Introduction to insect identification, sampling and management

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Agriculture and Natural Resources

Outline

- Important insect ID features
- Sampling and recognizing injury
- IPM guidelines

Why are insects unique?

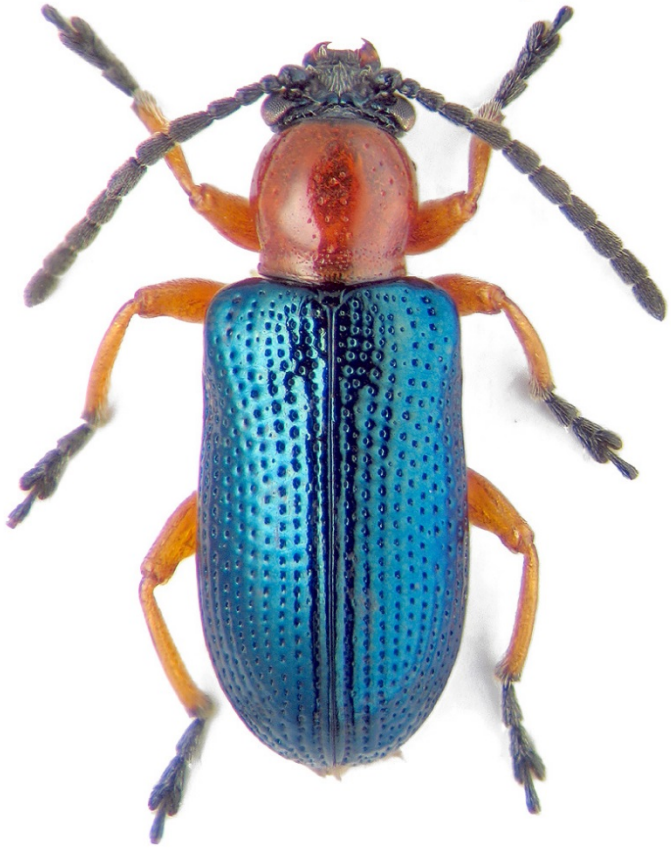
3 body regions

1. Head (1 pair of antennae)
2. Thorax (3 pairs of legs and 2 pairs of wings)
3. Abdomen

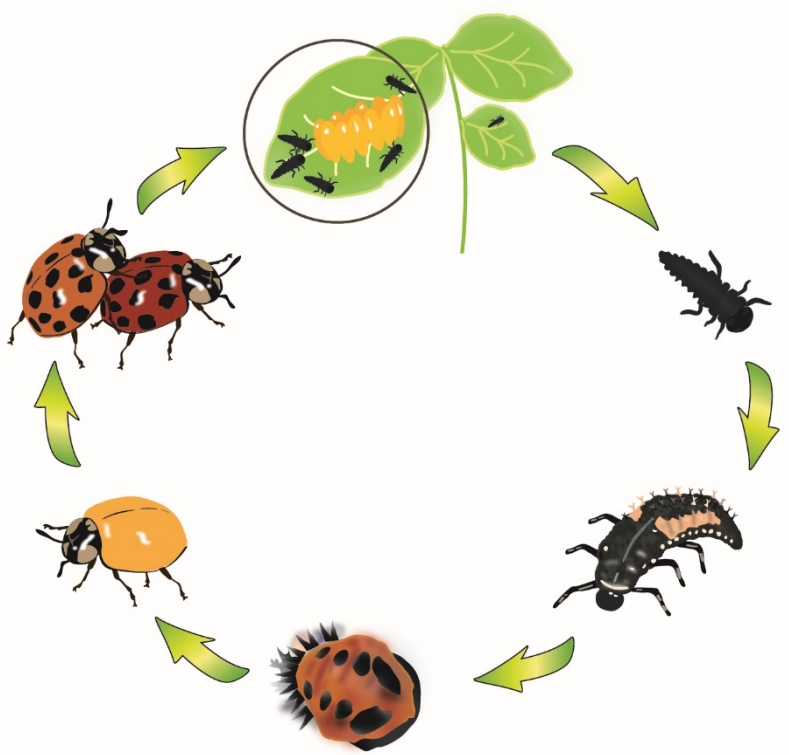
*exoskeleton, joints

Why are insects so successful?

