Introduction to IPM

- Types of pests
- Importance of pest identification
- Information resources

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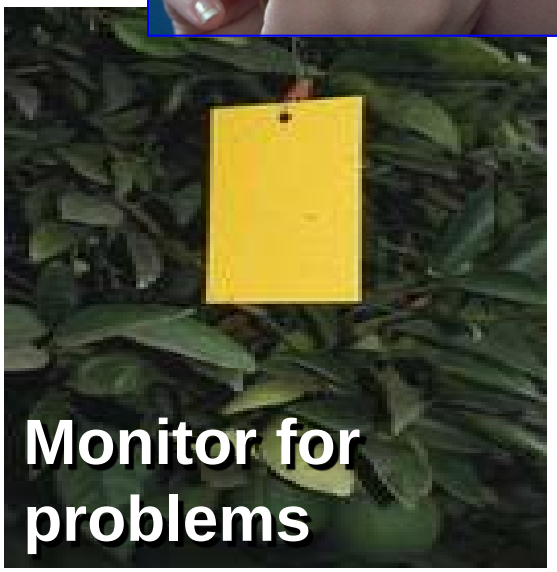
What is the idea behind IPM?

- Ecologically-based approach
- Prevents problems
- Based on knowledge of pest, biology, and habitat
- Don't spray just because you see a pest
- Uses least-toxic methods to protect people and environment



IPM tools and techniques

Combine practices for long-term management

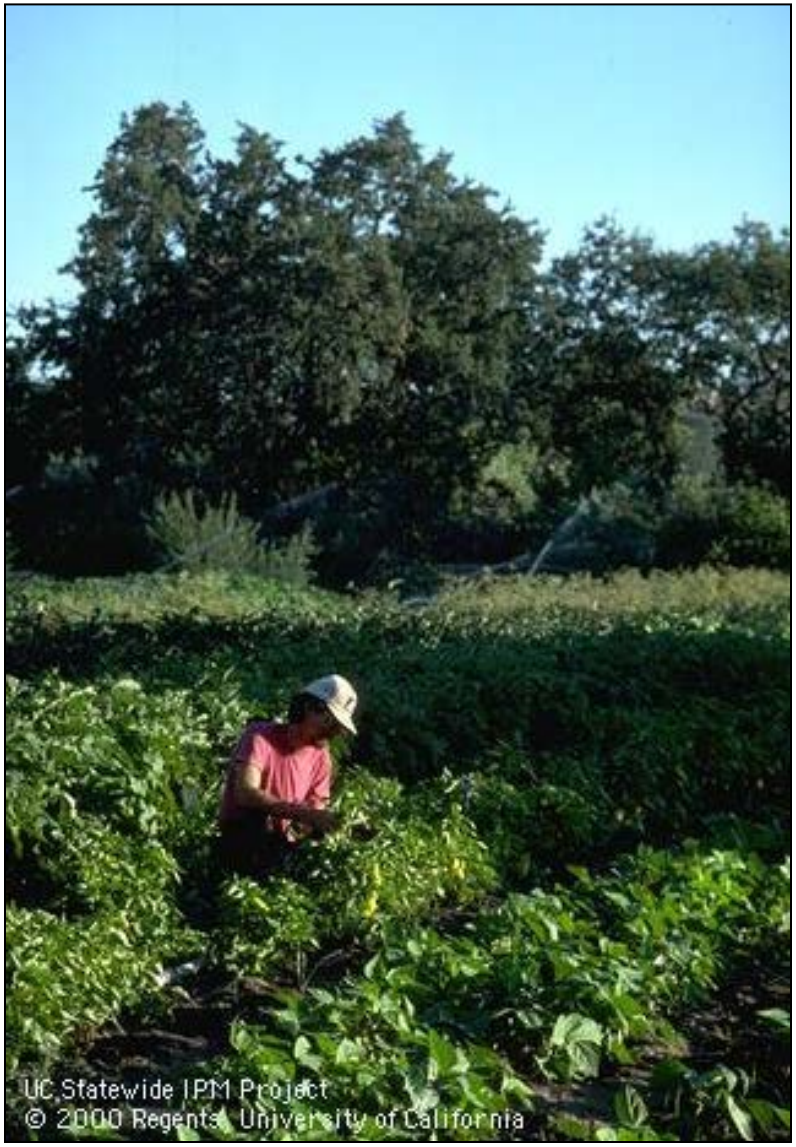
Competitive plants

Mulch

- ✓ **Prevention**
- ✓ **Cultural practices**
- ✓ **Physical/ mechanical**
- ✓ **Biological control**
- ✓ **Pesticides, if needed**
  - **Monitor to detect and assess problems**
  - **Use least-toxic materials**

Why choose IPM?

