Identification and Management of Insects on Roses

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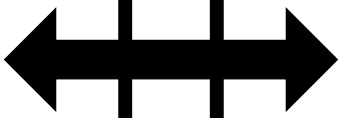
Insects

Less than 1% of insects on earth are considered pests

- Become pests because they take advantage of their surroundings or *disturbances* in the local environment

- The remainder are beneficial or neutral in the environment

Insects on Landscape Plants



Insect Pests

- Twospotted spider mites
- Rose sawflies
- Rose aphids
- Chilli thrips
- Fuller rose weevil
- Rose scale
- Eriophyid mites
- Flower thrips
- Others…

Environment

- Water
- Temperature
- Nutrients
- Day length
- Insecticides
- Landscape features
- Plant diversity
- Plant characteristics
- Natural enemies

Integrated Pest Management

"A more ***sustainable*** approach that combines cultural, biological, mechanical, and chemical controls that minimize environmental and human health risks"

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Integrated Pest Management

"An attempt to maintain the balance of a managed ecosystem"

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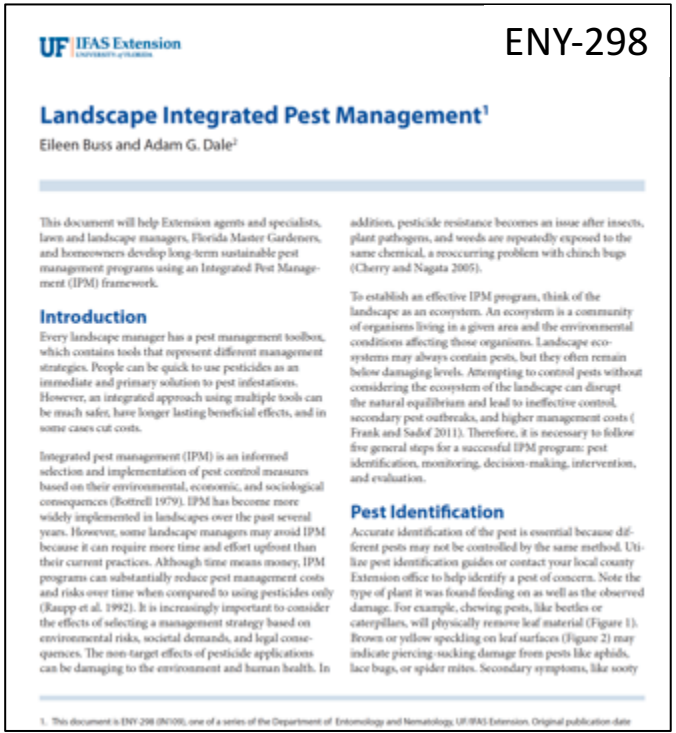
Effective IPM

IPM is a program, not a pest control tool

- FIVE primary components of IPM:
  1. Identification
  2. Monitoring/scouting
  3. Decision making
  4. Intervention
  5. Evaluation



UF IFAS Extension

ENY-298

Landscape Integrated Pest Management[1]

Eileen Buss and Adam G. Dale[2]

This document will help Extension agents and specialists, lawn and landscape managers, Florida Master Gardeners, and homeowners develop long-term sustainable pest management programs using an Integrated Pest Management (IPM) framework.

Introduction

Every landscape manager has a pest management toolbox, which contains tools that represent different management strategies. People can be quick to use pesticides as an immediate and primary solution to pest infestations. However, an integrated approach using multiple tools can be much safer, have longer lasting beneficial effects, and in some cases cut costs.

Integrated pest management (IPM) is an informed selection and implementation of pest control measures based on their environmental, economic, and sociological consequences (Bottrell 1979). IPM has become more widely implemented in landscapes over the past several years. However, some landscape managers may avoid IPM because it can require more time and effort upfront than their current practices. Although time means money, IPM programs can substantially reduce pest management costs and risks over time when compared to using pesticides only (Raupp et al. 1992). It is increasingly important to consider the effects of selecting a management strategy based on environmental risks, societal demands, and legal consequences. The non-target effects of pesticide applications can be damaging to the environment and human health. In addition, pesticide resistance becomes an issue after insects, plant pathogens, and weeds are repeatedly exposed to the same chemical, a reoccurring problem with chinch bugs (Cherry and Nagata 2005).

To establish an effective IPM program, think of the landscape as an ecosystem. An ecosystem is a community of organisms living in a given area and the environmental conditions affecting those organisms. Landscape ecosystems may always contain pests, but they often remain below damaging levels. Attempting to control pests without considering the ecosystem of the landscape can disrupt the natural equilibrium and lead to ineffective control, secondary pest outbreaks, and higher management costs (Frank and Sadof 2011). Therefore, it is necessary to follow five general steps for a successful IPM program: pest identification, monitoring, decision-making, intervention, and evaluation.

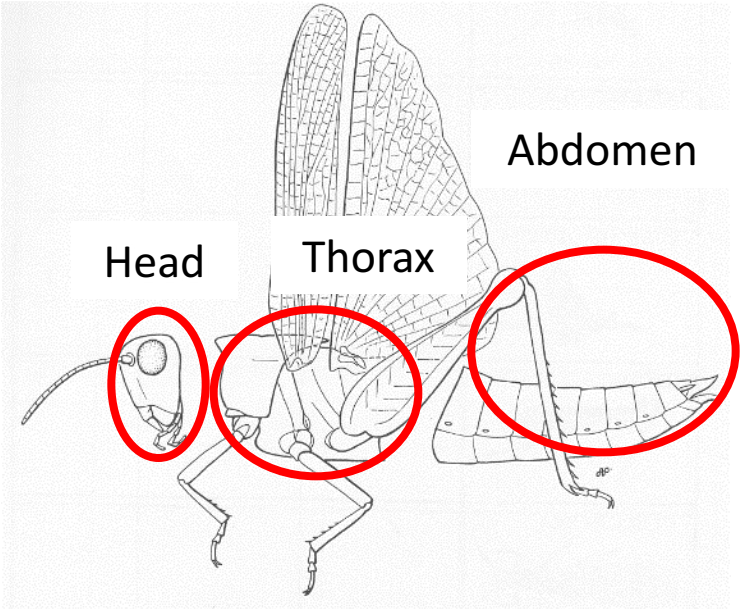
Pest Identification

Accurate identification of the pest is essential because different pests may not be controlled by the same method. Utilize pest identification guides or contact your local county Extension office to help identify a pest of concern. Note the type of plant it was found feeding on as well as the observed damage. For example, chewing pests, like beetles or caterpillars, will physically remove leaf material (Figure 1). Brown or yellow speckling on leaf surfaces (Figure 2) may indicate piercing-sucking damage from pests like aphids, lace bugs, or spider mites. Secondary symptoms, like sooty

1. This document is ENY-298 (IN109), one of a series of the Department of Entomology and Nematology, UF/IFAS Extension. Original publication date