- Small size
- Multigenerational
- Flight
- Wide variety of food choices
- Wide variety of habitat resources



Insect metamorphosis



Complete is most common (egg, larva, pupa, adult)

E.g., beetles, butterflies, flies, lacewings

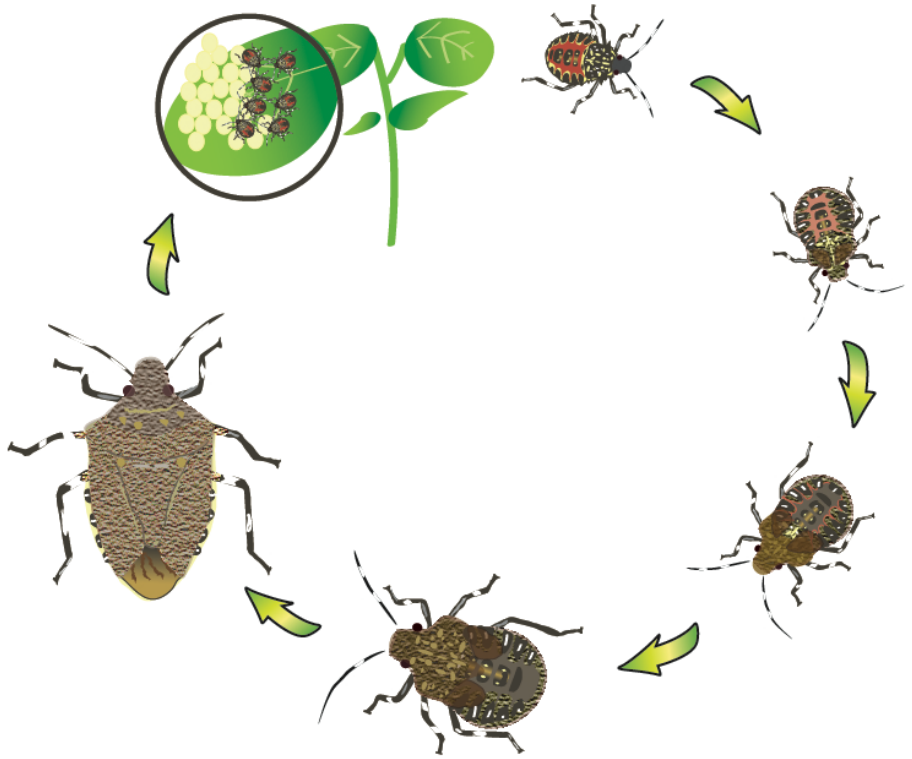
Note larvae and adults look very different; they often take advantage of totally different food resources. E.g., larvae are predators while adults are herbivores.

Insect metamorphosis

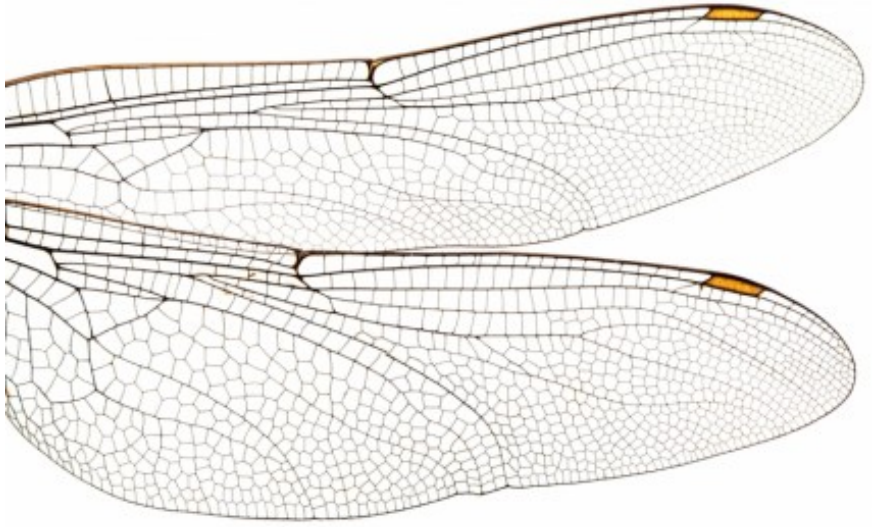
Incomplete is less common (egg, nymph, adult)