- Provides long-term solutions
- Manages potential problems before they get out of hand
- Eliminates unnecessary pesticide use
- Good for health and the environment
- Gives you choices that rarely require pesticides



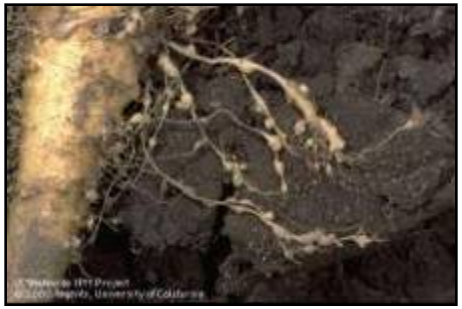
Types of Pests

Insects/mites

Pathogens

Weeds

Molluscs



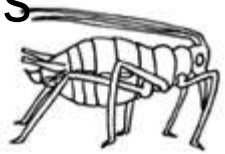
Nematodes

Vertebrates

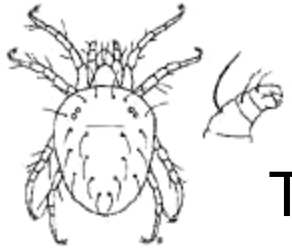
Insects and Mites

Insects

Head, thorax, and abdomen
3 pairs of legs



Mites

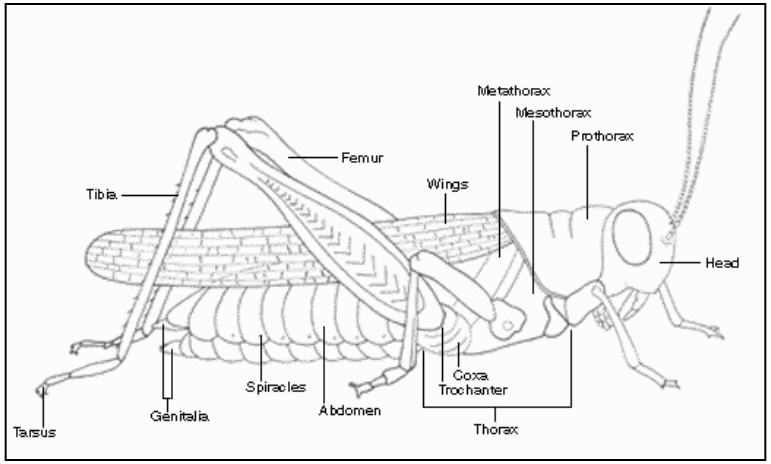


Two body parts
4 pairs of legs

Mouthparts

- **chewing** (beetles, caterpillars)
- **piercing-sucking** (aphids, bugs)
- **sponging** (flies)
- **siphoning** (moths)
- **rasping-sucking** (thrips)
- **cutting-sponging** (biting flies)
- **chewing-lapping** (wasps)

piercing-sucking



Weed Classifications

- Plant
  - Monocots Grasses and Sedges
    - Annuals
      - Winter
      - Summer
    - Perennials
  - Dicots Broadleaf
    - Annuals
      - Winter
      - Summer
    - Perennials