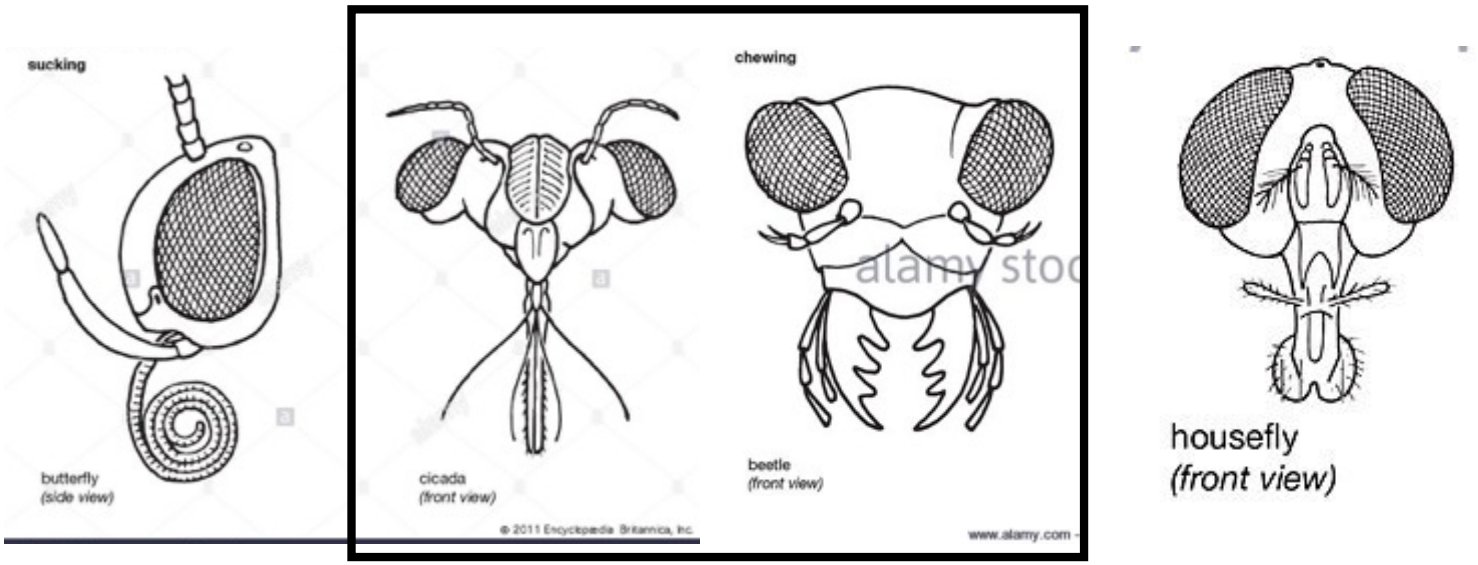
I.D. - What Makes an Insect an Insect

1. Six jointed legs (3 pairs)
2. 3 main body regions or functional units
3. One pair of antennae



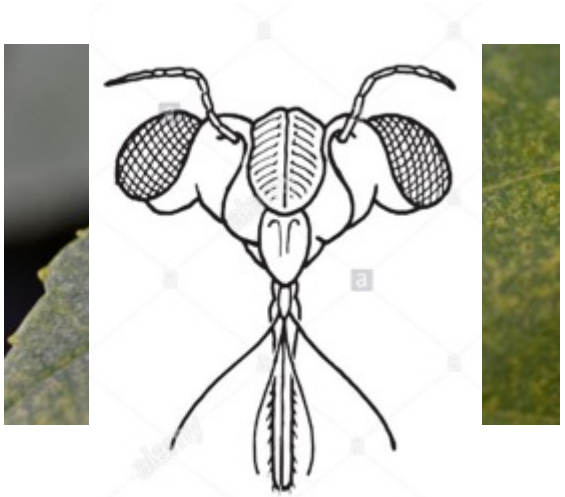
Insect Morphology

- Mouthparts

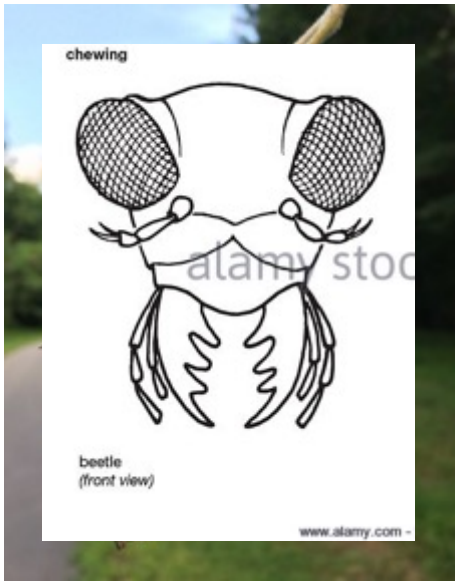


Siphoning Piercing-sucking Chewing Sponging

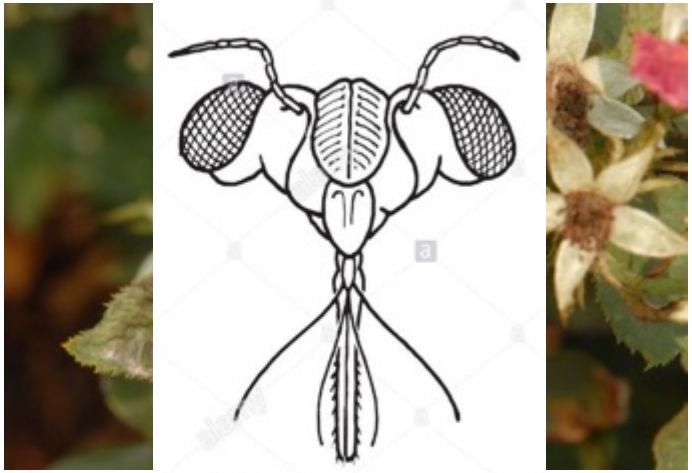
Identification by plant damage



Stippling



Chewing



Distortion and/or scarring

Sooty mold

Identification: What is the pest?

- How many legs?
- What kind of mouthparts?
- What kind of signs and symptoms do you see?

Key Pests

Key Pest – an organism that is frequently found damaging plants and requires management

Identification: What is the plant?

- Many plants are attacked by a suite of pests
- Plant identification can significantly narrow the list of possible culprits

- However, we know the host…

Key Pests

What **Key Pests**
of roses can you think of?

Key Pests of Roses

* • Chilli thrips, *Scirtothrips dorsalis*
* • Rose aphid, *Macrosiphum rosae*
  • Fuller rose beetle, *Naupactus cervinus*
* • Twospotted spider mite, *Tetranychus urticae*
* • Rose scale, *Aulacaspis rosae*
  • Flower thrips
  • Leafcutter bees?

Integrated Pest Management Tools

1. Cultural practices
2. Mechanical control
3. Biological control
4. Insecticides
   - Biorational / “natural” insecticides
   - Synthetic insecticides
     - EPA Reduced risk
     - Broad spectrum

EPA Reduced-Risk products

- Reduced Risk Products:
  - Safer to humans
  - Low non-target toxicity
  - Low potential for groundwater contamination
  - Low use rates
  - Low resistance potential
  - Compatible with IPM practices

- Examples:
  - Chlorantraniliprole (Acelepryn)
    - Caterpillars, white grubs
  - Acetamiprid (TriStar)
  - Pyriproxyfen (Distance)
    - Scales, whiteflies
  - Buprofezin (Talus)
    - Scales, whiteflies, mealybugs, spider mites
  - Spiromesifen
    - Mite control
  - Pymetrozine (Endeavor)
    - Aphids, whiteflies

Advantages

- Highly selective for insects
  - Low vertebrate toxicity
- Low topical and residue toxicity
  - Reduced exposure to beneficial organisms
- Long lasting plant protection
  - Fewer applications to control pests

Newest tools for ornamentals

Mainspring GNL - Cyantraniliprole

- Released in early 2016
- Anthranilic diamide
- Reduced-risk
- Systemic
- Sap-feeding pests
- Thrips control
- Foliar & drench applications
- Preventive, not curative

7862-12642 01-26-16 SCP 01-00 (02-02-16)
Mainspring GNL – 1 pint – Specimen Label
SCP 7862...

GROUP 28 INSECTICIDE

Mainspring® GNL

Insecticide

KEEP OUT OF REACH OF CHILDREN. / MANTÉNGASE FUERA DEL ALCANCE DE LOS NIÑOS.

For control of insects on ornamental plants; ornamental bulb, corm and tuber crops; conifers; Christmas trees; and non-bearing fruit and nut trees grown in greenhouses and nurseries (including field- and container-grown plants grown outdoors and in shade houses, lath houses and other ornamental production structures), conifer nurseries, retail nurseries, residential and commercial landscapes, and interior plantscapes

Effective on both chewing and sucking pests
Systemic activity by foliar or soil application
Effective control of ornamental insect pests on trees and shrubs

Active Ingredient:	
Cyantraniliprole*: 3-bromo-1-(3-chloro-2-pyridinyl)-N- [4-cyano-2-methyl-6-[(methylamino) carbonyl]phenyl]-1H-pyrazole-5-carboxamide:	18.66%
Other Ingredients:	81.34%
Total:	100.00%

Mainspring® GNL is a suspension concentrate (SC) formulation containing 1.67 pounds of cyantraniliprole per gallon.

*Cyantraniliprole belongs to the anthranilic diamide chemical class.

KEEP OUT OF REACH OF CHILDREN. / MANTÉNGASE FUERA DEL ALCANCE DE LOS NIÑOS.

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See additional precautionary statements and directions for use inside booklet. Vea más declaraciones de precaución e instrucciones del uso en folleto.

