A close-up photograph of a whitefly, a small insect with a pale, fuzzy body and long, thin legs, perched on a green plant stem. The insect's head is dark, and its body is covered in fine, white hairs. The background is blurred, showing more of the plant and some green foliage.

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Managing Rugose Spiraling Whitefly in the Landscape

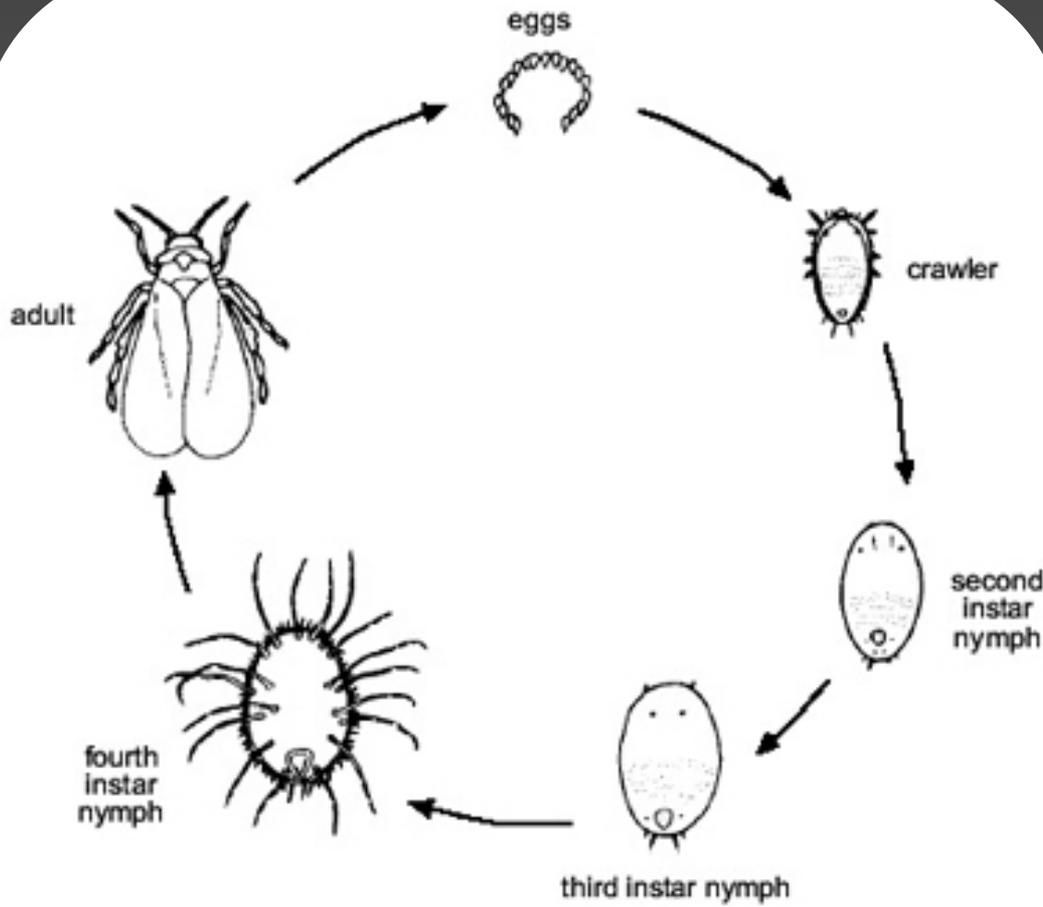
November 2011

Whiteflies



- Approximately 75 species of whiteflies in Florida.
- Common pests of many ornamental plants
- Narrow and wide host range depending on the species
- Piercing-sucking mouthparts
- Excrete honeydew
- Capable of transmitting viruses
- Adults are small, moth-like, usually with white wings.

Whitefly Life Cycle



Courtesy University of California: Statewide IPM Program,
Agriculture and Natural Resources



Variability in Whitefly Immature Stages



Damage from Whiteflies

- Direct damage
 - Caused by the piercing and sucking of sap from the foliage; leaf drop
 - Usually not sufficient to kill plants
- Indirect damage
 - Accumulation of honeydew and white, waxy flocculent material
 - Sooty mold growth on honeydew
- Virus transmission
 - Some whiteflies can transmit disease
 - Currently, no known viruses associated with the Rugose spiraling whitefly

Rugose Spiraling Whitefly

Aleurodicus rugioperculatus

- First found at USDA office in Miami on *Bursera simaruba* Spring 2009
- Known from Belize, Guatemala and Mexico
- Eggs are in a spiral pattern
- Adult is relatively large and docile



Plants Hosts

- *Acalypha wilkesiana* (Copperleaf)
- *Annona* sp. (Sugarapple)
- *Araucaria heterophylla* (Norfolk island pine)
- *Bucida buceras* (Black olive)
- *Bursera simaruba* (Gumbo limbo)
- *Calophyllum* species
- *Catharanthus roseus* (Madagascar periwinkle)
- *Chrysobalanus icaco* (Cocoplum)
- *Chrysophyllum oliviforme* (Satinleaf)
- *Cocos nucifera* (Coconut palm)
- *Conocarpus erectus* (Buttonwood)
- *Cordyline fruticosa* (Hawaiian ti)
- *Dictyosperma album* (Hurricane palm)
- *Dypsis lutescens* (Areca palm)
- *Eugenia* spp.
- *Ficus aurea* (Strangler fig)
- *Ficus carica* (Edible fig)
- *Hyophorbe verschaffeltii* (Spindle palm)
- *Mangifera indica* (Mango)
- *Manilkara roxburghiana*
- *Myrica cerifera* (Wax myrtle)
- *Musa* sp. (Banana)
- *Parthenocissus quinquefolia* (Virginia creeper)
- *Persea americana* (Avocado)
- *Phoenix roebelenii* (Pigmy palm)
- *Quercus virginiana* (Live oak)
- *Sabal palmetto* (Sabal palm)
- *Schinus terebinthifolius* (Brazilian pepper)
- *Simarouba glauca*
- *Smilax auriculata*
- *Spondias* sp.
- *Spondias purpurea*
- *Strelitzia nicolai* (White bird of paradise)
- *Strelitzia reginae* (Bird of paradise)
- *Tabebuia* species
- *Terminalia catappa* (Tropical almond)
- *Veitchia* species
- Washingtonia palm
- *Zeuxine strateumatica*

