PEST IDENTIFICATION

PMA 4570/6228

Lab 1

July 3 2014

Steps towards a successful IPM program

1. Correct identification
2. Monitoring
3. Economic thresholds
4. Choice of optimum pest control option

Pests

- Pest – organism that interferes with the availability, quality, or value of a managed resource; conflicts with human needs or values
  - Key – perennial pest, causes major losses
  - Secondary – minor pest, kept in check by natural enemies
  - Occasional – infrequent damage

Insects as Pests

- ~1,000,000 species of insects have been described
  - ~1% could be considered serious (key) pests
  - ~10,000 occasional pests

- > $5 bill on insecticides and miticides in 2007 (USDA-ERS 2012)
  - This does not include costs for cultural or biological control practices!!

Injury

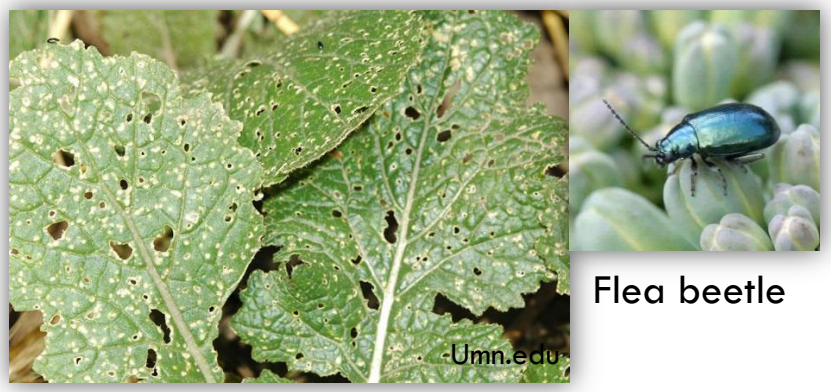
- Injury – the affect of pest activities on the host
  - Bites, feeding, stings, vectors of disease
  - Direct or Indirect injury

Indirect Injury

- Injury caused to the *non-marketable* parts of the crop

Beet armyworm, *Spodoptera exigua*

Blueberry leaf beetle, *Colaspis pseudofavosa*



Flea beetle

Mosaic virus on squash

Melon aphids, *Aphis gossypii*

Direct Injury

- Injury caused to the *marketable* parts of the crop

Corn earworm, *Helicoverpa zea* feeding on sweet corn

Pickleworm, *Diaphania nitidalis* feeding in squash

Tomato spotted wilt virus

Western flower thrips, *Frankliniella occidentalis*

Pest Identification – *not just sight ID!*

- Life cycle - damaging life stages, life span, growth requirements
- Damage symptoms and when crop most severely affected
- Identify natural enemies
- Understand environmental conditions and management practices that impact the pest

Leaf miner on tomato

Spider mites

Correct Pest ID

- Wrong pest ID
  - Incorrect information on biology and ecology
  - Wrong choice of strategy
  - Unnecessary/ineffective action taken

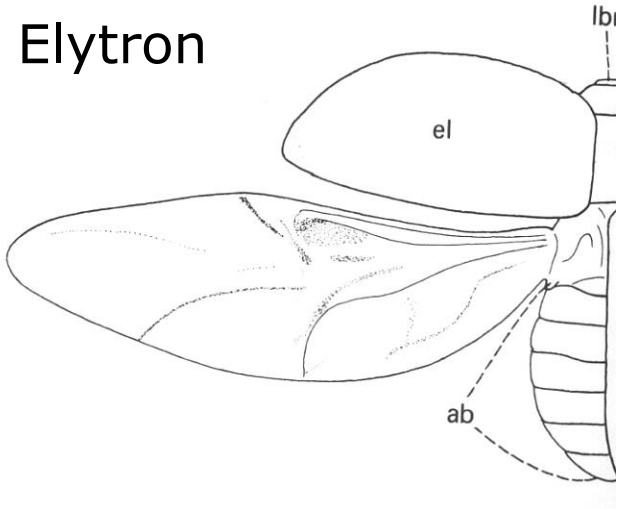
<u>Worst Case Scenario:</u>

- Pesticide applied that does not kill the target pest
- Or a beneficial insect is released but the pest is not the prey or the host