EPA Reg. No. 100-1543
EPA Est. No. 072344-MO-004
Formulated in USA
SCP 1543A-L1 1115

FIRST AID

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

HOT LINE NUMBER
For 24-Hour Medical Emergency Assistance (Human or Animal)
or Chemical Emergency Assistance (Spill, Leak, Fire or Accident),
Call
1-800-888-8372

Cuando llame a un centro de control de envenenamiento, a un médico, o intente obtener tratamiento, tenga a la mano el envase o la etiqueta del producto. Para más información sobre el tratamiento médico de emergencia, llame al **1-800-888-8372.**

PRECAUTIONARY STATEMENTS

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants.
- Shoes plus socks.

After the product has been diluted in accordance with label directions for use, shirt, pants, socks, and shoes are sufficient Personal Protective Equipment (PPE). Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables are available, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

Users Should: Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Equipo de Protección Personal (PPE)

Los aplicadores y otros manipuladores de pesticidas necesitan usar:
- Camisa de manga larga y pantalones largos.
- Zapatos y calcetines.

Después de diluir el pesticida de acuerdo a las instrucciones de uso en la etiqueta, es suficiente usar el equipo de protección como camisa de manga larga, pantalones, calcetines y zapatos. Sigue las instrucciones del fabricante para la limpieza/mantenimiento del Equipo de Protección Personal. En el caso de no existir dichas instrucciones de limpieza para equipos de protección, utilice detergente y agua caliente. Mantenga y lave el Equipo de Protección Personal separadamente de otras prendas de vestir.

Recomendaciones de Seguridad para los Manipuladores de Pesticidas

Los Manipuladores Deben: Lávese minuciosamente con agua y jabón después de manipular los pesticidas, y antes de comer, beber, masticar chicle, usar tabaco o utilizar el sanitario. Quítese la ropa sucia y lávela antes de volverla a usar.

Environmental Hazards

Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. This pesticide is toxic to aquatic invertebrates. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging the treatment area.

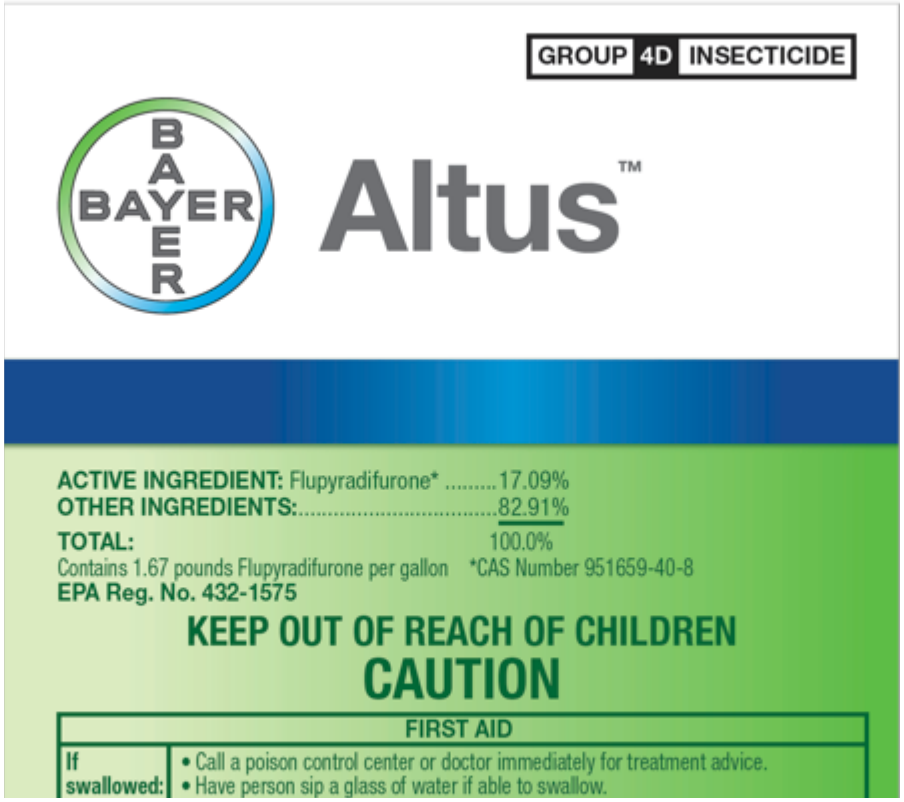
Surface Water Advisory

This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having a high potential for reaching surface water via runoff for several months or more after application.

Newest tools for ornamentals

Altus - Flupyridifurone

- Released May 1, 2017
- Butenolide insecticide
- Reduced-risk
- Systemic
- Sap-feeding pests
- Thrips *suppression*
- Foliar & drench applications
- Can be applied to flowering plants



Consider Low Impact Pesticides

- Insecticidal soaps
- Horticultural oils
- Biopesticides
  - *Bacillus thuringiensis* (B.t.) – soil bacterium
  - *Chromobacterium subtsugae*
  - *Beauveria bassiana* - Fungus
  - Spinosad – soil bacterium
  - Metarhizium – fungus found in soil
  - Azadirachtin – natural product from neem trees

Key Pests of Roses

- Rose aphid, *Macrosiphum rosae*
- Chilli thrips, *Scirtothrips dorsalis*
- Flower thrips
- Twospotted spider mite, *Tetranychus urticae*
- Fuller rose beetle, *Naupactus cervinus*
- Rose scale, *Aulacaspis rosae*
- Leafcutter bees?


UGA5082075

Rose Aphids (*Macrosiphum rosae*)

- Common sap-feeding insect pest of roses
- Primarily found on undersides of leaves or on flower buds
- Easily identified by **cornicles** on end of abdomen

Rose Aphid Damage

<u>Damage:</u>

- Distorted new growth
- Honey dew and **sooty mold**
- Shed exoskeletons
- Reduced flower size or bud death

Rose Aphids

- Overwinter as eggs deposited near buds
- Eggs hatch in Spring and populations boom
- Females are **parthenogenic**
  - Female produces up to 100 offspring
  - Offspring become reproductive in one week
  - Rapid population growth

Common Prey of BioControl Organisms

Frequently attacked by:

- Lady beetles
- Lacewings
- Syrphid flies
- Parasitoid wasps

- May escape biocontrol early in season or if **broad-spectrum** insecticides are used frequently

Aphid Biological Control

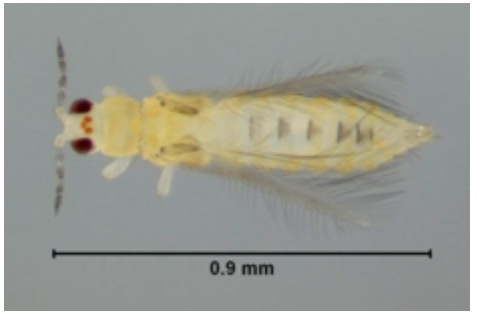
Aphid Management

- Full sun locations may experience greater pressure
- Moderate fertilizer use
  - Too much nitrogen may fuel aphid reproduction & development
- Naturally-derived products can be highly effective
- Systemic products are most effective synthetics

Aphid Chemical Control

Product	Systemic or Contact	Natural Products	Safe for N.E.	Homeowner Use?
Horticultural oils	Contact	Yes	Yes	Yes
Insecticidal soaps	Contact	Yes	Yes	Yes
Pyrethrins	Contact	Yes	Moderately	Yes
Beauveria bassiana	Contact	Yes, Fungus	Yes	Yes
Pyrethroids (-thrin)	Contact	No	No	Yes
Acephate	Contact/Systemic	No	No	Yes
Azadirachtin	Contact	Yes	Moderately	Yes
Flonicamid	Contact	No	No	No
Abamectin	Contact	No	No	No
Thiamethoxam	Systemic	No	No	No
Cyantraniliprole	Systemic	No	Yes	No
Clothianidin	Systemic	No	No	No
Flupyridifurone	Systemic	No	Yes	No

Chilli Thrips
(*Scirtothrips dorsalis*)

