

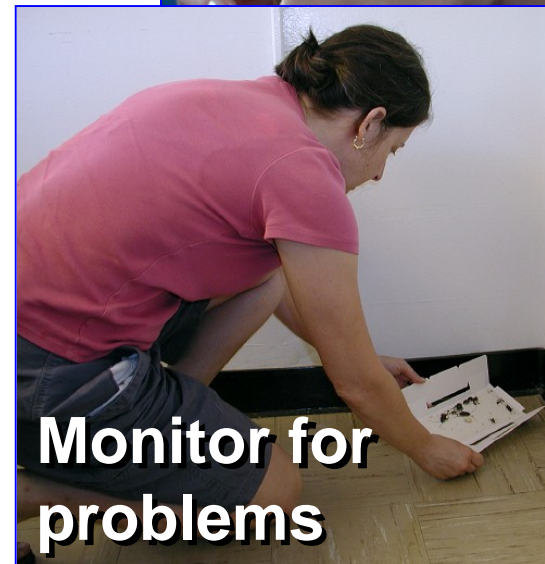
Introduction to IPM

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



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

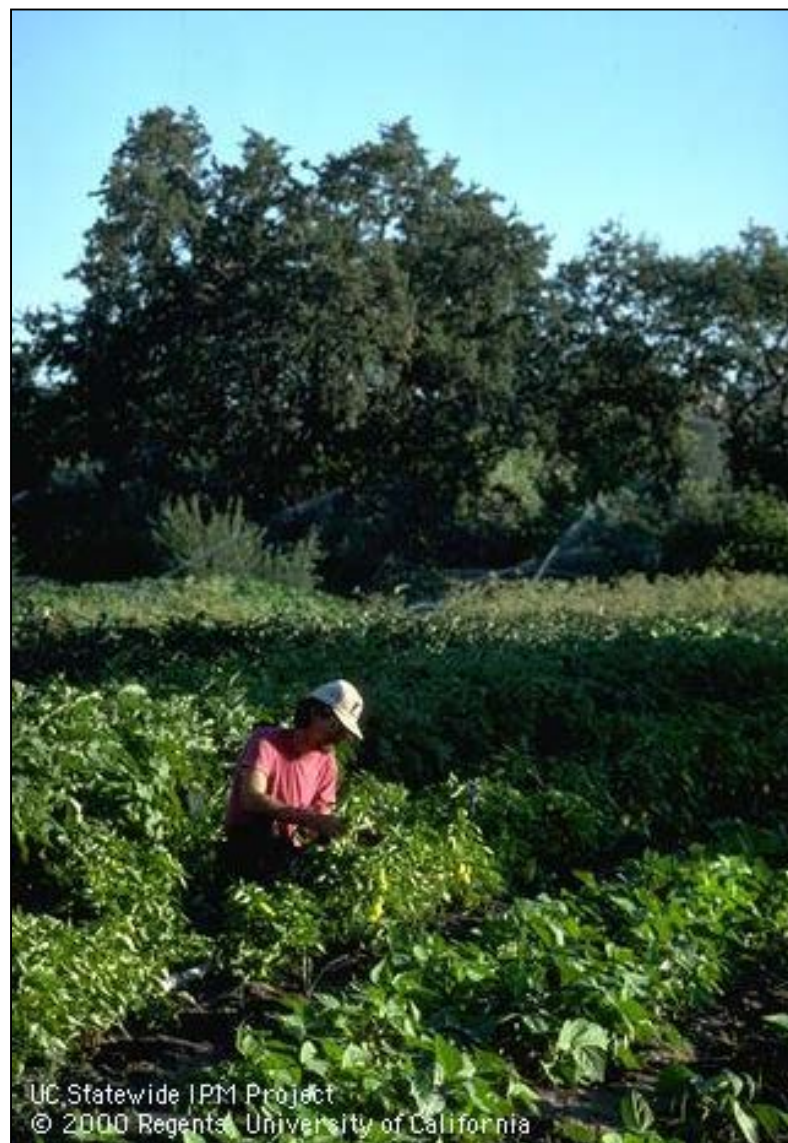
- Combine practices for long-term management



