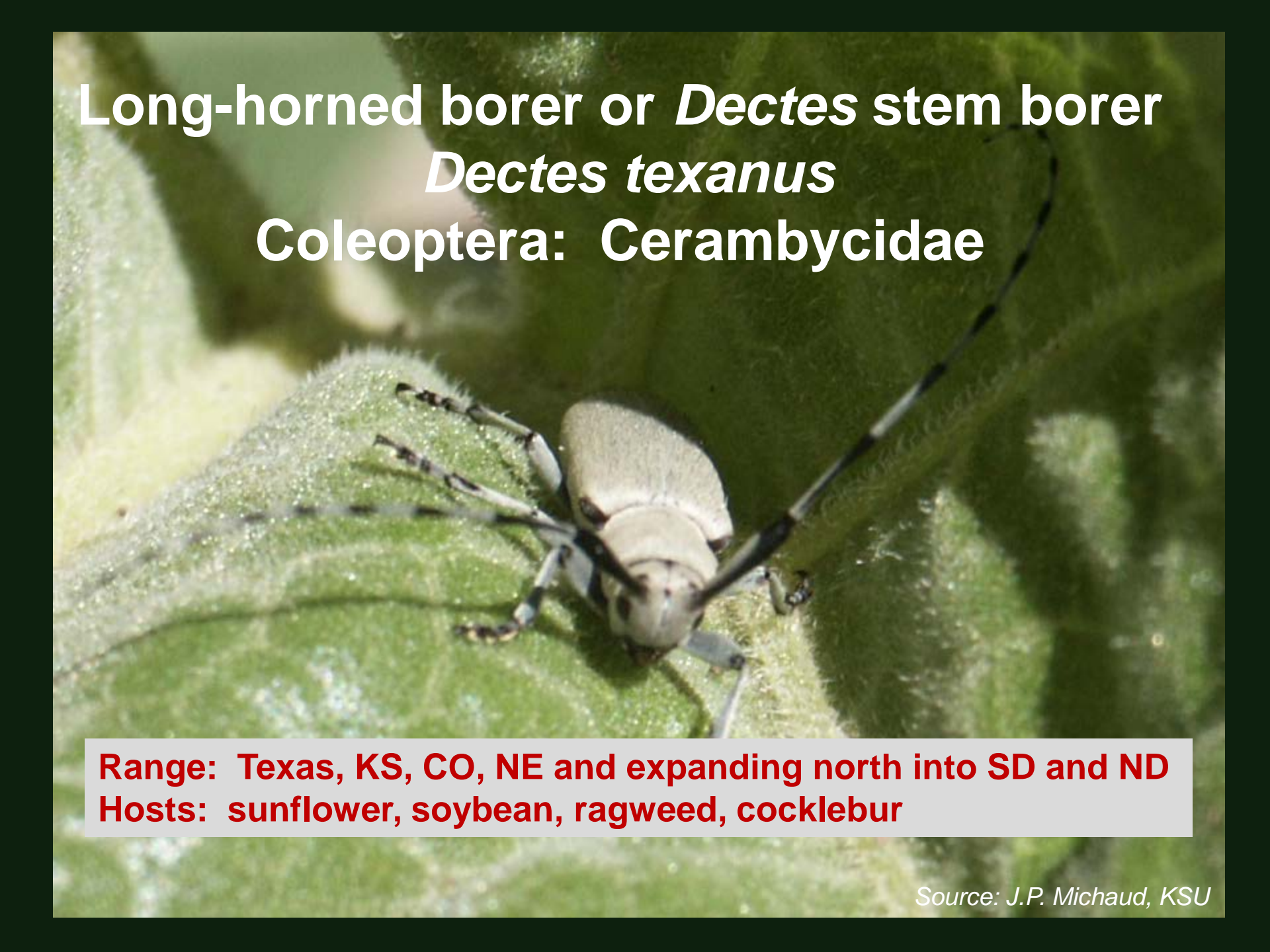


Cutworm IPM



- Scouting fields biweekly as soon as sunflower emerge until mid-June
 - Use trowel to dig around damaged plants
- Using economic threshold
 - **One per square foot or 25-30% stand reduction**
- Applying rescue foliar insecticide treatment
- Preventative IPM based on field history
 - Apply insecticide as T-band or in-furrow at seeding
- Insecticide seed treatment provides only suppression