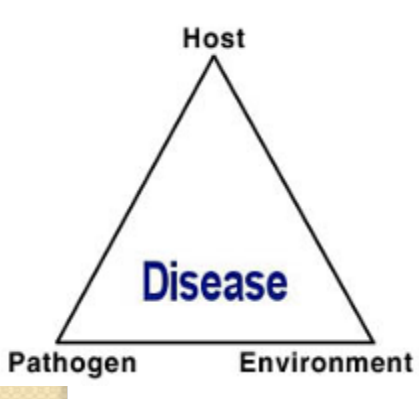
Annual bluegrass

Crabgrass

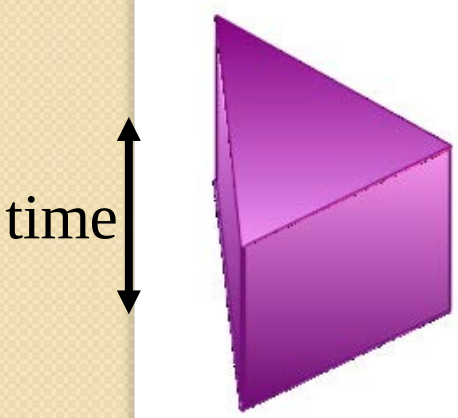
Mallow

Spotted spurge

Pathogens and Nematodes



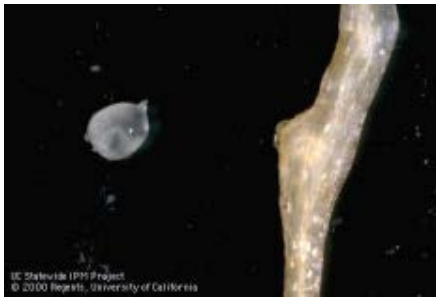
Old model



New model

- Virus
- Bacteria
- Water molds

Verticillium Wilt



Female root-knot nematode next to root gall

Adult root lesion nematodes inside root

Vertebrates

Rabbits

Ground squirrels

Birds

Gophers

Voles

Snails and Slugs

Adult brown garden snail

Estivate in hot weather

Gray garden slug

Importance of Pest Identification

- Have to identify the problem before it can be solved.
- Requires correlating pests to damage.
  - Damage from insects, diseases, weeds, etc., vs.
  - Damage from equipment, nutrition, water mgt., etc.

Big-eyed bug—beneficial insect

False chinch bug—sporadic, minor pest

Lygus bug—major pest

Herbicide damage vs. grub damage

Mower damage

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Diagnosing Problems

- Just because you see a pest doesn't mean it caused the damage.
- Not all damage needs to be treated.
- Pests may no longer be present.
- Pest may be difficult to find
- Irrigation problems and nutritional deficiencies

