Hemp IPM

Protect your Crop with Integrated Pest Management

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Maine.gov/IPM

Potential Pests

Diseases

Photo: Whitney Cranshaw

Insects

Photo: Whitney Cranshaw

Photo: Mary Yurlina

Weeds

Mites

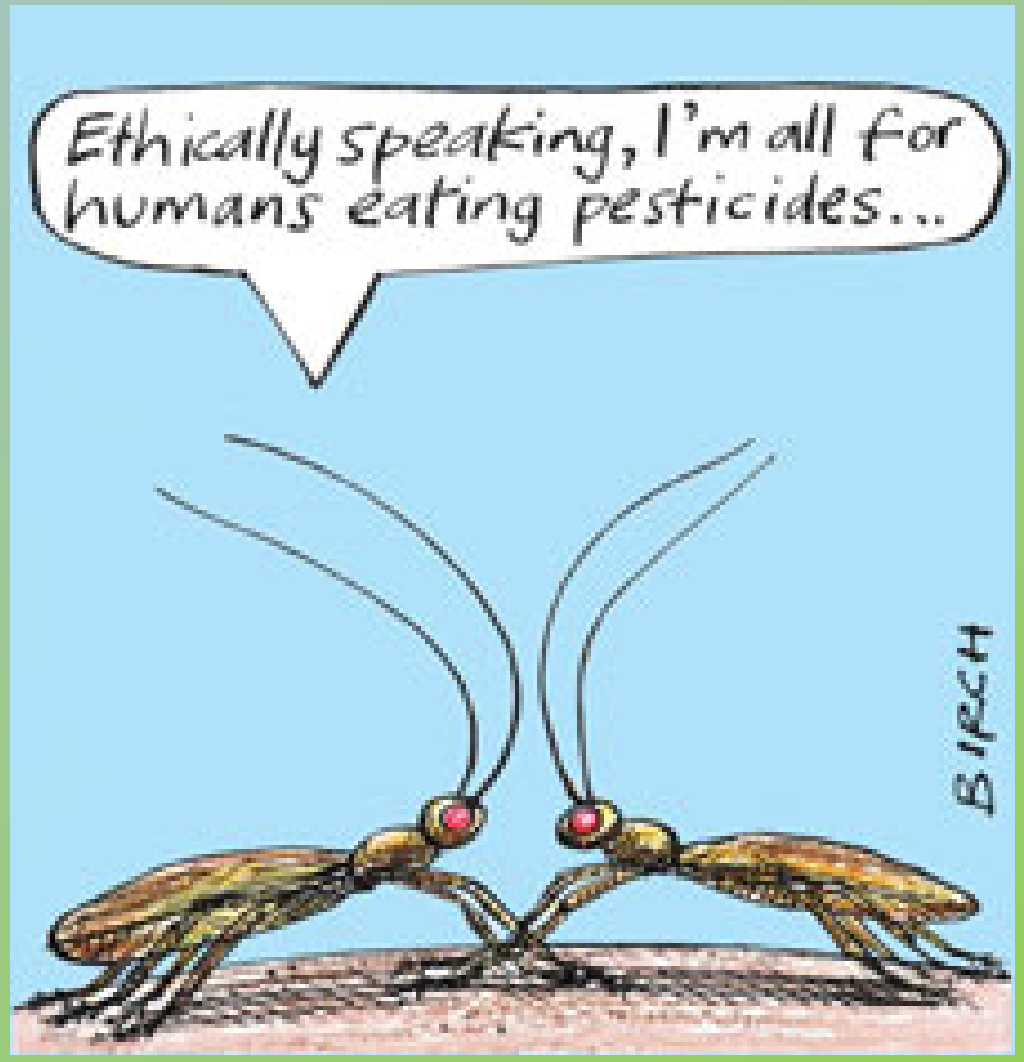
Photo: Whitney Cranshaw

Rodents & Other Vertebrates

Pesticides can be Problematic

- $ (product + labor)
- Risk (human, environmental)
- Pest resistance and/or resurgence
- Restrictions (regulatory, market)

Photo: Whitney Cranshaw



IPM is the Answer!

- Integrated Pest Management
  - Organized and systematic approach to preventing and managing **all** pests
- IPM Offers
  - Minimized risks (health, $, disruption)
  - Effective, long-term pest control
  - Improved crop quality/quantity

What is IPM?

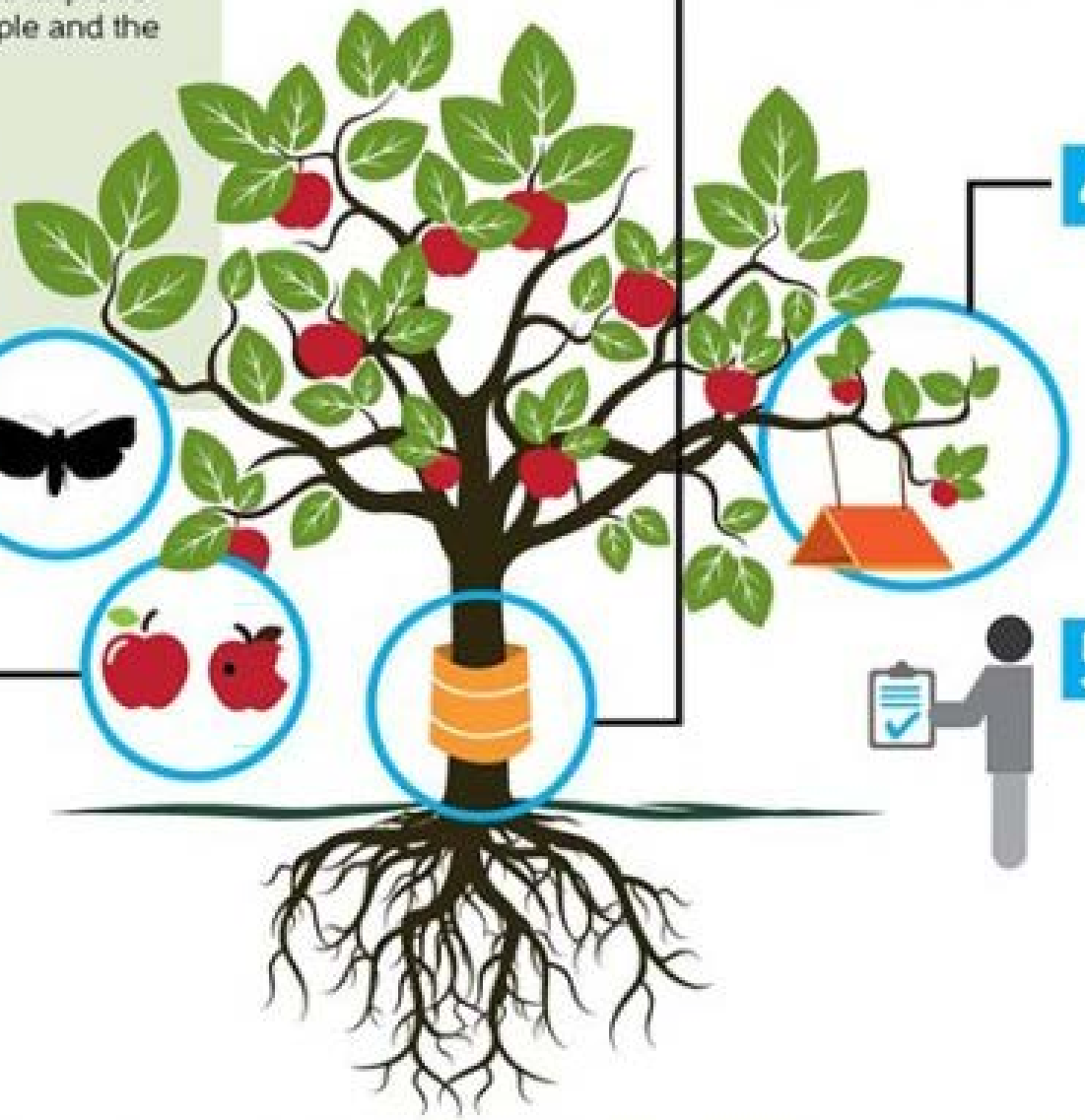
Integrated Pest Management is a science-based approach that combines a variety of techniques. By studying their life cycles and how pests interact with the environment, IPM professionals can manage pests with the most current methods to improve management, lower costs, and reduce risks to people and the environment.