- ✓ 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



UC Statewide IPM Project
© 2000 Regents, University of California

Types of Pests



Insects/mites



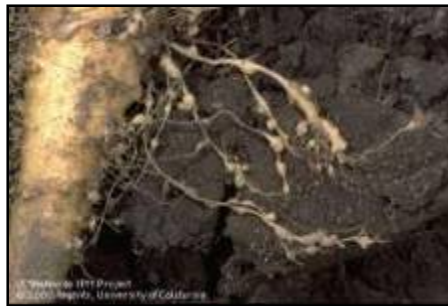
Pathogens



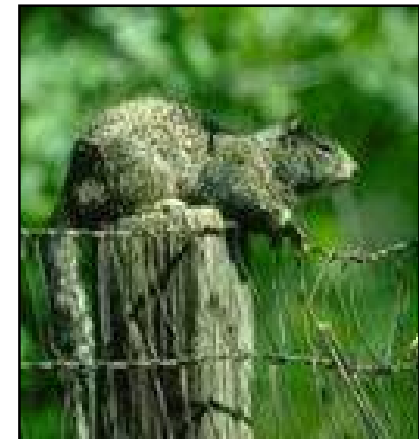
Weeds



Molluscs



Nematodes



Vertebrates

Insects and Mites

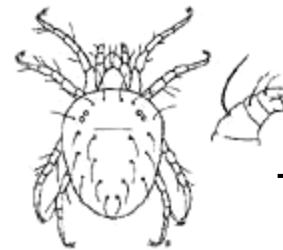
Insects

Head, thorax, and abdomen
3 pairs of legs



Mouthparts

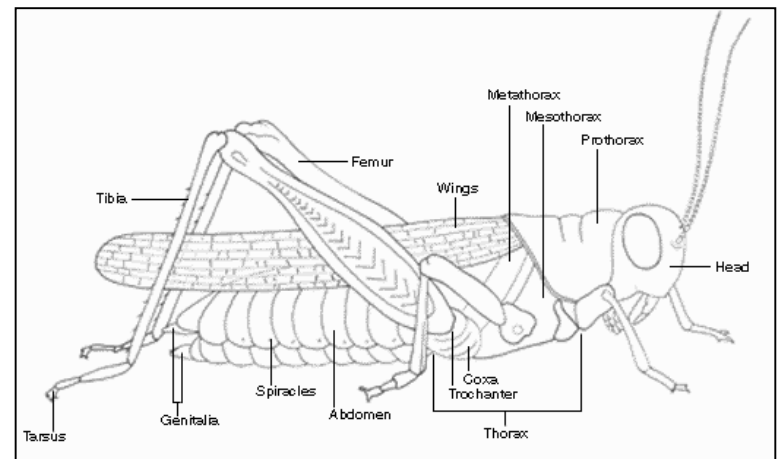
- **chewing** (beetles, caterpillars)
- **piercing-sucking** (aphids, bugs)
- **sponging** (flies)
- **siphoning** (moths)
- **rasping-sucking** (thrips)
- **cutting-sponging** (biting flies)
- **chewing-lapping** (wasps)



