

# Insects in the Home Yard and Garden



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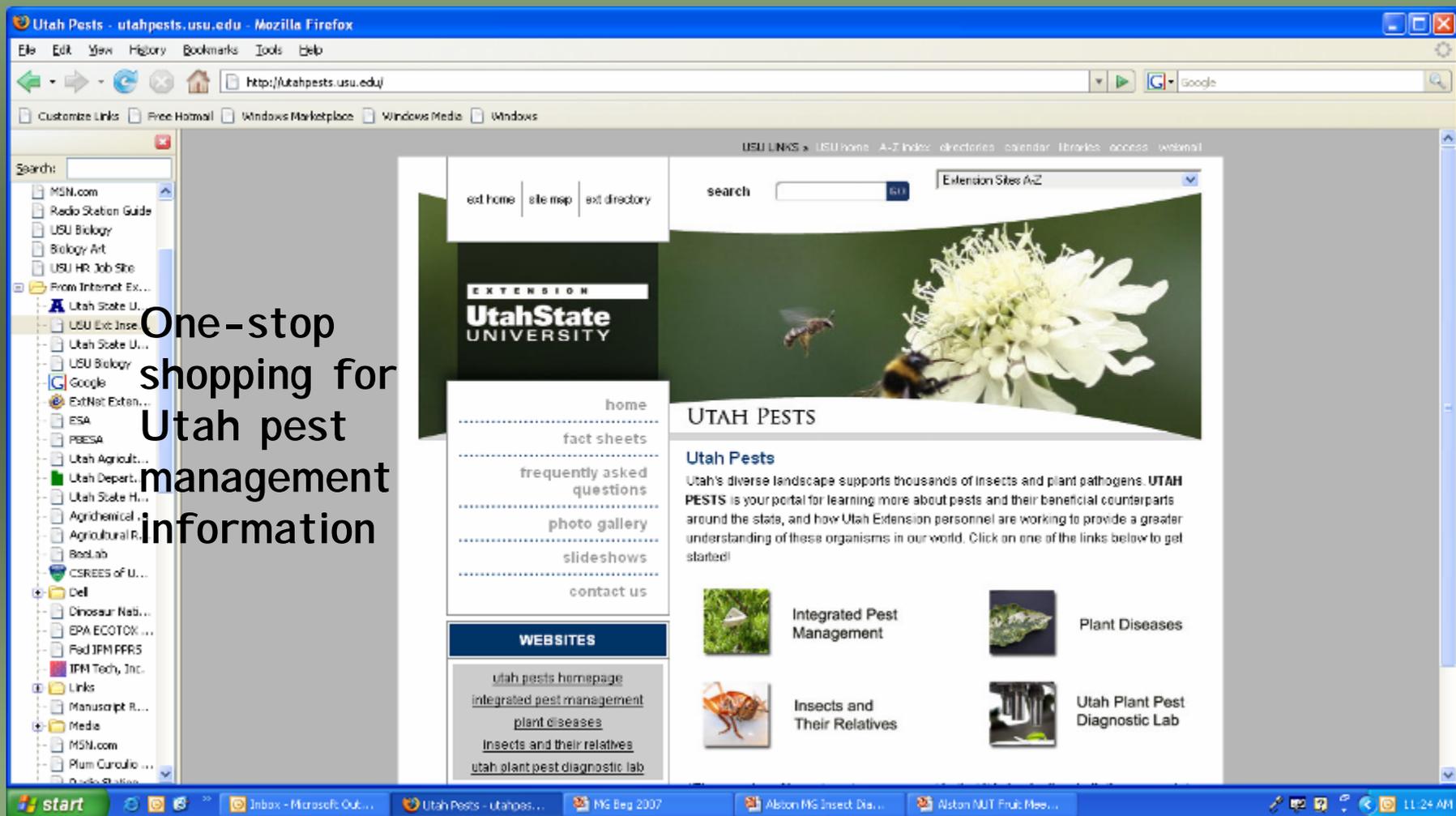
2007



# Lecture Topics

1. Resources on the Web
2. What is an insect?
3. Diagnosing insect problems
4. IPM & reduced-risk (lower toxicity) tools
5. Common insect pests:
  - ▣ Ornamentals
  - ▣ Vegetables
  - ▣ Fruit

# Insect & Pest Management Resources on the Web



One-stop shopping for Utah pest management information

<http://utahpests.usu.edu>

# Resources on the Web

## “USU Extension Publications”

Utah State University Extension - extension.usu.edu - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://extension.usu.edu/index.cfm

Customs Links Free Hotmail Windows Marketplace Windows Media Windows

USU LINKS: USU home A-Z index directories calendar libraries access webmail

est.home site.map ext.directory

search  go

Extension Sites A-Z

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AND COMMUNITIES SINCE 1907

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**BROWSE BY SUBJECT**

- 4-H & youth
- agriculture
- families & communities
- food & nutrition
- finance & economics

