Soft and New Insecticides

for Control of Landscape Insect and Mite Pests

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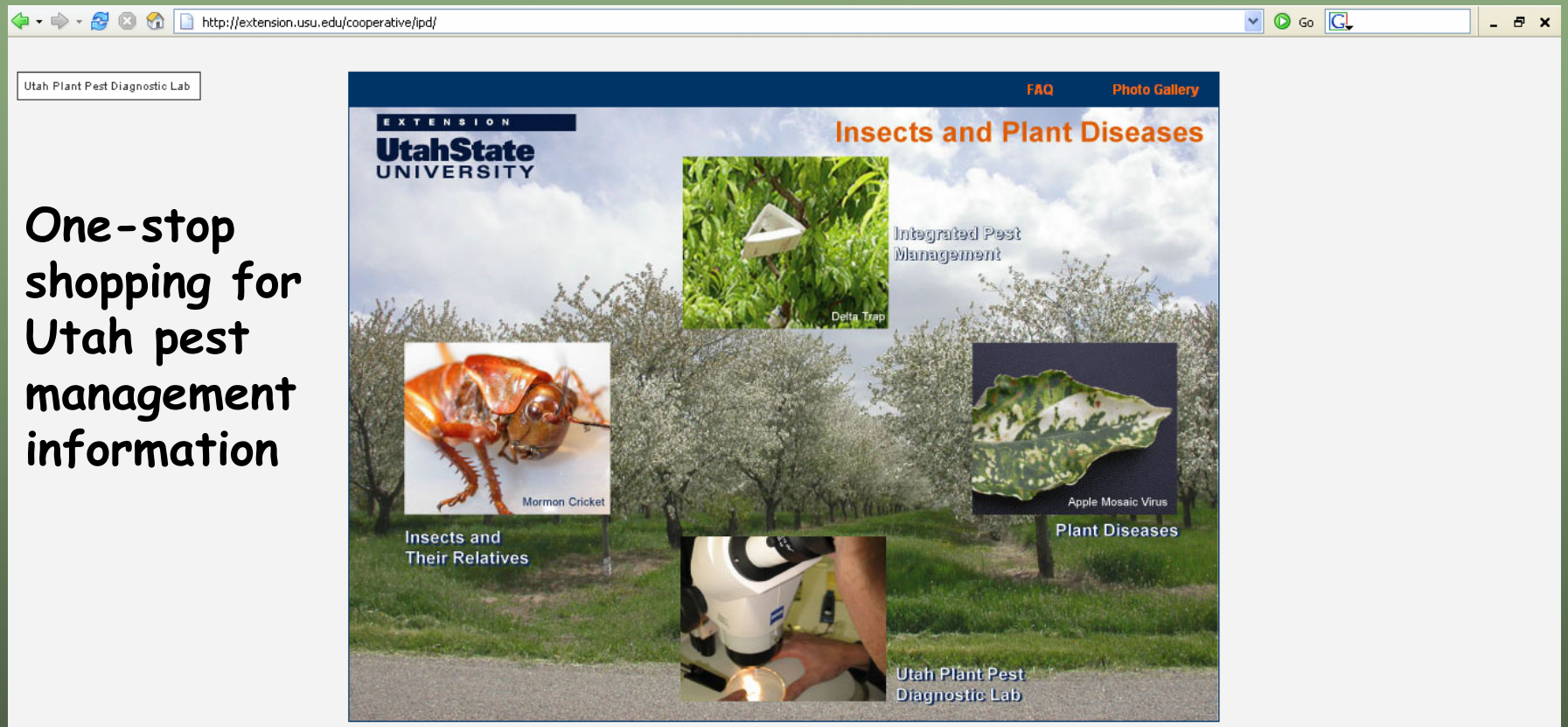
Pest Management Resources on the Web