Mites

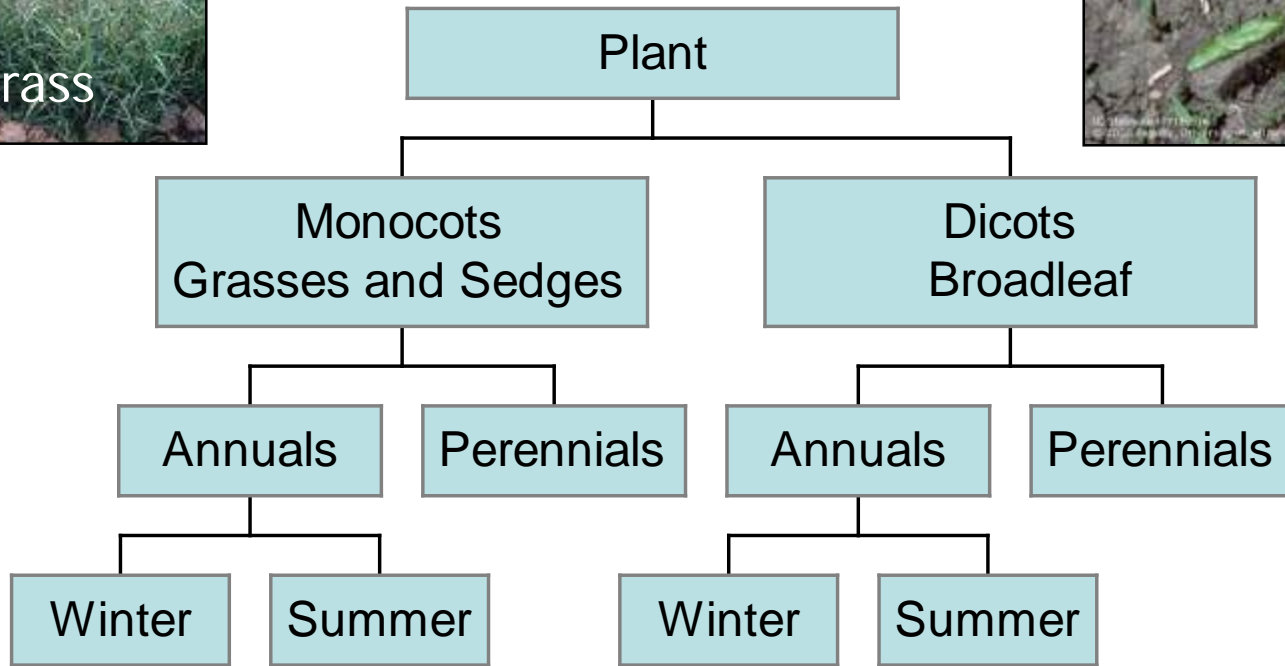
Two body parts
4 pairs of legs

piercing-sucking





Weed Classifications



Annual bluegrass



Crabgrass

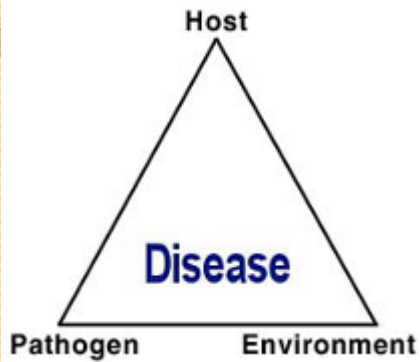


Mallow



Spotted spurge

Pathogens and Nematodes



Old model

- Virus
- Bacteria
- Water molds



Almond Alternaria
Leaf Spot



Verticillium Wilt

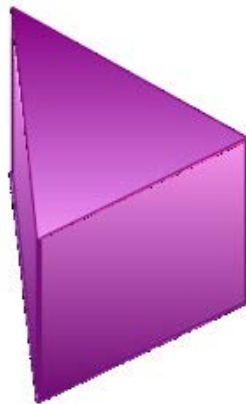


Female root-knot
nematode next to root gall



Adult root lesion nematodes
inside root

time



New model

Vertebrates



Ground squirrels



Birds



Rabbits



Gophers



Voles

Snails and Slugs



Adult brown garden snail



"Hibernate" 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

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



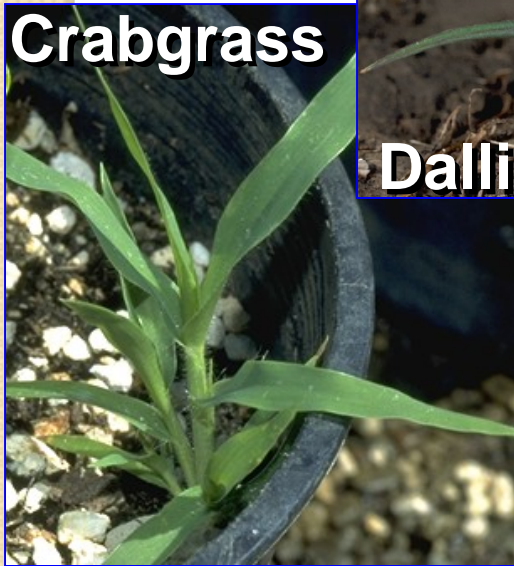
Damping off from fungi, primarily weather-related