**Utah State University Extension**

**Recent News** [More >>](#)

- February 20, 2007**  
[Governor's Office of Economic Development Webcast](#)
- February 16, 2007**  
[Sage-Grouse Summit Coming to Salt Lake City](#)
- February 16, 2007**  
[Extension 4-H Awarded Grant](#)
- February 16, 2007**  
[Should I Wash Fruits and Vegetables?](#)
- February 10, 2007**

**Recent Publications** [More >>](#)

- [Greater Peachtree Borer \(Synanthedon exitiosa\)](#)
- [PODCAST: Preventing Snow Breakage on Trees](#)
- [Utah Beef Quarterly - December 2006](#)
- [Equine Viral Arteritis \(EVA\)](#)
- [Codling Moth \(Cydia pomonella\)](#)

**Quick Links**

- [Review of the Socioeconomic Analysis](#)

**USU Extension Publications**  
**Horticulture**  
**Agriculture**  
**Natural Resources**

http://extension.usu.edu

# Search for Information on the Web

## "Google Search Engine"

The screenshot shows a Google search results page for the query "spider mite management". The search bar at the top contains the text "spider mite management" and a "Search" button. Below the search bar, there are navigation links for "Web", "Images", "Groups", "News", "Froogle", "Local", "Scholar", and "more". The search results are displayed in a list format, with each result including a title, a brief description, and a URL. The first result is "Spider Mite Management in Corn and Soybeans G93-1167-A" from Nebraska. Other results include "UC IPM: UC Management Guidelines for Webspinning Spider Mites on Cotton" and "Portrait FS-96-05 Spider Mite Management in Home Gardens.qxd". On the right side of the page, there are "Sponsored Links" for "Spider mite" and "Spider Mite?". The browser's address bar shows the URL "http://www.google.com/search?hl=en&lr=&q=spider+mite+management&btnG=Search".

http://www.google.com

Web Images Groups News Froogle Local Scholar more »  
spider mite management Search Advanced Search Preferences

Web Results 1 - 10 of about 205,000 for spider mite management (0.28 seconds)

**Spider Mite Management in Corn and Soybeans G93-1167-A**  
Spider Mite Management in Corn and Soybeans. This NebGuide describes the two common spider mites found in Nebraska corn and soybeans, their natural enemies ...  
ianrpubs.unl.edu/insects/g1167.htm - 25k - [Cached](#) - [Similar pages](#)

**UC IPM: UC Management Guidelines for Webspinning Spider Mites on ...**  
UC Management Guidelines for Webspinning Spider Mites on Cotton.  
www.ipm.ucdavis.edu/PMG/r114400111.html - 32k - [Cached](#) - [Similar pages](#)

**UC IPM: UC Management Guidelines for Spider Mites on Alfalfa**  
UC Management Guidelines for Spider Mites on Alfalfa.  
www.ipm.ucdavis.edu/PMG/r1400111.html - 19k - [Cached](#) - [Similar pages](#)  
[ More results from www.ipm.ucdavis.edu ]

**Portrait FS-96-05 Spider Mite Management in Home Gardens.qxd**  
File Format: PDF/Adobe Acrobat - [View as HTML](#)  
**SPIDER MITE MANAGEMENT IN HOME GARDENS.** Peggy McKie, Agriculturist, Nevada Division of Agriculture. Wayne S Johnson, State Horticulture Specialist ...  
www.unce.unr.edu/publications/FS96/FS9605.pdf - [Similar pages](#)

**Spruce Spider Mite Fact Sheet -- Woody Ornamental Integrated Pest ...**  
Resources for woody ornamental integrated pest management in Southwestern ... The spruce spider mite, Oligonychus ununguis (Jacobi) is a common pest of ...  
woodypests.cas.psu.edu/FactSheets/InsectFactSheets/html/Spruce\_Spider\_Mite.html - 25k - [Cached](#) - [Similar pages](#)

**Web Spinning Spider Mites Twospotted Spider Mite (Tetranychus ...**  
File Format: PDF/Adobe Acrobat - [View as HTML](#)  
**Management.** Page 5 of 10. **Spider Mite** fact sheet. 6/25/2003.  
http://extension.usu.edu/ipm/spider.htm. Page 6. Relying primarily on biological and cultural ...  
extension.usu.edu/files/factsheets/spider.pdf - [Similar pages](#)

**Web Spinning Spider Mites**  
File Format: PDF/Adobe Acrobat - [View as HTML](#)  
for spider mite management should be the goal of every orchard pest manager. In most

Sponsored Links

**Spider mite**  
Control Unwanted Pests.  
Solutions - **Spider mite**  
www.AntiPest.com

**Spider Mite?**  
Brief and Straightforward Guide to  
Dust **Mite** Spray  
wisegeek.com

<http://www.google.com>

information  
images

# What is an insect?

## Insects:

6 legs

3 body regions

Antennae

Flight - adults

## Arthropods

Exoskeleton

Segmented bodies

## Insect Relatives:

Spiders (Arachnids)