IPM tools include:

- Alter surroundings
- Add beneficial insects/ organisms
- Grow plants that resist pests
- Disrupt development of pest
- Prevention of pest problem developing
- Disrupt insect behaviors
- Use pesticides

1 PREVENT

Some pest problems can be prevented by using resistant plants, planting early, rotating crops, using barriers against climbing pests, sanitation, and sealing cracks in buildings.



2 IDENTIFY/ MONITOR

Determine the causal agent and its abundance (contact your local extension agent for help).

3 Assess

The results from monitoring will help to answer the questions: Is the pest causing damage? Do we need to act? As pest numbers increase toward the economic threshold further treatments may be necessary.

4 ACTION

IPM uses multiple tools to reduce pests below an economically damaging level. A careful selection of preventive and curative treatments will reduce reliance on any one tactic and increase likelihood of success.

5 Review and Evaluate

Continue to monitor the pest population. If it remains low or decreases, further treatments may not be necessary, but if it increases and exceeds the action threshold, another IPM tool should be used.

Best Management Practice Guidance for Hemp

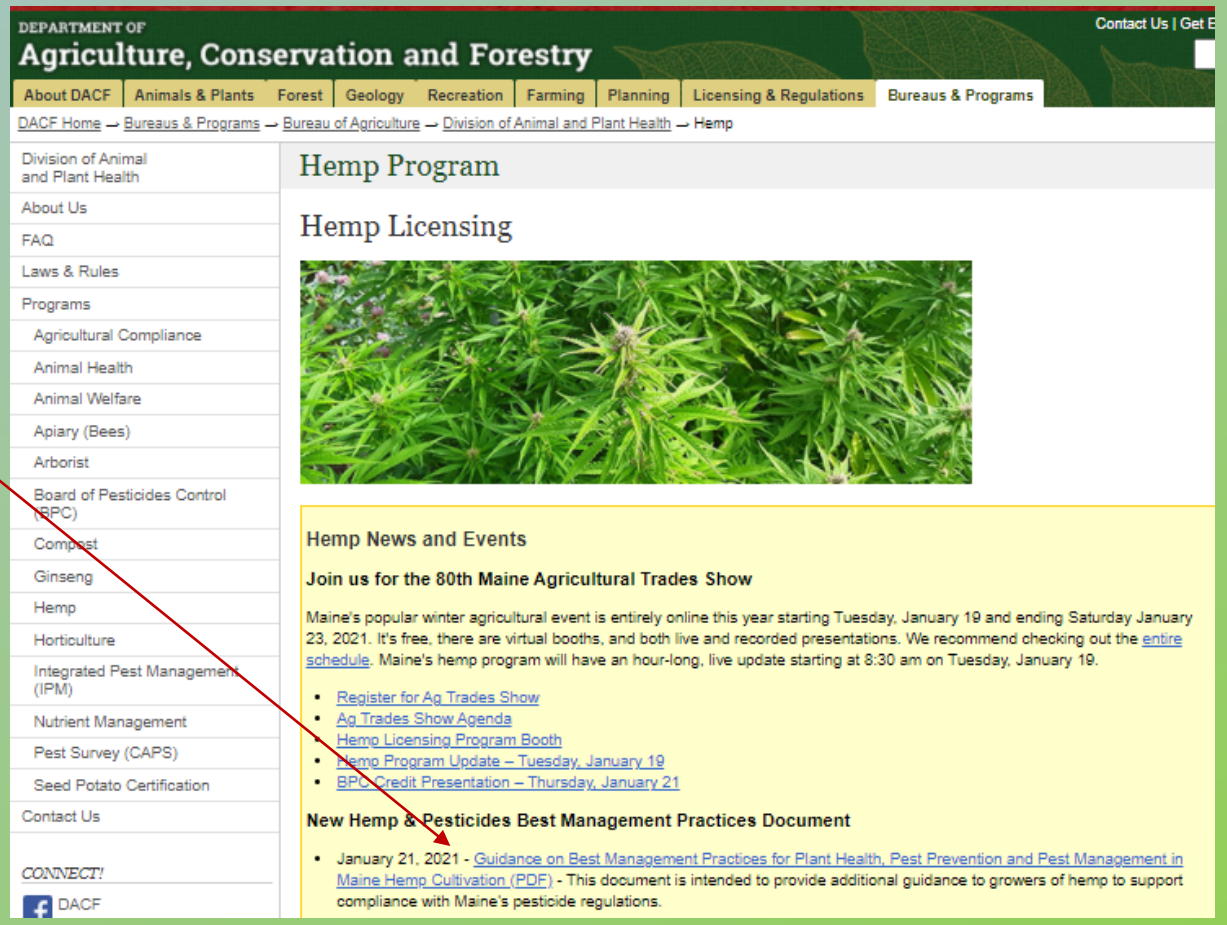
STATE OF MAINE

Guidance on Best Management Practices for Plant Health, Pest Prevention and Pest Management in Maine Hemp Cultivation

Maine Department of Agriculture, Conservation and Forestry
1/14/2021

This document describes practices for preventing and managing arthropods, rodents, plant pathogens and other pests using combinations of physical, mechanical, biological, cultural and chemical methods in an integrated pest management (IPM) program. The intent of this document is to provide science-based information to assist Maine hemp growers for successful management of pest problems while complying with state and federal pesticide regulations. Maine permits the use of pesticides on hemp only in accordance with best management practices. Information can be found via www.maine.gov/ipm or by contacting the Maine Board of Pesticides Control (207-287-2731 or pesticides@maine.gov). The goal of this guidance document is to guide hemp growers in the production of an uncontaminated product while providing a safe workplace environment for workers.