Identify your pest

- Identify your pest
- Understand its life cycle



Crabgrass



Dallisgrass



**Damage to lawn
from improper
watering**



Lady beetle larva



Beneficial insects

**Syrphid
fly larva**



Resources to help you identify pests

Science-based

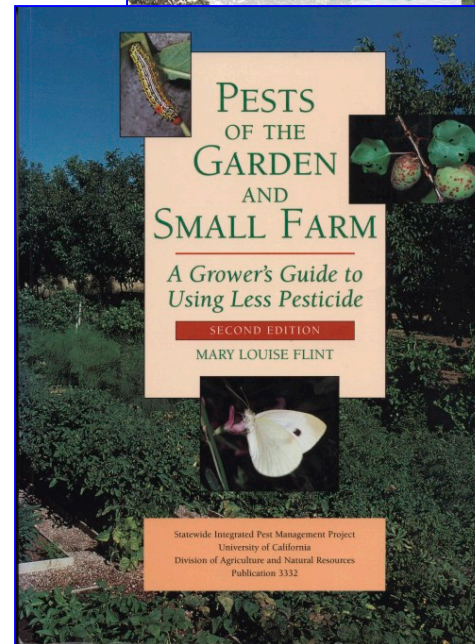
Pest
notes

www.ipm.ucanr.edu

Weed photo
gallery



Key to weeds
in turf



UC IPM
Publications



Be on the lookout

- Monitor regularly



Check for weeds



Inspect plants



Powdery growth

Mice droppings

Rat droppings



Monitoring devices



Cockroach trap



Yellow sticky trap for whiteflies or aphids



Hand lens

Reduce problems with cultural controls

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



- **Keep lawns competitive with proper irrigation, fertilization, and mowing height**

Destroy pests with physical or mechanical methods



Remove pests with physical or mechanical methods

- Hand pick snails
- Reduce aphids with strong spray of water

Hose off aphids



Traps

Yellowjackets



Mice



Snails



Biological Control Arthropods

Controlling insects and mites
with:

- Pathogens
- Predators
- Parasites

Looper larvae with
Granulosis virus



Predacious beetles



Parasitic wasp



Identification

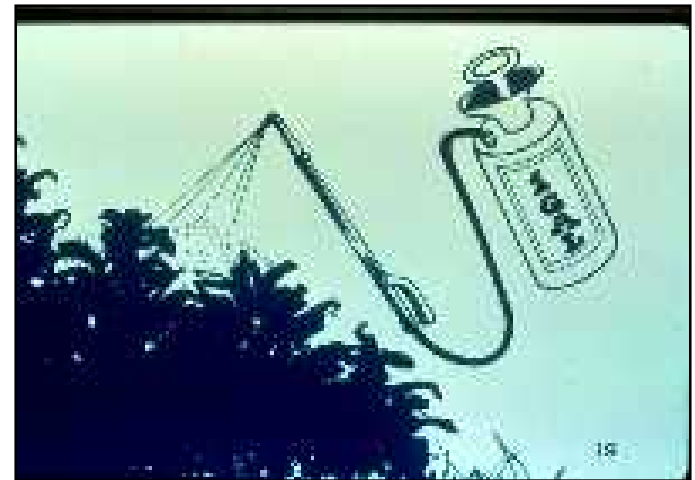
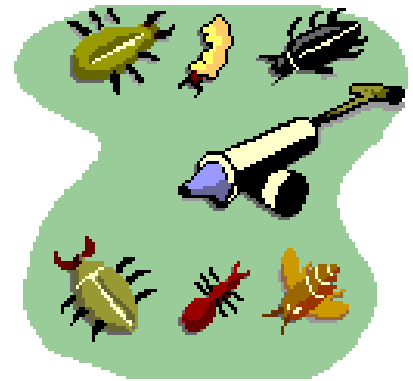
Good or Bad?