Mites (Acari)

Centipedes

Millipedes



Non-Arthropods:  
Snails and Slugs



# Most insects are not pests



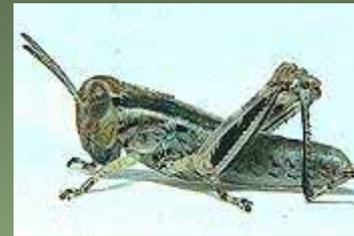
Beneficial insects & mites

# Insect Life Cycles

## Complete Metamorphosis



## Incomplete Metamorphosis



# Proper Diagnosis!

Most plant health problems are not caused by biotic factors (pests: insects, diseases), but by **abiotic factors** (irrigation, environment, culture & care)



# First Step: Proper Diagnosis!



Insect is present



Injury is present



What type of injury?

Friend or Foe?

What life stage is present?

# Insect Plant-Feeding Types

Chewing



Piercing-Sucking



Borers



Gall Formers



Diagnosis



# Scouting for Pests

- Look at the big picture
  - Pattern of plant decline/injury
    - Pest injury tends to be aggregated
    - Can injury be associated with irrigation or other pattern?
- Look at new growth
- Check for root/crown problems
- Hand lens for small insects and mites
- Scout every 1-2 weeks



Raspberry  
horntail  
injury to cane tips

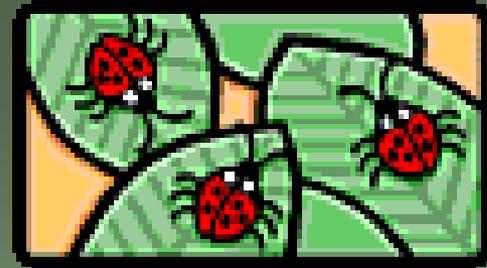
# Target & Timing

- Target susceptible life stages
  - Usually eggs and/or young
- Time the control for target life stage(s) and weak points in their life cycle
  - For severe and recurring pests - early in seasonal cycle when life stages are synchronized and before substantial injury has occurred
  - For occasional pests - wait and see if pest will be abundant

# Integrated Pest Management

## IPM

- Plan ahead (use preventive strategies where possible)
- Use multiple pest management tools
  - Cultural
  - Mechanical
  - Biological
  - Chemical
- Treat only if needed (thresholds)
- Environmentally, economically, and socially sound



# IPM Strategies

- Plant selection & planting site selection
- Irrigation – design for plant needs
  - Amount & application method
  - Group plants with similar needs
- Plant nutrition – prevent stress !!!
- Preventive controls for chronic pests
  - Sanitation
  - Traps, exclusion barriers
  - Oil sprays
  - Spring application of systemic or residual insecticide



*Ips* bark beetle-killed spruce trees in Garland, UT cemetery

# IPM Strategies

- For “secondary pests”

- Aphids, Scale, Leaf feeders
- Exposed feeders
- Use “soft” (selective) controls
- Natural biological control is more prevalent

- For “primary pests”

- Tree borers, Fruit feeders
- Hidden feeders
- Target / Timing for susceptible life stage(s) is critical
- Maintain active residues for critical period

- Conserve natural enemies by avoiding toxic, broad-spectrum insecticides



Elm leaf beetle



Codling moth injury to apple

# Traps and Physical Barriers

- Traps
  - Yellow jacket wasps, slugs, spiders
- Sticky bands
  - Trees and shrubs
- Row covers
- Diatomaceous earth



# Biological Control

- How can I make it work?
- Outdoor landscapes - Conservation of natural enemies
  - Avoid toxic chemicals
  - Maintain a diverse plant environment (avoid monocultures)
  - Cultivate plants that provide quality nectar & pollen
  - Tolerate some herbivorous insects



Parasitic wasp that attacks caterpillars



Big-eyed bug nymph feeding on an insect egg

# List of Plants with Quality Nectar and Pollen

http://www.ars.usda.gov/Main/docs.htm?docid=12052

USDA  United States Department Of Agriculture  
Agricultural Research Service

Northern Plains Logan, UT Pollinating Insect-Biology, Management, Systematics Research

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You are here: Home / Plants Attractive to Native Bee

Home

Plants Attractive to Native Bee

Sorted By Genus  
Blue plant names are widely cultivated & broadly attractive to bees.