Norris et. al 2003

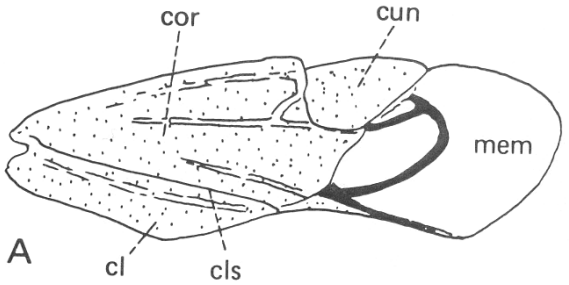
Key Features - Wings

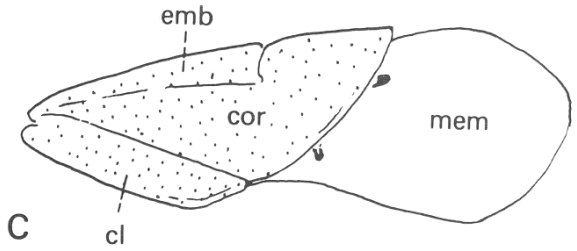
Elytron

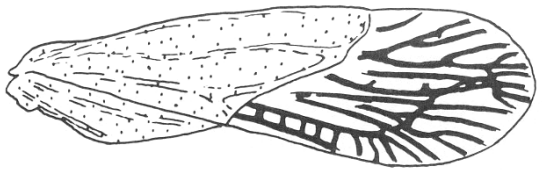


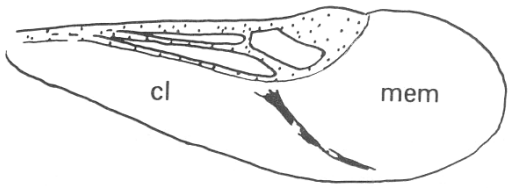
Coleoptera

Hemelytra





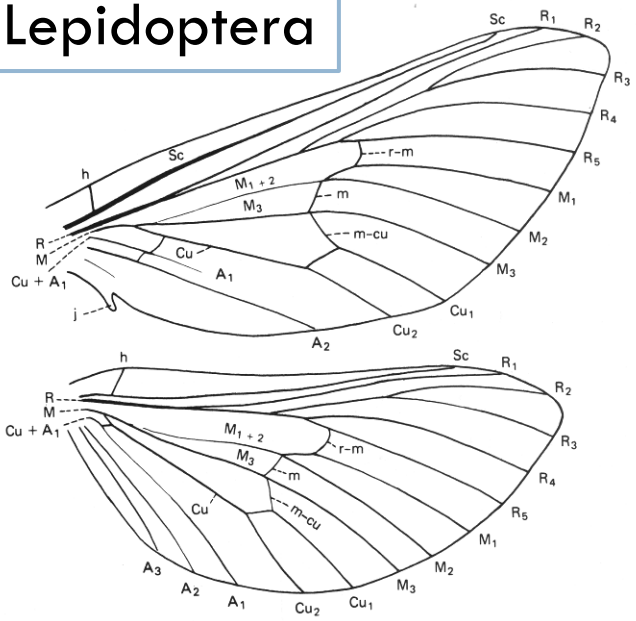




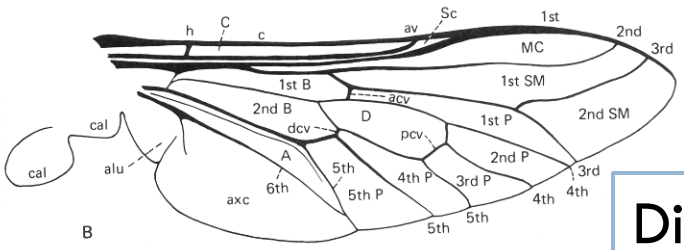
Hemiptera

Wings

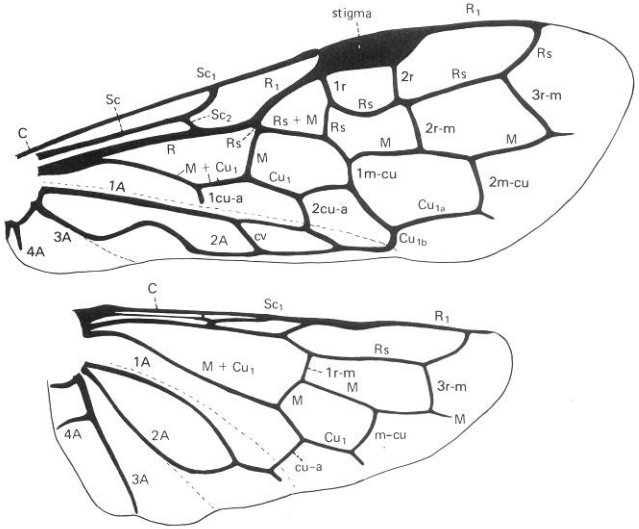
Lepidoptera



Diptera



Hymenoptera



Thysanoptera

Correct Identification

Western flower thrips, *Frankliniella occidentalis* (Pergande) - pest

Six-spotted thrips, *Scolothrips sexmaculatus* (Pergande) - predator

Damaging vs beneficial mites

Twospotted spider mites - pest

Neoseiulus californicus – predatory mite

If you kill the natural enemies you inherit their job!!