Katydid damage

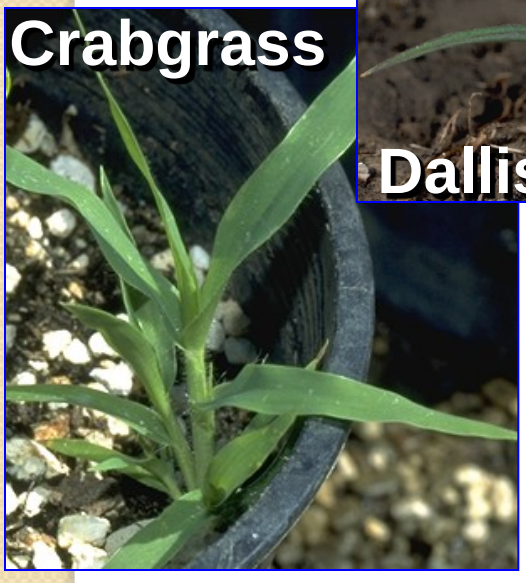
Stink bug damage

Belowground damage from root-knot nematode

Damping off from fungi, primarily weather-related

Identify your pest

- Identify your pest
- Understand its life cycle

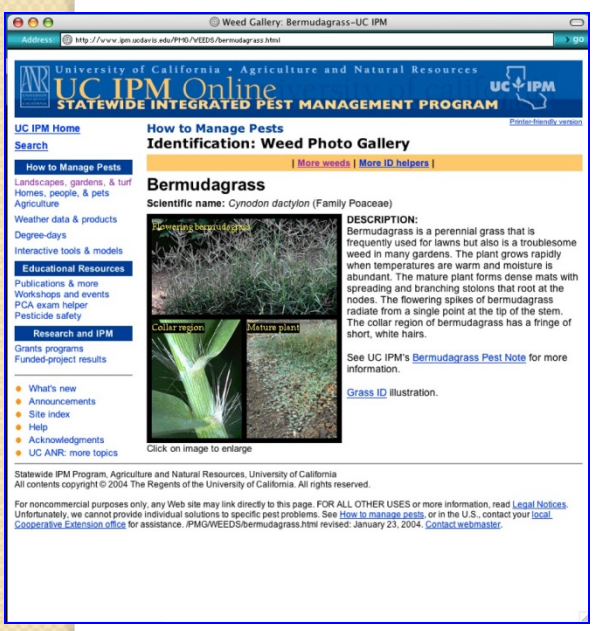


Beneficial insects

Resources to help you identify pests

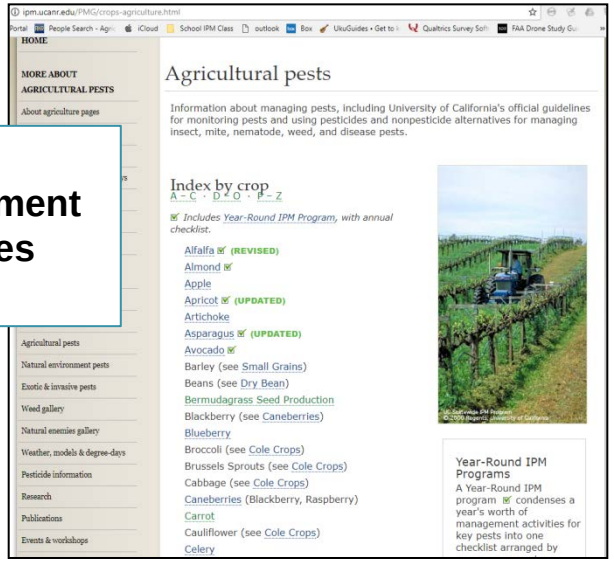
Science-based

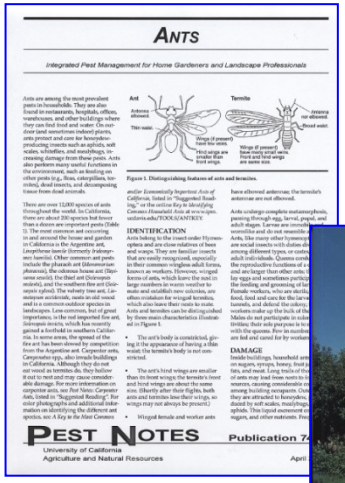
www.ipm.ucanr.edu

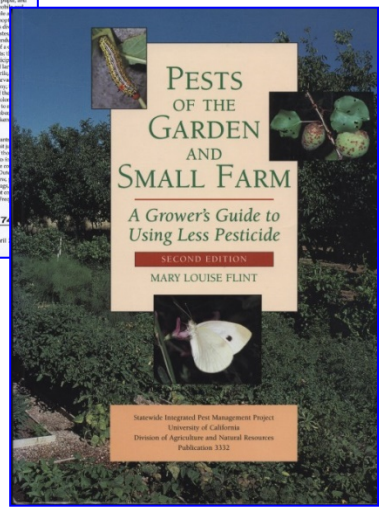


Weed photo gallery

Pest management guidelines (PMGs)



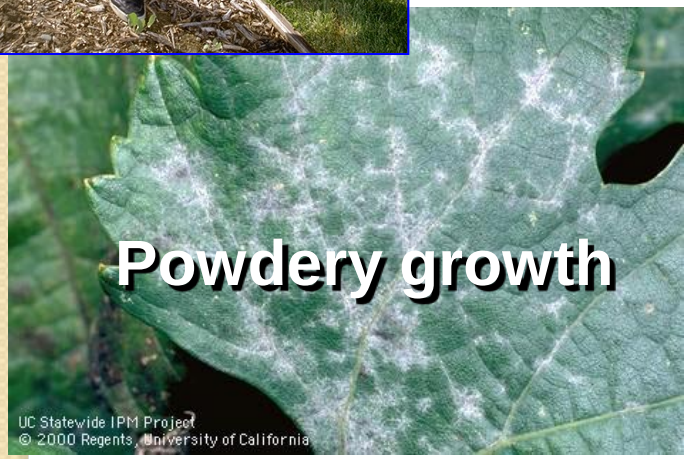




UC IPM Publications

Be on the lookout

- Monitor regularly



Monitoring

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Reduce problems with cultural controls