<u>FAMILY</u>	<u>GENUS</u>	<u>COMMON NAME</u>	<i>Notes</i>
Caprifoliaceae	<i>Abelia</i>	abelia	
Fabaceae	<i>Acacia</i>	acacia	
Aceraceae	<i>Acer</i>	maple	
Asteraceae	<i>Achillea</i>	yarrow	<i>A. millefolium weedy</i>
Ranunculaceae	<i>Aconitum</i>	monkshood	
Lamiaceae	<i>Agastache</i>	hyssop	
Lamiaceae	<i>Ajuga</i>	carpet bugle	
Malvaceae	<i>Althea</i>	hollyhock	not doubled
Liliaceae	<i>Allium</i>	allium	
Rosaceae	<i>Amelanchier</i>	serviceberry	
Boraginaceae	<i>Anchusa</i>	wild forget-me-not	
Apiaceae	<i>Anethum</i>	dill	
Ranunculaceae	<i>Aquilegia</i>	columbine	not doubled
Ericaceae	<i>Arctostaphylos</i>	manzanita	

http://www.ars.usda.gov/main/site\_main.htm?modecode=54280500

# Beneficial Insects & Mites

## *Cast of Characters*



Parasitic wasps & flies

Predaceous true bugs & beetles



Syrphid Fly

Lacewing



Common Aphid Predators

Lady Beetle



Predaceous Mites

# "Old" vs. "Reduced Risk" Insecticides

- "Old" Insecticides
  - Broad-spectrum
  - Higher toxicity
  - Human safety concerns
  - Environmental concerns
- "Reduced Risk" Insecticides
  - More selective
  - Lower toxicity
  - Shorter residuals
  - Some are easier on natural enemies



# Insecticides for the Home Garden & Orchard - Organic

Active Ingredient	Brand Name(s)	Class	Mode of Action	Toxicity Class
azadirachtin	Aza-Direct, Bioneem, Azatin	Botanical	Growth Regulator	Caution
<i>Bacillus thuringiensis</i> (Bt)	Dipel, Javelin, Thuricide	Microbial Bacterium	Larvicide	Caution
<i>Beauveria bassiana</i>	Botanigard, Naturalis	Microbial Fungus	Larvicide	Caution
beneficial nematodes	<i>Steinernema</i> , <i>Bacteriophora</i>	Biological Nematode	Larvicide, Adulticide	Caution
capsaicin	Hot Pepper Wax	Botanical	Repellent	Caution

# Insecticides for the Home Garden & Orchard – Organic (cont.)

Active Ingredient	Brand Name(s)	Class	Mode of Action	Toxicity Class
diatomaceous earth	Natural Guard	Inorganic	Disrupts cuticle	Caution
horticultural mineral oil (dormant & summer)	Sunspray, Ultrafine, Orchex, Volck	Petroleum distillate	Suffocate	Caution
insecticidal soap	Safer, M-pede	Fatty acids	Disrupts cuticle	Caution
iron phosphate*	Sluggo, Ecar-Go	Inorganic	Feeding arrestant	Caution
Kaolin clay	Surround	Inorganic	Repellent	Caution

\* Molluscicide (Snails & Slugs)

# Insecticides for the Home Garden & Orchard – Organic (cont.)

Active Ingredient	Brand Name(s)	Class	Mode of Action	Toxicity Class
lime sulfur		Inorganic	Broad-spectrum	Danger
pyrethrins, pyrethrum	Pyrellin, Pyganic	Botanical	Paralyze	Caution
rotenone		Botanical	Neurotoxin	Warning
spinosad	Entrust	Microbial	Neurotoxin	Caution
sucrose octanoate ester	Sucroicide	Natural product	Disrupts cuticle	Caution
sulfur		Inorganic	Broad-spectrum	Caution

# Insecticides for the Home Garden & Orchard – Conventional

Active Ingredient	Brand Name(s)	Class	Mode of Action	Toxicity Class
bifenthrin	Ortho Lawn Insect	Pyrethroid	Neurotoxin	Warning
carbaryl	Sevin	Carbamate	Neurotoxin	Caution to Danger
cyfluthrin	Tempo, Bayer Adv.	Pyrethroid	Neurotoxin	Caution
endosulfan	Thiodan	Organo-chlorine	Neurotoxin	Warning
esfenvalerate	Ortho Bug-B-Gone	Pyrethroid	Neurotoxin	Warning
imidacloprid	Bayer Adv.	Nicotinoid	Neurotoxin	Warning

# Insecticides for the Home Garden & Orchard – Conventional (cont.)

Active Ingredient	Brand Name(s)	Class	Mode of Action	Toxicity Class
lambda-cyhalothrin	Triazicide Soil & Turf	Pyrethroid	Neurotoxin	Caution
malathion	Cythion	Organo-phosphate	Neurotoxin	Caution to Danger
permethrin	Astro, Spectracide	Pyrethroid	Neurotoxin	Caution
spinosad	Success, Conserve	Microbial	Neurotoxin	Caution

# “New” Insecticides with Broad-Spectrum Activity



Sucking insects



Chewing insects



Borers

# Nicotinoids



- Derived from nicotine
- Most have systemic activity; if applied to soil or injected can last for a season
- Neurotoxin – interfere with nerve impulses
  - Imidacloprid
  - Bayer Advanced Tree & Shrub, Bayer Ad. Lawn, Bayer Ad. Flower, GrubEx - Ornamental uses, Pome fruits & Pecans
    - Chewing & Sucking Insects: Aphids, Scale, Leaf beetles, Leafhoppers, Thrips (suppression), Root weevils, Billbugs, White grubs, Cutworms, Flatheaded borers, Roundheaded borers (suppression), Bark beetles (suppression)