Paper wasp vs Grape root borer

Paper wasp

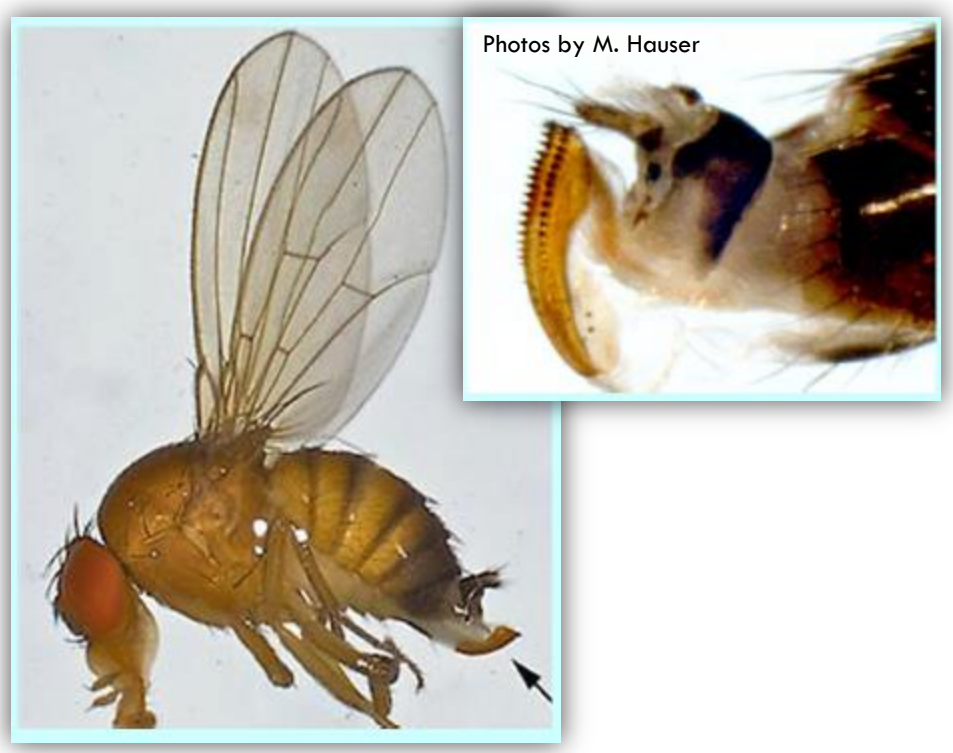
Grape root borer

Be careful when using physical appearance to ID insects!