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

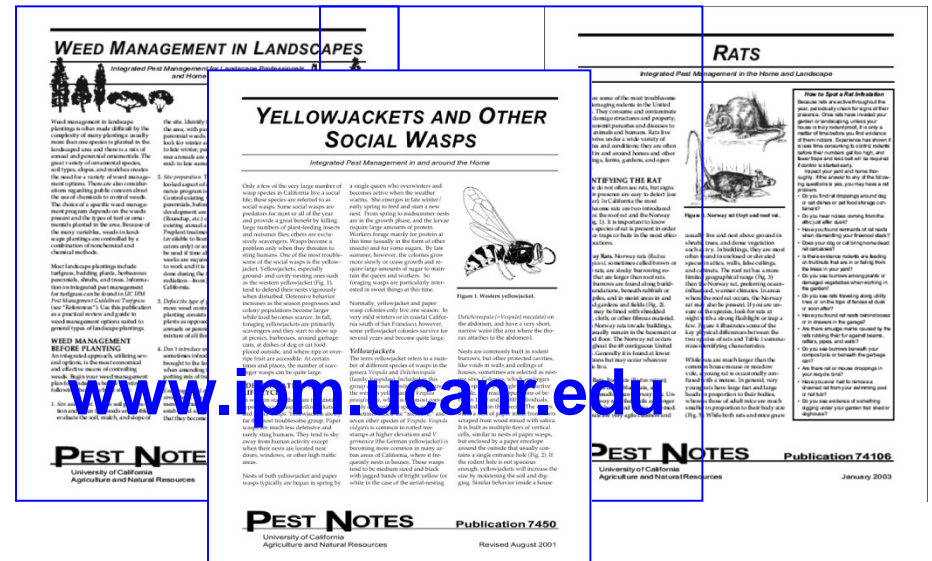


Pesticide

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



- **Consult UC IPM Pest Notes**



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.



Preemergent
herbicide

Untreated



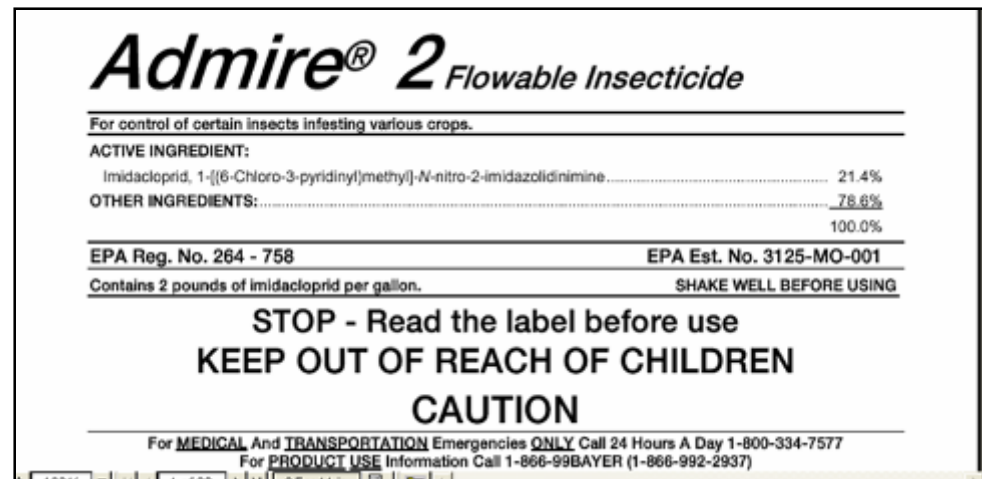
Untreated

Postemergent
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.