# Spinosad



- Bacterial fermentation product
- *Saccharopolyspora spinosa* discovered in soil of abandoned rum distillery in the Caribbean
- Neurotoxin – novel binding site in nerve transmission
  - Conserve – Herbaceous & Woody Orn., Turf
  - Success & Entrust (organic) – Fruits & Veggies.
    - Chewing & Sucking Insects: Caterpillars, Beetles, Thrips, Fly larvae, Leafminers, etc.

# *Beauveria bassiana*



Grasshopper

- Fungus, natural soil organism
- Fungal hyphae penetrate the insect's exoskeleton
  - Botanigard & Naturalis - Ornamentals, Turf, Fruits, Vegetables, Grains, Forages
    - Aphids, Plant bugs, Caterpillars, Beetle larvae, Mormon cricket, Grasshoppers, Mites

# Ornamental Insect Pests

## Chewing Injury



# Tent Caterpillars



- Hosts:
  - Maple, poplar, cottonwood, plum, cherry, aspen, alder, willow, birch, apple, ash, others
- Eggs hatch in spring
- Larvae aggregate in groups; form webbing - tents

# Tent Caterpillar Management

- Early detection
- Remove egg masses or young larvae/ tents - pruning, burning
- Bt (Dipel, Thuricide) & spinosad (Entrust, Success) - good coverage, target young larvae
- Contact insecticides:
  - Sevin, Pyrethroids, Malathion, others
- Systemic insecticide:
  - BAG Tree & Shrub (imidacloprid)



# Elm & Cottonwood Leaf Beetles

- Adults over winter under bark, debris
- Females lay eggs on new growth in spring/early summer
- Skeletonize leaves; aggregate feeders
- Elm LB: pupate on ground at base of tree
- Cot LB: pupa hangs from leaves
- Multiple generations per summer



# Leaf Beetle Management

- Insecticide Bark Bands (ELB Only)
  - Apply when mature larvae seen on leaves (May-June) - Sevin, Pyrethroids, Thiodan
- Foliar Sprays of Selective Insecticides
  - Summer oils - target young larvae
  - *Bacillus thuringiensis* var. *tenebrionis*
  - Spinosad (Entrust, Success)
- Insecticides: Merit, Imidan, Orthene, pyrethroids (Talstar, Tempo)
- Biological Control
  - Conserve Predators & Parasites



# Lilac Root Weevil



- Drought related
- Observed heavy injury to shrubs & small trees

-Prevention of stress is the first & most important step (irrigation, soil, planting site)



# Lilac Root Weevil

## *Otiorhynchus meridionalis*

- Common hosts: lilac, peony, dogwood, yew, privet, cotoneaster, arbovitae, spruce, others
- Adults chew irregular notches in leaf edges – target with foliar insecticide (**Azadirachtin, Pyrethrum, Spinosad**) – in late spring at first leaf notching
- Larvae feed on roots – target with soil insect-attacking nematodes (*Heterorhabditis*), *Beauveria* fungus – late spring or early fall



Adult & leaf notching



Needle notching on spruce



Larvae feeding on crown & roots

# European Earwig

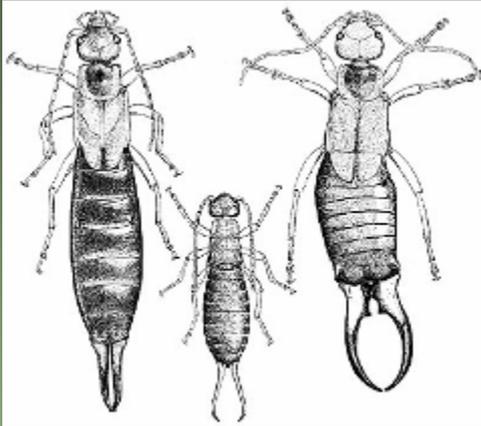


- Primarily feed on decaying organic matter (saprophytic)
- Feed on young, tender plants; chew holes in flower petals, fruits; nuisance pest
- Adults are also predators; nocturnal