And, the list continues to grow





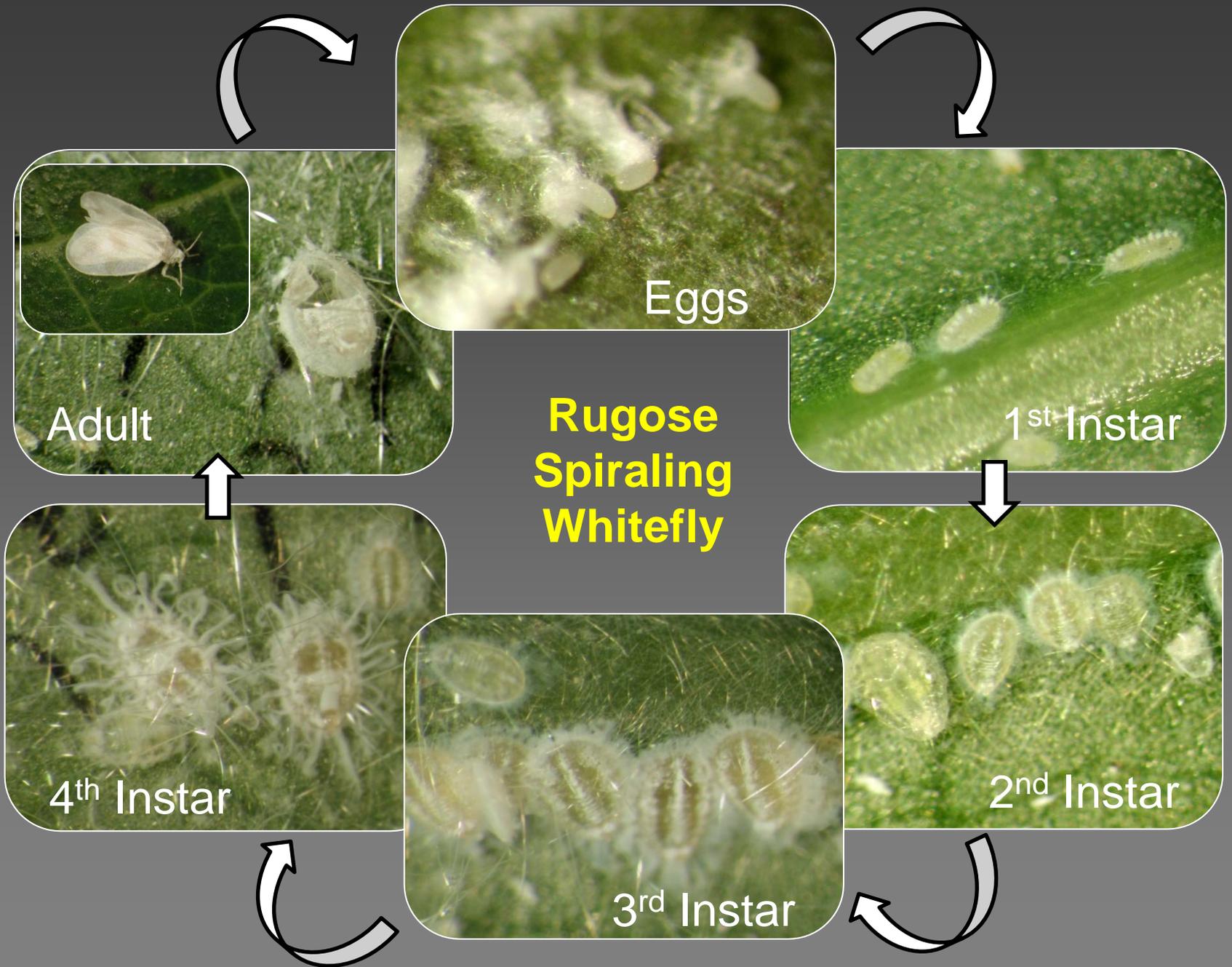
Rugose Spiraling Whitefly



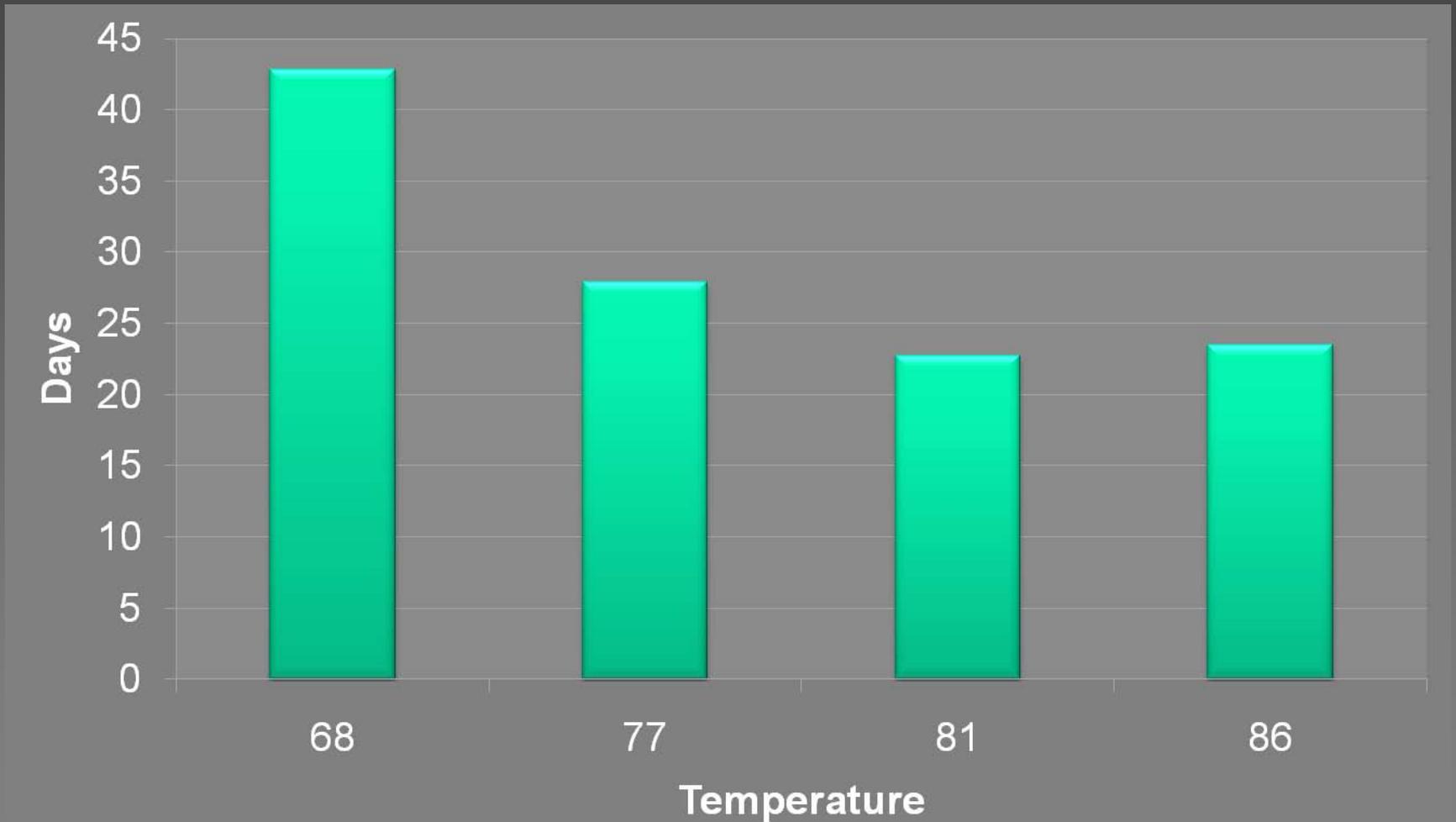
Spiraling Eggs

Rugose Spiraling Whitefly

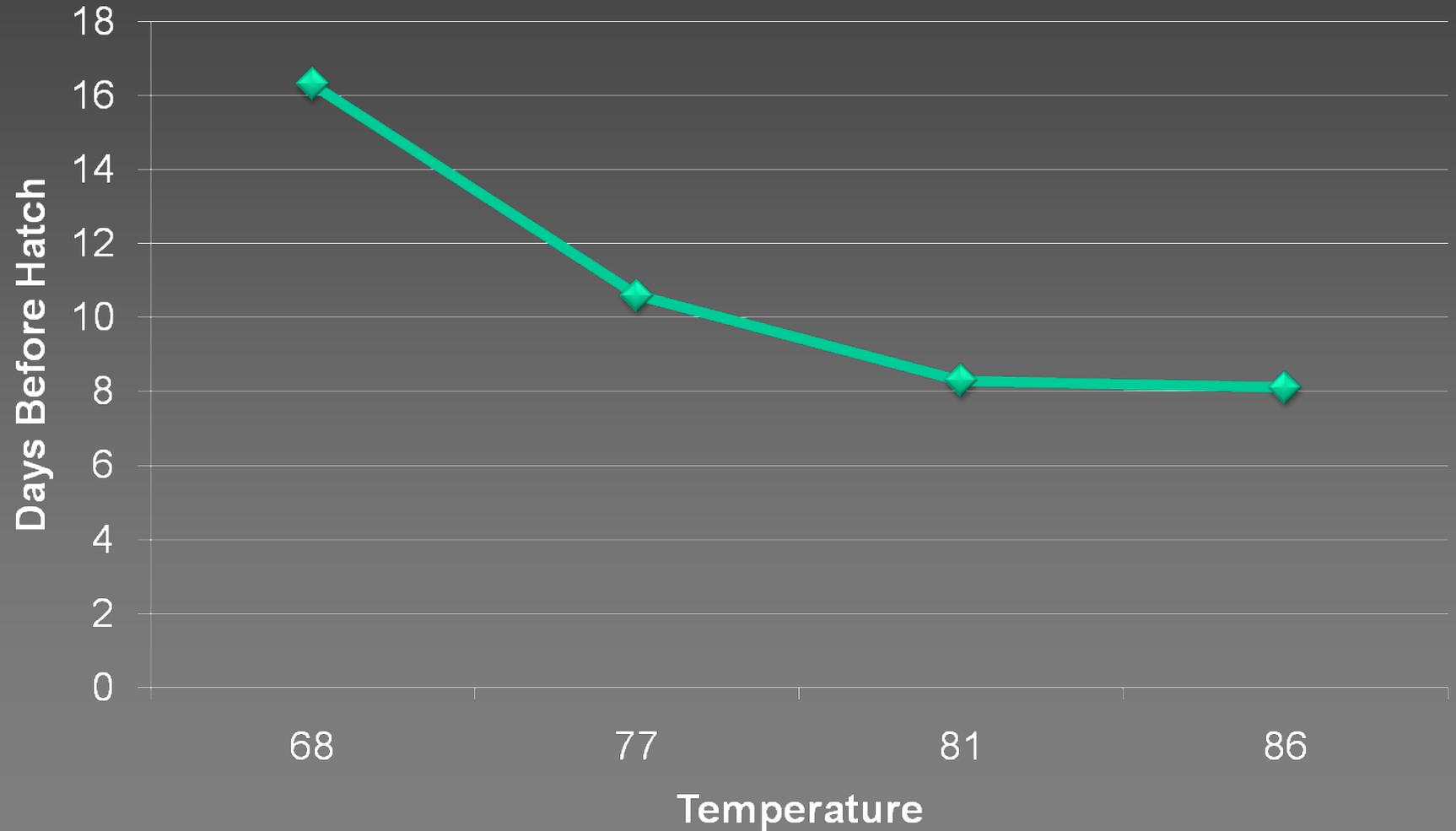




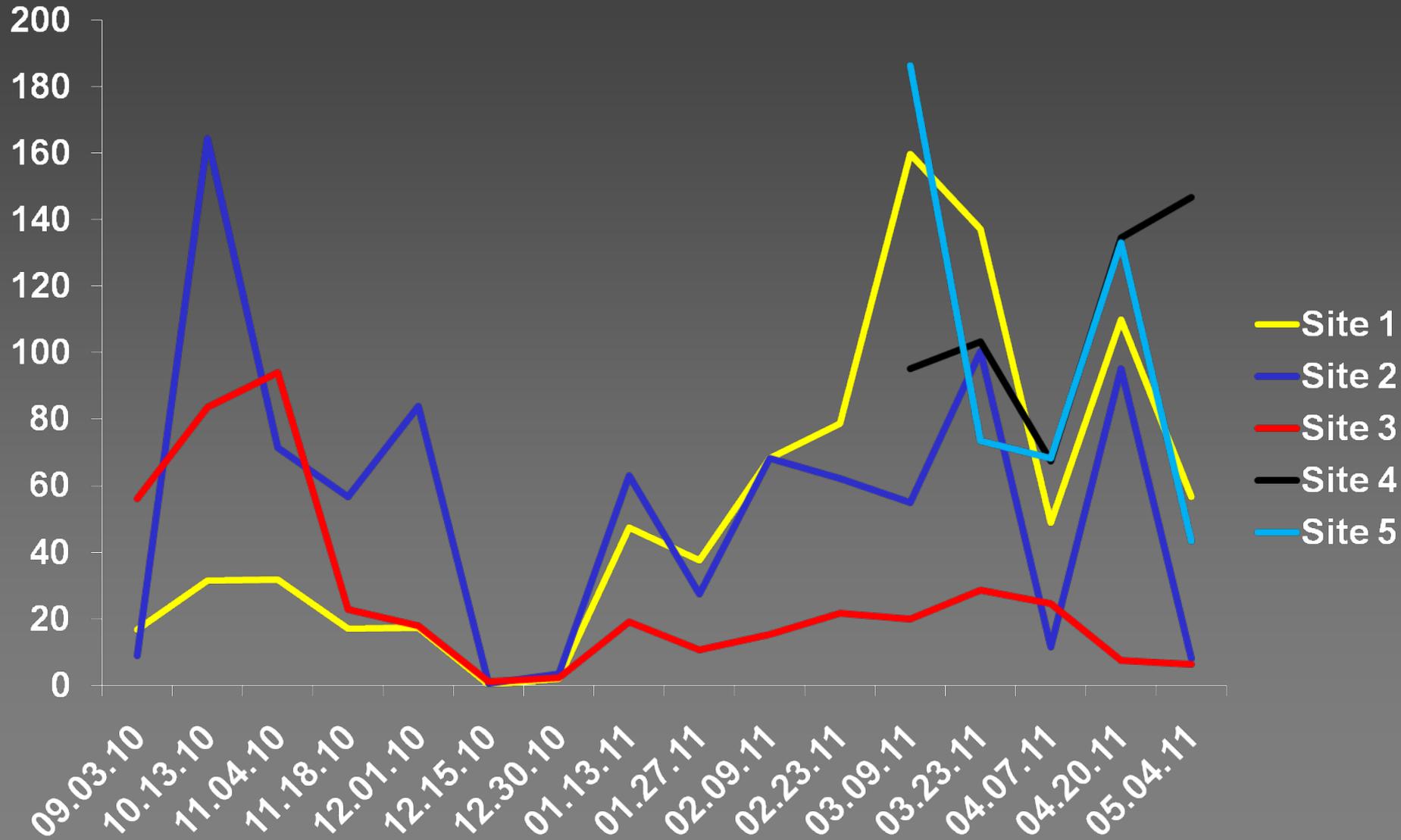
Effect of Temperature on the Life Cycle of the Rugose Spiraling Whitefly



Effect of Temperature on Egg Hatch



Population of Rugose Spiraling Whitefly



Natural Enemies

Parasitoid:
Encarsia guadalupae



Beetle predator:
Nephaspis oculatus



Lacewing Predator:



Management of the Rugose Spiraling Whitefly in the Landscape

- Need long term management which requires other options other than complete reliance on insecticides
- Importance of scouting/monitoring
 - Spiral eggs
- Awareness of natural enemies

Management of Whitefly in the Landscape

- Cultural control
 - Alternative plant choices (difficult in this situation)
- Washing plants off with water
 - Small infestations or small plants
 - Must remove the immature stages and eggs.

Management of Whitefly in the Landscape

- Soaps and oils
 - Horticultural oil; insecticidal soap; dish soap (don't use soaps with degreasers i.e. Dawn)
 - Strictly contact so thorough coverage is required
 - Several applications are required 7-10 days
 - Phytotoxicity under high temperatures

Management of Whitefly in the Landscape

- Insecticides
 - Sometimes important in the early management of a pest
 - Appropriate choices of insecticide, formulation, methods of application and frequency of application
 - Effects on natural enemies

Management of Whitefly in the Landscape

- Insecticides
 - Misuse or overuse can cause problems such as insect resistance, secondary pest problems, environmental contamination, and detrimental effects on non-target organisms
 - Follow label instructions - The site and method of application must be on the label (i.e. landscape, nursery, etc.)