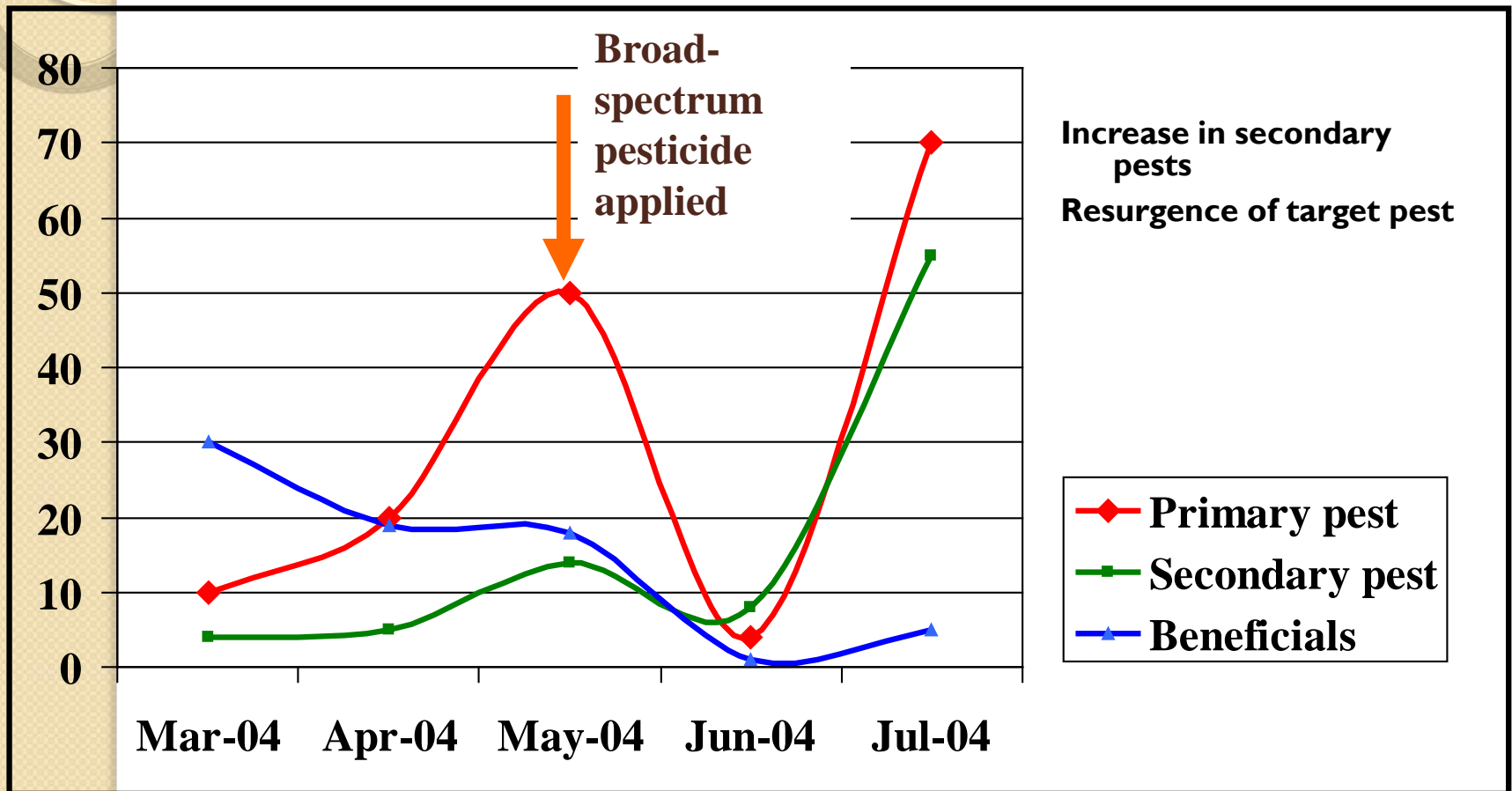


UC Statewide IPM Project
© 2000 Regents, University of California

Powdery mildew on grape



Impacts on Beneficial Organisms



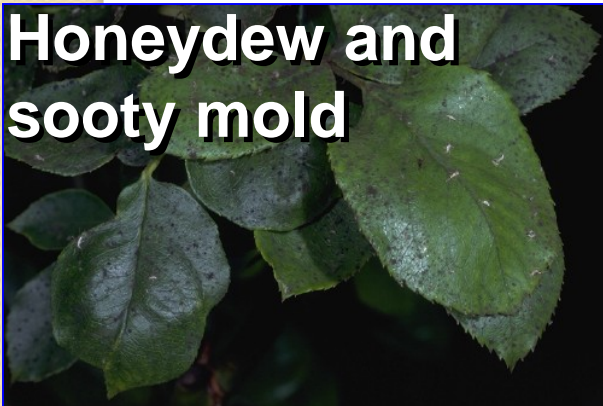
IPM for aphids

1. Identify the pest

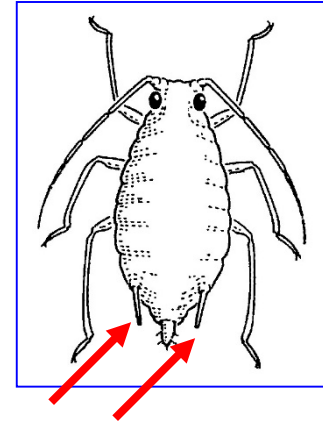
Curled leaves



Honeydew and sooty mold



**Many different
aphid species**



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

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

IPM for aphids

3. Identify the conditions that cause aphids to thrive

- Plants such as apples, roses, vegetables
- New lush plant growth
- Destruction of natural enemies by pesticides
- Protection by ants



Lacewing
larva



Parasites



Syrphid larva



Sticky tree wrap



How can you change these conditions?