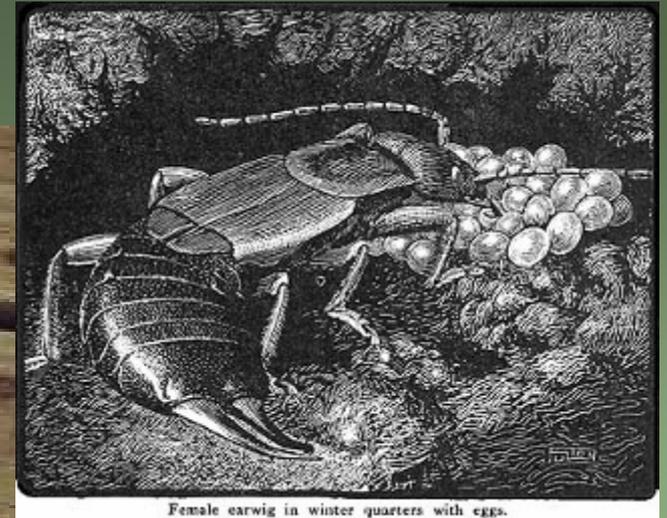


# European Earwig

- Cultural & mechanical controls: avoid overuse of mulch and damp debris where they hide during the day; place and remove rolled newspaper; attractant traps: tuna can with bacon grease
- Chemicals: pyrethrum, azadirachtin, diatomaceous earth; target young in nests
- Tanglefoot on base of trunks, stems



Tuna can trap with  
bacon grease



Female earwig in winter quarters with eggs.

# Grasshoppers

- Young (nymphs) & adults chew holes in leaves, completely consuming foliage
- Move into yards from nearby rangeland, grassy areas, undeveloped lots
- Treat borders of property when young grasshoppers are first seen moving in
- Young are much easier to kill than adults
- **Insecticidal baits: wheat bran + insecticide (carbaryl) - effective on young & adults**
- **Malathion, Sevin, Permethrin - most effective on young**
- ***Nosema locustae* (No-Lo-Bait) - natural pathogen of grasshoppers - treat young**



# Major Turf Insect Pests

- Surface / Thatch Feeders (leaf, stem):
  - Armyworm
  - Cutworm
  - Sod webworm
  - Mites
- Surface / Crown Feeders (burrow into stem, crown):
  - Billbug
  - Subterranean webworm
- Subsurface (root):
  - May & June beetles



# White Grubs

May and June Beetles (*Phyllophaga*)  
Black Turfgrass Ataenius (*Ataenius*)

- Scarab beetle family
- C-shaped white larvae
  - Brown head, legs
  - Eat roots
  - Turf “roll-back”
- 1-3 year life cycle



# White Grubs

## 1-3 year life cycle

Spring

Summer

Fall/Winter



Can spend 1-2 years as  
2<sup>nd</sup> to 3<sup>rd</sup> instar larva

2<sup>nd</sup>-3<sup>rd</sup> instars move  
3" to 12" deep for winter

# White Grub Control

- Target small larvae (late spring-early summer)
- Target larvae before they dig deep for the winter (late summer to early fall)
- Threshold: 3-4 grubs/sq ft
- Irrigate to move chemicals to grubs in the upper root zone
  - Imidacloprid (Merit™, BAG Lawn)
  - Halofenozide (Mach 2™)
  - Carbaryl (Sevin™)
  - Trichlorfon (Dylox™)
  - Beneficial Nematodes - *Heterorhabditis bacteriophora* (Cruiser™), *Steinernema carpocapsae* (Scanmask™)
  - Fungus - *Beauveria bassiana* (Botanigard™, Naturalis™)



# Ornamental Insect Pests

## Piercing-Sucking Injury



# Aphids

- Suck sap from phloem tubes in leaves and stems
- Curl leaves, produce sticky honeydew that promotes growth of black sooty mold, reduce plant vigor at high densities
- Populations increase rapidly, low numbers can be tolerated
- Only control if honeydew is a nuisance problem or distortion of leaves is severe and aphid numbers are very high
- Many generations per summer



Apple aphid curls leaves



Giant willow aphid feeds on limbs



Sooty mold

# Aphid Management

- **Delayed Dormant Spray:**  
Dormant oil + Pyrethroid (at bud break)
- **Spring and Summer control:**  
hard spray of water,  
horticultural oil, insecticidal soap, BAG T&S (systemic), Conserve, azadirachtin, Orthene, pyrethroids, others
- **Biological control:** lady beetles, lacewings, syrphid flies, parasitic wasps



Syrphid fly larva



Lacewing larva



Aphid mummies

# Scale Insects

- Soft scales feed in phloem, produce sticky honeydew
- Armored scales feed on mesophyll of plant cells, do not produce honeydew
- Multiple years of scale feeding can kill limbs; cause dieback



European fruit lecanium scale



San Jose scale & injury

# Scale Biology

- 1-2 generations per summer
- Overwinter as eggs or young nymphs
- Females are sessile
- Males have wings
- "Crawler" stage is the best target for control



Oystershell scale female surrounded by crawlers

# Scale Management

- Delayed Dormant Control is effective for soft scales & some armored scales: Dormant oil + Pyrethroid (at first bud break)
- Use sticky tape in late spring to early summer to time a spray for "crawlers"
- Soft scales: BAG T&S (systemic), horticultural oil, insecticidal soap
- Armored scales: Pyrethroids or others timed with crawlers