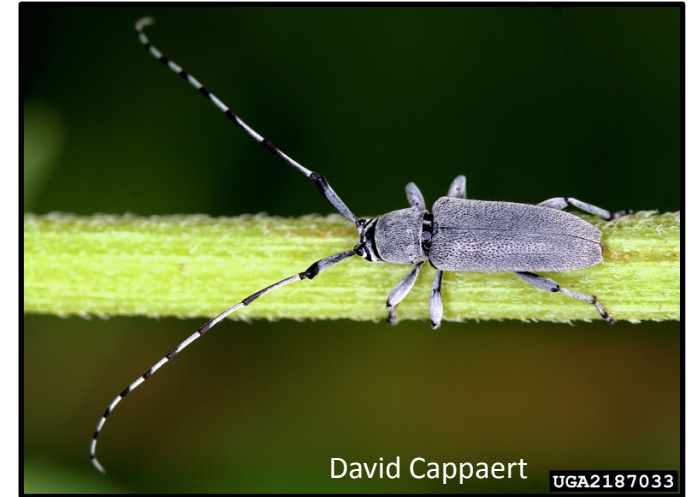
Long-horned borer or *Dectes* stem borer
Dectes texanus
Coleoptera: Cerambycidae

Range: Texas, KS, CO, NE and expanding north into SD and ND
Hosts: sunflower, soybean, ragweed, cocklebur

Source: J.P. Michaud, KSU

Long-horned borer/Dectes stem borer

- Adults are 5/8" long gray beetles
 - Very long antennae that have alternating segments
- Larvae are 1/3 to 1/2" long
 - Brown head and cream colored body



Dectes Stem Borer: Life Cycle



Larvae feed on stalk pith creating tunnels
Larvae go through 6 instars and are cannibalistic



Fall-Winter



LARVA

Late summer, larvae move to lower stalk and girdle it
Overwinters in lower stalks or crown roots



Spring



PUPA



ADULT

Emerge June through August



EGG

Egg laying in July-August



Females lay 50 eggs in leaf petioles.
Hatch in 6-10 days into larvae

Long-horned borer/Dectes stem borer

- Larvae bore in stalk
- Girdle the stalk at the base and overwinter





Yield loss from lodging!

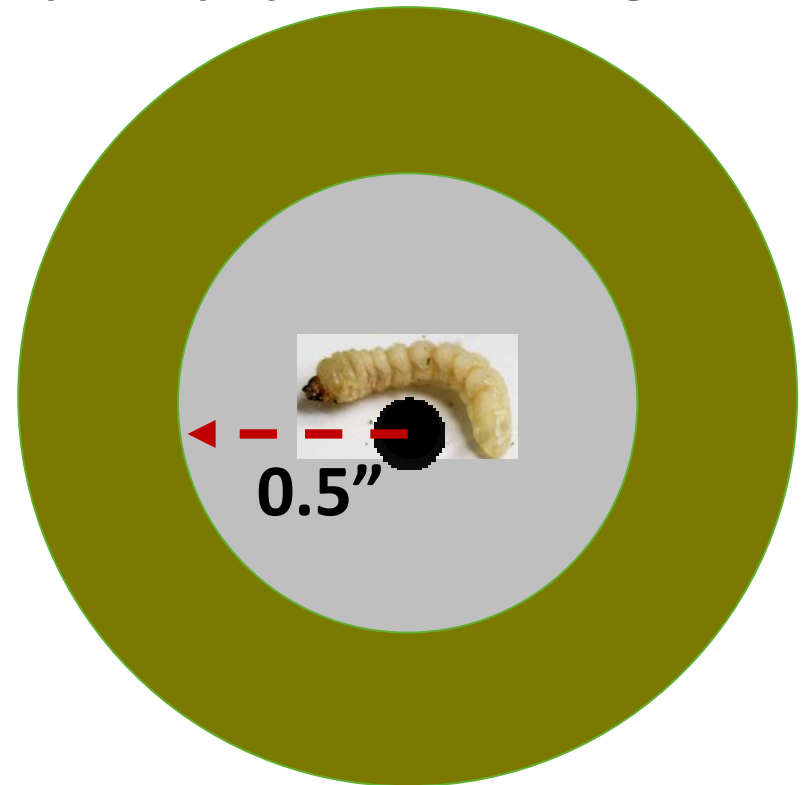
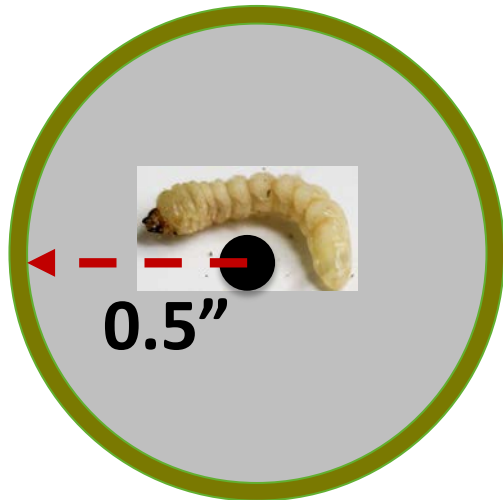
Source: J.P. Michaud, KSU