- 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

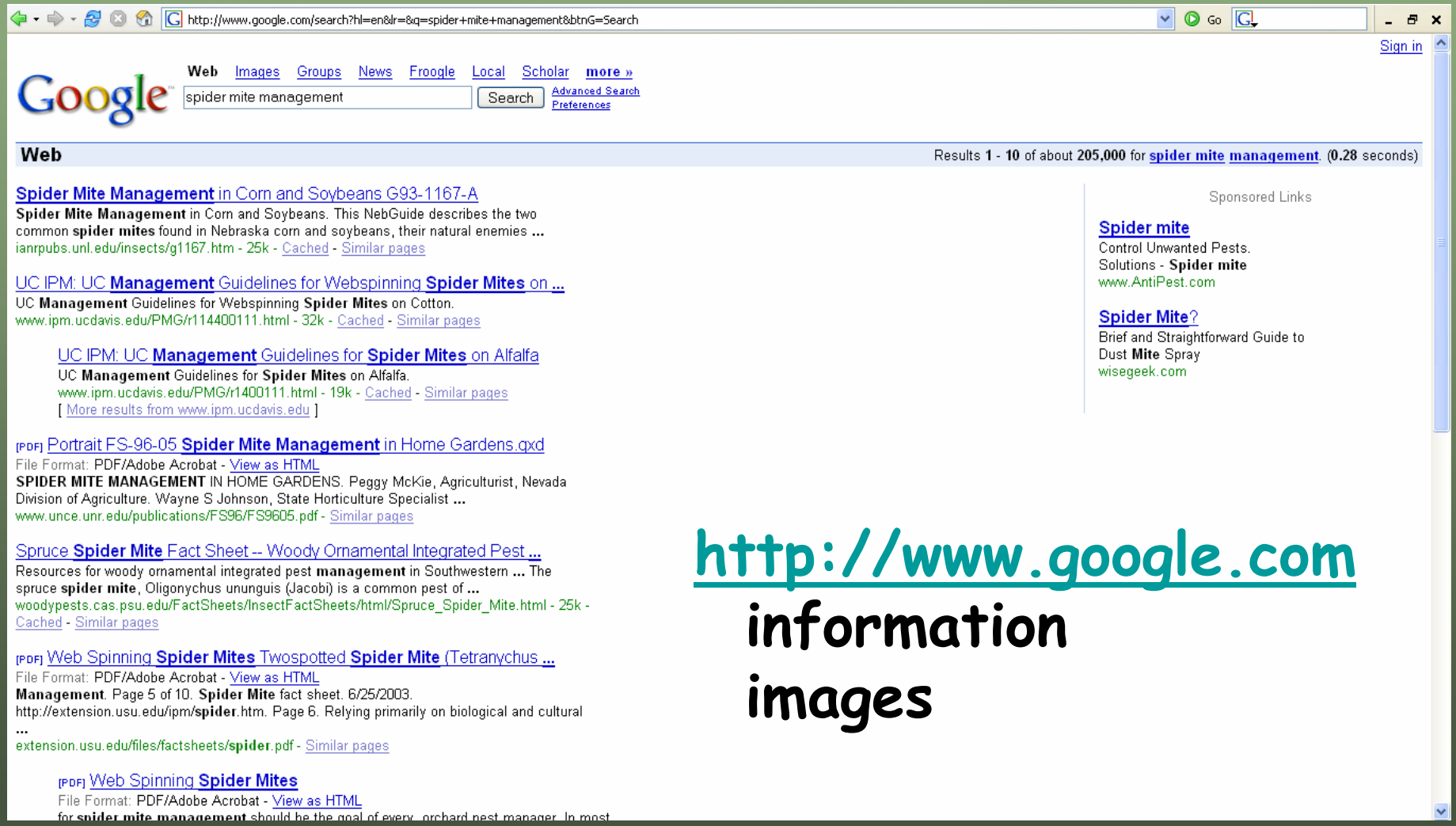
http://extension.usu.edu/cooperative/ipd

Pest Management Resources on the Web "USU Extension Publications"