Management of Whitefly in the Landscape

- Apply a systemic (neonicotinoid) insecticide to the soil or trunk for longer term protection
 - Soil application (drench, granular, pellets)
 - Trunk application (basal spray, injection)
- Foliar application



Spray trunk to chest height



Safari Basal Trunk Spray
(12 oz/ gallon)

Gumbo Limbo

Tree Injection

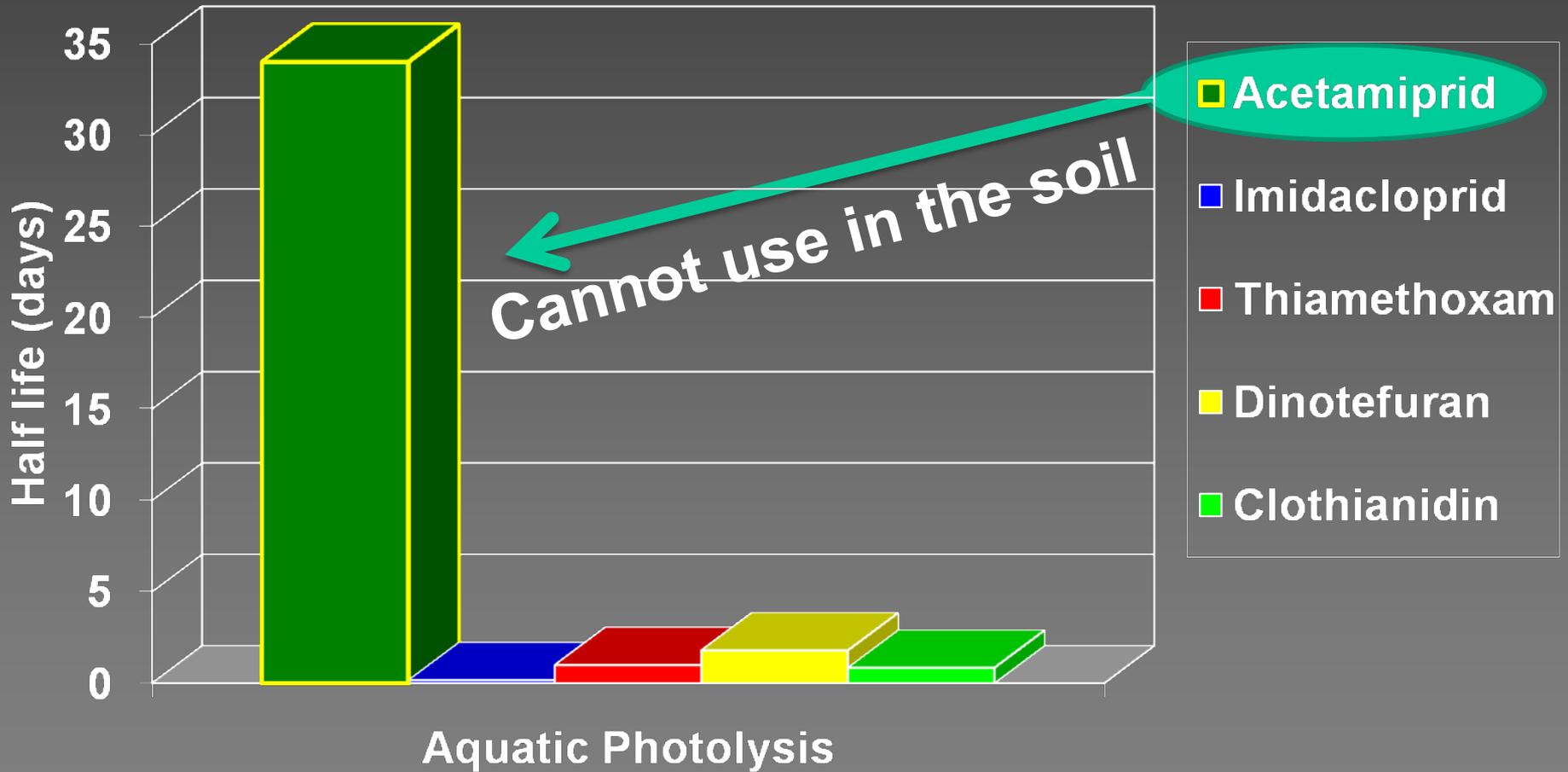


Neonicotinoid Insecticides

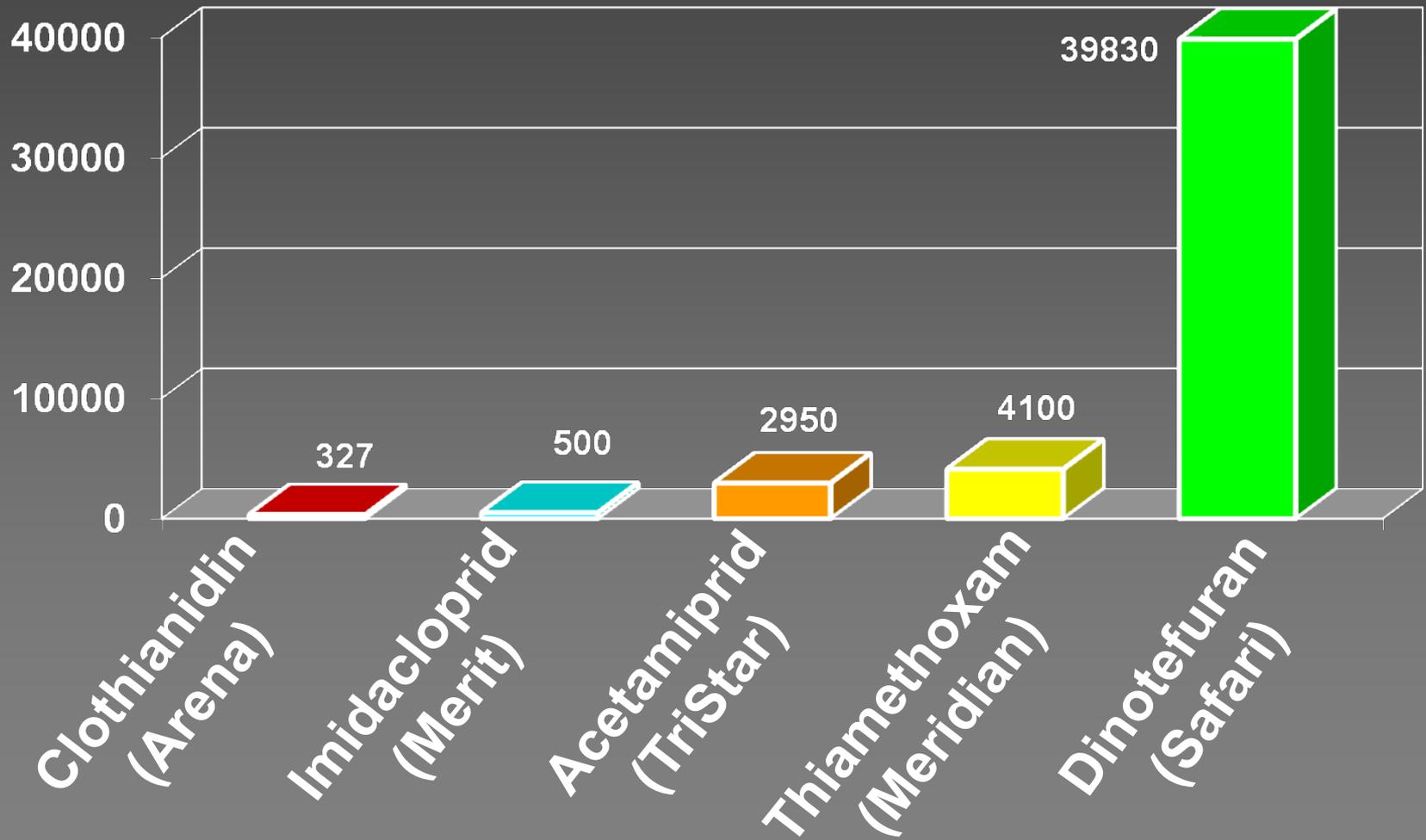
Active Ingredient	Trade Names Professional Use	Trade Names Over-the-Counter
Acetamiprid	TriStar (no soil application)	
Clothianadin	Arena, Aloft*	
Dinotefuran	Safari	Green Light Tree & Shrub Insect Control with Safari
Imidacloprid	Merit, Marathon, Coretect, Discus*, Allectus*, several generic labels	Bayer Advanced Lawn Complete Insect Killer; Bayer Advanced Tree & Shrub Insect Control ; Ortho Max
Thiamethoxam	Flagship, Meridian	

