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

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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”

One-stop shopping for Utah pest management information

http://extension.usu.edu/cooperative/ipd
Pest Management Resources on the Web
“USU Extension Publications”

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Spider Mite Management in Corn and Soybeans G98-1167-A
Spider Mite Management in Corn and Soybeans. This PestGuide describes the two common spider mites found in Nebraska corn and soybeans, their natural enemies...

UC IPM UC Management Guidelines for Webspanning Spider Mites on Alfalfa
UC Management Guidelines for Webspanning Spider Mites on Cotton...

Spider mite
Control Unwanted Pests.
Spray: Spider mite
www.ArtSemi.com

Spruce Spider Mite Fact Sheet - Woody Ornamental Integrated Pest Management in Southwestern...
The spruce spider mite, Oligonychus ununguis (Jacobi), is a common pest of...

http://www.google.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**
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
Insecticides

- Database of pesticides registered in Utah
- Insecticide resistance
- “Old”, “New” and “Soft”
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 & Vags.
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
- Scale insects
- Thrips
- Plant bugs
Flonicamid

- 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

- **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

- **IGR:** Disrupts/mimics molting hormone, induces premature molting
  - **Mach 2 – Turf**
    - Billbugs, White grubs, Masked chafers, Sod webworms, Cutworms
  - **Confirm – Fruits, Vegs. & Ornamentals**
    - Webworms, Leafrollers, Armyworms
  - **Mimic – Woody Ornamentals**
    - Many caterpillars
  - **Intrepid – Fruits & Vegs.**
    - Codling moth, Leaf rollers, Webworms
“New” Miticides

Twospotted Spider Mite

Leaf Blister Mite
Clofentezine & Hexythiazox

- 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

- **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

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

- 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
Acequinocyl

- 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
“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
Beauveria bassiana

- Fungus, natural soil organism
- Fungal hyphae penetrate the insect’s exoskeleton
    - 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
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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