Available on the DACF Hemp Program

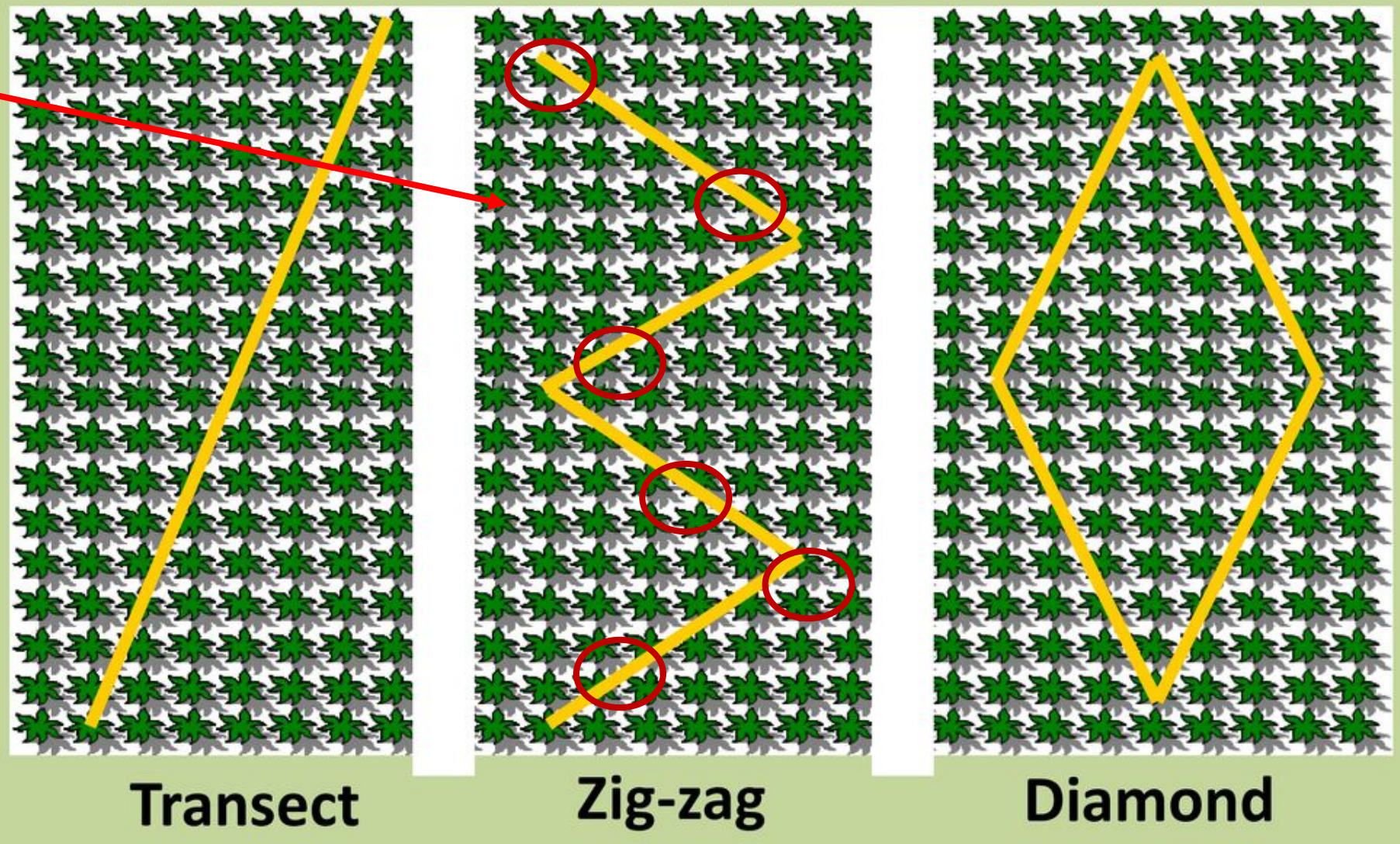


Scout Fields 1-2x/week

- Bring magnifier, data sheets & clipboard or tablet, insect and disease ID guides, camera, ziplock bags
- Dedicate enough time: bring water, hat, sunscreen
- Look at big picture & individual plants

Scouting patterns

- Examine 5-10 plants at each of 5-10 spots per field. Total or 25-100 plants.
- Look for damage, pests, natural enemies, plant growth/shape/ color



You Will Find Things…but are they a problem?

Identify Them!

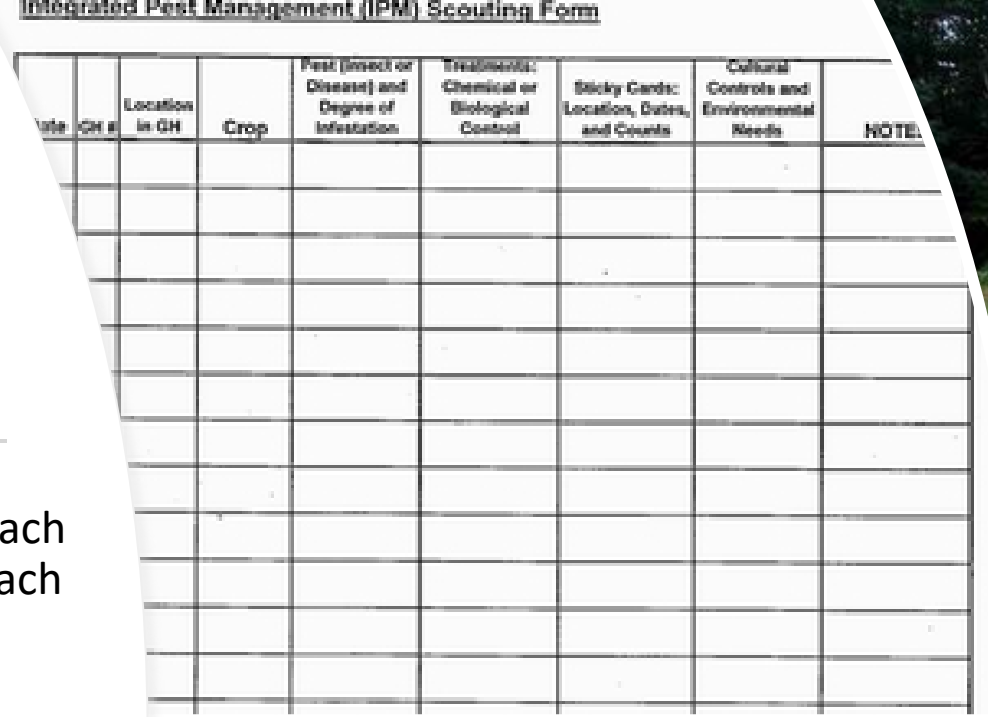
- UM Extension Insect, Tick and Plant Disease Lab
- DACF Hemp Program
- Ipmimages.org
- GotPests.org