* Contains a Neonicotinoid and a pyrethroid

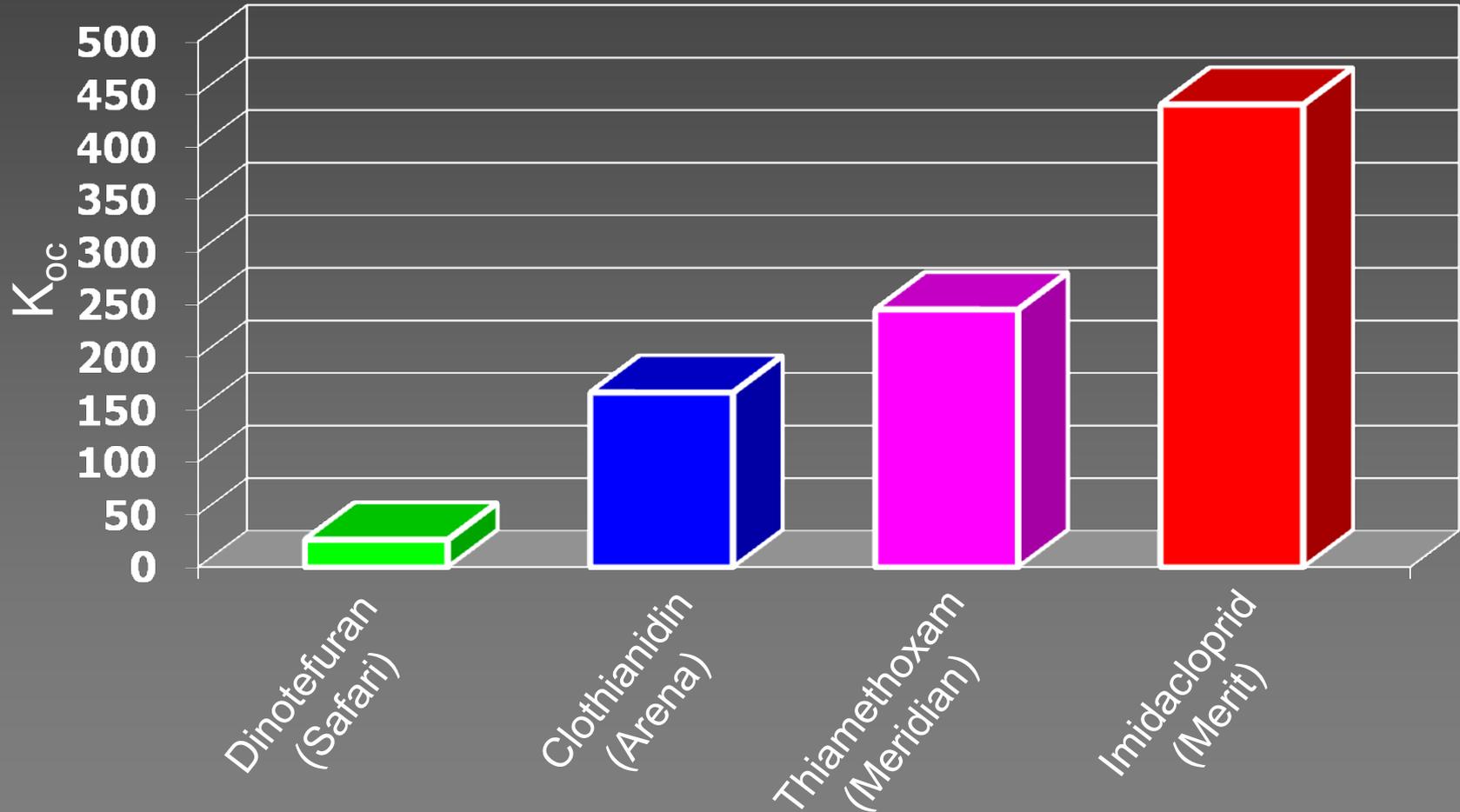
UV Stability of Neonicotinoids



Relative Water Solubility of Neonicotinoids

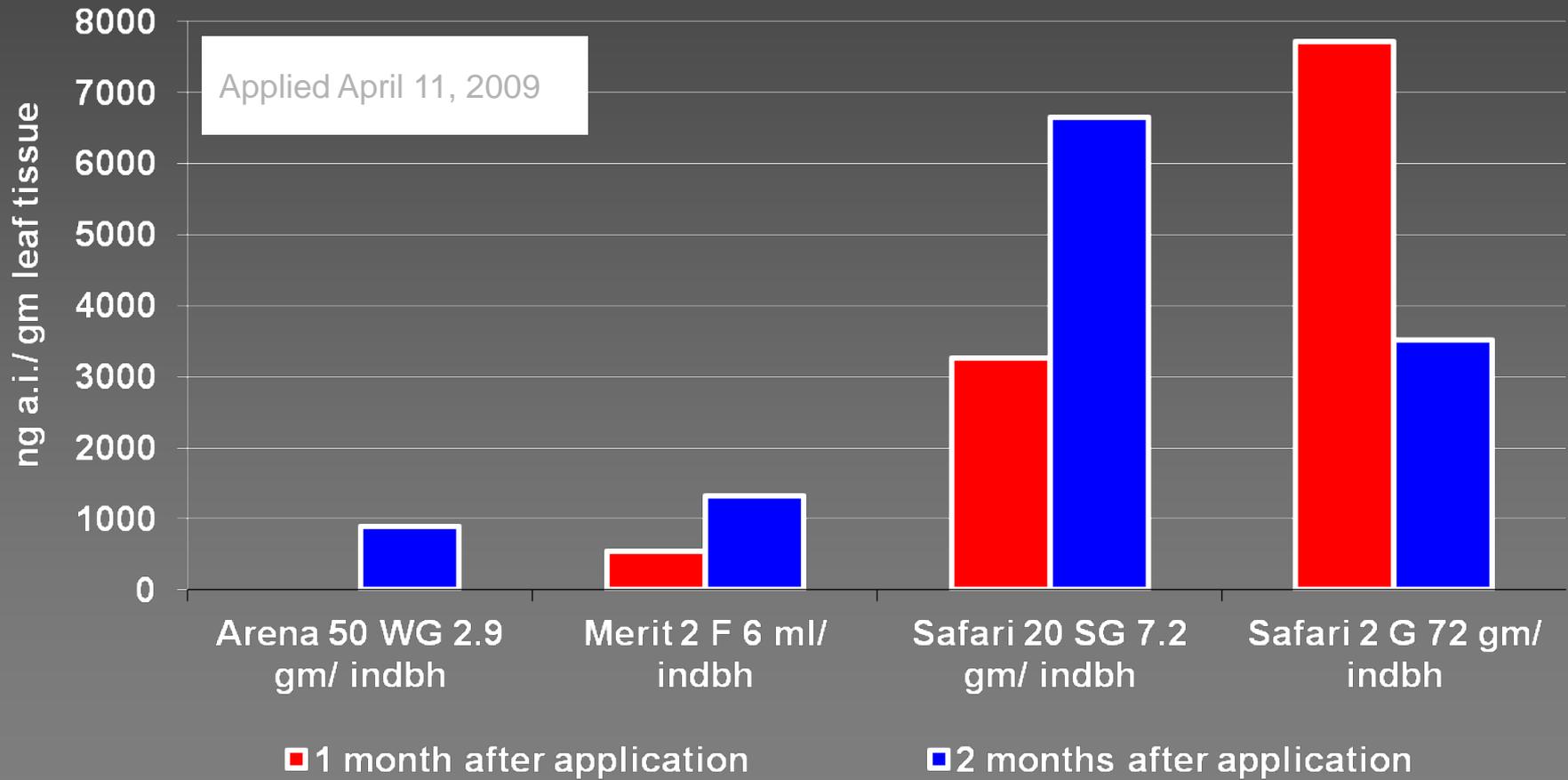


Soil Binding Potential (K_{oc})