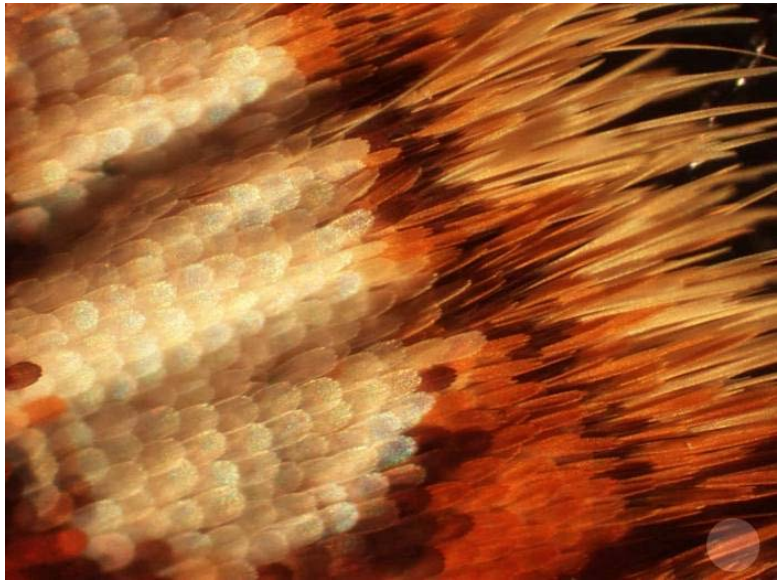
E.g., grasshoppers, true bugs, aphids, hoppers

Note nymphs and adults look very similar; they eat and live in the same area. E.g., both are predatory or herbivores.

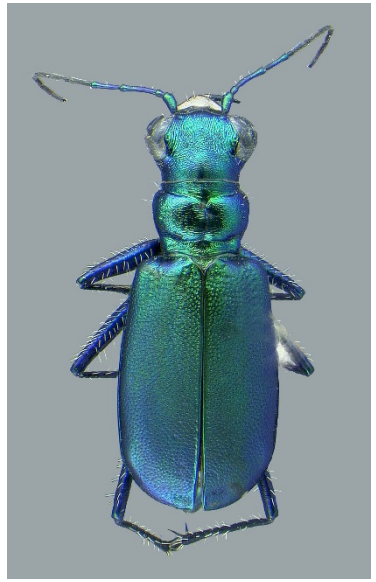


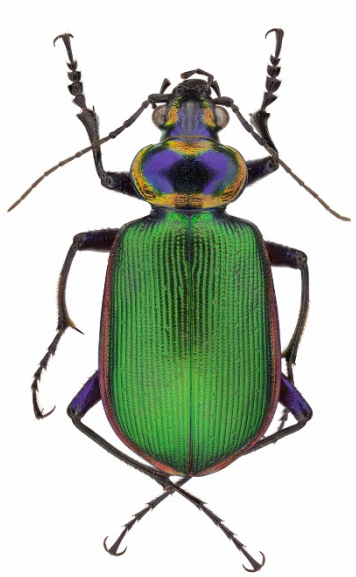
How to ID insects: wings...most are membranous





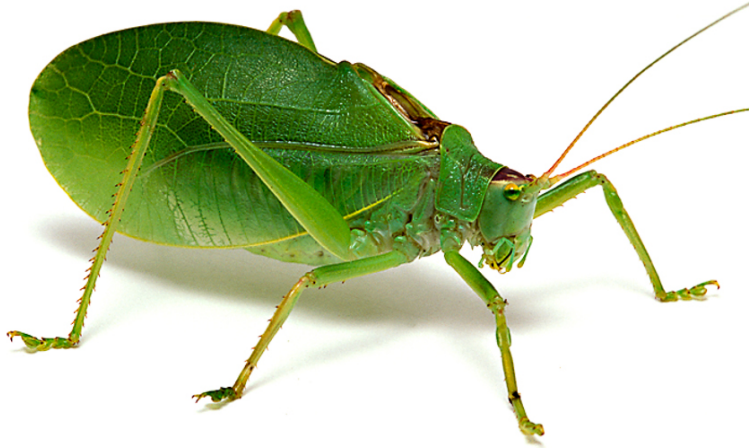
How to ID insects: wings…beetles and earwigs have elytra