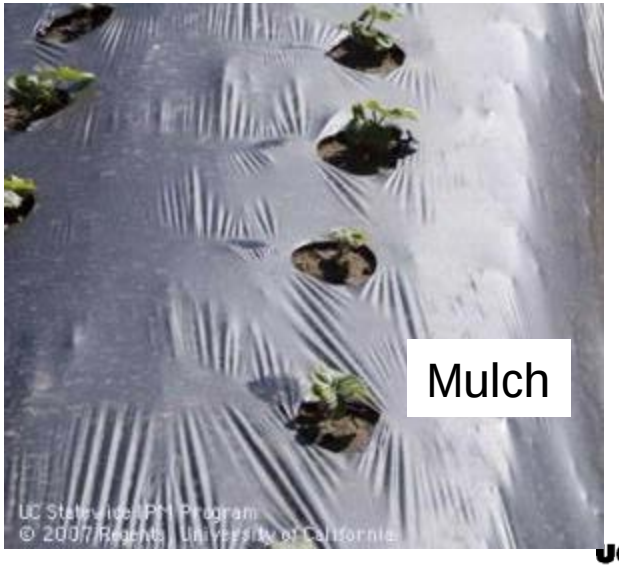
- **Select well-adapted and pest-resistant plant species**
- **Provide adequate water**

Drip irrigation reduces weeds

The San Andreas strawberry cultivar (left) is resistant to Fusarium wilt, while the Albion cultivar (right) is susceptible

Keep crop competitive with proper irrigation, fertilization

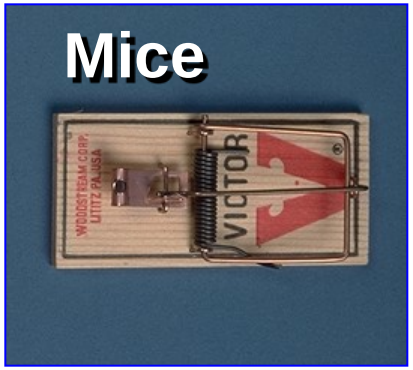
Manage pests with physical or mechanical methods



Remove pests with physical or mechanical methods

Traps

Reduce mites by washing off dusty leaves



Biological Control Arthropods

Controlling insects and mites with:

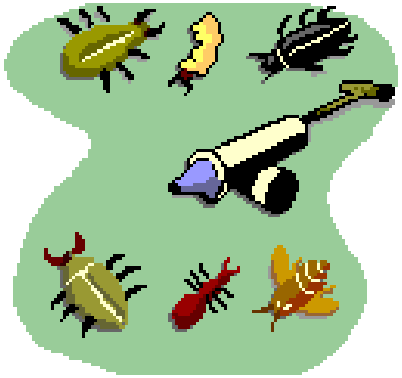
- Pathogens
- Predators
- Parasites

Identification

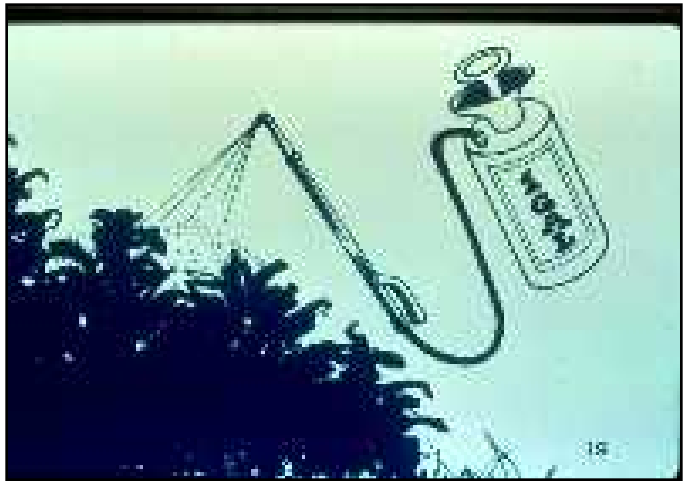
Good or Bad?

Many beneficial insects such as the syrphid fly larvae and the cecidomyid midge look like plant pests, but are actually effective predators of aphids.

Pesticide



Any chemical (natural or synthetic) that mitigates (kills, controls, repels) a pest (animal or plant, etc.).