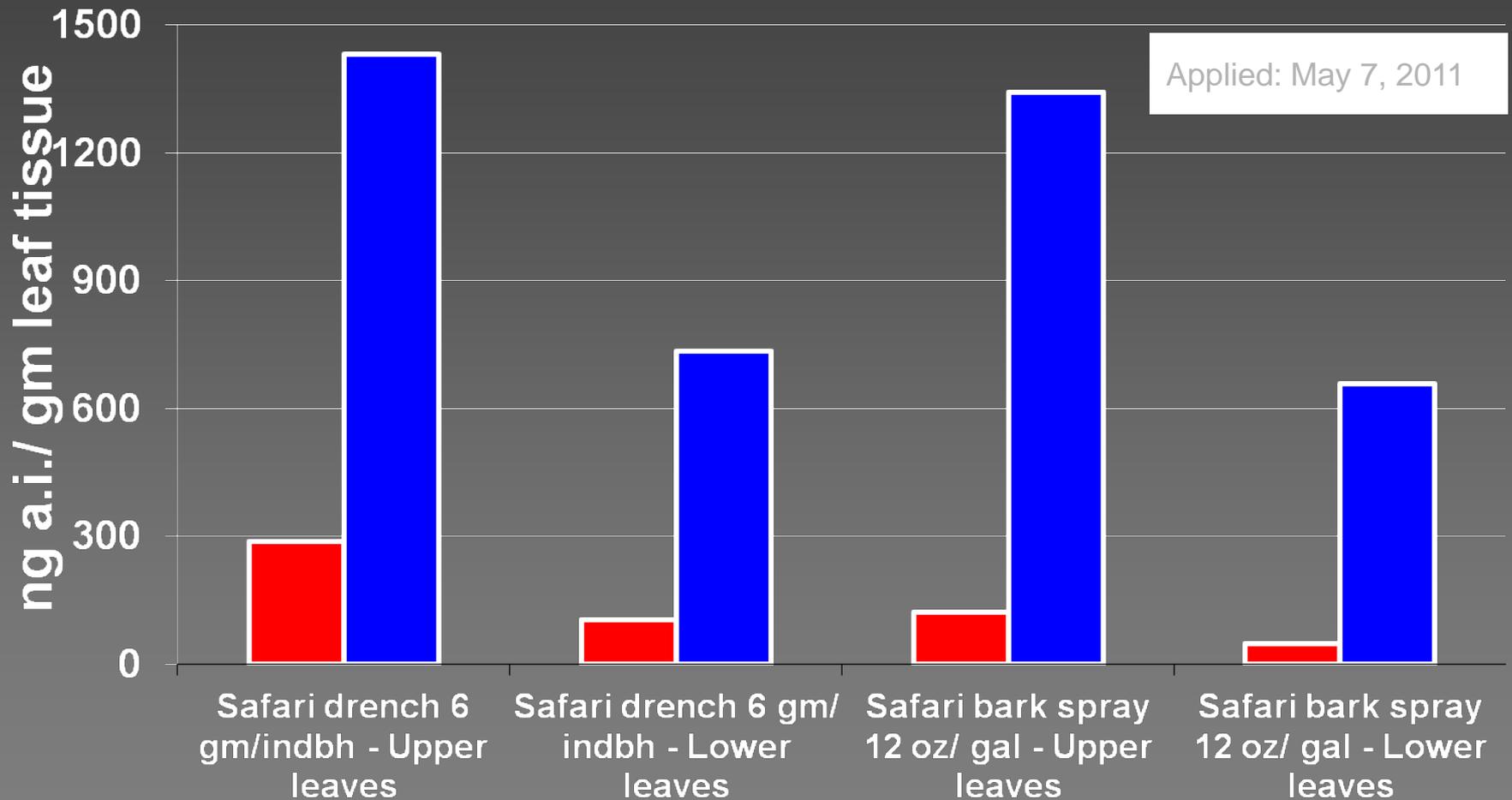


Neonicotinoid Uptake

Royal Palm (25-30 ft) – Soil Application

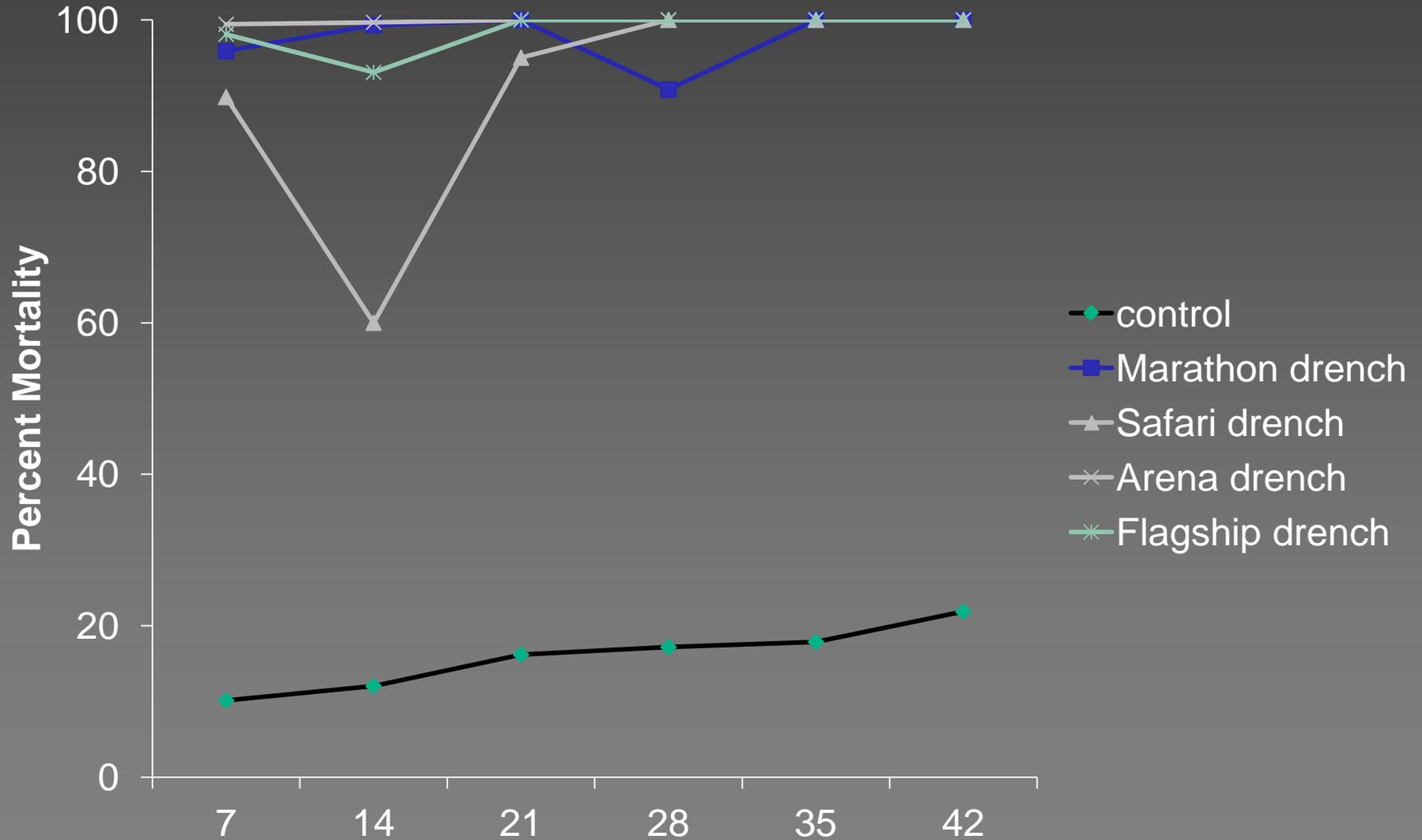


Safari Uptake into Foliage Mexican Fan Palm (13" dbh)