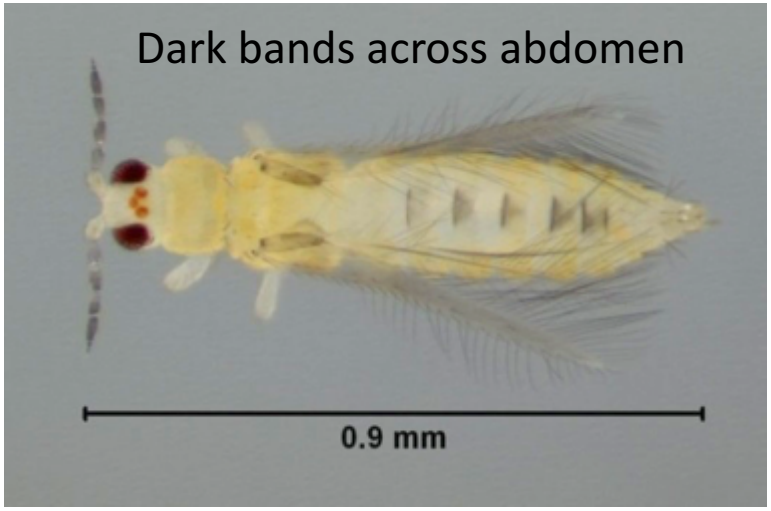


- Present year round
- Extremely small & mobile
- Feed on over 150 plant species

Damage

- Distorted, scarred leaves on top and bottom
- Defoliation & eventual plant death

Chilli Thrips
(*Scirtothrips dorsalis*)



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Chilli Thrips
(*Scirtothrips dorsalis*)

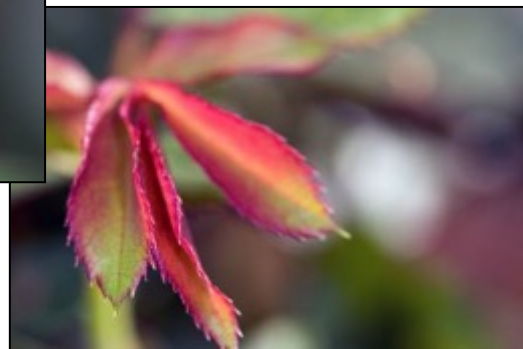
Life Cycle:

- Insert eggs inside plant tissues (60-200 per female)
- Eggs hatch in 6 – 8 days
- Larvae develop and feed for approximately 7 days
- Complete life cycle (egg to adult) in 14 – 20 days

Monitoring / Scouting

- Thoroughly inspect new growth
  - Hand lens or magnifying glass will help
- Detect by beating foliage over a white surface

Chilli thrips damage



Chilli Thrips Control

<u>Management strategies:</u>

- Moderate fertilization
  - Do not over-fertilize

- Biological control organisms
  - Minute pirate bugs, *Orius insidiosus*
  - Predatory mites (*Amblyseius swirskii*)
  - Predatory thrips (*Franklinothrips vespiformis*)

Chilli Thrips Control

Chemical control options

- Systemic/translaminar products:
  - Neonicotinoids (imidacloprid, acetamiprid, thiamethoxam, dinotefuran, clothianidin)
  - Spinosyns (spinosad)
  - Anthranilic diamides (cyantraniliprole)
  - Butenolides (flupyridifurone)

- Contact toxic products (bifenthrin, cypermethrin, carbaryl)

Chemical Control

	Active ingredient	IRAC Class	Use Site	Reduced Risk	Homeowner Use?
	Flonicamid	9C	G, I, N	No	No
	Abamectin	6	G, N, L	No	No
	Thiamethoxam	4A	G, N, I, L	No	No
	Cyantraniliprole	28	G, N, L	**Yes**	No
	Clothianidin	4A	G, N, L, I	No	No
	Flupyridifurone	4D	G, N, L, I	**Yes**	No
	Spinosad	5	G, N, I, L	No	Yes
*	Acetamiprid	4A	G, N, I, L	**Yes**	Yes
*	Imidacloprid	4A	G, N, L, I	No	Yes
	Carbaryl	1A	G, N, L	No	Yes
	Acephate	1B	G, N, L	No	Yes
	G = Greenhouse, N = Nursery, L = Landscape, I = Interiorscape				

Kumar et al. 2017. *Florida Entomologist*

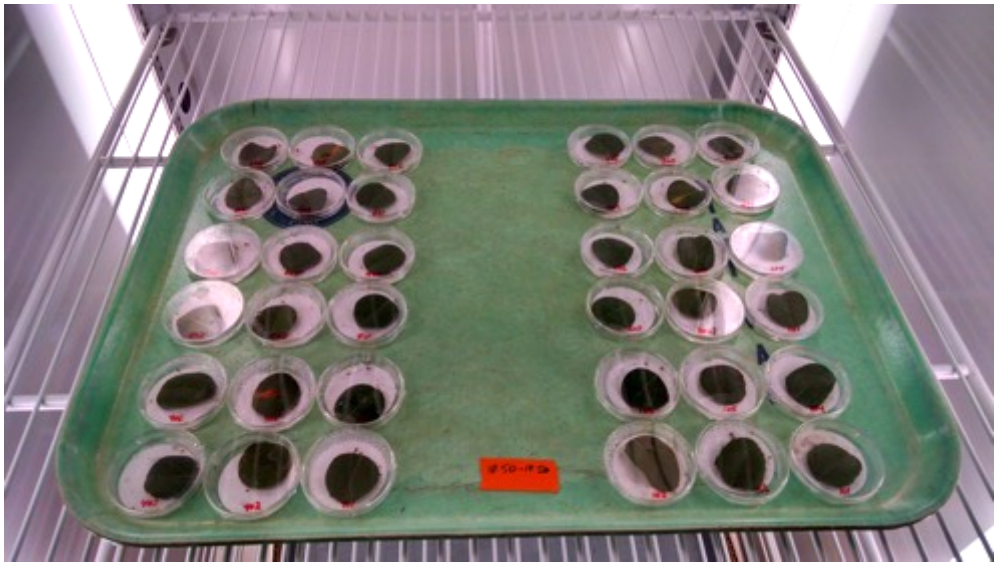
Chilli thrips toxicity

Foliar applications to Indian hawthorn shrubs

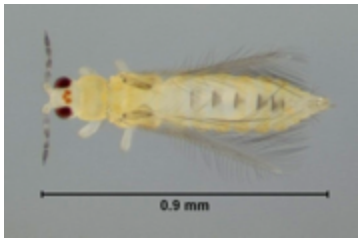
- Leaf discs taken from new growth
- Four thrips added to each disc
- Toxicity monitored over 48 hours

