

Soft and New Insecticides for Control of Landscape Insect and Mite Pests



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2006 Utah Green Conference



Pest Management Resources on the Web

- Pest fact sheets & photos
 - Pest management recommendations
 - Pesticide information
- Utah Plant Pest Diagnostic Lab
 - Outreach education slideshows

Pest Management Resources on the Web "Insects and Plant Diseases"

Utah Plant Pest Diagnostic Lab

One-stop shopping for Utah pest management information

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FAQ Photo Gallery

Insects and Plant Diseases

Integrated Pest Management

Delta Trap

Mormon Cricket

Insects and Their Relatives

Apple Mosaic Virus

Plant Diseases

Utah Plant Pest Diagnostic Lab

<http://extension.usu.edu/cooperative/ipd>

Pest Management Resources on the Web "USU Extension Publications"

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Search for Information on the Web "Google Search Engine"

The screenshot shows a Google search results page for the query "spider mite management". The browser address bar displays the URL: <http://www.google.com/search?hl=en&lr=&q=spider+mite+management&btnG=Search>. The search bar contains the text "spider mite management" and a "Search" button. The page shows results 1-10 of about 205,000 for "spider mite management" in 0.28 seconds. The results include:

- 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 ...
ianpubs.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

Integrated Pest Management

- Definition
- IPM strategies for landscape pests
 - IPM Tools

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 and economically sound



Major IPM Strategies for Landscape Pests

- 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-killed spruce trees in Garland, UT cemetery

Major IPM Strategies for Landscape Pests

- 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

Traps and Physical Barriers

■ Traps

- Yellow jacket wasps, slugs, spiders



■ Sticky bands

- Trees and shrubs



Biological Control

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



Parasitic wasp that attacks caterpillars



Big-eyed bug nymph feeding on an insect egg

Insecticides

- Database of pesticides registered in Utah
- Insecticide resistance
- “Old”, “New” and “Soft”

Utah Dept. of Agri. & Food Database of Registered Pesticides

The screenshot shows the website interface with the following elements:

- Navigation:** "State Online Services", "Agency List", "Business.utah.gov", and a search bar for "Utah.gov".
- Header:** "State of Utah Department of Agriculture and Food".
- Left Sidebar:** A vertical menu with links: "About UDAF", "Divisions", "Services", "News & Info", "Licensing", and "Product Registration". Below the menu are logos for "Utah's Own", "State Ground Water Program", "2006 National Nonpoint Source Coordinators Conference", and "UDAFA Commissioner Leonard Blackham supports USDA's new MyPyramid healthy food guide system".
- Main Content Area:**
 - 2005 UDAF Annual Report and USDA Statistics Now Available:** A news item about agricultural production reports.
 - Soil Conservation Districts (SCD):** A notice about nominating board members for 38 districts.
 - Utah farmers and ranchers are encouraged to dispose of their unused or outdated pesticides:** A notice about a free disposal program.
 - Utah Avian Influenza Surveillance and Response Plan and Avian Influenza Talking Points:** A link to a plan and talking points.
 - APHIS fact sheet on Avian Influenza:** A link to a fact sheet.
 - UDAFA is temporarily waiving a state fuel dispensing law:** A notice about a temporary waiver.
 - Information on Vesicular Stomatitis in Utah:** A link to information.
 - Perchlorate Information:** A box containing a chemical structure diagram of perchlorate ([O-]Cl(=O)(=O)[O-]) and a link to "Perchlorate Facts".
- Right Sidebar:** A "Find It FAST!" section with a list of links: "Market News", "Ag in the Classroom", "Pesticide Applicators", "Rangeland Monitoring", "UCHAP", "Animal Health", "Loan Programs", "Ag Directories", "Food Safety", "Organic Program", "Weed-Free Hay", "Ag Mediation", "Brand Inspection", "Livestock Movement", "Nuisance Animals", "Product Labeling", "Livestock Auctions", "Utah's Own", "Consumer Complaints", and "Jobs at Agriculture".