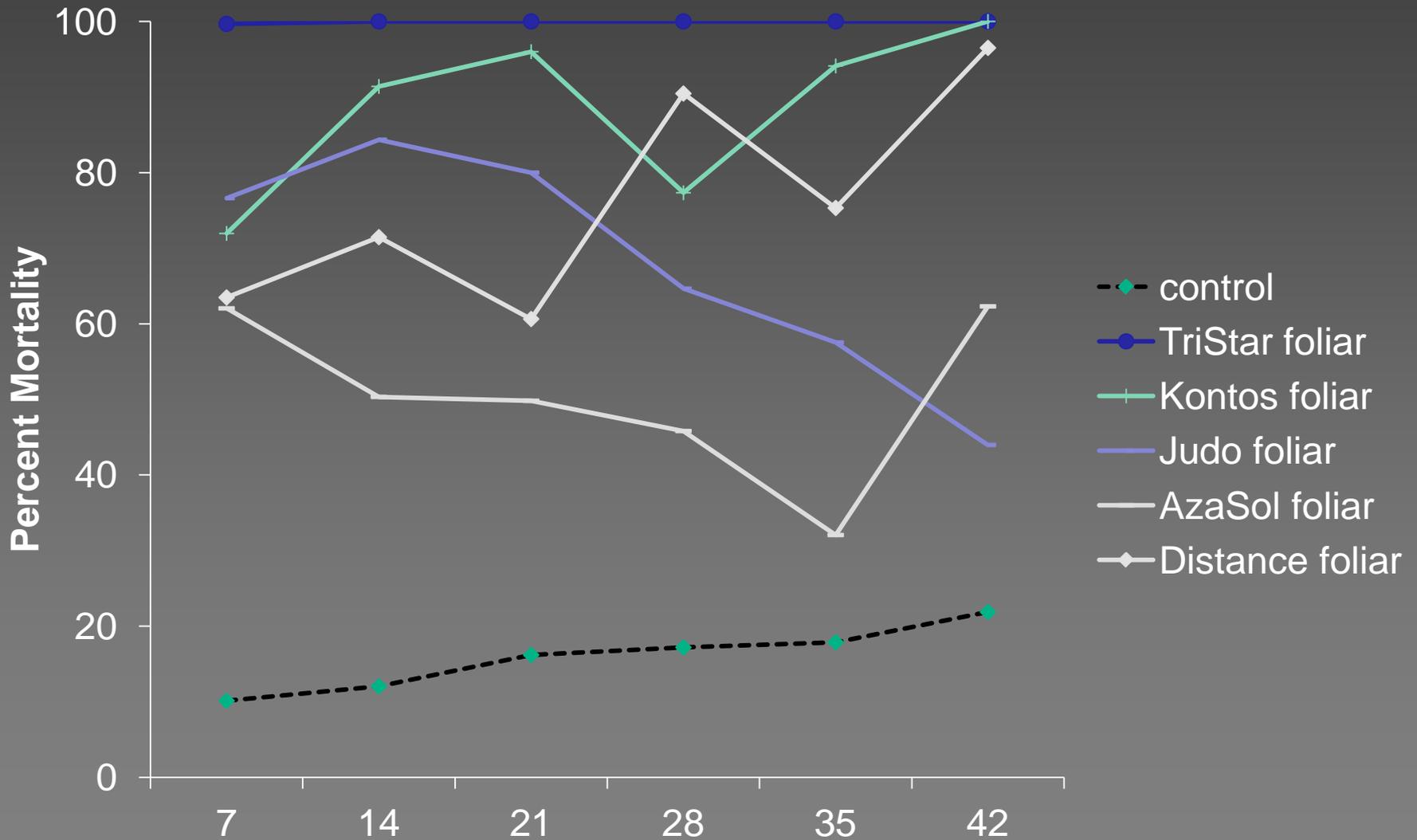


■ 14 days after application ■ 28 days after application

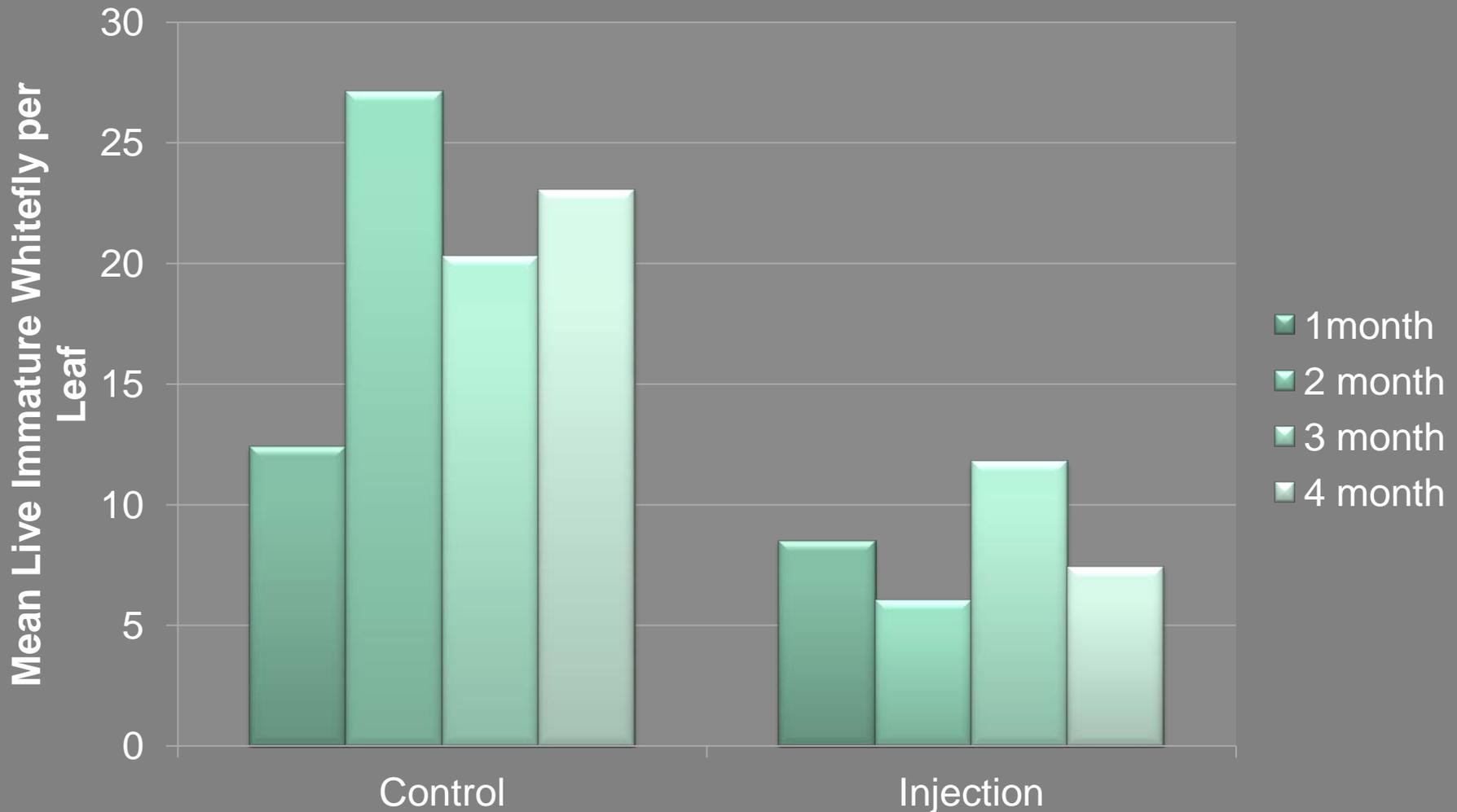
Drench Application Neonicotinoids



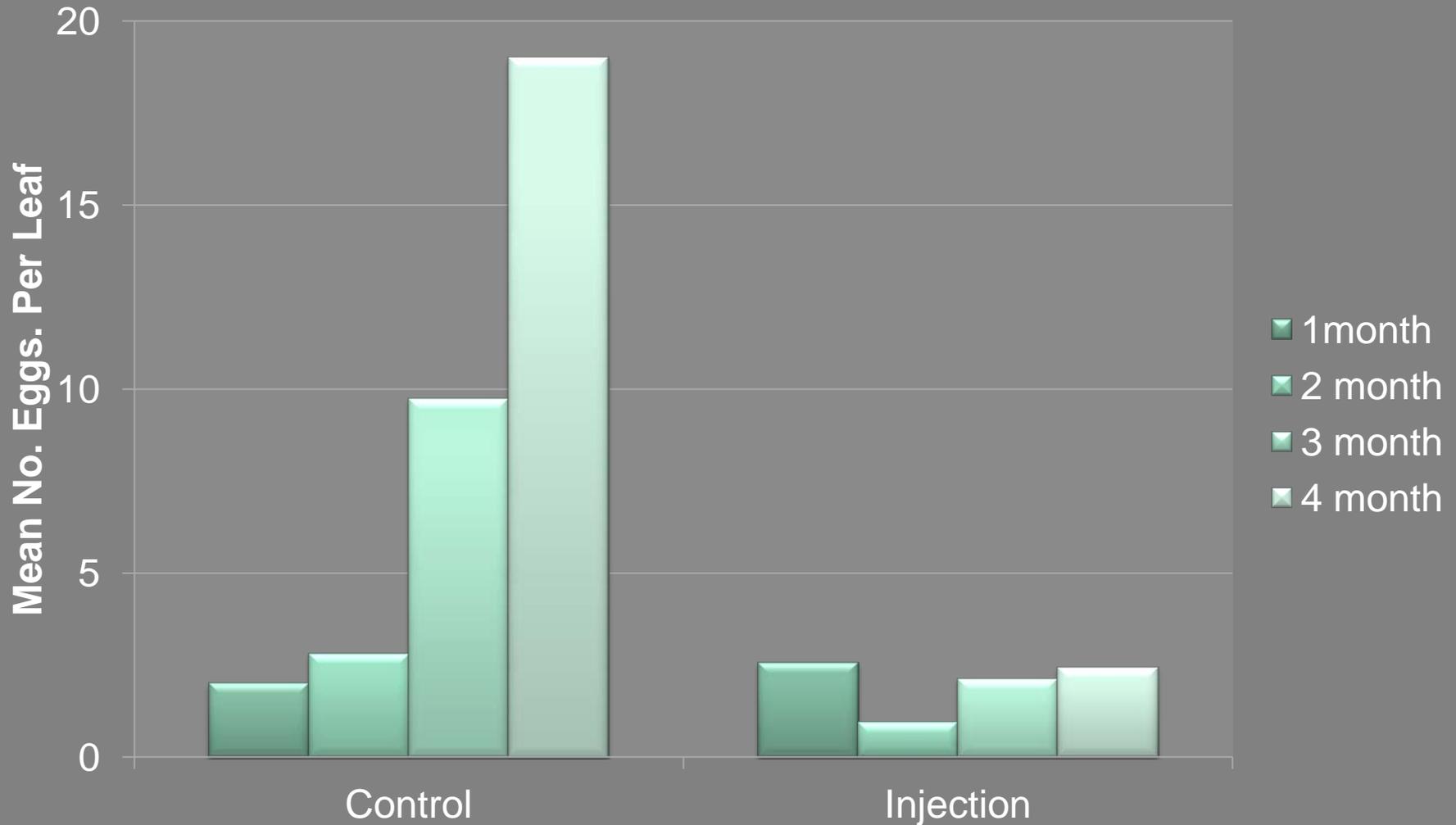
Foliar Application



Rugose Spiraling Whitefly



Rugose Spiraling Whitefly



Management Options

Foliar Insecticide Application

- Whitefly should be present
- Foliar insecticides may provide quick control, most will not provide long-term control.
- Some foliar insecticides (i.e. pyrethroids) may disrupt the natural enemies and should be used very selectively.
- It is not recommended to use the same insecticide on both the foliage and in the soil

Insecticide Selection

Foliar Application

Professional Use (Landscape and Nursery)

Abamectin (Avid)

Acetamiprid (TriStar)

Azadirachtin (Azatin XL)

Bifenthrin (Talstar)

Buprofezin, (Talus)

Clothianidin (Arena)

Endosulfan (Endosulfan;
Thiodan)

Flonicamid (Aria)

Horticultural oil

Imidacloprid (Merit,
Marathon, Discus, Allectus)

Pymetrozine (Endeavor)

Pyriproxyfen (Distance)

Spiromesifen (Judo)

Beauveria bassiana
(BotaniGard)

Foliar Insecticides for Homeowner Use

Trade Name(s)	Active Ingredient
Flower, Fruit & Vegetable Insect Killer (Ortho)	Acetamiprid
Bug-B-Gon Max Lawn & Garden Insect Killer (Ortho)	Bifenthrin
Rose & Flower Insect Killer (Bayer Advanced); Lawn & Garden Insect Killer (Schultz)	Cyfluthrin
Triazicide Once & Done Insect Killer (Spectracide)	Lambda-cyhalothrin
Indoor/Outdoor Broad Use Insecticide (Hi-Yield)	Permethrin
Yard & Garden Insect Killer (Bonide); Rose & Flower Insect Spray (Spectracide)	Pyrethrin