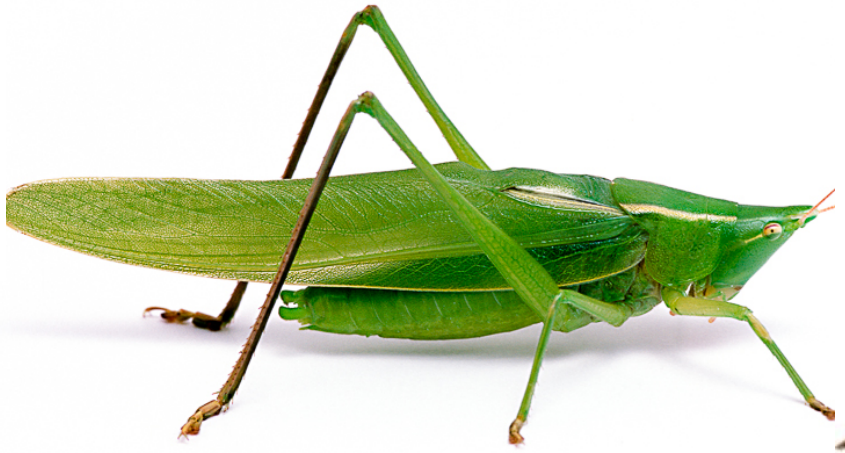




How to ID insects: wings...true bugs have hemelytra

How to ID insects: wings...grasshoppers have tegmina





How to ID insects: mouthparts

Chewing: grasshoppers, beetles, mantids

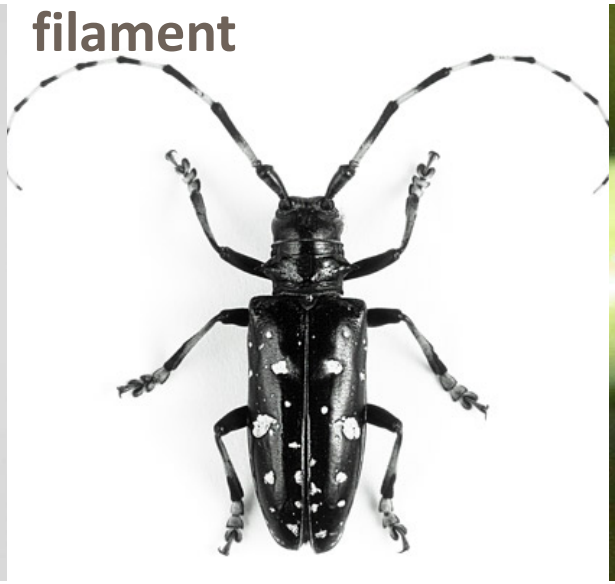
Piercing sucking: true bugs, aphids, mosquito