Oystershell scale



Pine needle scale

# Box Elder Bug



- Primarily a nuisance pest
- Exclusion of insects from buildings is most effective management
- Removal of female boxelder trees can be helpful (trees with winged seeds)
- Targeted removal of adults from problem areas (mechanical removal: hard spray of water, sweep, vacuum), chemical sprays

# Ornamental Insect Pests

## Tree Borers



# Tree Borers



- Avoid planting trees with borer problems (birch, poplars, aspen, ash)
- Maintain good tree health - stressed trees are more prone to attack
- Preventive trunk insecticide sprays
- Systemic insecticide (BAG T&S) - beetles



# Tree Borer Management

## ■ Preventive Trunk Treatments

- Timing is critical (northern Utah)

- Ash/Lilac borer – May 1- late June
- Bronze birch borer – late May – June
- Aspen borer – May-July
- Peachtree (Crown) borer – late June – August
- Poplar-and-Willow borer – July – Sept.
- Locust borer – August – Sept.
- Shothole borer – May and Sept.

## ■ Insecticides: Orthene, Sevin, Thiodan, Pyrethroids, BAG T&S

# Ornamental Insect Pests

## Gall Formers



Cooley Spruce  
Gall Adelgid



Poplar Twig  
Gall Fly

# Cooley Spruce Gall Adelgid

- Form galls on new growth of spruce; also attack Douglas fir – cause needle swelling, necrosis and shedding
- Adults lay eggs on new “candle” growth in spring; young feeding forms galls
- Insecticide treatment at egg hatch (BAG T&S, Orthene, Malathion)
- Avoid planting spruce and Doug fir together
- Prune off green/purple galls



# Poplar/Willow Twig Galls



- Twig Gall Flies
- Females lay eggs on new shoots
- Disfigure tree, but do not seem to threaten life of tree
- High rates of parasitism by parasitic wasps



# Vegetable and Herb Garden Insect Pests Chewing Injury



# Mexican Bean Beetle

- “Black sheep” of the lady beetle family
- Skeletonize leaves; scar stems & pods
- Cultural controls: Adults over winter in plant debris, clean up garden in fall
- Some beans are more resistant (Asian)
- Plant early and late crops; avoid major activity period of beetle (late July & August)
- Hand pick or squish
- Chemicals: Sevin, Permethrin, Neem oil, Success



# Corn Earworm

- Corn: caterpillars feed on new silks & ear tips; reduce pollination & damage ear tips; allow entry of molds & attract other insects (sap beetles, earwigs)
- Tomato & Pepper: caterpillars feed on leaves & fruit
- Cultural control: Early crops avoid injury
- Protect young silk; difficult to control worms once inside ear tip
- Chemicals: Sevin, permethrin, pyrethrin, neem oil, oils applied to silks (reapply every few days)
- Bt & Success effective for tomato & pepper worms



# Tomato Hornworm

- LARGE green caterpillars with horn on tail
- Feed on tomato, eggplant, potato
- Consume large amounts of foliage and buds in a short time period
- Remove by hand
- Chemicals: Bt (Dipel, Thuricide), Success, many others
- Parasitic wasp - white cocoons on caterpillars



# Cabbage Worms

- Caterpillars chew large holes in leaves; produce abundant frass (excrement)
- Bt (Dipel, Thuricide), Success - very effective
- Row cover fabric) - cover plants to prevent egg-laying



# Leafminers in Leafy Veggies

- Adults - Small flies
- Larvae - White to cream maggots
- Winding trails on leaves, white blotches
- Scout regularly, >1 mine/leaf
- Natural enemies (Paper wasp)
- Row covers
- Spinosad (Success, Entrust) insecticide



# Vegetable & Herb Garden Pests

## Piercing-Sucking Injury



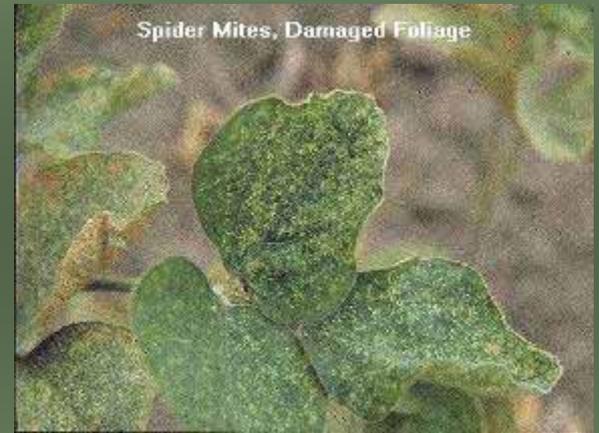
# Squash Bug

- Adults & nymphs suck fluids from plant leaves, stems & fruit; may transmit Yellow Vine Disease (bacteria)
- Congregate in plant debris under plants
- Cultural controls: Remove garden debris in fall, nearby woodpiles or other protected sites (adults over winter)
- Hand pick or destroy eggs & nymphs
- Chemicals: spray when first detect nymphs, drench undersides of leaves & stems
- Malathion, Sevin, permethrin, Neem oil, Thiodan, Surround (kaolin clay)