<u>Insecticides</u>

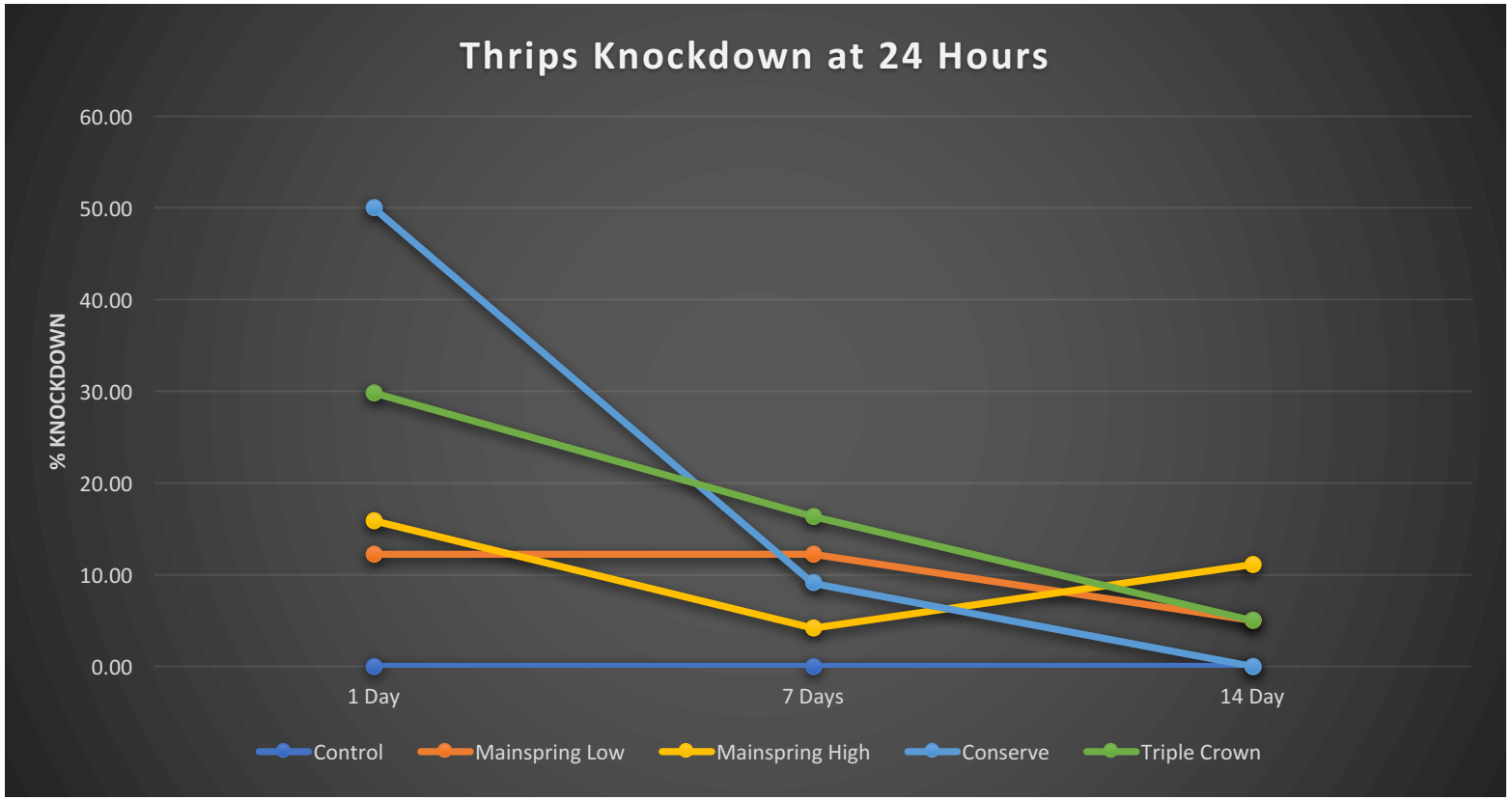
- Cyantraniliprole 2 oz/100 gal
- Cyantraniliprole 8 oz/100 gal
- Spinosad 6 oz/100 gal
- Imidacloprid + Bifenthrin + z-cypermethrin 7 oz/100 gal



Chilli thrips control



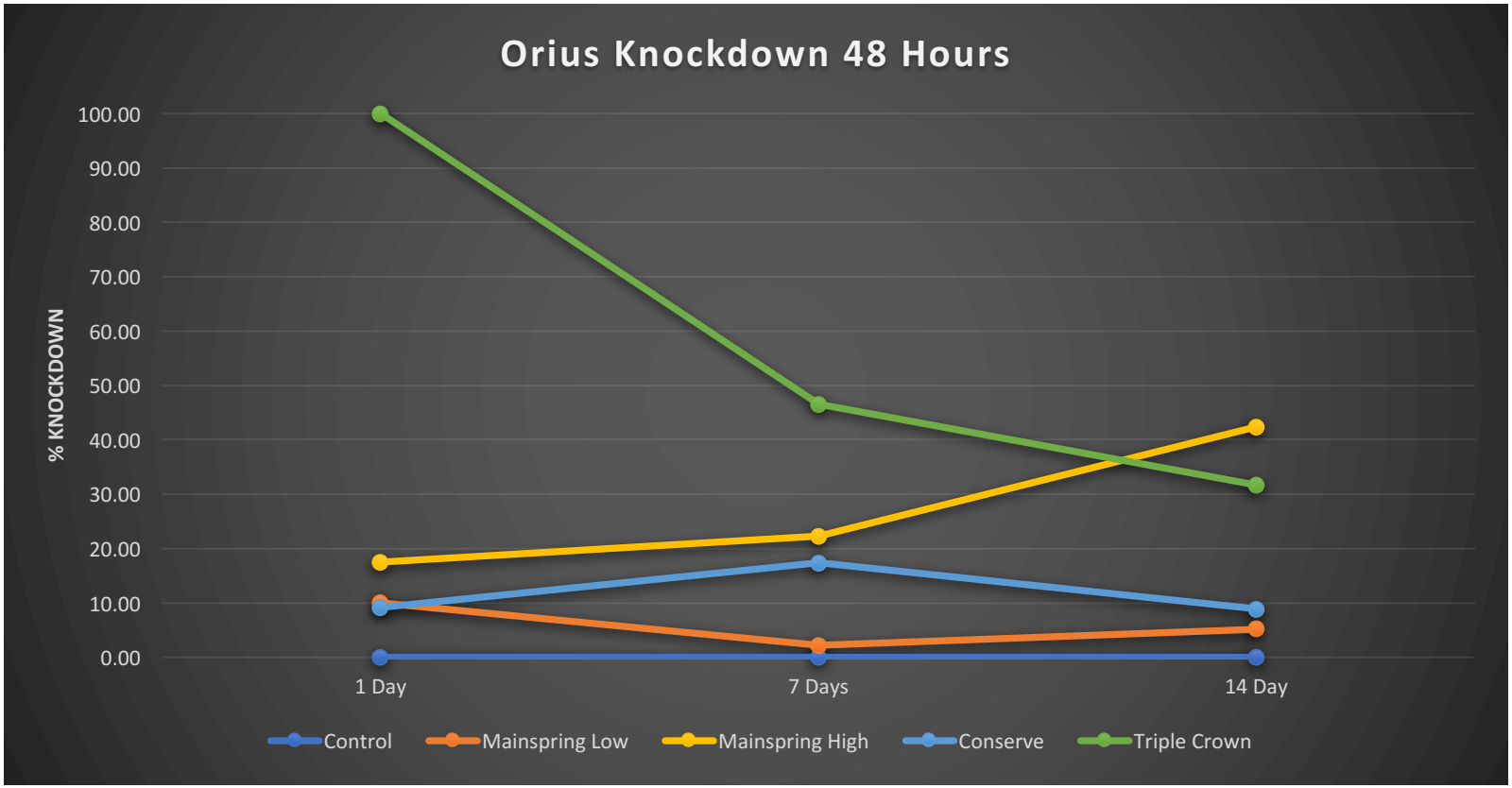
- Contact toxic and systemic products can provide control



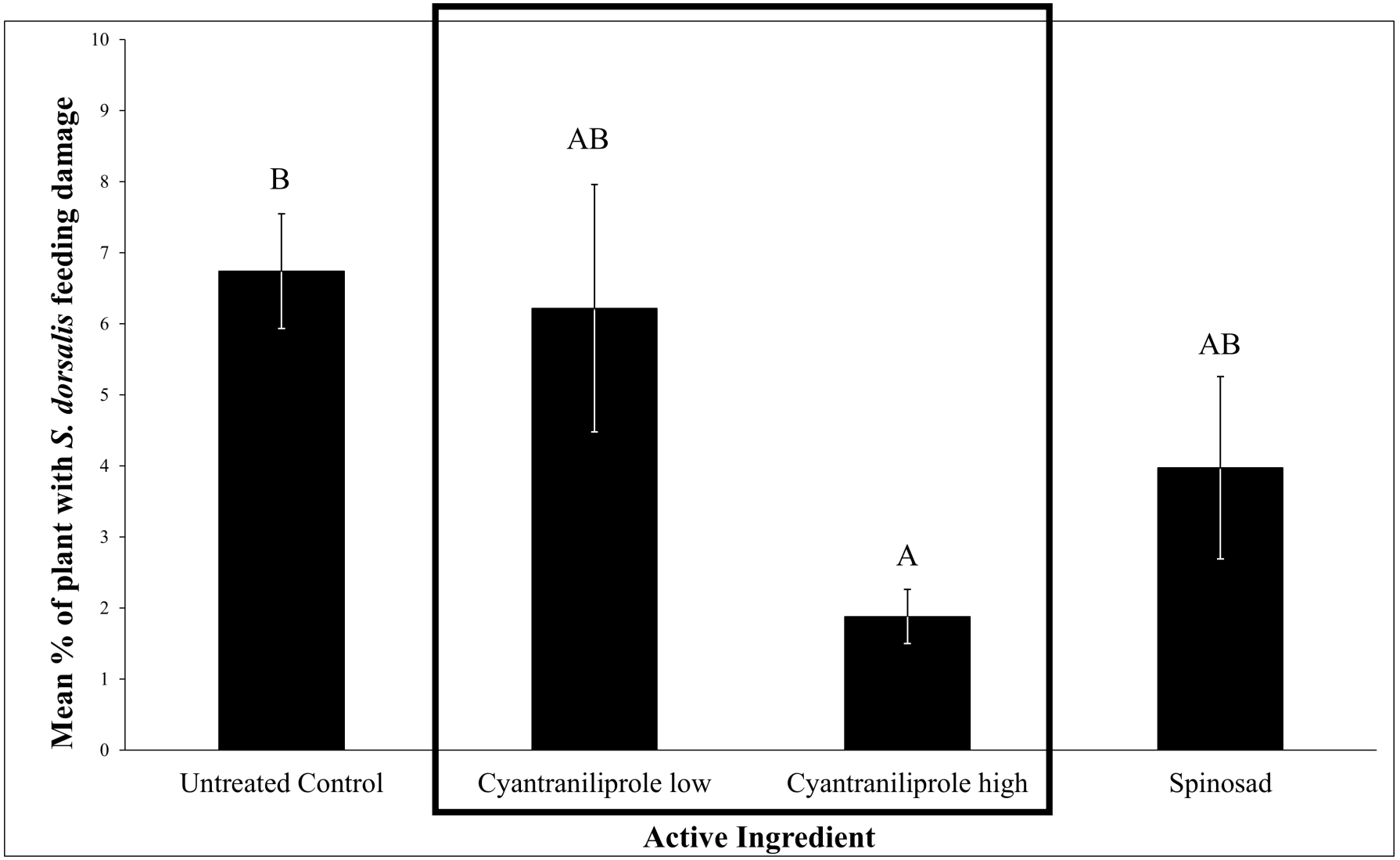
- But there is more to it...