- Choose plants not prone to aphid problems
- Avoid overfertilizing plants
- Avoid pesticides that kill natural enemies
- Keep ants off plants

IPM for aphids

4. Consider other methods

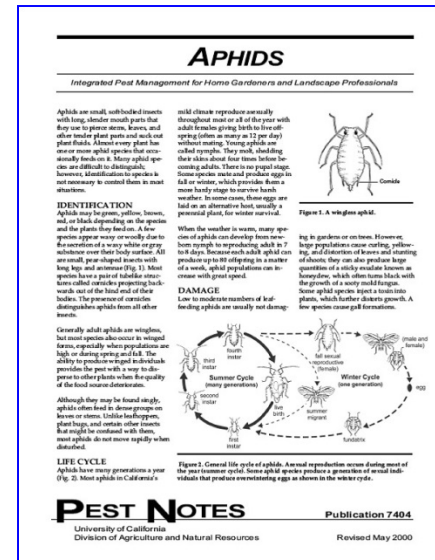
- Prune out infested leaves and stems
- Knock pests off plants with a strong stream of water
- Examine plants for natural enemies



Lady beetle



Aphid mummies

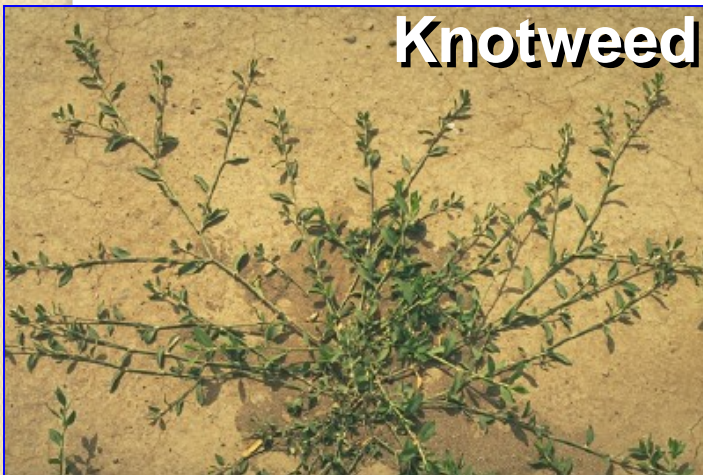


- As a last resort, integrate methods with a pesticide. Choose least-toxic materials such as oils and soaps.

IPM for weeds

1. Identify the pest

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



Knotweed

Dandelion in turfgrass



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

- **Weeds in planting beds**
- **Perennial weeds**

IPM for weeds

3. Identify the conditions that cause weeds to thrive

- Sources of weed seeds or propagules
- Unplanted areas
- Poorly maintained plantings



Mulches



Mow strips



How can you change these conditions?

- Destroy weedy areas around gardens
- Don't bring in seeds or propagules
- Plant dense plantings
- Use mulch, mow strips, concrete strips
- Select competitive plants
- Install low-output irrigation systems
- Water, fertilize, prune, mow properly

IPM for weeds

4. Consider other methods

- Hand pull, shallow cultivation, hoeing
- Remove weeds when small before they set seed



Pull weeds by hand

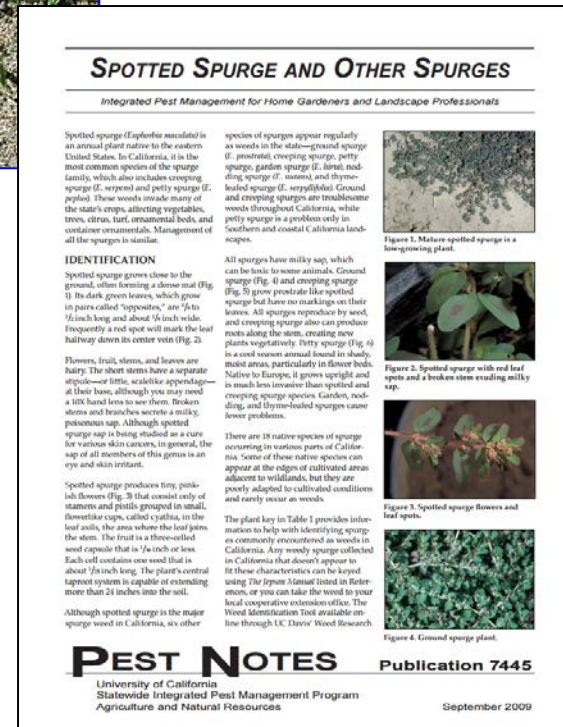


Garden hoe



Flamer

- Solarize new planting beds
- Use herbicides



SPOTTED SPURGE AND OTHER SPURGES

Integrated Pest Management for Home Gardeners and Landscape Professionals

Spotted spurge (*Euphorbia maculata*) is an annual plant native to the eastern United States. In California, it is the most common species of the spurge family, which also includes creeping spurge (*E. virgata*) and petty spurge (*E. prostrata*). These weeds invade many of the state's crops, affecting vegetables, trees, citrus, turf, ornamental beds, and container ornamentals. Management of all the spurges is similar.