Long-horned borer/Dectes stem borer

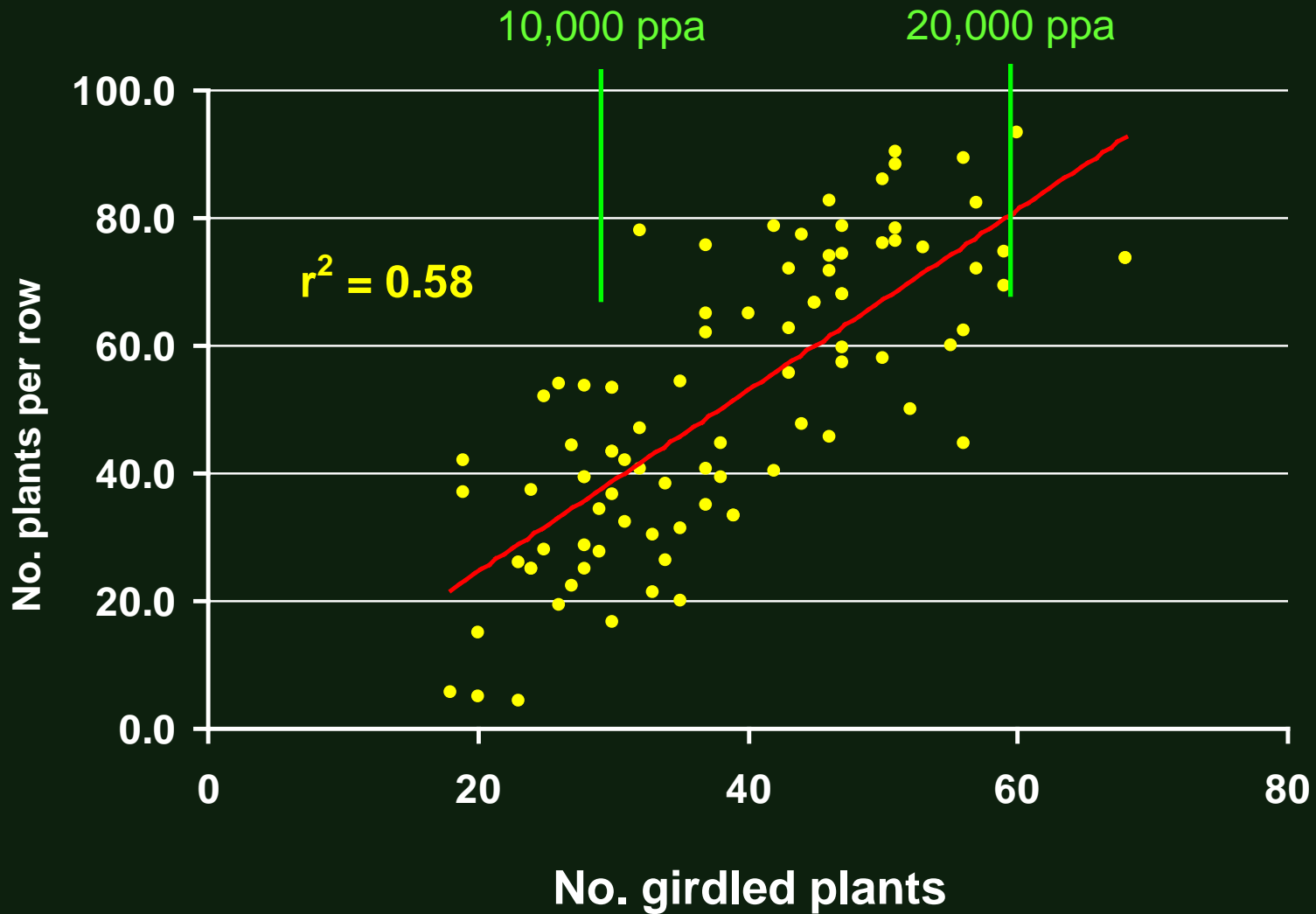
- **Injury:** From girdling (lodging); not feeding

