Common Pests: "Green" Solutions

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http://www.dracaena.com/ http://www.evergrowing.com/

Topics to be Covered

*Survey of interior plants at resorts *Major pests of interior plants *Control Strategies – Preventative vs Remedial ***Green Solutions** -Cultural Control = sanitation -Physical = pressure wash and heat treatment -Bio Control = natural enemies, microbes -Natural/Softer Products = boric acid, diatomaceous earth, kaolin clay, neem, pyrethrins, oils, soaps *Conclusions

SURVEY FOR PESTS OF INTERIOR PLANTS

- * Visited 5 major resort hotels in West Hawaii in one day (September 14, 1995).
- * Observed interior plants for insects.



Hilton Waikoloa Ponytail palm, Beaucarnea recurvata



Ponytail Palm heavily infested with mealybugs



Hapuna Prince



Hapuna Prince Armored Scales



Ritz Carlton Ixora with whiteflies.



Royal Waikoloan



Royal Waikoloan Spider mites on Beach Naupaka

Survey for Pests of Interior Plantscape

	Mealybugs	Armored	Whiteflies	Soft Scales	Spider
		Scales			Mites
Hotel 1	No	No	No	No	Yes
Hotel 2	Yes	Yes	Yes	No	No
Hotel 3	Yes	Yes	Yes	Yes	No
Hotel 4	Yes	No	Yes	No	No
Hotel 5	Yes	Yes	No	No	No

Observed on September 14, 1995

Pests of Interior Plantscape

Mealybugs
Armored Scales
Whiteflies
Soft Scales



Kahului Airport Lobby June 02, 2011

Interior landscape plants infested with mealybugs [probably longtailed mealybug,, infesting interior green ti leaf plants.



Strategies for Interior Pest Management

Preventative Before installing plants. Plants not infested.

Remedial

After installing plants Plants infested.

Remedial "Green" Controls

 *Cultural Control – Early detection and removal of infested plant or parts
 *Physical Control – pressure wash, hot water
 *Biological Control – release of parasitic wasps, predators, pathogens (fungus, bacterium, virus, nematodes)
 *Netural/Softer Products – bario goid, distance output

*Natural/Softer Products – boric acid, diatomaceous earth, kaolin clay, neem, pyrethrins, soaps, oils

All insects have a hard, waxy, oily exoskeleton (outside skeleton).





Physical Control Pressure washing







HOT WATER TREATMENTS: NON-CHEMICAL CONTROL OF INVASIVE PESTS All photos by UH CTAHR unless

otherwise noted.

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Hot Water Controls Spider Mites >120 F for 10 min

Ti leaves

Sexy pink heliconia

PREVENTS ABSCISSION



7 days after hot water treatment



Portable Hot Water Sprayer



Spraying hot water 115 F at nozzle against coqui frogs & other quarantine pests.

Tankless Water Heater



Water at 115 F at Nozzle tip.



Green Solution!

Hot Water Drench for Reniform Nematode 122 °F for 10 min



Root-Infesting Quarantine Pests Are Controlled By Hot Water

with continuous drenching of potted plants at 122 °F for 10 min



Burrowing nematode

Ensign scale insect



Root Knot Nematode







Hot Water and IBA Treatments on Dracaena Bush Tip Cuttings

Untreated

Hot Water Dip





Untreated Hot Water + IBA Dip





Hot water is not detrimental to root growth; treat cuttings from field stock infested with thrips, banana moth, mealybugs, scales, etc. before propagating them in your nursery

Treating Propagative Materials with Hot Water & Rooting Hormone

(49° C for 10 min + 0.8% indole butyric acid (IBA) rooting powder)

Number of roots

	Hot water + IBA	IBA only
Massangeana	8.3	3.3
Gardenia	118.3	15.6
Plumeria	12.4	3.2
'Janet Craig'	2.2	1.1





Biological Control in Hawaii



- *Hawaii's government has been practicing classical biological control by purposely introducing and releasing natural enemies, for over a 100 yrs.
- *Early attempts to control pests (rats & armyworms) through the introduction of animals (mongoose & mynah bird) into Hawaii were made by private citizens in 1865.
- *In 1890, 25 years later, procedures of biological control were regulated and supported by the Hawaiian government.
- *Of the 243 natural enemies purposely introduced (1890-1985), 86.4% have been recorded to prey on or attack about 200 pest species.
- *No purposely introduced species, approved for release in the past 35 years, has attacked any native or other desirable species.