Photo: John Jemison

Photo: John Jemison

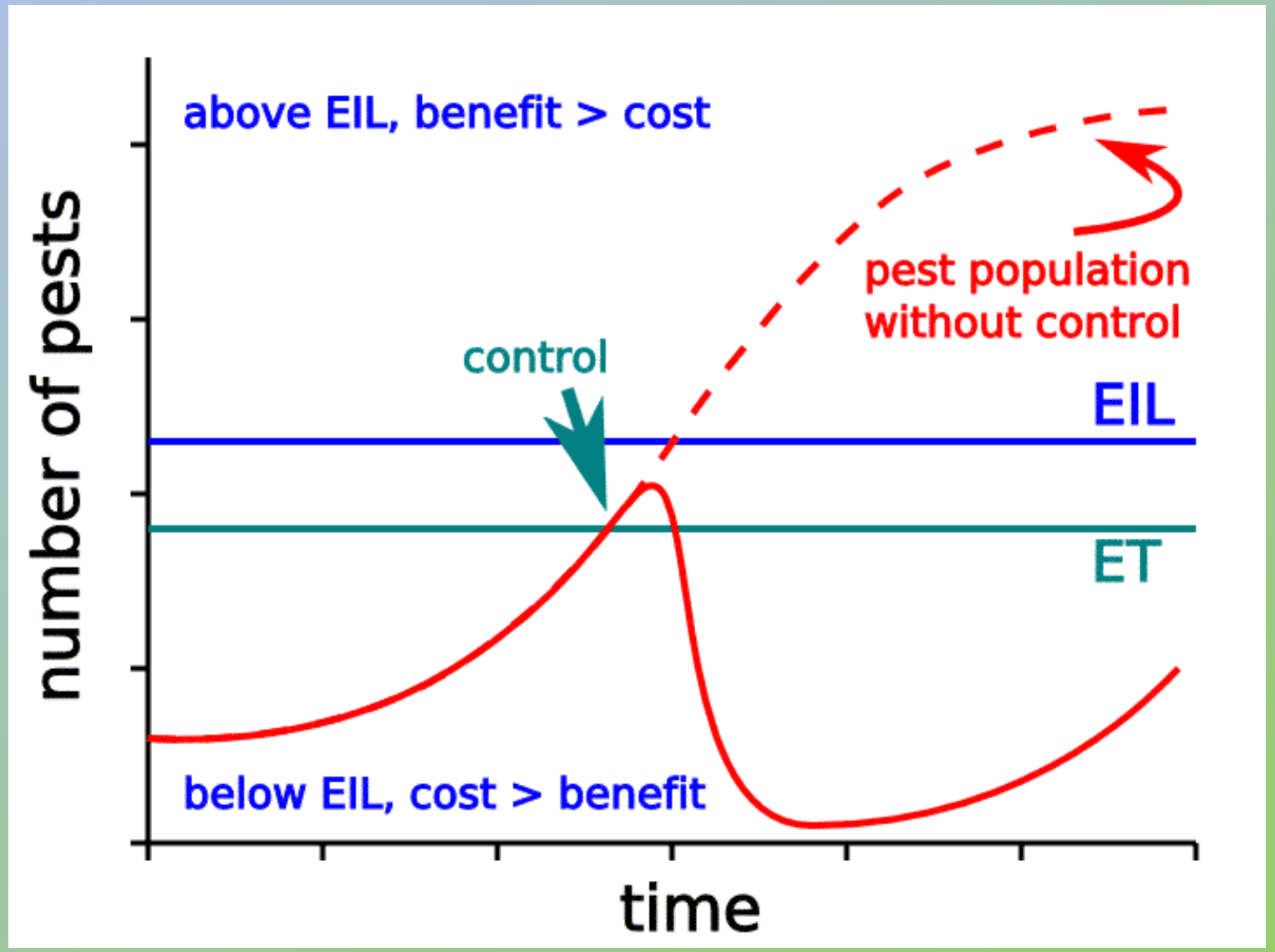
Keep Records

- Count number of affected plants out of ~5 plants at each of ~5-10 locations within each variety or site
- Record
  - How many plants affected,
  - Severity of infestation,
  - Date,
  - Location in field (diagram, map, gps),
  - Trap captures
  - Growth stage/conditions
  - Take photos


Integrated Pest Management (IPM) Scouting Form

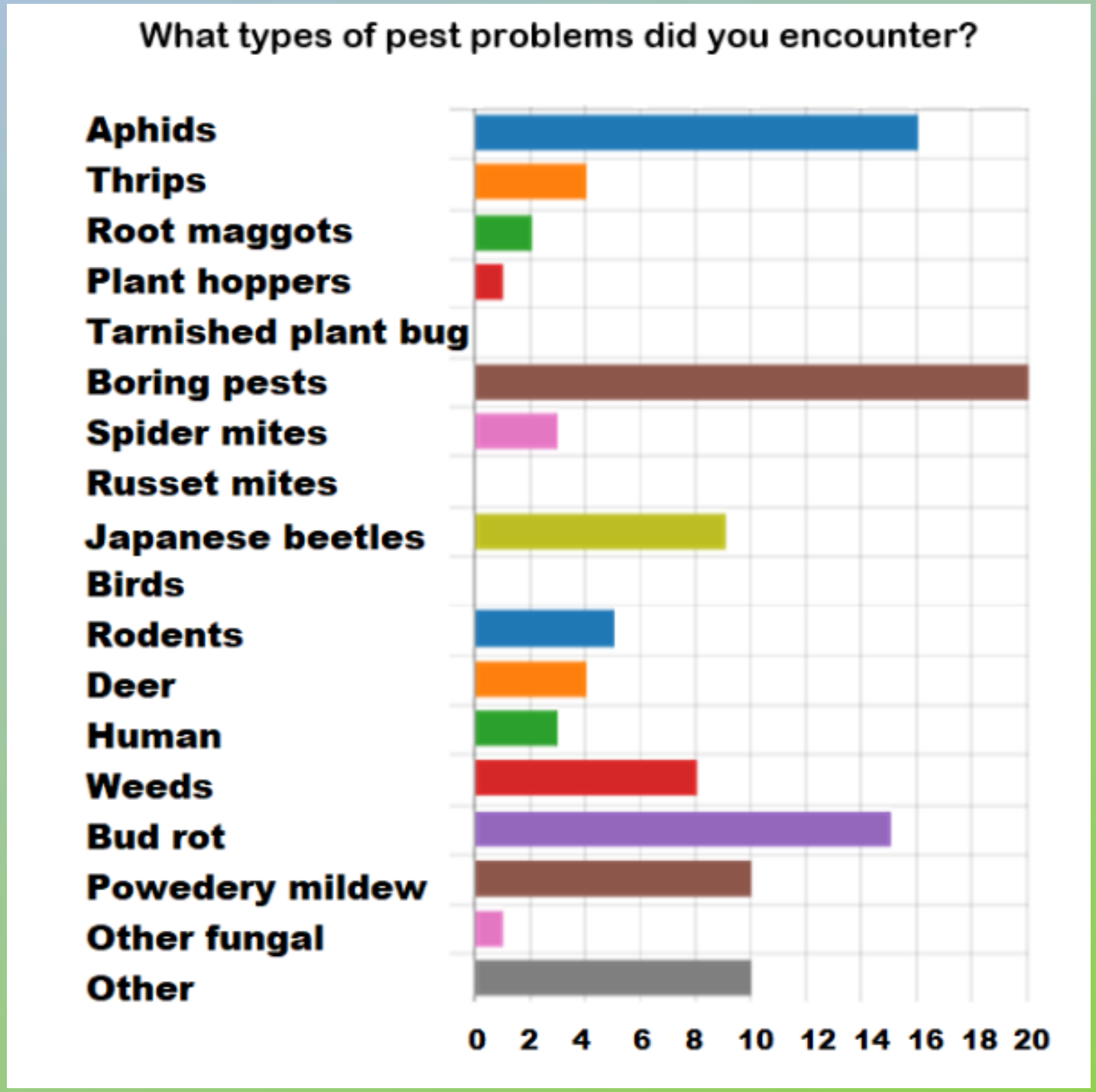
Location in GH	Crop	Pest (insect or Disease) and Degree of Infestation	Treatments: Chemical or Biological Control	Sticky Cards: Location, Dates, and Counts	Cultural Controls and Environmental Needs	NOTE:

Economic Injury Level/ Economic Threshold



2020 Grower Survey

- 40 responses



Aphids

- Suck plant sap
- Secret honeydew = substrate for sooty mold
- Rapid population increase

Aphids

Cannabis Aphid

Image: https://hempinsects.agsci.colostate.edu/

Slide Borrowed from Dr. Raymond Cloyd's (Kansas State U) Presentation November 2020.

Should I Buy and Release Ladybugs in my Fields?

- NOPE!
- Permit from IFW required
- Natural populations in unsprayed fields are abundant
- Introducing bugs collected from elsewhere risks introducing a non-native species, subspecies, or insect disease.
- Ladybugs fly! Away from your field!

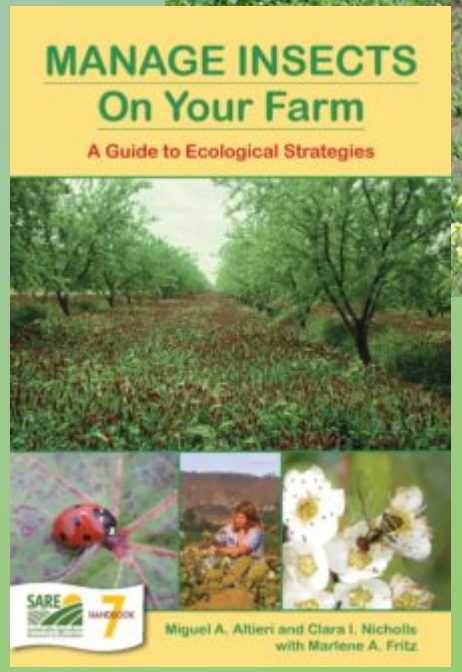
Nature Provides Biocontrol Services


Image: Luca Foscili


Photo: Jack Kelly Clark

Farmscape to Attract and Support Natural Enemies

- Plant strips, borders or banks of flowering plants
  - provides nectar and pollen for beneficial insects
- Resources:
  - Manage Insects on your Farm (pdf at sare.org)
  - Farmscaping: Making Use of Natures Pest Management Services' (search for 'extension.org and farmscaping'



Extension.org. Search for 'Farmscaping'