Chewing lapping: honey bee

Siphoning: butterflies, moths

Sponging: house fly

How to ID insects: antennae



How to ID insects: legs

walking

running

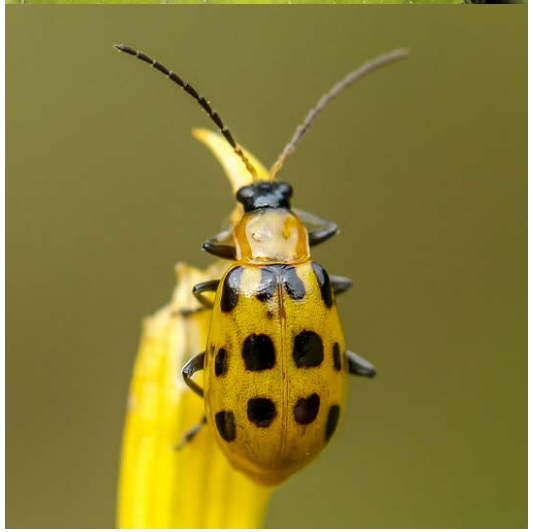
Easy to confuse…

Bean leaf beetle

Striped cucumber beetle

Japanese beetle

Spotted cucumber beetle/Southern CRW



Western corn rootworm

False Japanese beetle

Easy to confuse within a family…

Lots of variation within a species…

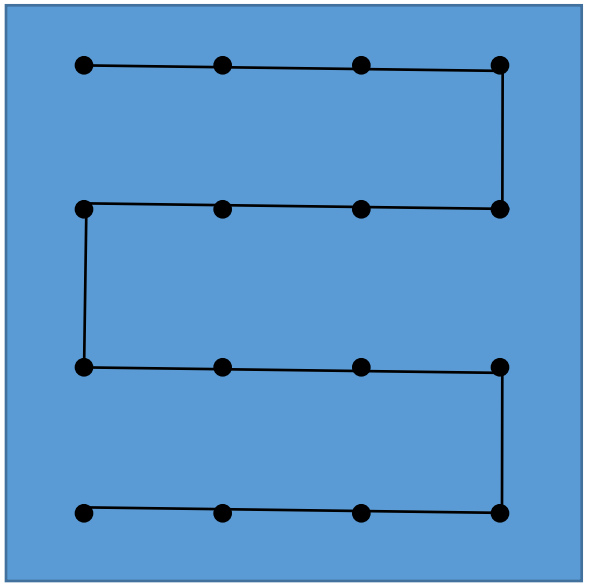
How to sample insects

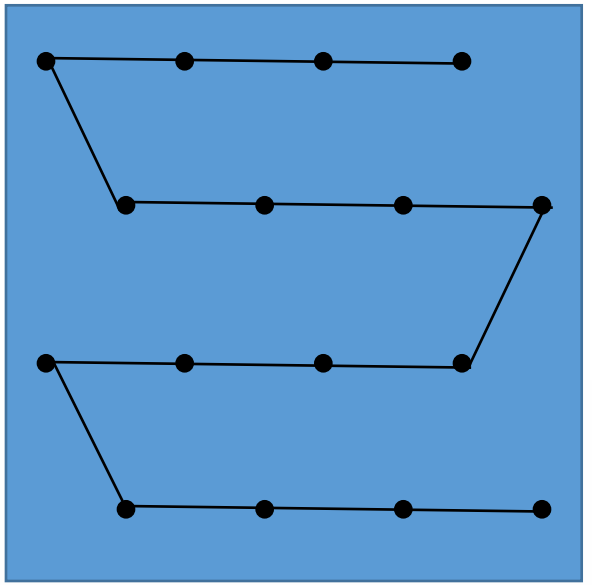
Use the “best” collecting method

- Varies depending on target insect
- Estimate density or injury
  - # insects per plant
  - % defoliation
- In-field counts, sweep net

Key points about scouting

- Start looking before you expect them
- Continue sampling regularly
- Try to cover the field
- DON'T avoid and DON'T "eyeball"
- Use a defined walking pattern