Funasaki et al. 1988

Plumeria at Keahole Ag Park (09/2010)



Immature Lady Beetlo



Adult Lady Beetle

No natural enemies present

Biological Control of Mealybugs

Mealybug destroyer





Live Biological Control Agents for Sale in Mainland U.S.



- *Importation and sale in Hawaii require Hawaii Dept. of Ag permit and approval because of possible contamination of the host pest, or hyperparasites.
- *Most of these parasitic wasps & predators already occur naturally in HI.
- *Capture these biocontrol agents that naturally occurs in HI and release into interiorscapes without natural enemies of pests.

Biological or Microbial Insecticide

Bacteria - Bacillus thuringiensis – caterpillars B.t. israelensis – mosquitoes, fungus gnats Fungi - Paecilomyces fumosoroseus – whiteflies, Preferal aphids, thrips, mealybugs Humidity is 80% or higher for 8 - 10 hours Temp is between 68° and 82° F

 Beauvaria bassiana – whiteflies, thrips, aphids BotaniGard coffee berry borer High humidity and free water enhance activity. Sunlight kills fungal spores.
 Nematodes - Steinernema carpocapsae – banana moth, Nematac borers (weevil), soil-High humidiy required. dwelling insects.

Oils

- *Horticultural oils (petroleum, vegetable & essential) are effective in controlling insects by suffocation.
- *Safe to the environment and nontarget organisms.
- *No development of resistance.
- *Major disadvantage like soap is plant injury.
- *Essential plant oils include cedar, lavender, citrus (citronella, lemon, orange) peppermint, eucalyptus, etc.
- *Neem oil works as an oil only as the oil fraction from the neem seed is free of the insect growth regulator & repellent, azaditrachtin (Azatin).
- *Limonene, refined from citrus oil is thought to be a nerve poison causing excessive motor nerve activity.

Horticultural Oils against Spider Mites

"For spider mites, a low rate of horticultural oil, 0.5%, can be exceptionally effective and is compatible with predaceous mites. Nurseries that adopted the use of low dosage oil for managing mites, while at the same time avoiding use of acephate or pyrethroids, essentially saw their spider mite problems disappear."

Richard Cowles, Entomologist The Connecticut Agricultural Experiment Station July 20, 2013

Insecticidal Soaps and Detergents

- *Soaps and detergents destroy the oily & waxy
- exoskeleton of insects.
- *Broad-spectrum against most insects, causing them to drown in water.
- *Major disadvantage is injury to plant tissue, especially at rates higher than 1-2%.
- *Do not apply under hot conditions (>90 °F).
- *Soaps and detergents act strictly as contact insecticides, with no residual effect. To be effective, sprays must be applied directly to and thoroughly cover the insect.
- *Certain brands of hand soaps and liquid dishwashing detergents can be effective for this purpose.
- *Dry (powder) dish soaps and all clothes-washing detergents are too harsh to be used on plants. (W. S. Cranshaw, Colorado State)



Boric Acid is a weak acid of boron used for control of cockroaches, ants and other insects by acting as a stomach poison, and the dry power is abrasive to the insect's exoskeleton?

Diatomaceous Earth is a soft, silica rock crumbled into a powder and used as an insecticide, due to its abrasive and absorptive properties. The fine powder absorbs oils from insects' exoskeleton, causing them to dehydrate.

Kaolin Clay is a clay mineral used in organic farming, as a spray applied to crops to deter insect damage, and in the case of apples, to prevent sun scald. Commercial product: Surround WP

Kaolin Clay Crop Protectant White residue may be washed or brushed off prior to sale or installation in interior landscapes (Preventative)







Natural Pyrethrin Insecticide



*Pyrethrins are produced from seeds of chrysanthemum. *Pyrethrin is a repellent and a nerve poison to insects & coqui frog. *Non-persistent in the environment and biodegradable. *One of the safest insecticides pyrethrins are degraded by stomach acids in mammals. *Non-phytotoxic, unlike citric acid.



Pyrethrins + Hydrated Lime Strategy

Developed by HDOA



=pyrethrins

A hydrated lime that helps reduce soil acidity.

Satisfaction Guaranteed





Dead – no recovery

Conclusions

- *Green solutions are effective options for interor plants including natural enemies, hot water, oils, soaps, pyrethrins.
- *New green products are being produced by major agrochemical companies, including natural enemies and microbial control products.
- *All new insecticides developed by agrochemical companies will be considered reduced-risk with a movement to organically acceptable or green pest control products.

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