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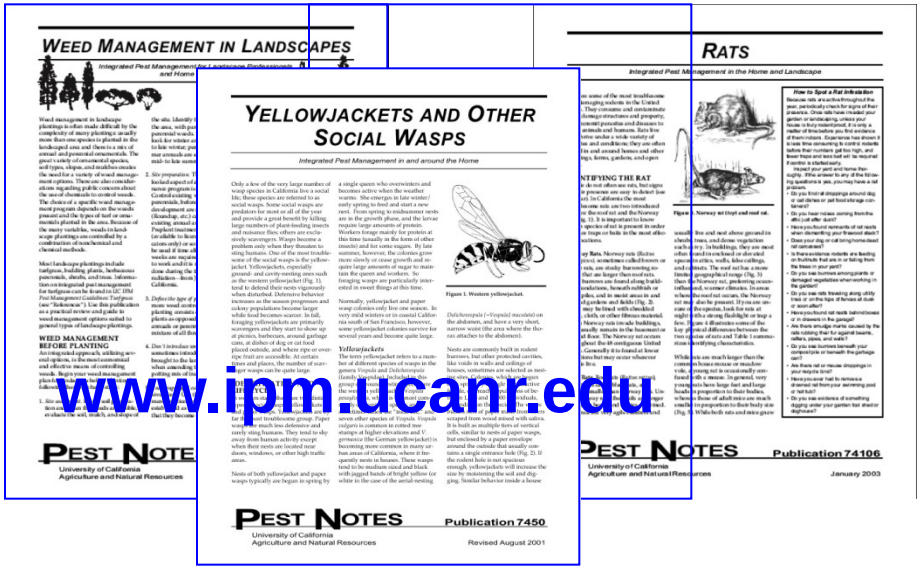
If you use pesticides

- **Choose the least-toxic effective material**
- **Use in combination with other methods**
- **Follow label directions carefully**
- **Consult UC IPM Pest Notes or PMGs**



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Herbicide

A chemical substance used to kill undesirable plants.

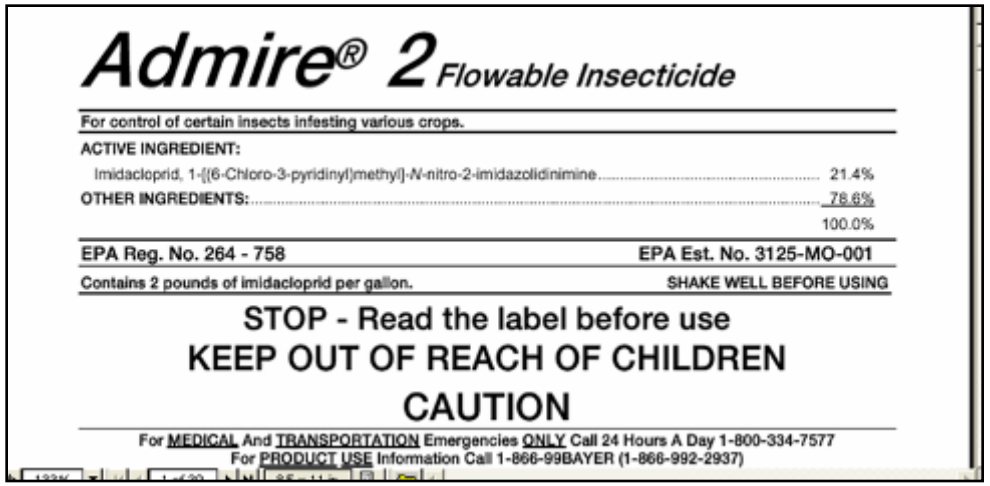
- Will kill any plant (not just weeds).
- Target broad range of or specific weeds.
- Preemergence and postemergence.
- Contact and systemic.

Postemergence contact herbicide

Insecticide

A chemical substance used to kill undesirable insects.

- Contact—taken in directly through the surface of the pest.
- Stomach—ingested by the pest.
- Systemic—translocated through the plant.
- Fumigant—uptake by the pest through its breathing apparatus.