Low plant populations/Large stems

High plant populations/small stems



Dectes larval girdling as a function of no. plants / row, Sept. 5, 2005



Long-horned borer/Dectes stem borer

- **Girdling:**

- Slender stems girdled sooner
- Dry conditions + slender stems = earlier lodging



Dectes Stem Borer: IPM

- No scouting or E.T. established
- Cultural
 - Delayed planting
 - Lower planting populations
 - Fall tillage
 - Prompt harvest of infested fields
- Host Plant Resistance
 - Wild sunflowers are resistant to stalk infestation
- Chemical Control
 - Foliar insecticides not effective due to long window of adult activity.



J.P. Michaud, KSU



J.P. Michaud, KSU



**Range: Southern and northern
Great Plains states into Canada**



Sunflower stem weevil
Cylindrocopturus adspersus

Black stem weevil
Apion occidentale



Source: J.P. Michaud, KSU

Sunflower Stem Weevil: Identification

- Adult
 - 3/16 inch long, gray with white markings on wing covers, black snout
- Egg
 - Very small, oval and white
- Larva
 - 1/4 inch long when mature
 - Legless, creamy white with brown head capsule
 - C-shaped larva in stem
- Pupa (resting stage)
 - Similar to adult but creamy white



Sunflower Stem Weevil: Life Cycle



Egg hatch in early July and larvae feed in pith through August before moving to lower stalk or crown root.



EGG
Egg laying in July-August

Fall-Winter



LARVA
Overwinter as larvae in stalks

Spring



PUPA

Summer



ADULT
Emerge mid to late June

Sunflower Stem Weevil: Crop Damage

- Minor damage: Adult feeding on stem-leaf tissue
- Major damage: Larval tunnel in pith and overwintering chambers
- Dryland sunflower - 20-25 larvae per stem cause stalk breaking and lodging of heads
- Irrigated sunflower need 80 larvae per stem to cause yield loss
- Lodging worst in drought or high winds when plants are dry before harvest
- Weevil transmits Phoma black stem (*Phoma macdonaldii*)



Sunflower Stem Weevil: Scouting

- **Timing: 8-14 leaf stage (V8 – R1)**
- **Difficult due to the weevil small size, cryptic color and 'play dead' behavior**
- **Walk W pattern in field**
- **Sample 5 plants at 5 sites (total of 25 plants)**
- **Record weevils and calculate average weevil per plant**
- **Various foliar materials @ V8-V10 give good results, but don't count on seed treatments to provide protection**