Common tools

- Notebook
- Smartphone/tablet
- Hand lens
- Sweep net

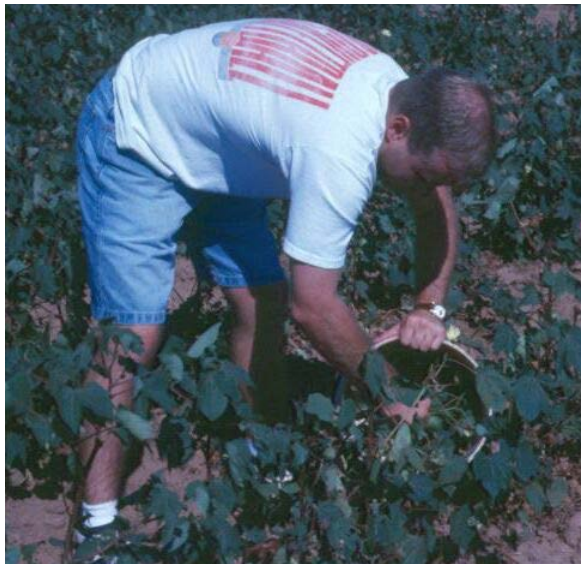
Other common sampling methods

sticky cards/
pheromone traps

drop cloth

black light trap

shake bucket



in-field plants

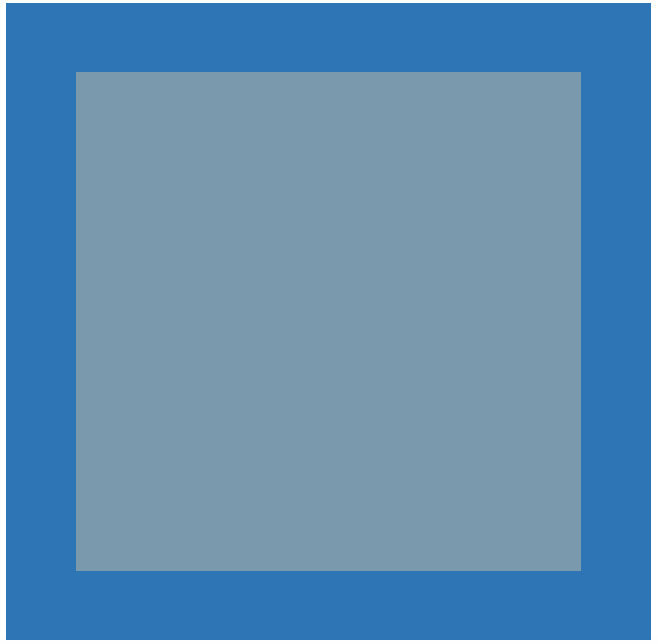
Recognize insect feeding and injury

Recognizing feeding injury

- **Chewing**: remove plant tissue, girdle stems, defoliate, skeletonize leaves, or clip pods
  - Beetles, grasshoppers, caterpillars

Defoliation summary

- Humans tend to over-estimate defoliation
- Calibrate your “eye” every spring to be more accurate
- Defoliation is usually most severe around the perimeter
- Defoliation should be based on whole plants and be field wide



Recognizing feeding injury

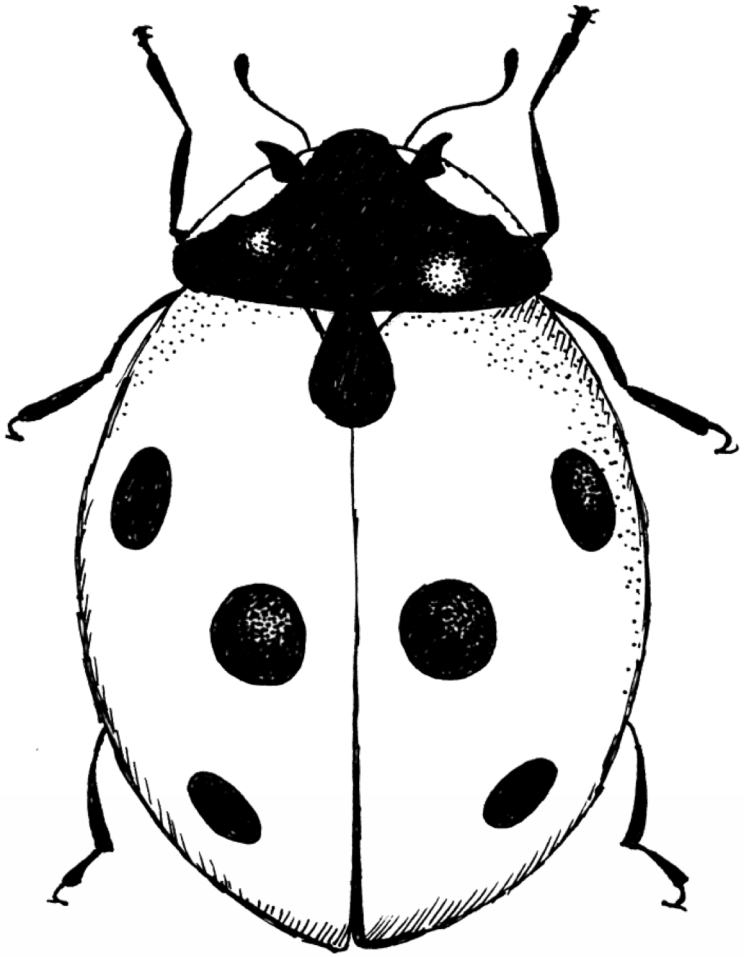
- **Piercing-sucking**: feed on phloem and can cause stippling or punctures that result in discoloration or mottling, honeydew
  - Aphids, thrips, spider mites, stink bugs