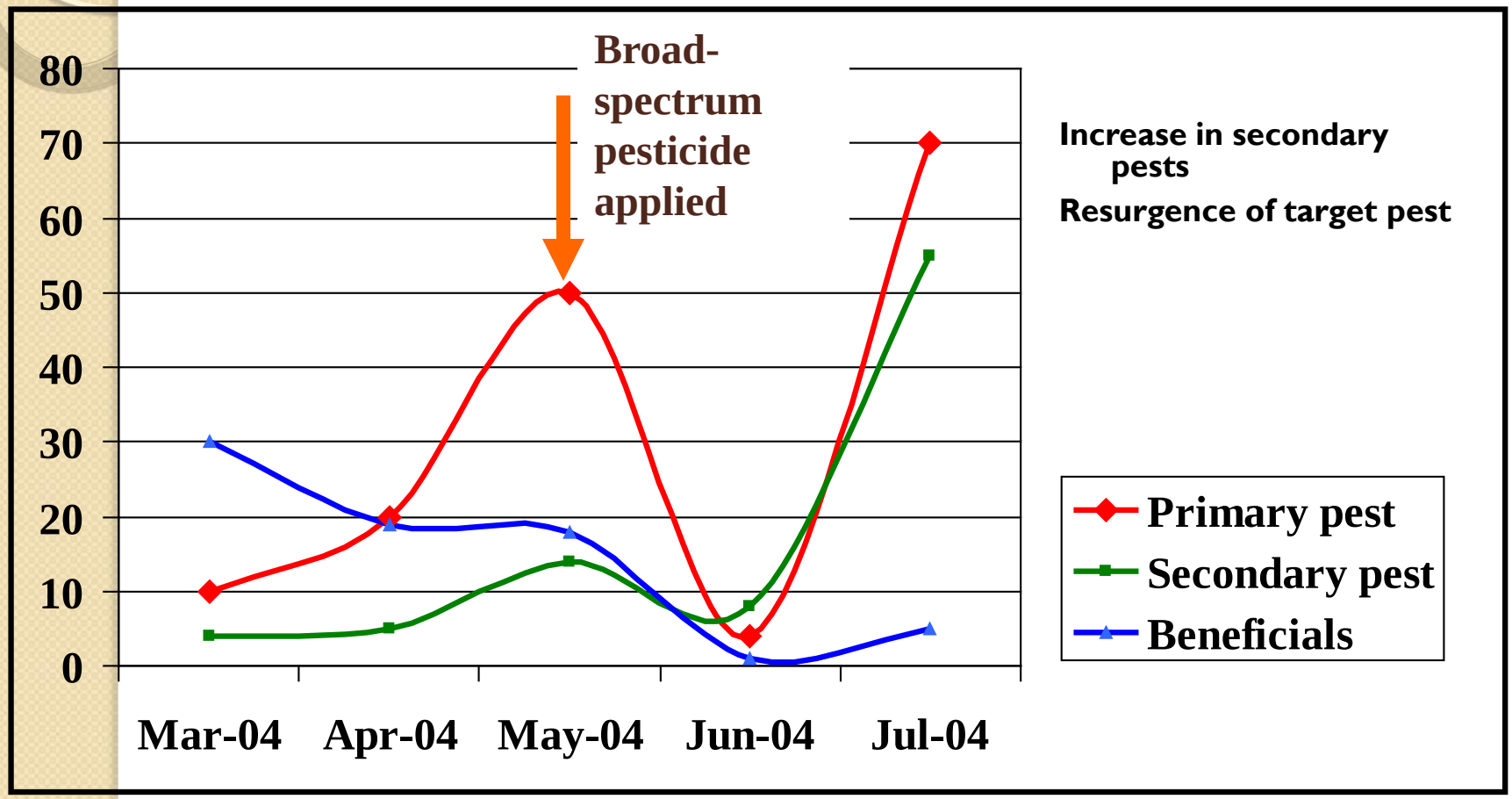


Fungicide

A chemical substance used to kill undesirable fungi.