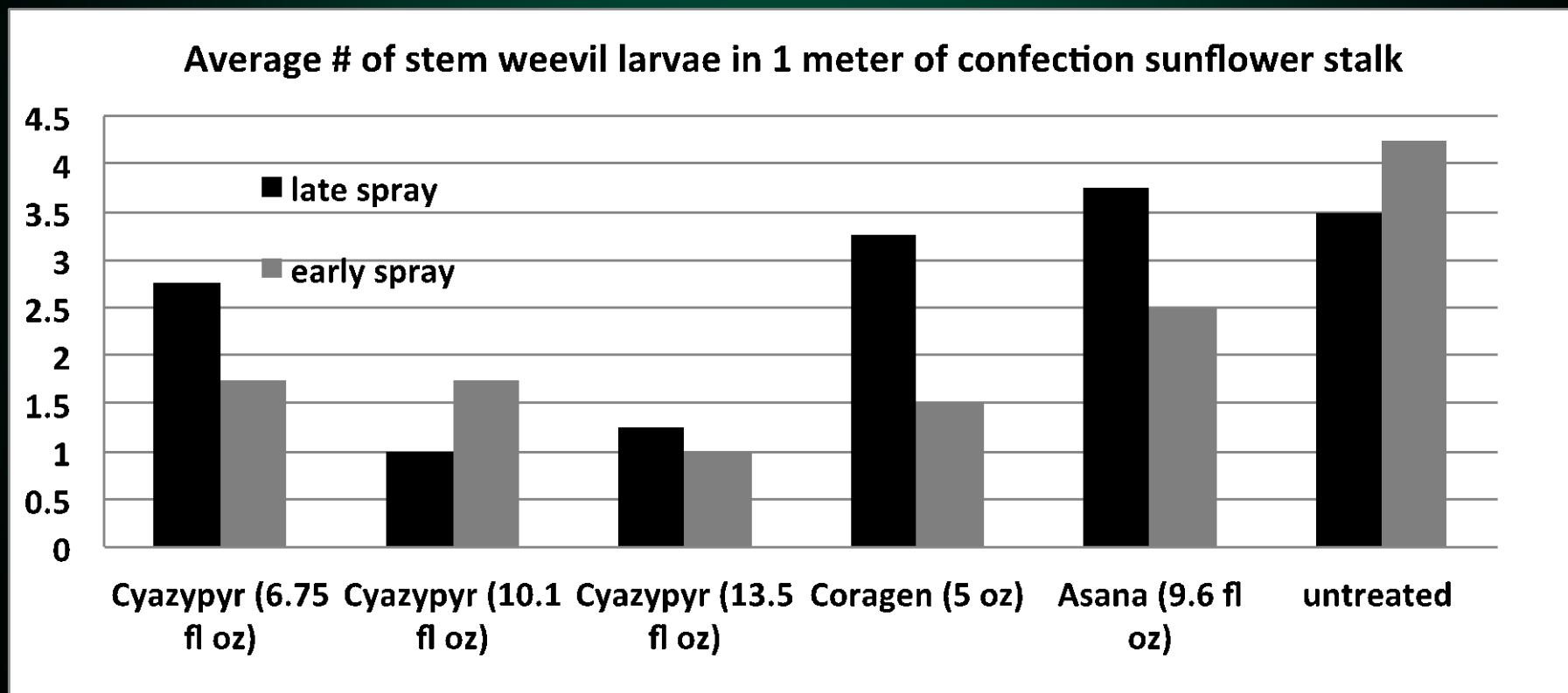


■ **Economic Threshold**

1 adult sunflower stem weevil per 3 plants

Suppression of spotted Sunflower Stem Weevil (*Cylindrocopturus adspersus*)

Source : Dr. Bradshaw, Univ. of Nebraska



Sunflower Stem Weevil: IPM

- **Cultural**
 - Delayed planting – late May or early June
 - Reducing plant population (<18,000 plants per acre) decreases damage from lodging (thicker stem diameter)
 - Disking to break up stalks and plowing to bury them 6 inches deep
- **Host Plant Resistance**
- **Biological Control**
 - Parasitic wasps



Figure 13. Larval parasitoid of the sunflower stem weevil, *Nealiothus curculionis* (Braconidae).
Size=4-5 mm.