Product Registration
View Registered Products
Pesticide Registration Search
Search by
pest
site
product
company name

<http://www.ag.state.ut.us>

Insecticide Resistance Management

- Rotate chemical classes / modes of action
 - Within a generation
 - Between generations within a season



Aphid giving birth to live nymph

"Old" & "Soft" Insecticides

Selective, Lower Toxicity, Natural

- Horticultural Oils

- Dormant, Summer

- Neem & Neem oil

- Azadirachtin

- Insecticidal Soap

- Kaolin Clay

- Surround

- *Bacillus thuringiensis*

- Soil bacterium, Caterpillars, Beetles, Mosquitoes, Fungus gnats

- Diatomaceous earth

- Ground-dwelling or climbing insects & snails/slugs

"Rules of Thumb" for lower toxicity insecticides:

- Critical to target most susceptible insect life stages (eggs, early immature)
- Short residual - reapply every 5-10 days until pest subsides
- Selective for target pests, minimize harm to the beneficials

"Old" vs. "New" Synthetic Insecticides

■ "Old" Insecticides

- Broad-spectrum
- Higher toxicity
- Worker safety concerns
- Environmental concerns



■ "New" Insecticides

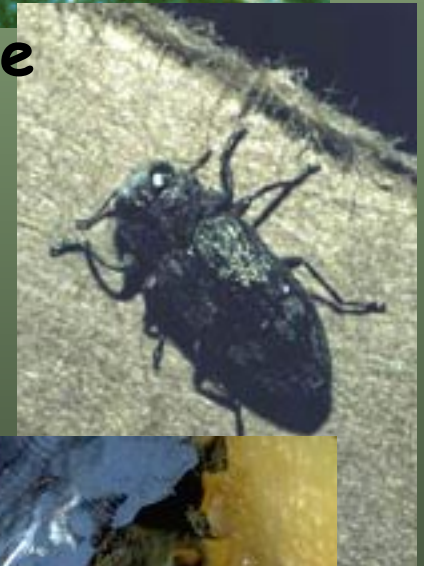
- Selective
- Lower toxicity
- Shorter residuals
- Most are easier on natural enemies



"Old" Classes of Insecticides

Nerve Poisons

- Carbamates (Group 1A):
 - Sevin, Vendex, Lannate
- Organophosphates (Group 1B):
 - Diazinon, Malathion, Dursban, Orthene
- Organochlorines (Group 2):
 - Thiodan, Lindane, Kelthane, DDT
- Synthetic Pyrethroids (Group 3):
 - Pounce, Astro, Talstar, Tempo



"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
 - Merit - Woody Ornamentals, Turf
 - Chewing & Sucking Insects: Aphids, Scale, Leaf beetles, Leafhoppers, Thrips (suppression), Root weevils, Billbugs, White grubs, Cutworms, Flatheaded borers, Roundheaded borers (suppression), Bark beetles (suppression)
 - Safari & Tri-Star - Herbaceous and Woody Orn., Turf
 - Provado, Assail, Calypso, Actara - Fruits & Veggies.

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
 - Chewing & Sucking Insects: Caterpillars, Beetles, Thrips, Fly larvae, Leafminers, etc.
 - Elector & Extinsad - Livestock
 - Success & Entrust (organic) - Fruits & Veggies.

"New" Insecticides with Activity on Sucking Insects



Aphids



Thrips



Scale insects



Plant bugs

Flonicamid



Giant willow aphid



Lace bug

- Antifeedant, leads to starvation
- Systemic, nicotine-derived
- Unique, but undetermined mode of action
 - Aria - Herbaceous & Woody Orn.
 - Aphids, Whiteflies, Scale, Mealybugs, Leafhoppers, Thrips, Plant bugs, Stink bugs

Pymetrozine

- Antifeedant
- Neuromuscular effects, prevents insertion of insect stylets
 - Endeavor - Herbaceous ornamentals, Greenhouse
 - Aphids, Whiteflies
 - Fulfill - Vegetables
 - Aphids