IDENTIFICATION

Spotted spurge grows close to the ground, often forming a dense mat (Fig. 1). Its dark green leaves, which grow in pairs called "opposites," are 1/2 to 1/4 inch long and about 1/4 inch wide. Frequently a red spot will mark the leaf halfway down its center vein (Fig. 2).

Flowers, fruit, stems, and leaves are hairy. The short stems have a separate stipule—or little, scaly appendage—at their base, although you may need a 10X hand lens to see them. Broken stems and branches secrete a milky, poisonous sap. Although spotted spurge sap is being studied as a cure for various skin cancers, in general, the sap of all members of this genus is an eye and skin irritant.

Spotted spurge produces tiny pinkish flowers (Fig. 3) that consist only of stamens and pistils grouped in small, flowerlike cups, called cyathia, in the leaf axils, the area where the leaf joins the stem. The fruit is a three-lobed seed capsule that is 1/8 inch or less. Each cell contains one seed that is about 1/8 inch long. The plant's central taproot system is capable of extending more than 24 inches into the soil.

Although spotted spurge is the major spurge weed in California, six other

species of spurges appear regularly as weeds in the state—ground spurge (*E. prostrata*), creeping spurge (*E. virgata*), garden spurge (*E. hibernica*), nodding spurge (*E. nutans*), and thymelaeoid spurge (*E. thymelaeifolia*). Ground and creeping spurges are troublesome weeds throughout California, while petty spurge is a problem only in Southern and coastal California landscapes.

All spurges have milky sap, which can be toxic to some animals. Ground spurge (Fig. 4) and creeping spurge (Fig. 5) grow prostrate like spotted spurge but have no markings on their leaves. All spurges reproduce by seed, and creeping spurge also can produce roots along the stem, creating new plants vegetatively. Petty spurge (Fig. 6) is a cool season annual found in shady, moist areas, particularly in flower beds. Native to Europe, it grows upright and is much less invasive than spotted and creeping spurge species. Garden, nodding, and thymelaeoid spurges cause fewer problems.

There are 18 native species of spurge occurring in various parts of California. Some of these native species can appear at the edges of cultivated areas adjacent to wildlands, but they are poorly adapted to cultivated conditions and rarely occur as weeds.

The plant key in Table 1 provides information to help with identifying spurges commonly encountered as weeds in California. Any weedy spurge collected in California that doesn't appear to fit these characteristics can be keyed using the *Ipomoea* list in the *Field Notes*, or you can take the weed to your local cooperative extension office. The Weed Identification Tool available online through UC Davis' Weed Research

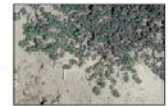


Figure 1. Mature spotted spurge is a low-growing plant.



Figure 2. Spotted spurge with red leaf spots and a broken stem exuding milky sap.



Figure 3. Spotted spurge flowers and leaf spots.



Figure 4. Ground spurge plant.

PEST NOTES

University of California
Statewide Integrated Pest Management Program
Agriculture and Natural Resources

Publication 7445

September 2009

ipm.ucanr.edu

UNIVERSITY OF CALIFORNIA AGRICULTURE & NATURAL RESOURCES

UC IPM

Statewide Integrated Pest Management Program

[What is IPM?](#) [Identify & Manage Pests](#) [Research](#) [Publications](#) [Training & Events](#) [Links](#) [About Us](#) [Contact Us](#)

Subscribe 

Solve your pest problems with UC's best science

What's New

- Highlights: **2014 Annual Report**
- New: Seasonal Landscape IPM Checklist
- Ag Pest Management: Rice, Cherry, Almonds, Peach, Nectarine, Citrus and Alfalfa updated, Grape and Pistachio revised
- Pest Notes: Opossum and Whiteflies revised, Wild Pigs added
- Workshops:
 - IPM seminars
 - Pesticide safety training
- Online courses:
 - Pesticide Resistance
 - Providing IPM Services in Schools and Child Care Settings
- More...

QUICK LINKS

- Newsletters
- Recursos en español
- Online training
- Weather, models,



[Return to Home Page](#)

Home, Garden, Turf & Landscape Pests



Agricultural Pests



Natural Environment Pests



Exotic & Invasive Pests