Non-target effects of control

- Broad-spectrum products also control predatory insects



Plant Protection Over 6 Weeks



IPM Chemical Recommendation

Summary:

- Spinosad provides rapid thrips control
- Cyantraniliprole provides extended preventive control (for licensed applicators)
- Acetamiprid provides good extended control (homeowner use)
- Both have minimal toxicity to natural enemies

Apply spinosad, 1 week later treat with cyantraniliprole (high rate), monitor biweekly and treat with imidacloprid or acetamiprid if needed

Dr. Lance Osborne at the UF/IFAS MREC in Apopka, FL has worked with these extensively

Twospotted Spider Mite (*Tetranychus urticae*)

- Found throughout the world infesting over 200 plant species

- Underside of leaves
- Very small, brownish-white mites (8 legs)
- Small translucent – cream colored eggs
- Needle-like piercing-sucking mouthparts

Twospotted Spider Mite

- Entire life cycle on host plant, primarily on leaves
- Deposit small, translucent eggs on underside of leaves
- Feed on leaves through 3 immature stages then as adults
- Complete development in 5 to 20 days depending on temperature

Spider Mite Damage

Spider Mite Management

- Management can be extremely difficult
- Moderate fertilization
  - Too much nitrogen can make problems worse
- Predators are common and can be effective

- Insecticide / miticide resistance can rapidly occur
- **Non-target effects of insecticides are common**

Spider Mite Biological Control

- Minute pirate bug (*Orius insidiosus*)
- Predatory mites (*Phytoseiulus persimilis*)
- Lacewing larvae
- Many can be purchased in addition to naturally occurring

Mite Pest Control

- Domination by pyrethroids

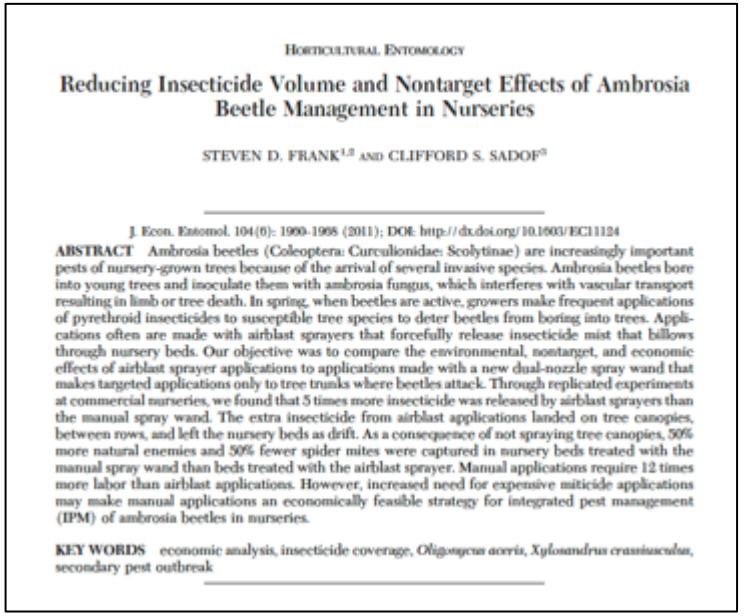
Table 1. Insecticides registered for use on turfgrass in Florida.

Active Ingredient	Trade Names	Chemical Class	IRAC Classification	Mode of Action	Notes
Bermudagrass Mite					
Azadirachtin	Azatrol, Neemix, Turplex	Azadirachtin	18B	Ecdysone agonist / molting disruptor	
Bifenthrin	Talstar, Menace	Pyrethroids, Pyrethrins	3	Sodium channel modulators	
Chlorpyrifos	Dursban, Chlorpyrifos SPC	Organophosphates	1B	Acetylcholine esterase inhibitor	For use on sod farms
Deltamethrin	Deltagard G	Pyrethroids, Pyrethrins	3	Sodium channel modulators	
Dicofol	Dicofol 4E, Kelthane	Organochlorine	2A	GABA-gated chloride channel blockers	Sod farms and non-residential only.
Lambda-cyhalothrin	Battle, Demand, Scimitar, Cyonara	Pyrethroids, Pyrethrins	3	Sodium channel modulators	
Zeta-cypermethrin + Bifenthrin +Imidacloprid	Triple Crown Golf, T&O	Pyrethroids, Neonicotinoids	3, 4A	Sodium channel modulators, Nicotinic acetylcholine, receptor agonists/antagonists	

Buss & Dale. 2016. EDIS #ENY-300

Pyrethroids cause secondary pest outbreaks

- Secondary pests – herbivores that are common, but typically remain below damaging levels (e.g., mites, scale insects, aphids)



HORTICULTURAL ENTOMOLOGY

Reducing Insecticide Volume and Nontarget Effects of Ambrosia Beetle Management in Nurseries

STEVEN D. FRANK[1,2] AND CLIFFORD S. SADOF[3]

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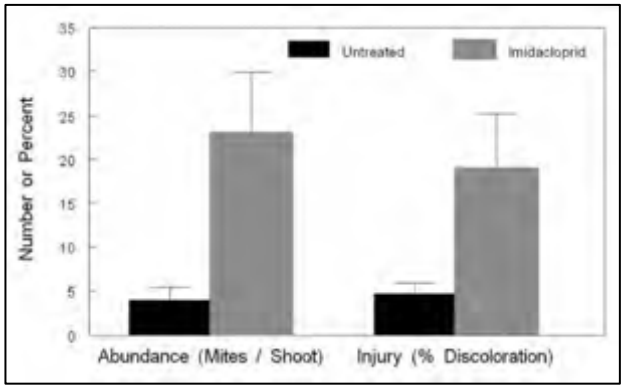
ABSTRACT Ambrosia beetles (Coleoptera: Curculionidae: Scolytinae) are increasingly important pests of nursery-grown trees because of the arrival of several invasive species. Ambrosia beetles bore into young trees and inoculate them with ambrosia fungus, which interferes with vascular transport resulting in limb or tree death. In spring, when beetles are active, growers make frequent applications of pyrethroid insecticides to susceptible tree species to deter beetles from boring into trees. Applications often are made with airblast sprayers that forcefully release insecticide mist that billows through nursery beds. Our objective was to compare the environmental, nontarget, and economic effects of airblast sprayer applications to applications made with a new dual-nozzle spray wand that makes targeted applications only to tree trunks where beetles attack. Through replicated experiments at commercial nurseries, we found that 5 times more insecticide was released by airblast sprayers than the manual spray wand. The extra insecticide from airblast applications landed on tree canopies, between rows, and left the nursery beds as drift. As a consequence of not spraying tree canopies, 50% more natural enemies and 50% fewer spider mites were captured in nursery beds treated with the manual spray wand than beds treated with the airblast sprayer. Manual applications require 12 times more labor than airblast applications. However, increased need for expensive miticide applications may make manual applications an economically feasible strategy for integrated pest management (IPM) of ambrosia beetles in nurseries.