Complications in Management

- Insect reproduces quickly; populations can build rapidly
- Large host range
- Excessive wax can impede good coverage/contact of insecticides
- Drought conditions have affected the activity of the systemic insecticides (particularly imidacloprid)
- Local impact is great but national concern is limited which means less resources

Methods of Application for Neonicotinoids

- There are numerous options on how to apply the neonicotinoids;
- Take advantage of the different methods
- Take advantage of the different formulations
- Fit the method of application for the site
- The site and method needs to be on the label

Specific Management Tips

Rugose Spiraling Whitefly

- Scout – spiraling eggs on undersides of leaves; easy to see



Specific Management Tips

Rugose Spiraling Whitefly

- Foliar insecticides – contact may be difficult due to heavy wax production



- Soil or trunk insecticides – use for heavily infested trees; can use for nearby plants or if eggs are present

Specific Management Tips

Rugose Spiraling Whitefly

- Whatever control method you use, there will be impact on natural enemies
- Insecticide use
 - Use appropriate insecticides and methods of application
- **DO EVERYTHING POSSIBLE TO CONSERVE NATURAL ENEMIES**
 - Necessary for long term control

Remember - the below symptoms do not stop or go away immediately even if you are controlling the pest



Leaf drop



Sooty mold



White, waxy flock

Do not apply additional insecticide unless you are sure it is necessary

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