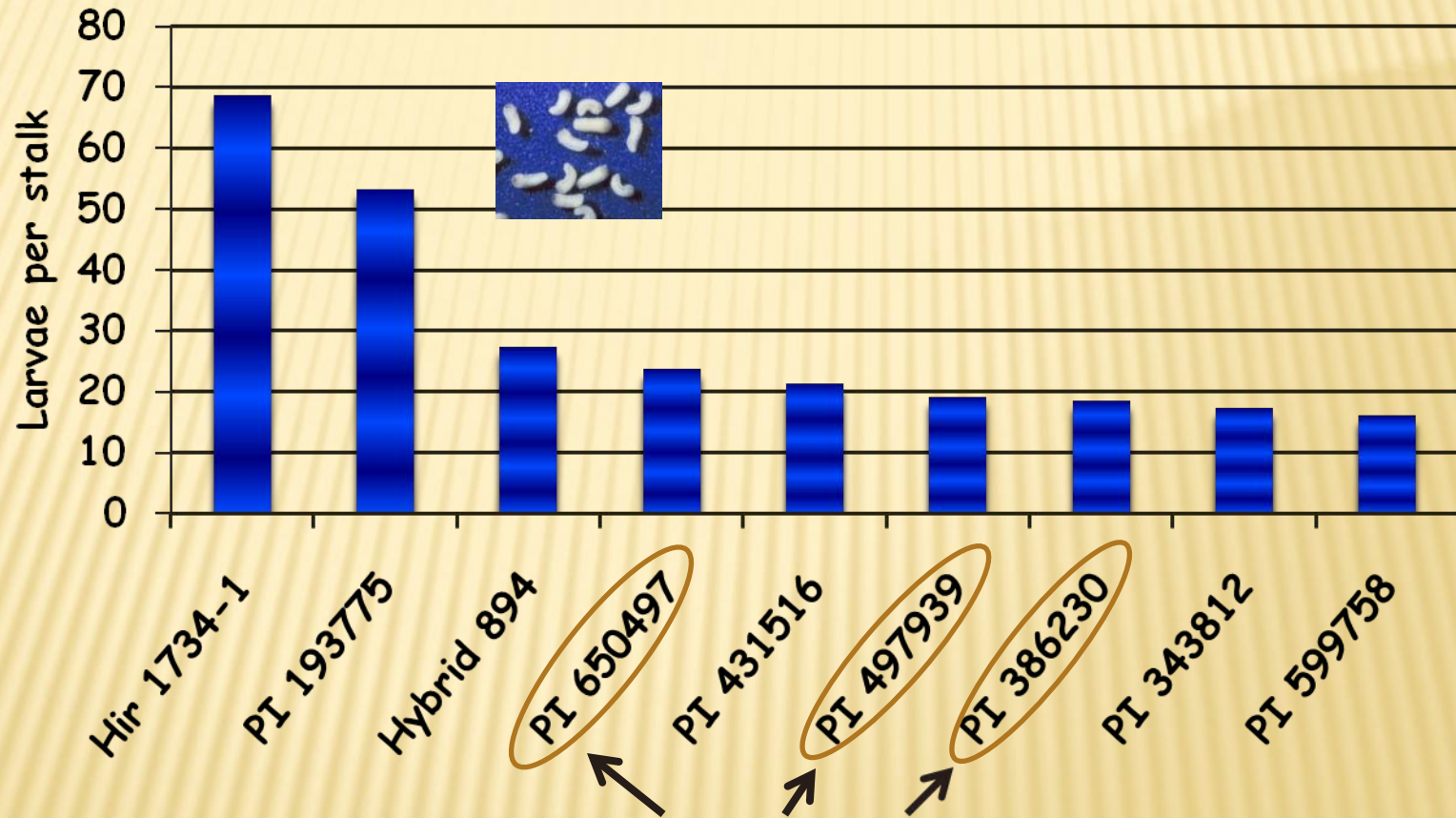


Figure 14. Larval parasitoid of the sunflower stem weevil, *Quadrastichus ainsliei* (Eulophidae).
Size=4-5 mm.

Sunflower Stem Weevil Trial 2008



30 accessions or interspecific crosses tested



PI 650497
PI 497939
PI 386230

Tested 6 years
means = 11.8, 11.7, 13.1

Colby, KS

Sunflower Maggot

Strauzia longipennis

(Diptera: Tephritidae)

- Widespread species from U.S. into Canada
- Adult
 - Yellow with 1/2 inch wing span
 - Bright green eyes
 - Dark bands on wings with F pattern
- Larva
 - Yellow-white, headless and legless, 9/32 inch long at maturity



Patrick Beauzay, NDSU



John Gavloski, MAFRI

Sunflower Maggot: Life Cycle

- One generation per year
- Overwinters as larva in plant debris
- Pupation and adult emergence in spring (mid-June through July)
- Adult active in day
- Eggs laid in apical meristem
- Larvae feed on stalk pith creating tunnels
- Larvae go through 3 instars, 6 weeks, and drops to soil in mid-August

Sunflower Maggot: Damage

- No economic loss, even though often found in 100% of sunflower stalks
- Feeding in pith only and not critical to plant nutrition
- No scouting or E.T. developed
- No control necessary



Thank you!



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