Use IPM guidelines to manage pests

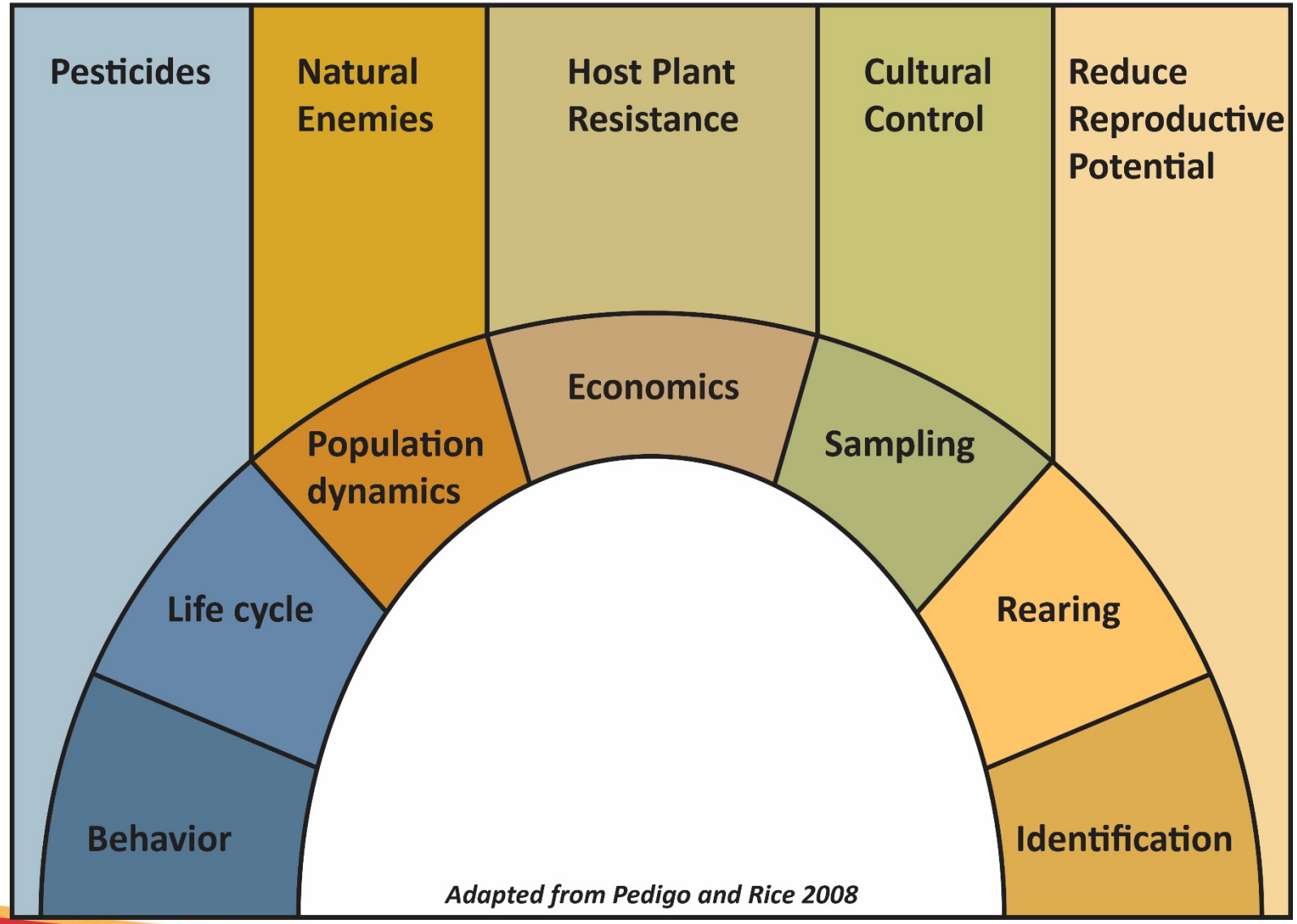
What is IPM?

- Integrated Pest Management
  - Multiple, proactive tactics
  - Suppress pest pressure
  - Sustainable crop production

- More than biological control!