KEY WORDS economic analysis, insecticide coverage, *Oligonycus aceris*, *Xyloandrus crassiusculus*, secondary pest outbreak

Imidacloprid may make mites worse

- Imidacloprid can reduce the biological control of mites by natural enemies
- Mites feeding on plants treated with imidacloprid produced more offspring!



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Neonicotinoid Insecticide Imidacloprid Causes Outbreaks of Spider Mites on Elm Trees in Urban Landscapes

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Abstract

Background: Attempts to eradicate alien arthropods often require pesticide applications. An effort to remove an alien beetle from Central Park in New York City, USA, resulted in widespread treatments of trees with the neonicotinoid insecticide imidacloprid. Imidacloprid's systemic activity and mode of entry via roots or trunk injections reduce risk of environmental contamination and limit exposure of non-target organisms to pesticide residues. However, unexpected outbreaks of a formerly innocuous herbivore, *Tetranychus schoenei* (Acari: Tetranychidae), followed imidacloprid applications to elms in Central Park. This undesirable outcome necessitated an assessment of imidacloprid's impact on communities of arthropods, its effects on predators, and enhancement of the performance of *T. schoenei*.

Methodology/Principal Findings: By sampling arthropods in elm canopies over three years in two locations, we document changes in the structure of communities following applications of imidacloprid. Differences in community structure were mostly attributable to increases in the abundance of *T. schoenei* on elms treated with imidacloprid. In laboratory experiments, predators of *T. schoenei* were poisoned through ingestion of prey exposed to imidacloprid. Imidacloprid's proclivity to elevate fecundity of *T. schoenei* also contributed to their elevated densities on treated elms.

Conclusions/Significance: This is the first study to report the effects of pesticide applications on the arthropod communities in urban landscapes and demonstrate that imidacloprid increases spider mite fecundity through a plant-mediated mechanism. Laboratory experiments provide evidence that imidacloprid debilitates insect predators of spider mites suggesting that relaxation of top-down regulation combined with enhanced reproduction promoted a non-target herbivore to pest status. With global commerce accelerating the incidence of arthropod invasions, prophylactic applications of pesticides play a major role in eradication attempts. Widespread use of neonicotinoid insecticides, however, can disrupt ecosystems tipping the ecological balance in favor of herbivores and creating pest outbreaks.

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Effects of Imidacloprid on Spider Mite (Acari: Tetranychidae) Abundance and Associated Injury to Boxwood (*Buxus* spp.)

Adrianna Szczepaniec and Michael J. Raupp

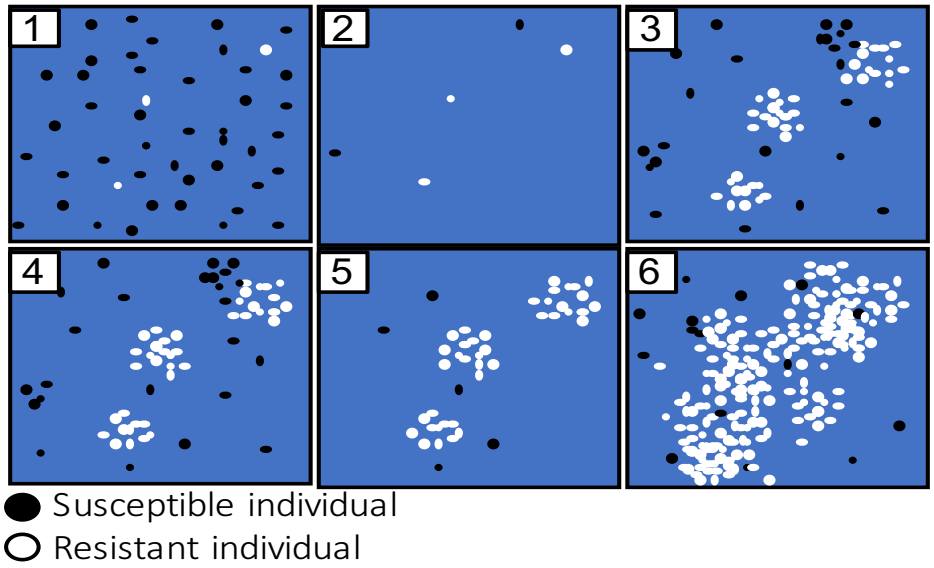
Abstract. Boxwoods are one of the most widely used woody shrubs in managed landscapes, but they suffer frequent attack by the boxwood leafminer (*Monarthropalpus flavus*). The neonicotinoid insecticide imidacloprid is highly efficacious in reducing the abundance of *M. flavus* when applied as a foliar spray or a soil drench. Recent reports of elevated populations of spider mites following applications of imidacloprid to other species of woody plants prompted an investigation to determine the effects of imidacloprid on abundance of a specialist spider mite, *Eurytetranychus buxi*, and the resultant damage it causes. Boxwoods treated with imidacloprid housed significantly more *E. buxi* and sustained more discoloration than untreated boxwoods. Moreover, there was a direct relationship between the abundance of *E. buxi* and the amount of associated injury. Arborists and landscape managers should be aware of the potential for elevated abundance of spider mites on boxwoods and greater levels of discoloration following applications of imidacloprid.

Key Words. *Buxus* spp.; *Eurytetranychus buxi*; Imidacloprid; Injury; *Monarthropalpus flavus*; Secondary Pest Outbreak.

Insecticide / Miticide Resistance

Twospotted spider mites have developed resistance to multiple pesticides

- Use high enough rates
- Rotate products (incorporate 3 into rotation)



Use Miticides to Control Mites

Applications at ~7 days intervals when pressure is high

Product	Systemic or Contact	Natural Products	Safe for N.E.	Homeowner Use?
Horticultural oils	Contact	Yes	Yes	Yes
Insecticidal soaps	Contact	Yes	Yes	Yes
Carbaryl	Contact/Systemic	No	No	Yes
Azadirachtin	Contact	Yes	Moderately	Yes
Abamectin	Contact	No	No	No
Spiromesifen	Contact	No	No	No