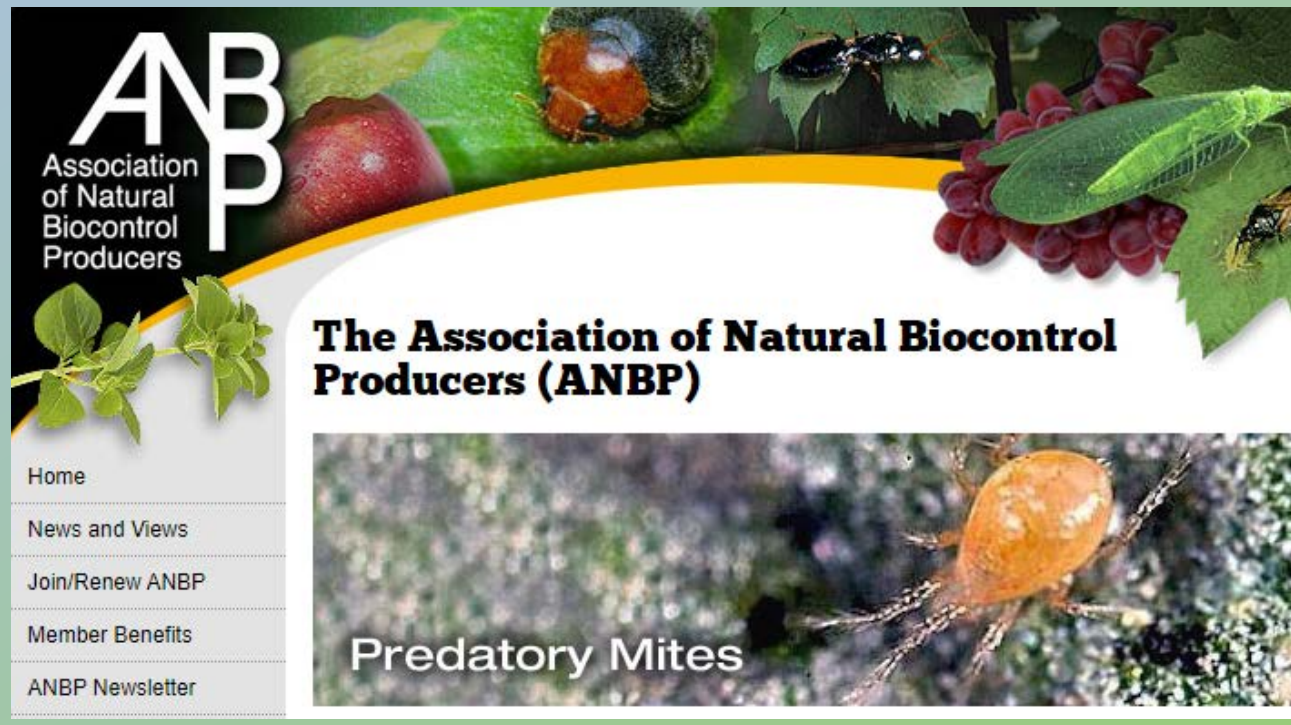
Weeds Don’t Support Natural Enemies

Weed management is critical for pest prevention and plant vigor

Photo: Mary Yurlina

Should I Buy and Release Beneficial Insects in my **Indoor** Grow?

- Can be helpful, BUT timing, quality, species released, conditions are very important!
- Get sound guidance from reliable source.
  - ANBP.org (Assoc of Natural Biocontrol Producers)



https://ipm.ifas.ufl.edu/pdfs/Grower%20Guide_RB.pdf

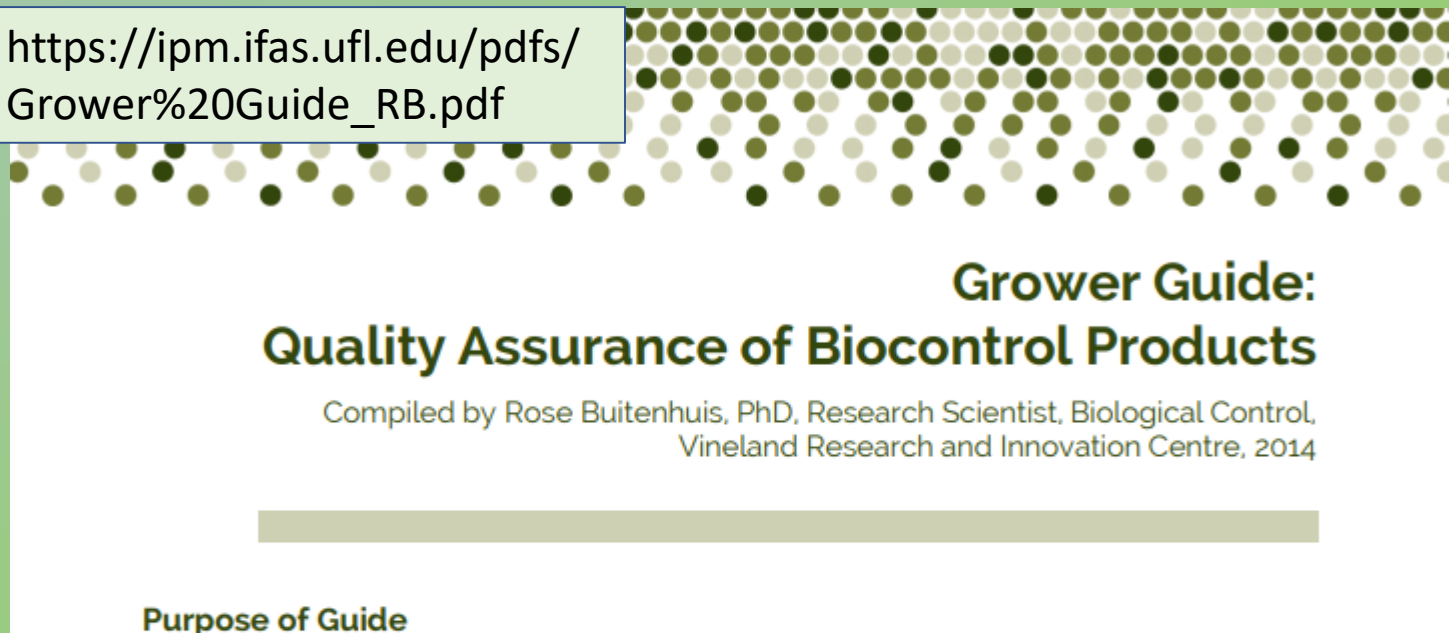


Image: Urban-gro

Gnpmag.com

Two-spotted Spider Mite (*Tetranychus urticae*)

- Primarily indoor pest
- Thrives in warm (75F), dry (<50% RH) environment
- Provide optimal growing conditions (cooler temps and >50% RH)
- Scout plants regularly
- Biocontrol options available (predatory mites)