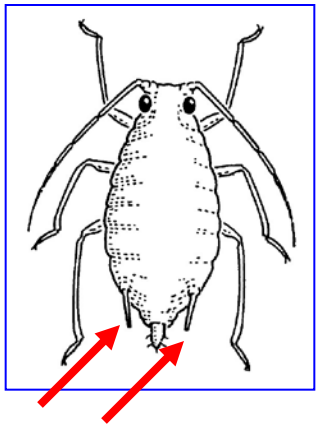
Powdery mildew on grape

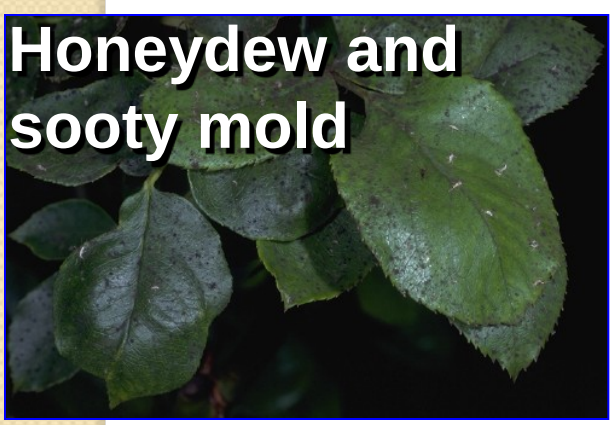
Impacts on Beneficial Organisms



IPM for aphids

1. Identify the pest





2. Determine if this pest is a problem you can't tolerate

- High number of aphids?
- No natural enemies?
- Know facts about biology

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IPM for aphids

3. Identify the conditions that cause aphids to thrive
   - New lush plant growth
   - Destruction of natural enemies by pesticides

- Protection by ants

Lacewing larva

Parasites

Syrphid larva

How can you change these conditions?

- Avoid overfertilizing plants
- Avoid pesticides that kill natural enemies
- Keep ants off plants

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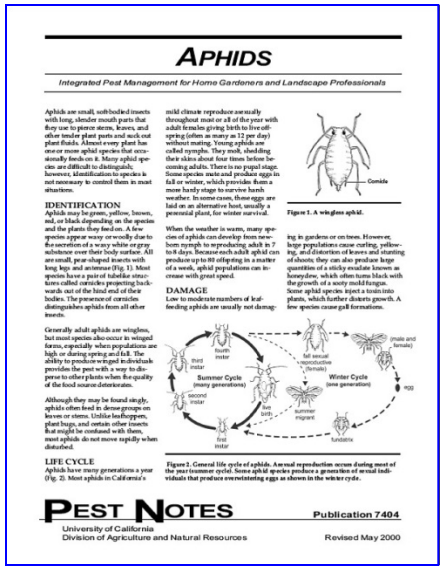
IPM for aphids

4. Consider other methods

- **Prune out infested leaves and stems**
- **Examine plants for natural enemies**



APHIDS

Integrated Pest Management for Home Gardeners and Landscape Professionals

PEST NOTES Publication 7404

University of California
Division of Agriculture and Natural Resources

Revised May 2000

Integrate methods with a pesticide. Choose least-toxic materials such as oils and soaps.

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IPM for weeds

1. Identify the pest

- **Know which weeds are invading**
- **Use tools on the UC IPM web site**

2. Determine if the weed is a problem

- **Early emerging**
- **Perennial weeds**

IPM for weeds

3. Identify the conditions that cause weeds to establish and grow

- **Sources of weed seeds or propagules**
- **Unplanted areas**
- **Letting weeds go to seed**

How can you change these conditions?

- **Manage weedy areas around growing area**
- **Don't bring in seeds or propagules**
- **Plant dense plantings**
  - **Select competitive plants**
  - **Transplant instead of direct seed**
- **Install low-output irrigation systems**
- **Water, fertilize, prune properly**
- **Use mulch**

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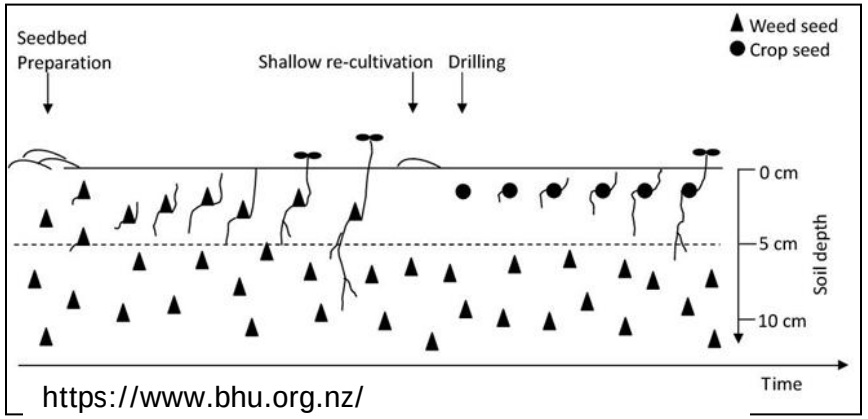
IPM for weeds

4. Consider other methods

- **Hand pull, shallow cultivation, hoeing**
- **Remove weeds when small and before they set seed**
  - **Solarize new planting beds**
  - **Use herbicides**

Use water/wait/cultivate method to deplete seed bank



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