Major components of a successful IPM program

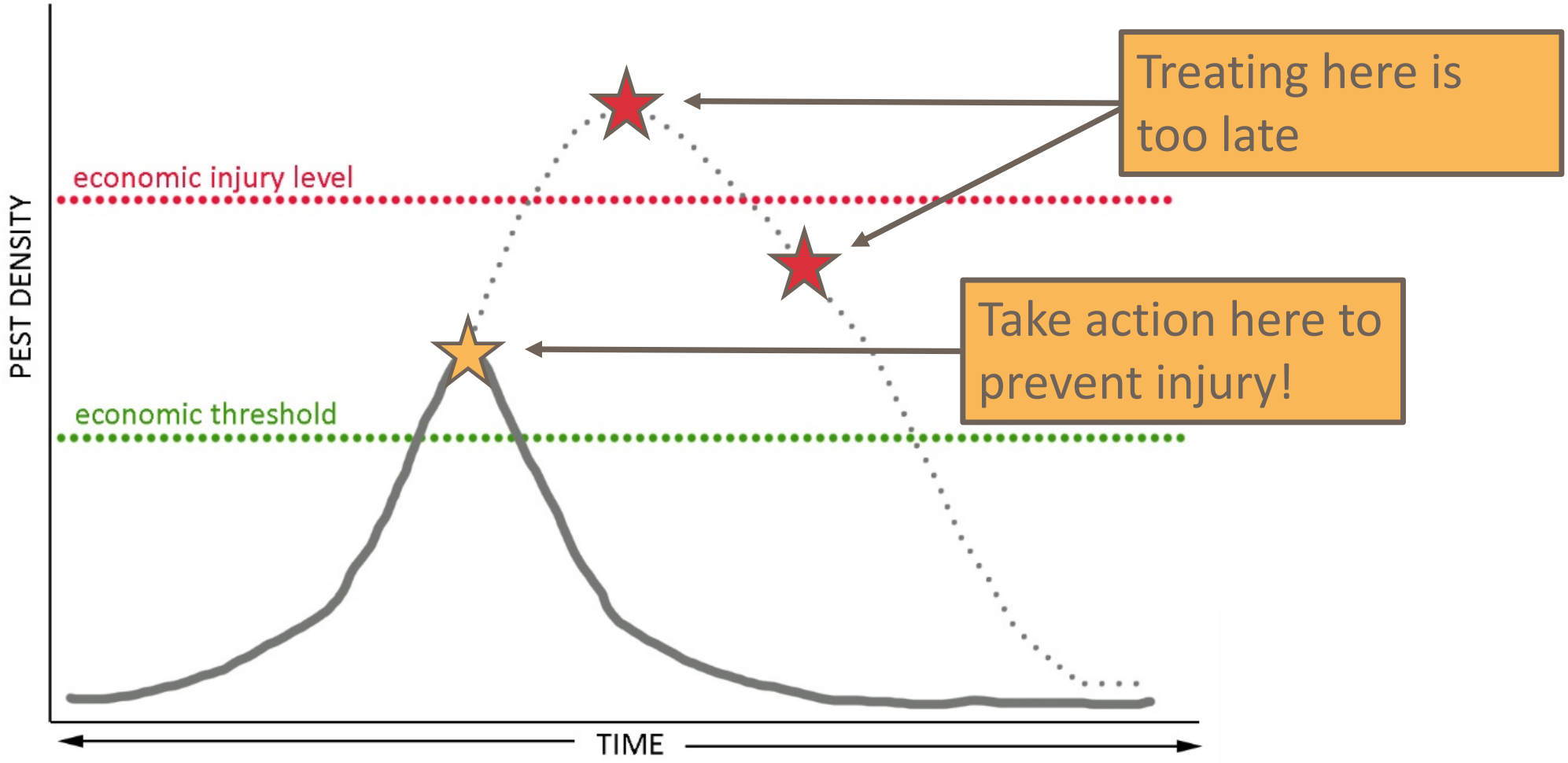


Treatment thresholds

- *Economic injury level*: lowest population density that will cause economic damage
  - E.g., bushels per acre

- *Economic threshold*: point at which action should take plant to avoid EIL
  - E.g., pest density or plant injury

Example of an economic threshold



Why use thresholds?

- Minimize input costs
- Protect beneficials and pollinators
- Prevent flares of other pests
- Prolong insecticide efficacy, aka… delay genetic resistance to MOA

Important considerations

- Strive for 100% kill with applications
- Uniform coverage
  - Sufficient volume/pressure
- Be aware of pre-harvest intervals later in season (30d, 45d, 60d)
- Assess product efficacy (check strips!)
- Continue to scout

Take home points

- Use references!
- Know the target pest
  - ID, life cycle, biology
- Know how to sample
  - Recognize injury
  - Time of year, collection method

IPM
Integrated Pest Management
Thank you!
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