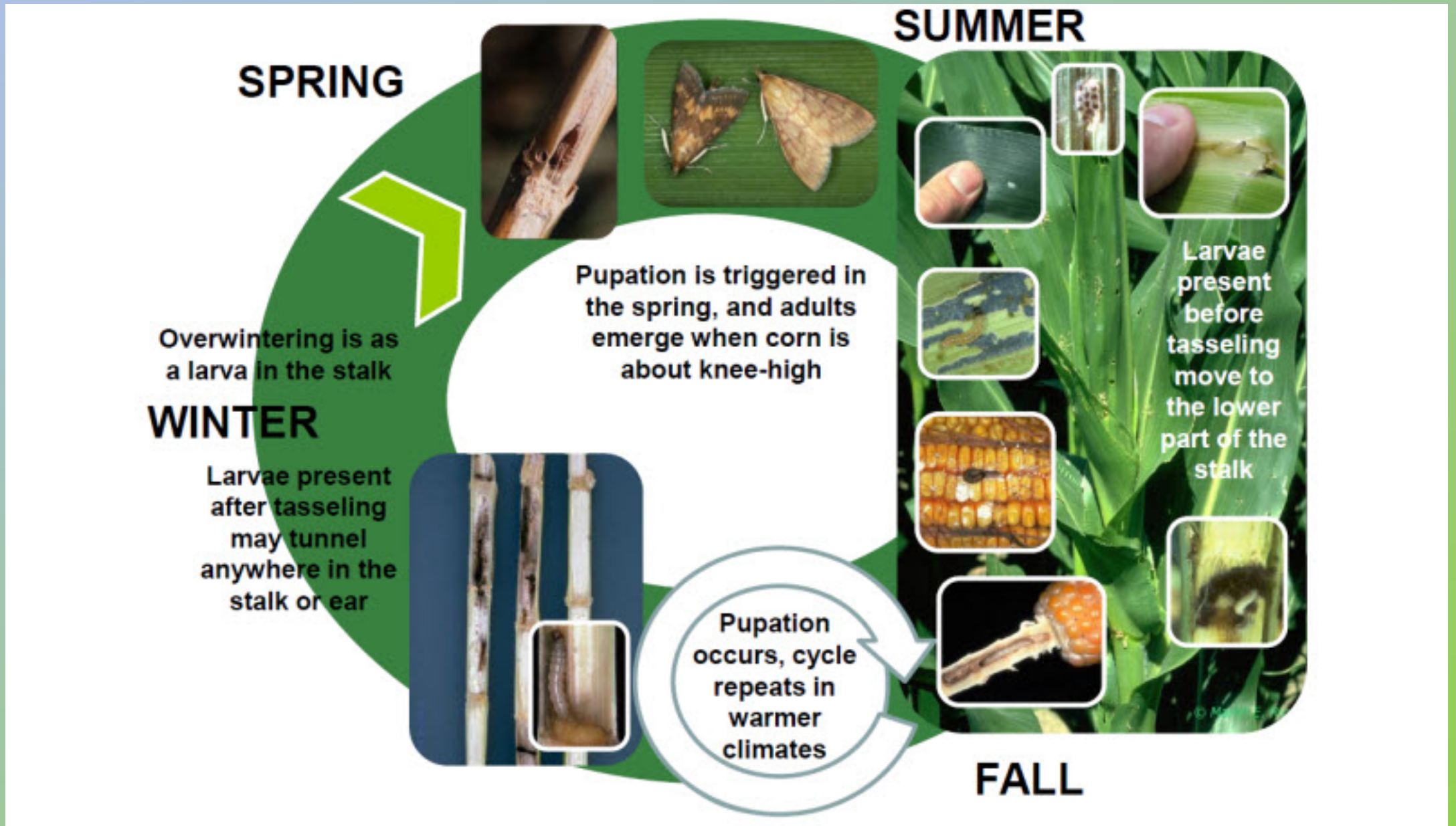
Photos: Whitney Cranshaw, Colorado State University

Some Common Outdoor Pests

European Corn Borer (*Ostrinia nubilalis*)

http://www.hemptrade.ca/eguide/production/insects-and-pests

European Corn Borer (ECB)



John L. Capinera

Monitor for European Corn Borer Moth Activity

- Install pheromone traps to monitor for adult moth activity in June
- Subscribe to University of Maine Extension sweet corn weekly reports

Scout for Borer Damage

Photo: Whitney Cranshaw

Photo: WI Dept Ag

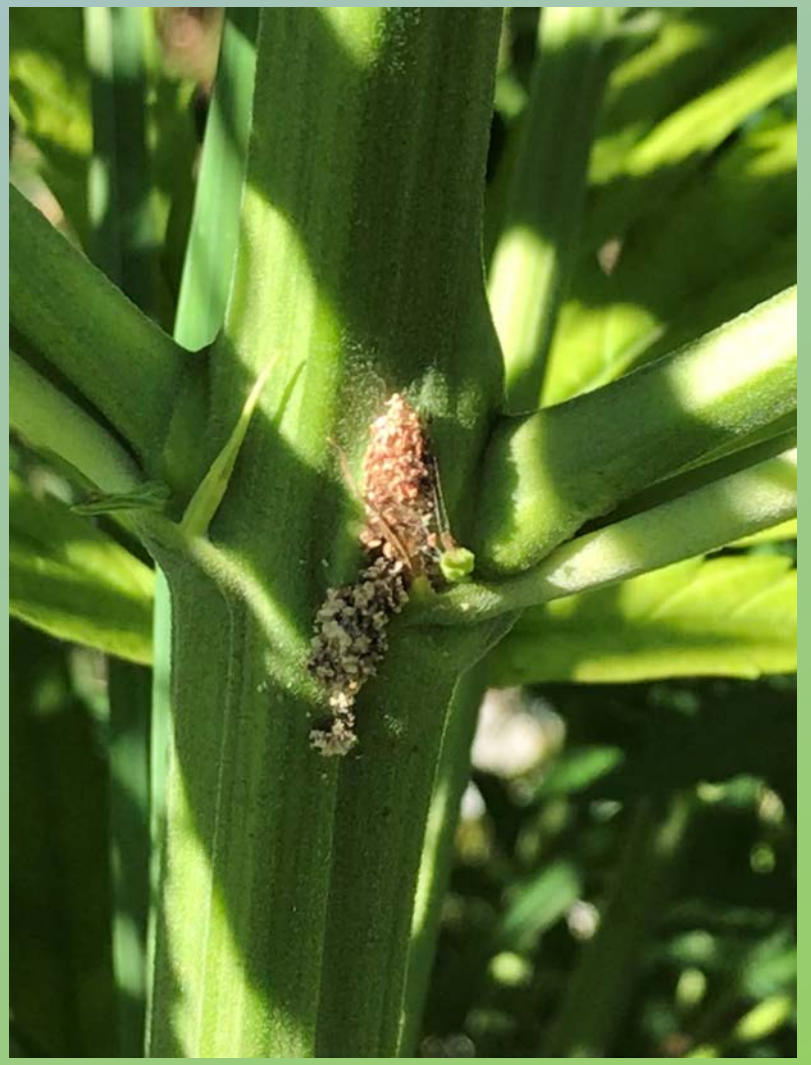


Photo: Devin McGuire

Eurasian Hemp Borer

Images:
https://webdoc.agsci.colostate.edu/

Image“: bellavancelandworks.com/

Image: https://minnesotafarm.files.wordpress.com/2013/11/100_2502.jpg

Borer Prevention

- Destroy crop residue after harvest
- Rotate fields to non-susceptible crops
- Manage weeds in and around fields

Hemp Russet Mite (*Aculops cannibicola*)

- Tiny, elongated, pale, on leaf undersides. 10-20x magnification needed to see them
- Can cause leaf curling, bronzing on some varieties. Heavy infestation can suppress bud growth and size.
- Can be spread mechanically and on wind currents

Meadow Vole

- Plastic mulch provides voles great habitat.
- Leaf litter, weeds and grass also provide good cover.
- Keep weeds under control. Use good sanitation in and around the field and greenhouse
- Set Snap traps

Vole Management in the Field

- Tillage – plowing destroys burrows
- Field sanitation
  - remove crop debris and old plastic mulch
  - Control weeds in and around field
- Trapping
- Stem guards?

Place snap traps in vole runways

- https://grasspad.com/voles/ (video)
- https://extensionpublications.unl.edu/assets/html/g887/build/g887.htm(fact sheet)

Traps parallel in runway. Triggers facing away from each other

Or traps at right angle to runway, with triggers in runway

Rodent Management in the Greenhouse/Hoophouse

- Mow natural vegetation away (2-3’) from perimeter
- Build them out- buried (18” deep) hardware cloth skirt around perimeter
- Set traps

IPM for Plant Disease Prevention

- Infectious (eg fungi, bacteria, viruses)
- Non-infectious (nutritional deficiencies, frost, salt, sunscald)
- Prevention is critical
  - Sanitation: remove plant debris, sanitize tools, disinfect grow room surfaces
  - Optimize Growing Conditions: water, sunlight, temperature, nutrition, soil condition
  - Adequate Spacing: reduce humidity, increase air movement
  - Scout regularly
  - Rogue-out, bag, and dispose of infected plants
- Pesticide options limited – check with BPC for guidance

Pest Prevention: Farm Hygiene/Sanitation

- Manage pests on starts BEFORE transplanting
- Prepare Field: remove old plastic mulch, properly clean and store equipment, control weeds, rogue out volunteers
- Clean equipment and boots between fields
- Work in dry, pest-free areas first before moving into infested, wet areas

Stem and Root Rots

- Young plants most at risk
- Caused by fungal pathogens: Fusarium spp, Pythium spp, Botrytis
- Maintain proper soil moisture -- avoid overwatering or poorly drained soil conditions
- Keep grow rooms clean of soil and plant debris
- Disinfect grow room surfaces periodically as well as pots and tools before reusing them.