Rose Rosette Disease

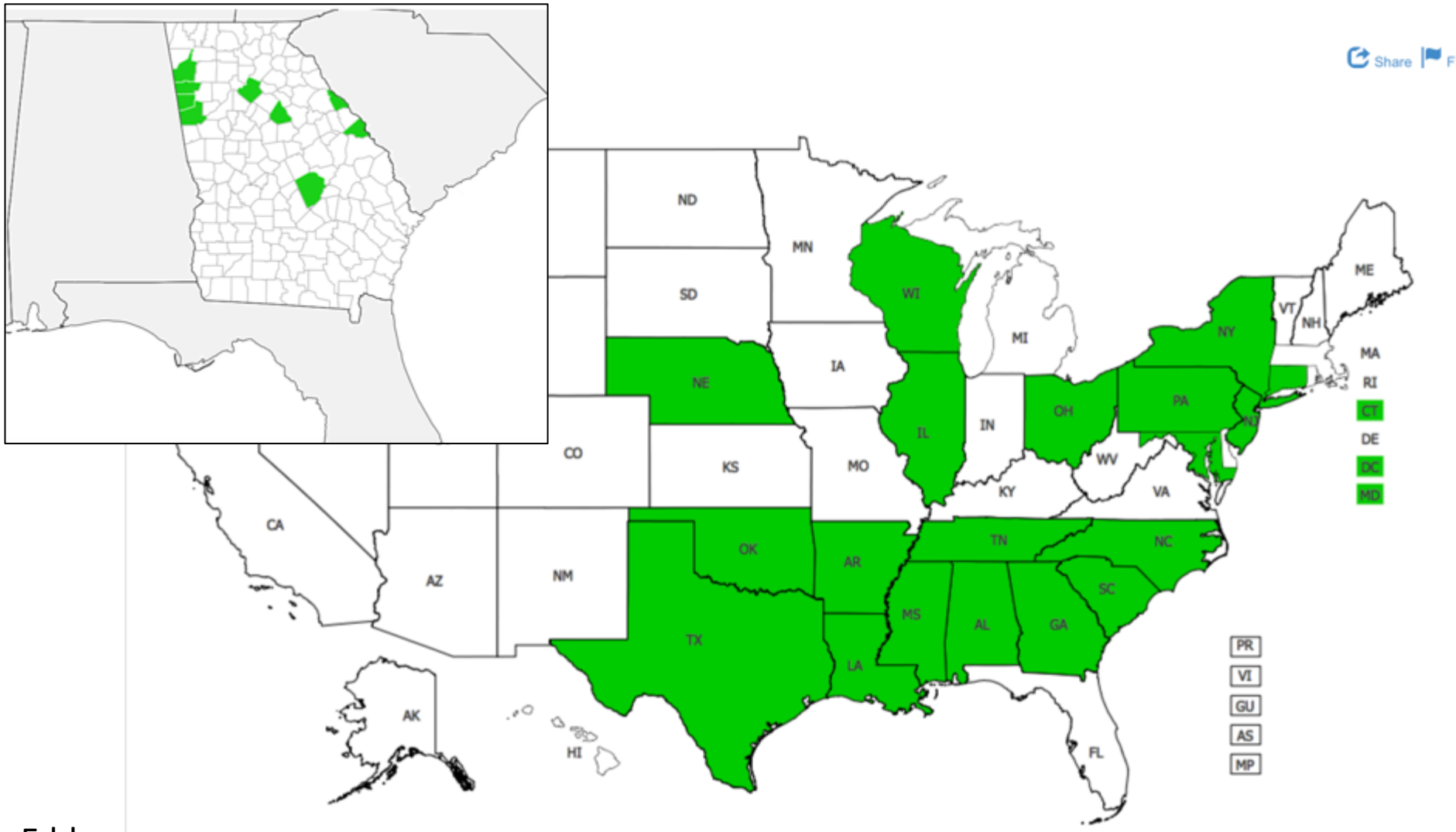
- Most destructive disease of roses
- First observed in Manitoba, Canada in 1940
- Infected rose plants often die within two years
- Caused by a virus transmitted by an eriophyid mite

Eriophyid mites

Plant-parasitic mites that cause a variety of symptoms

- Microscopic
- Some vector viruses (Rose rosette virus - *Phyllocoptes fructiphilus*)
- Ash flower gall mite
- Almost all specialists*

Rose Rosette Distribution



Eddmaps.org

Rose Rosette Symptoms

- Clustering of small branches
- Excessive thorn proliferation
- Unusual reddening of leaves
- Rapid elongation of new shoots
- Distorted flower buds and leaves
- Distorted dieback and sprouting of leaves

Rose Rosette Symptoms

Eriophyid Management

- Once symptoms occur, they cannot be corrected
- Sanitation is critical
- Infected / symptomatic plants and their roots must be removed at immediate detection of symptoms
- Pruning off or removing mites
- Promoting predatory mites

Chemical Control

- Controlling mites can reduce virus transmission
- Thorough coverage is critical
  - Carbaryl (Sevin)
  - Bifenthrin (Talstar)
  - Abamectin (Avid)
  - Spiromesifin (Forbid) – reduced-risk
  - *Chromobacterium subtsugae (*Grandevo) – bio-rational
  - Horticultural oils

Send in your samples

If you have symptomatic plants:

- Remove the infected region and send it to **FDACS-DPI** or your local **Extension office**
- Pending confirmation, remove and destroy plant

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Rose Scale (*Aulacaspis rosae*)

- Armored scale insect
- Infests stems
- Relatively immobile

Damage:

- Gradual dieback and decline

Armored Scale Management

- Prune off heavy infestations
- Conserve predatory and parasitic insects
- Moderate irrigation and fertilization

Chemical control:

- Systemic insecticides are most effective
- Horticultural oils & soaps can be equally effective

Chemical Control

- Thorough, frequent insecticidal soap or horticultural oil applications
- Insect growth regulators are highly effective
- Do not control armored scales with imidacloprid*

Table 1. Armored scale insect management.

Active Ingredient	Trade Name	IRAC Class	Activity	Labeled site	Notes
Acephate	Orthene	1B	Contact & translaminar	G, N, L	Target crawlers
Acetamiprid	TriStar	4A	Translaminar systemic	G, N, L	
Buprofezin	Talus	16	Contact	G, N, L	
Dinotefuran	Safari, Zylam	4A	Systemic	G, N, I, L	
Horticultural oil	Several	–	Contact	G, N, I, L	Thorough, frequent applications
Insecticidal soap	Several	–	Contact	G, N, I, L	Thorough, frequent applications
Spirotetramat	Kontos	23	Contact, systemic	G, N, I	
Pyriproxyfen	Distance	7C	Translaminar	G, N, I, L	

*The use of trade names is for example, not comprehensive, and does not imply endorsement or discrimination of other similar products.
*Always read and follow the label-specific instructions. The label is the law.
*G (greenhouse), N (nursery), I (interiorscape), L (landscape)
*Follow local pesticide use ordinances

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ENY-323

Managing Scale Insects on Ornamental Plants[1]

Eileen A. Buss and Adam Dale[2]

Introduction

Scale insects are a diverse group of piercing-sucking pests (Hemiptera) commonly found on ornamental plants in landscapes and nurseries. There are over 180 species of scale insects in Florida, but only a small percentage are important pests of ornamental plants (Dekle 1976; Hamon and Williams 1984). Scale insects are small, inconspicuous insects that use hair-like mouthparts to extract plant sap from leaves or branches. These insects can secrete a waxy covering that protects them from the environment and most chemical control measures. There are several families of scale insects; however, they can be generally divided into two main categories: armored and soft. Distinguishing between the two is important because their biology and management differ.

Armored scale insects (Hemiptera: Diaspididae) feed on the contents of cells just under the surface of leaves and bark and excrete their waste in the form of a protective cover (called a test). This cover can be removed to reveal the soft-bodied insect feeding beneath (Figure 1). Once female armored scales begin to feed on a host plant they will remain immobile in that location for the remainder of their life. Even after death, the scale insect cover may remain on the plant for several years. Armored scales are the most diverse group of scale insects in Florida with over 130 species (Dekle 1976).

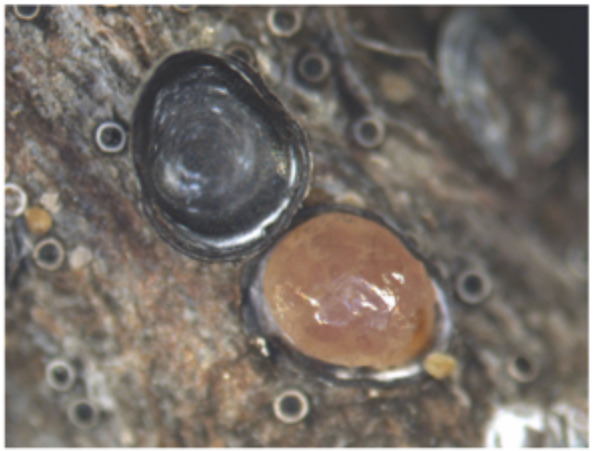

Figure 1. Gloomy scale, *Melanaspis tenebricosa*, with armored covering removed.
Credits: A.G. Dale

Common Armored Scales

Florida red scale (*Chrysomphalus aonidum*)

Cycad aulacaspis scale (*Aulacaspis yasumatsui*)

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2. Eileen A. Buss, emeritus professor; and Adam Dale, assistant professor; Department of Entomology and Nematology, UF/IFAS Extension, Gainesville, FL 32611.

Success Requires IPM

- Incorporate multiple strategies to reduce pests and promote plant and ecosystem health
- Never a cure-all or a singular solution
- Identify the problem, keep track of it, and constantly evaluate

Thank You

- For more information, search for specific plants, pests, or practices at UF/IFAS EDIS http://edis.ifas.ufl.edu
- IFAS/Extension Bookstore publications
  http://ifasbooks.ifas.ufl.edu/p-153-helpful-harmful-harmless.aspx

- For updates on landscape pest management:
  - @adamGdale
  - http://dalelab.org

Photos taken by L. Buss, J. Castner, A. Dale, L. Osborne, V. Kumar, C. Mannion