Photo credits: pest .ca.uky.edu

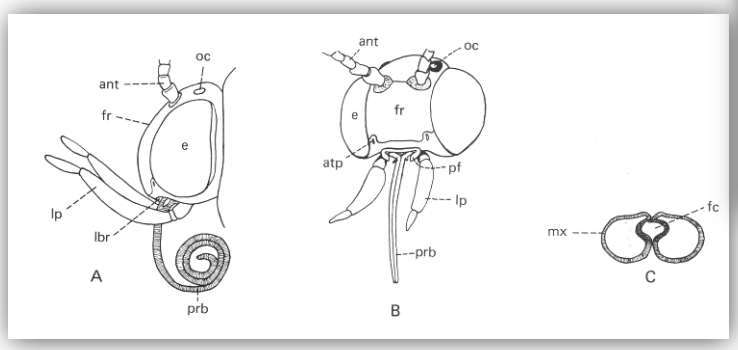
Sexual dimorphism

Spotted Wing Drosophila male

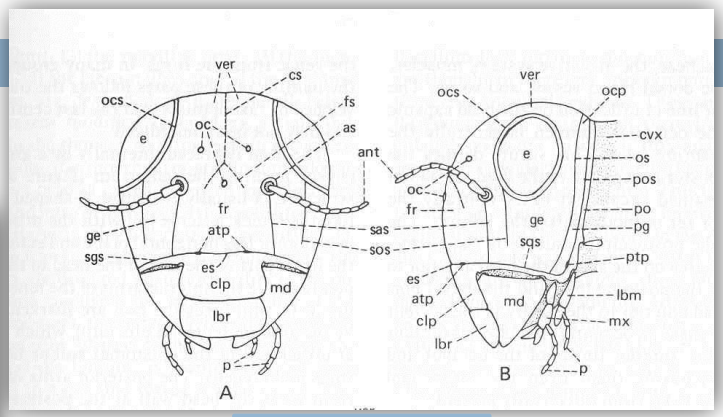


Spotted Wing Drosophila female

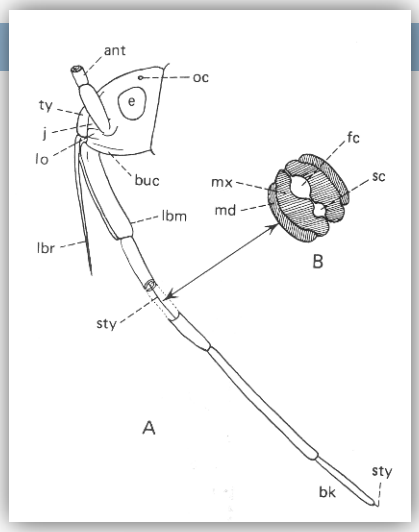
Key Feature - Mouthparts



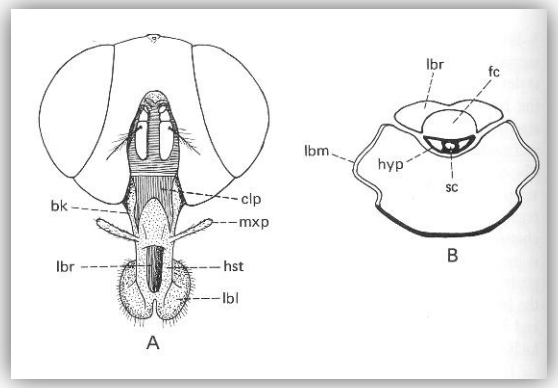
siphoning



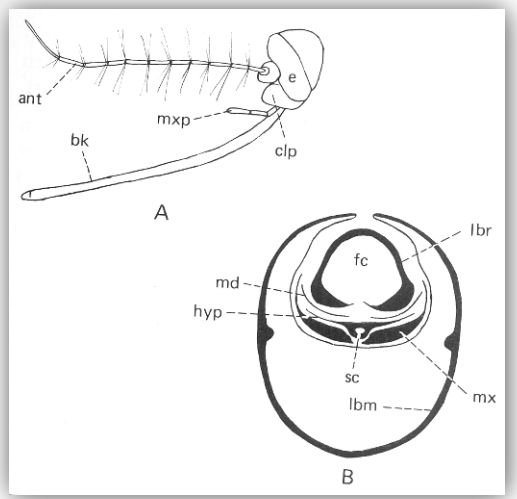
chewing



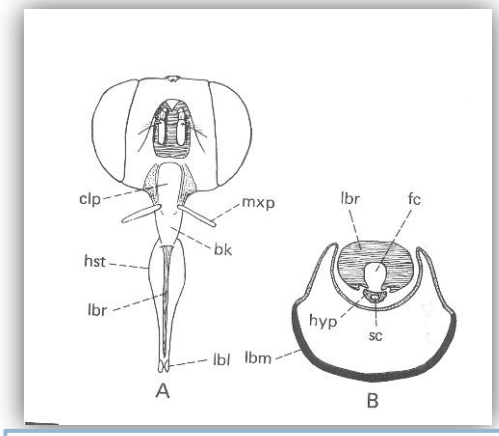
beak



sponging



biting



Piercing-sucking

Bottom Line

- Insect taxonomy can be complicated!
- Get to know your area and your crop(s)
  - Tomato & its pests
    - Whiteflies
    - Thrips
    - Tomato fruit worm
    - Tomato hornworm
    - Spider mites

Lab Assignment & Practical Exam

- What you need to know for lab practical:
  - ID by sight to common or scientific name
  - Pest or beneficial?
  - If a pest…
    - Damaging life stage
    - Type of damage (direct or indirect)
    - Pest of _____
    - Specific damage (what part of plant does it feed on)
  - If a beneficial…
    - Predator or parasitoid
    - What it attacks, its host

Lab 1 Homework – Crop Report
Due Tues, July 8 at start of lab

- Each one of you has been given a crop
- Find out the **three most damaging <u>insect</u> pests** of that crop and their natural enemies, if available
- Prepare a **1-page report** of the three pests focusing on:
  - damaging stage(s) of pest
  - part of the crop damaged
  - beneficial insects/mites
  - main control method currently being used for each pest

Useful Resources

- Pedigo and Rice LP. 2009. Entomology and Pest Management, 6th ed. Prentice Hall: Upper Saddle River, NJ.
- Metcalf, RL and RA Metcalf. 1992. Destructive and Useful Insects: Their Habits and Control, 5th ed. McGraw-Hill.
- Capinera, J. L. 2001. Handbook of Vegetable Pests. Academic Press, San Diego, CA.
- University of Florida, Entomology/Nematology Dept "Featured Creatures" website. http://creatures.ifas.ufl.edu/
- EDIS- Electronic Data Information Source http://edis.ifas.ufl.edu/
- IPM Centers http://www.ipmcenters.org/