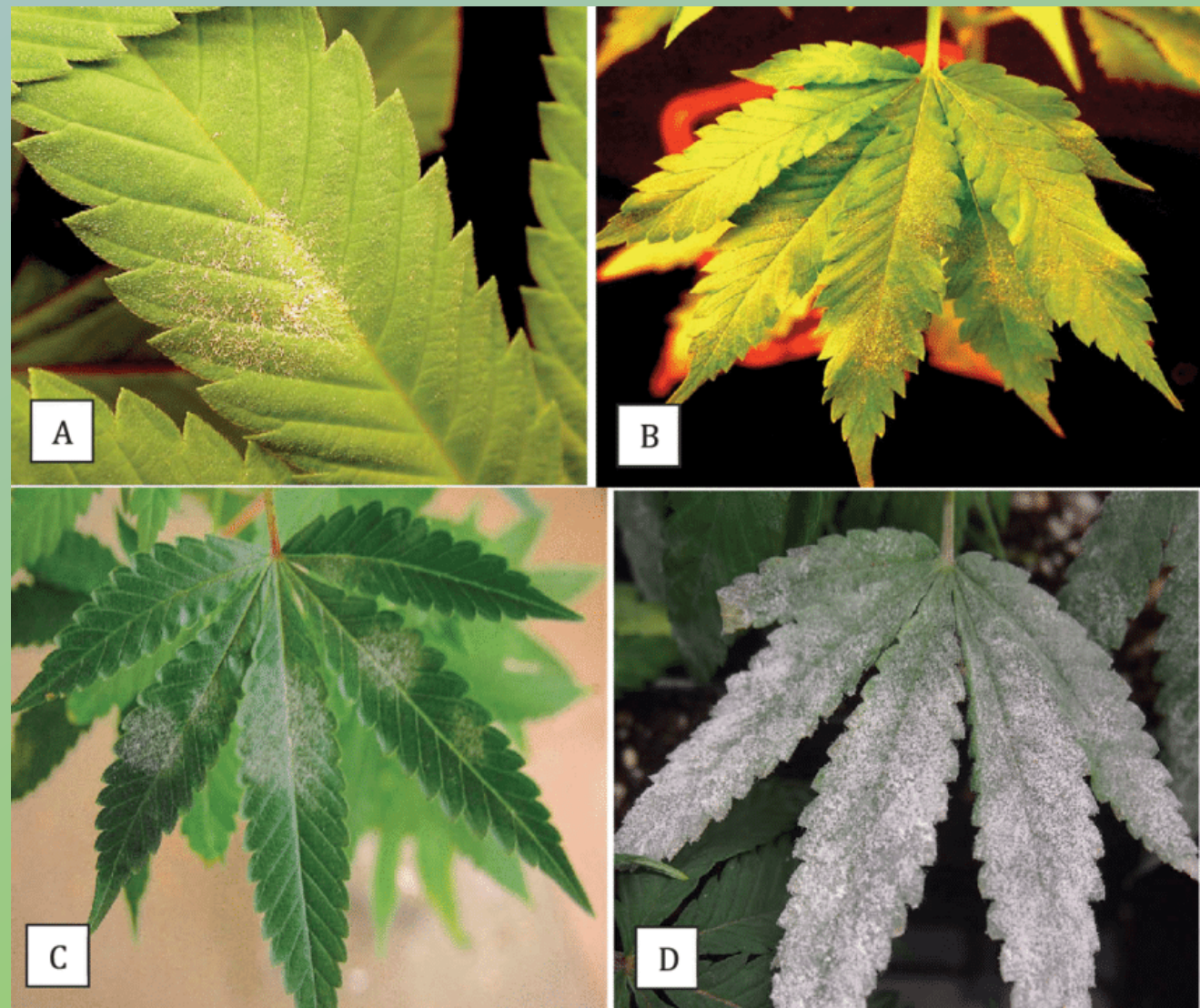
Gray Mold (bud rot, *Botrytis cinerea*)

Images: Nicole Gauthier, Univ of KY. http://www.kyhempdisease.com/gray-mold--botrytis--in--the-greenhouse.html

- Can be found in soil, dead plant tissue or living plants. **Remove plant debris**
- Develops in high humidity—in flower buds and tightly-packed plant parts – **provide adequate spacing. Scout regularly and remove infected plants.**
- Can enter through wounds and pruning cuts
- Stem infections and damping off disease of seedlings. **Scout early and often.**
- Good resource: UKY Hemp Disease Lab (search for Kentucky Hemp Disease)

Powdery Mildew

- Lives on live plant material
- Found on upper leaf surface
- Favored by moderate temps and high humidity
- Plant spacing to optimize air flow
- Select resistant varieties



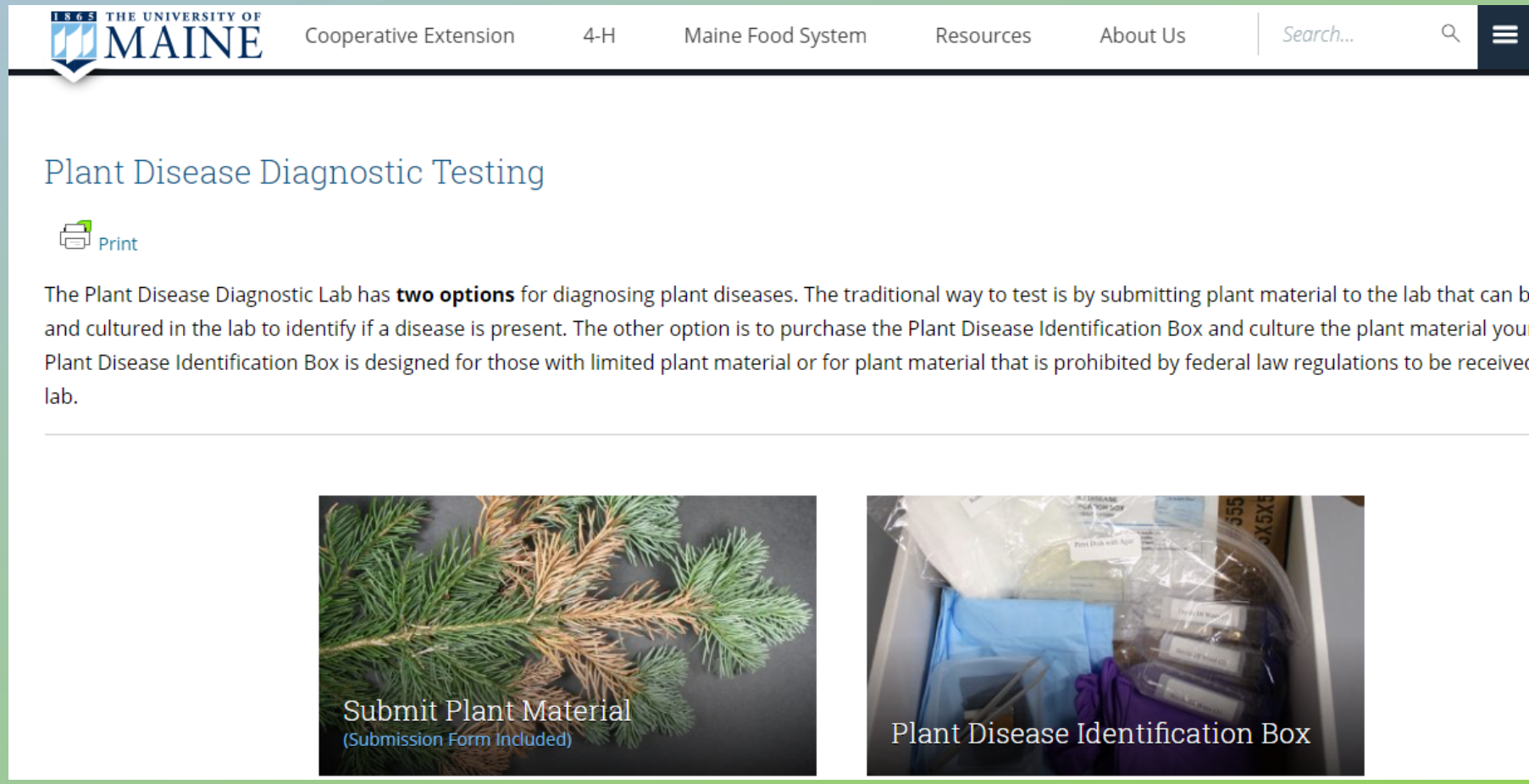
Leaf Spot Diseases (eg *Septoria, Cercospora, Anthracnose*)