Aphid



Whiteflies

"New" Insect Growth Regulators

IGRs: Disrupt growth, molting, formation of cuticle (exoskeleton), and maturation of eggs in females (birth control)



Thrips



Sod webworm

Novaluron



Whiteflies



Thrips

- IGR: chitin synthesis inhibitor, prevents proper formation of exoskeleton after molting
 - Pedestal - Ornamental flowering plants, Greenhouse
 - Whiteflies, Thrips, Leafminers, Armyworms, Plant bugs
 - Rimon - Pome fruits, Ornamentals, Potatoes
 - Codling moth, Colorado potato beetle, Pests listed above

Diacylhydrazines



White grubs

■ IGR: Disrupts/mimics molting hormone, induces premature molting

- Mach 2 - Turf
 - Billbugs, White grubs, Masked chafers, Sod webworms, Cutworms
- Confirm - Fruits, Veggies. & Ornamentals
 - Webworms, Leafrollers, Armyworms
- Mimic - Woody Ornamentals
 - Many caterpillars
- Intrepid - Fruits & Veggies.
 - Codling moth, Leafrollers, Webworms



Tent caterpillar

"New" Miticides



Twospotted Spider Mite



Leaf Blister Mite

Clofentezine & Hexythiazox



Twospotted spider mite

- Mite growth inhibitor
- Acts primarily as an ovicide (kills eggs) with some effect on early instars (first stages of young)
- Need to apply “early” in development of a mite population
- Translaminar activity (local systemic uptake)
 - Ovation & Hexagon - Flowering Orn., Greenhouse, Nursery
 - Twospotted spider mite, McDaniel spider mite, European red mite
 - Apollo, Onager & Savey - Tree Fruits & Raspberry (Savey only)

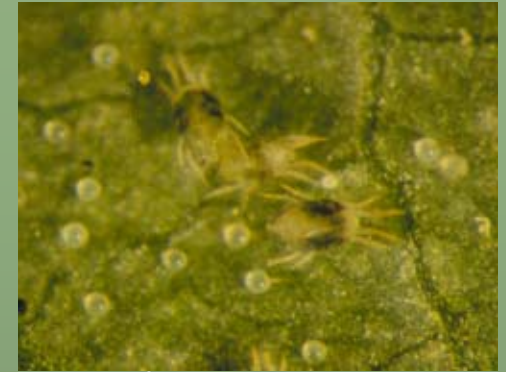
Etoxazole



European red mite

- Mite growth inhibitor
- Acts primarily as an ovicide (kills eggs) with some effect on early instars (first stages of young)
 - Tetrasan - Woody & Herbaceous Orn.
 - Twospotted spider mite, McDaniel spider mite, European red mite
 - Zeal - Fruit & Nut Trees, Strawberries

Chlorfenapyr



Spider mites

- Insecticide/miticide
- Interferes with formation of **ATP**, which is the "fuel" for muscle contractions
 - Pylon - Herbaceous Ornamentals
 - Mites, Thrips, Fungus gnats, Loopers, Fruitworms, Budworms
 - Phantom - Indoor sites & Outdoor soil treatments
 - Ants, Cockroaches, Termites

Pyridazinones

Spider mites



- Inhibits mitochondrial electron transport, affects respiration
- Same mode of action as rotenone
 - Akari & Nexter - Herbaceous & Woody Orn.
 - Sanmite - Herbaceous Orn., Greenhouse
 - Spider mites, Whiteflies, Leafhoppers
 - Fujimite, Pyramite, Nexter -Fruits
 - Spider mites, Leafhoppers, Aphids, Pear psylla



Whiteflies

Acequinocyl



Spruce spider mite

- Inhibits mitochondrial electron transport, affects respiration
- Different site of action than other METI compounds
 - Kanemite & Shuttle - Herbaceous Ornamentals, Pome Fruits, Strawberries
 - Spruce spider mite, Twospotted spider mite, European red mite

Bifenazate

- Carbazate (related to carbamates)
- Neurotoxic, but exact MOA unknown
 - Floramite - Flowering & Woody Orn., Turf
 - Spider mites
 - Acramite - Stone & Pome Fruits, Grapes, Veggies.