USU Cooperative Extension Publications
- Home Gardening
- Agriculture
- Natural Resources

http://extension.usu.edu/cooperative

Search for Information on the Web
"Google Search Engine"



http://www.google.com

information

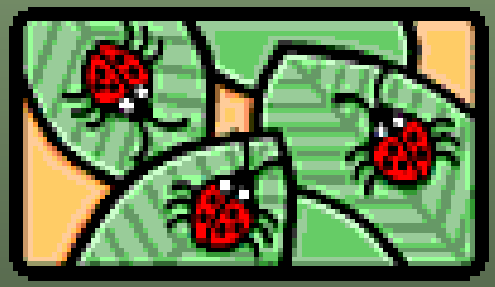
images

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

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:

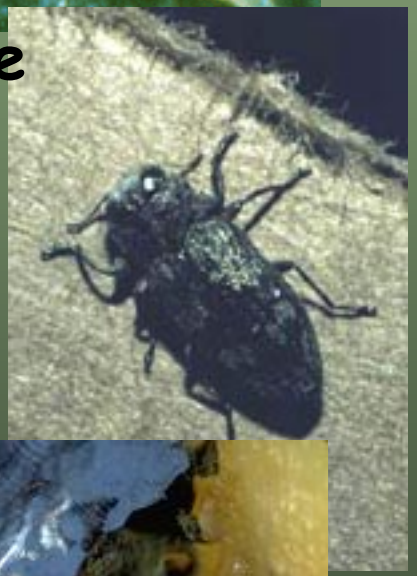
- Critical to target most susceptible insect life stages (eggs, early immature)
- Short residual - reapply every 5-10 days until pest subsides
- Selective for target pests, minimize harm to the beneficials

"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 & Vegs.**

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 & Vegs.

"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

Aphid

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

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, Vegs. & Ornamentals
    - Webworms, Leafrollers, Armyworms
  - Mimic – Woody Ornamentals
    - Many caterpillars
  - Intrepid – Fruits & Vegs.
    - 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, Vegs.

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
  - Sucrocide – 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

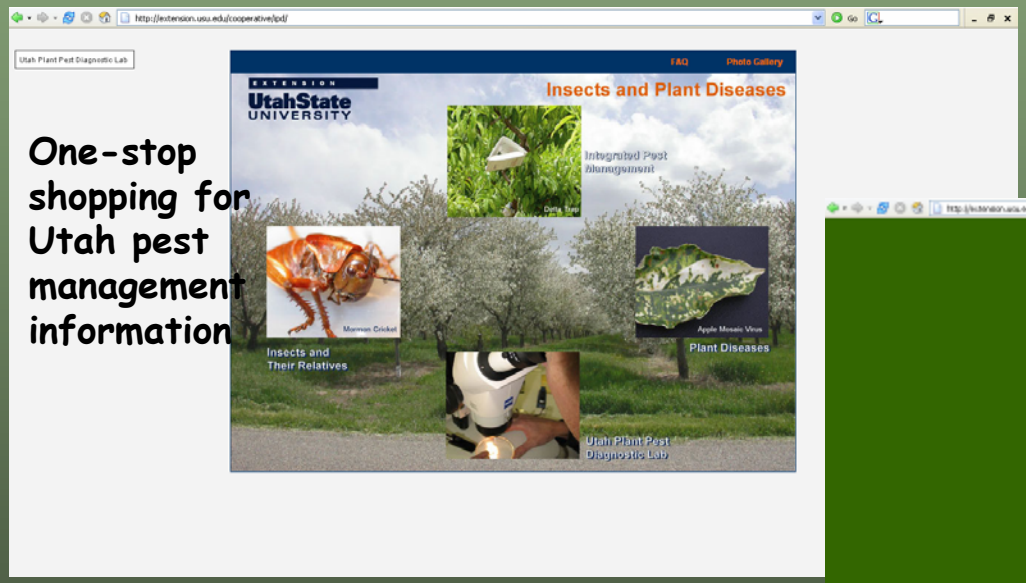
- Supply and demand
- Contact product manufacturers for local / regional suppliers
- Try them
  - Evaluate for good fits to your programs
  - Experiment / get experience
  - Phase them in stages

Giant Willow Aphid

USU Extension Pest Management Slideshows

Where can you view this slideshow?

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



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