# Spider Mites

- Very small; infested plants appear “dirty”; produce webbing, suck sap (remove chlorophyll); leaf speckling
- When severe, cause bronzing or silvering of leaves; populations build quickly in hot weather
- Suppress mite population before it explodes
- Controls: pressurized stream of water, horticultural oils, insecticidal soap
- Don't recommend Vendex or other miticides unless a rescue treatment
- Biological control: Predaceous mites



# Fruit Pests

## Chewing Injury



# Codling Moth

- Caterpillars bore into fruit; over winter as larvae inside silken cocoons on trunk; eggs laid by moth on leaf & fruit surfaces
- Chemical controls: target newly hatched larva; timing based on moth trap catch info. & degree-days in your area
- Sevin (7-10 d), Permethrin (5-7 d), Malathion (5-7 d), Bt (3-5 d), CM Virus (CydX, Virusoft; 7 d)
- Sanitation: pick up dropped fruit
- Trunk banding: place corrugated cardboard bands (3-4" wide) around trunks (Jun-Sep)
- Fruit bagging (May-Aug)



# Mechanical Codling Moth Controls



- Corrugated cardboard strip with codling moth pupa inside silk cocoon



- Fruit bags to exclude codling moth
- Place bags over 3/4" diameter fruit

# Peach Twig Borer

- Over winter as young larvae on limbs; brown caterpillars burrow inside twigs from bloom to petal fall; a second generation enters fruit, usually at the stem end
- Delayed Dormant Spray: Dormant oil + Pyrethroid or Thiodan (by first pink) - targets twig boring OR At-Bloom Sprays: 2 Bt or Success sprays (early & full to late bloom)
- Fruit protection: Success, Permethrin, or Thiodan timed with trap catch and degree-day info. or apply at shuck-fall & repeat if needed



# Western Cherry Fruit Fly

- Larvae feed in sweet & tart cherries; female flies lay eggs in ripening fruit; fruit doesn't become soft enough for egg-laying until it turns straw to salmon colored
- Cultural controls: Landscape fabric or barrier under tree canopy
- Chemical control: Malathion (5 d), Sevin (5-7 d), Permethrin (5 d), Success (7 d), GF-120 Fruit Fly Bait (7 d)



# Fruit Pests

## Piercing-Sucking Injury



# Grape & Virginia Creeper Leafhoppers

- Adults overwinter in leaf litter
- Lay eggs on new leaves
- 2 generations per season
- Natural enemies
- Vigorous vine growth
- Remove or incorporate leaves & debris
- Insecticides: Kaolin clay (Surround), Malathion, Spinosad (Success) – target young nymphs



Leafhopper  
*Erythroneura* sp.  
(adult)



# Aphids



- Suck fluids from leaves & stems; curl leaves; produce sticky honeydew; black sooty mold growth
- Protect young trees, older trees can tolerate more aphid feeding
- Controls: Dormant oil + Pyrethroid or Thiodan (at green tip stage)
- Insecticidal soap, horticultural oil, Malathion, Pyrethroids, Thiodan, imidacloprid (apple & pear)
- Biological control: lady beetles, lacewings, syrphid flies, parasitic wasps

# San Jose Scale

- Scales encrust limbs; can kill limbs after several years of feeding; scales and feeding spots on fruit
- Controls: Dormant oil + Pyrethroid or Thiodan (at green tip or pink)
- Use sticky tape in May to time a spray for “crawlers”
- Horticultural oil, insecticidal soap, imidacloprid (apple & pear), Malathion, Thiodan



# Spider Mites

- Feed on leaves; produce webbing; injury appears as white speckles; severe feeding leads to bronzing
- Mites build up on broadleaf weeds (bindweed, knotweed, mallow, prickly lettuce); reproduce rapidly in hot weather
- Cultural controls: Avoid mowing, herbicides, drying of vegetation - prompts mites to move into trees
- Avoid multiple applications of pyrethroid insecticides
- Biological control: naturally occurring predatory mites & small lady beetle
- Chemicals: horticultural oil, insecticidal soap



# Fruit Pests

## Tree and Cane Borers



# Peachtree Borer

- Female clear-winged moths lay eggs on lower trunk or in cracks in soil near the base; larvae bore into the cambium in lower trunk; trees may be girdled & die; adults begin activity in late June to early July in northern Utah
- Control: Trunk spray with Thiodan or Pyrethroid during first week of July; repeat in first week of August



# There are many other reasons that trees sap or bleed



Fungus canker



Winter injury

# Raspberry Horntail

- Wood wasp
- Cane tips wilt; larvae tunnel within pith
- Prune & destroy infested cane tops
- Parasitic wasp attacks horntail larvae
- Chemicals - treat in at bud break, repeat; avoid bloom: Sevin, Malathion, Permethrin