Spider mites

"New" and "Natural Product" Insecticides

Sucrose Esters and Fungus



Caterpillars



Grasshoppers

Sucrose Octanoate Esters

- Active ingredient found on tobacco leaf hairs
- Dissolves insect exoskeleton
 - Sucroicide - General labeling: Field, Fruit, Vegetable, and Ornamental Plants
 - Aphids, Leafhoppers, Scales, Whiteflies, Plant bugs, Caterpillars, Fungus gnats, Mites



Cankerworm
Caterpillar

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

Pros & Cons of "New" Insecticides



■ Pros:

- Lower toxicity, selectivity, easier on beneficials, reduced worker safety & environmental restrictions, short restricted entry intervals (REIs), broader application site labels

■ Cons:

- Higher cost, less availability, selectivity, critical to target susceptible life stage(s), shorter residuals, must invest in monitoring

Prescription Approach



- Properly diagnose problem
- Emphasize IPM strategies
 - Prevention, good plant health, cultural, mechanical, biological
- Minimize insecticide use
 - Use “soft” chemicals as primary insecticides
 - Save broad-spectrum chemicals for emergencies
- Establish on-going monitoring
 - Plant health issues
 - Pests
 - Keep records
- Think long-term
 - Avoid crisis / “putting out fires” mode

Ask Suppliers to Stock “New” Insecticides

- Supply and demand
- Contact product manufacturers for local / regional suppliers
- Try them
 - Evaluate for good fits to your programs
 - Experiment / get experience
 - Phase them in stages



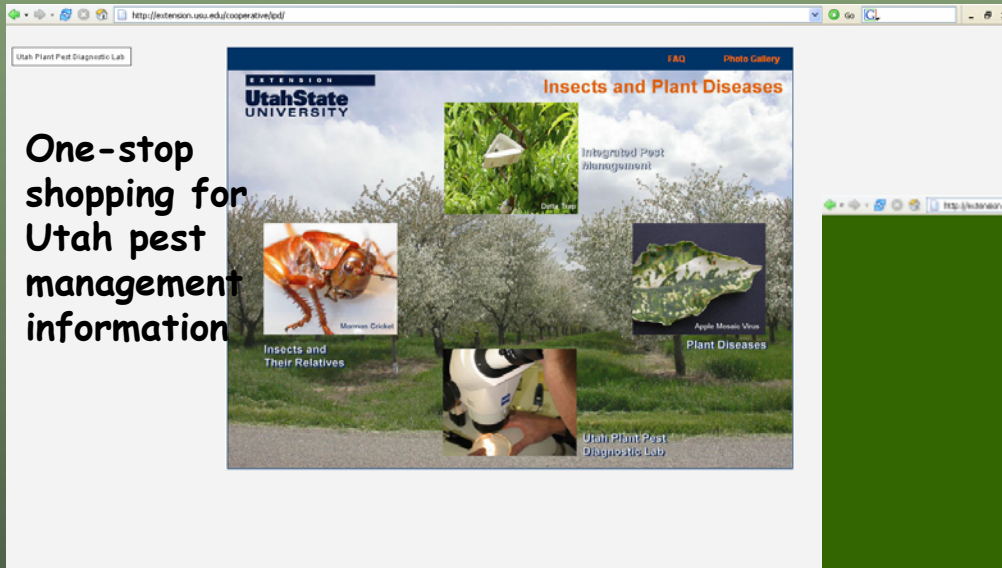
Giant Willow Aphid

USU Extension Pest Management Slideshows

Where can you view this slideshow?

<http://extension.usu.edu/cooperative/ipd>

One-stop shopping for Utah pest management information



<http://extension.usu.edu/cooperative/ipm>

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[http://extension.usu.edu/cooperative/
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