Slide credit: Scott Lewins
Entomology Extension
Educator UVM Extension
NWCS Team

- More common outdoors
- Some persist in soil or plant debris
- Plastic mulch can reduce soil splash onto plants
- Destroy plant debris at season end
- Get a diagnosis (UMaine Plant Disease Lab)

What's Ailing My Plants?

- UM Diagnostic Testing Lab
- Contact Alicyn Smart
- **207.581.3883**
  Email: alicyn.smart@maine.edu
- **Visit: https://extension.umaine.edu/ipm/plant-disease/**



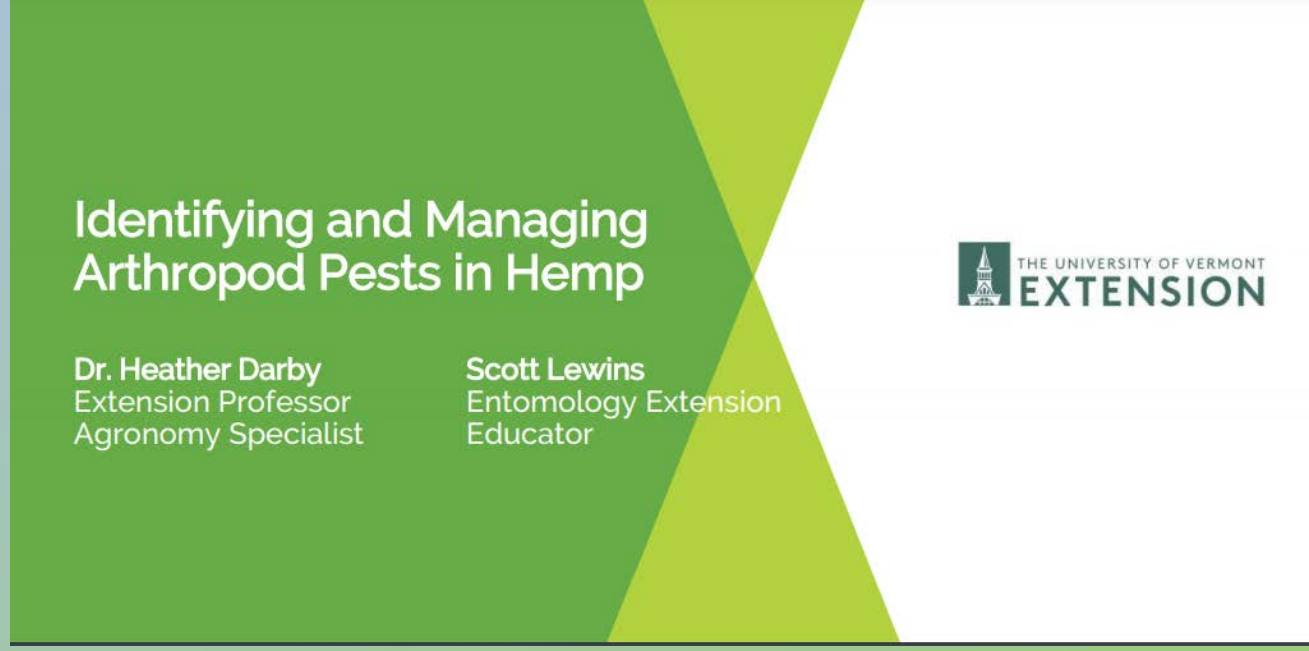
Keys to IPM Success

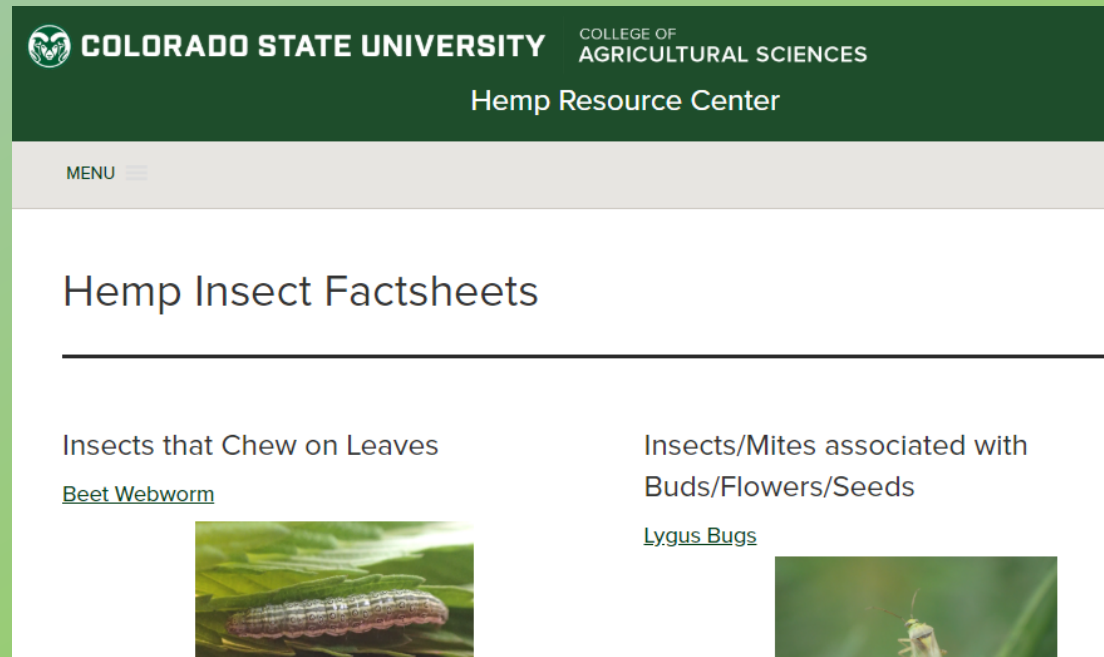
- Prevent: Learn how to avoid common pest issues and grow healthy plants.
- Prepare: Know your options and decision points for common pests.
- Scout: Intentionally and aggressively. 2-3x/week indoors, 1-2x/week outdoors
- Identify insects and disease accurately
- Assess and record what, where, when and severity of pest occurrence

Additonal Resources

UVM: Recorded webinars:
https://www.uvm.edu/extension/nwcrops/industrial-hemp

CSU Hemp Resource Center:
https://hempinsects.agsci.colostate.edu/





Maine Resources

- **Maine Dept Agriculture, Conservation and Forestry**
  - **Hemp Program:** https://www.maine.gov/dacf/php/hemp/index.shtml
  - **Maine Board of Pesticides Control:** www.thinkfirstspraylast.org, pesticides@maine.gov

- **Cooperative Extension**
  - **Food and Ag Center:** https://umaine.edu/mainefoodandagcenter/
  - **Insect, Tick and Plant Disease Lab:** https://extension.umaine.edu/ipm/
  - **County Offices:** https://extension.umaine.edu/county-offices/