Pests of Roses in Hawaii

Identification and Control Strategies

Honolulu Rose Society

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There are 45 total slides.
Click on “Outline” to close left pane.
Use navigational buttons at the bottom of the slide
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Click on “Slide Show” at bottom right, then click on each slide to advance or right-click mouse to back up to previous slide or close slide show.

Topics to Be Covered

- Basic Entomology
  - What is an insect? Why so many insect pests?
  - Major types of development
  - Types of mouthparts
- Some of Rose Pests and Control Strategies
  - Walking Stick
  - Chinese Rose Beetle
  - Roseslug
  - Aphids
  - Mealybugs
  - Scale Insects
  - Whiteflies
  - Thrips
  - Spider Mites

What is an Insect?

Head

Thorax

Abdomen

3 body regions

3 pairs of jointed legs

1 pair antennae or feelers

1 or 2 pairs of wings

*Hard exoskeleton requiring molting for growth.
*Open circulatory system (no blood vessels).
*Highly adaptable to the environment (land, water, air).
*Accounts for 90% of known animals w/ 10+ million species.

Two Major Types of Insect Development

I. Complete Metamorphosis

II. Gradual Metamorphosis

Complete Metamorphosis

Inside green onion

Beet armyworm

Insects with Complete Metamorphosis

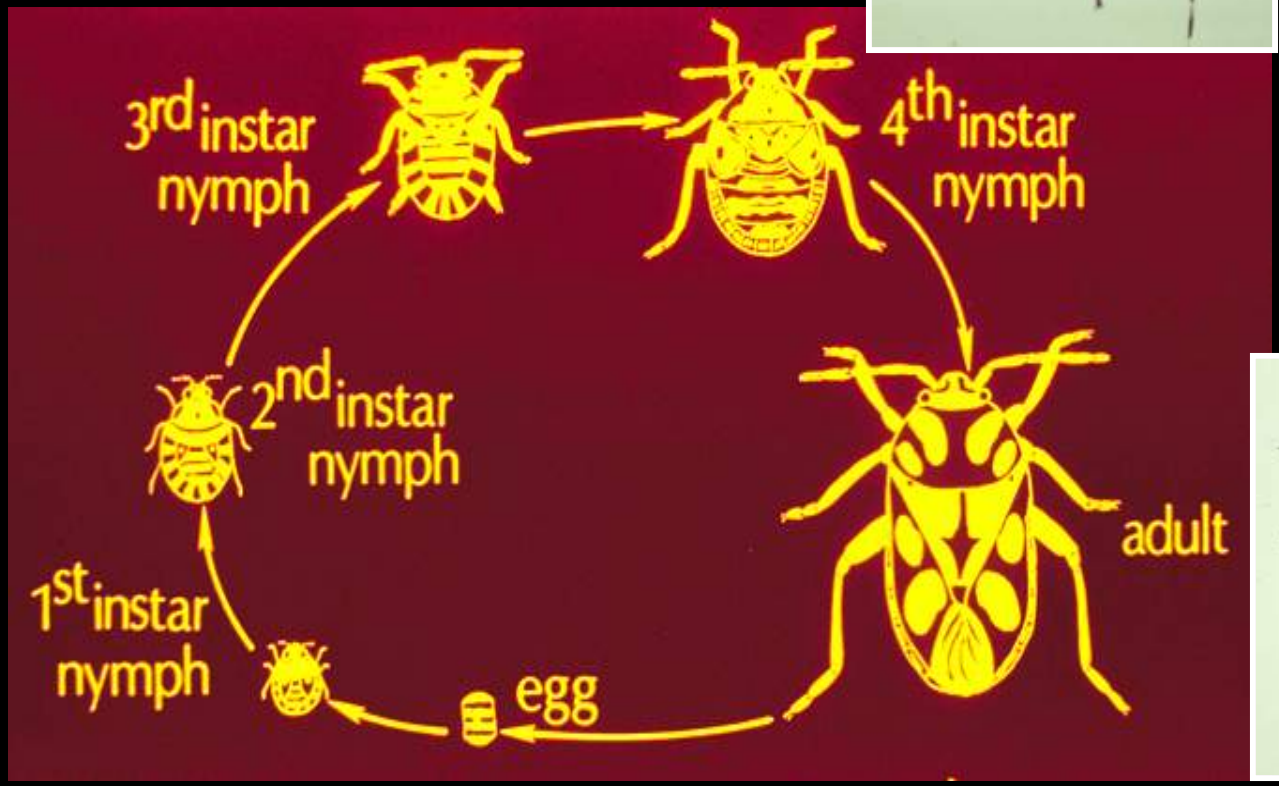
- Butterflies, Moths
- Flies
- Bees and Wasps
- Beetles

Complete Metamorphosis

Complete life cycle in as short as 9 days

Gradual Metamorphosis

Stink bug

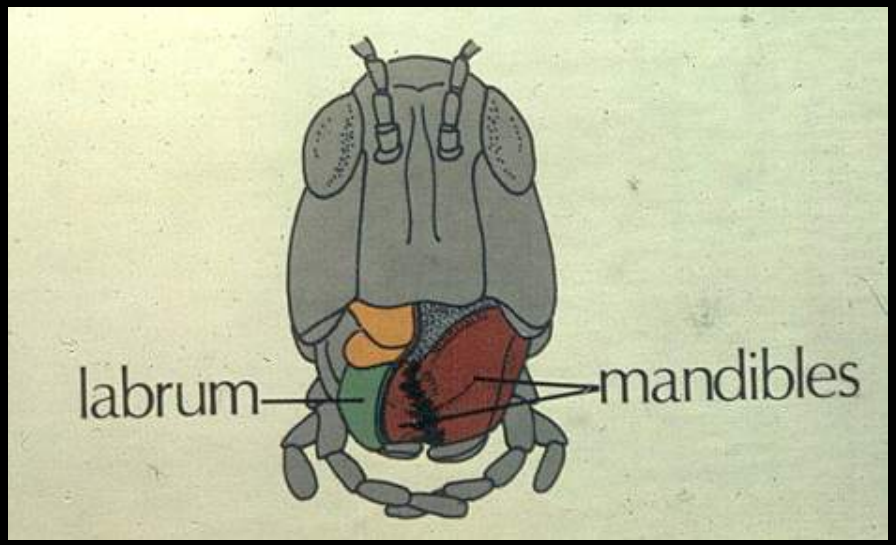


Insects with Gradual Metamorphosis

- Cockroaches, Grasshoppers, Crickets
- True Bugs (lacebugs, stinkbugs)
- Aphids, Mealybugs, Scales, Whiteflies

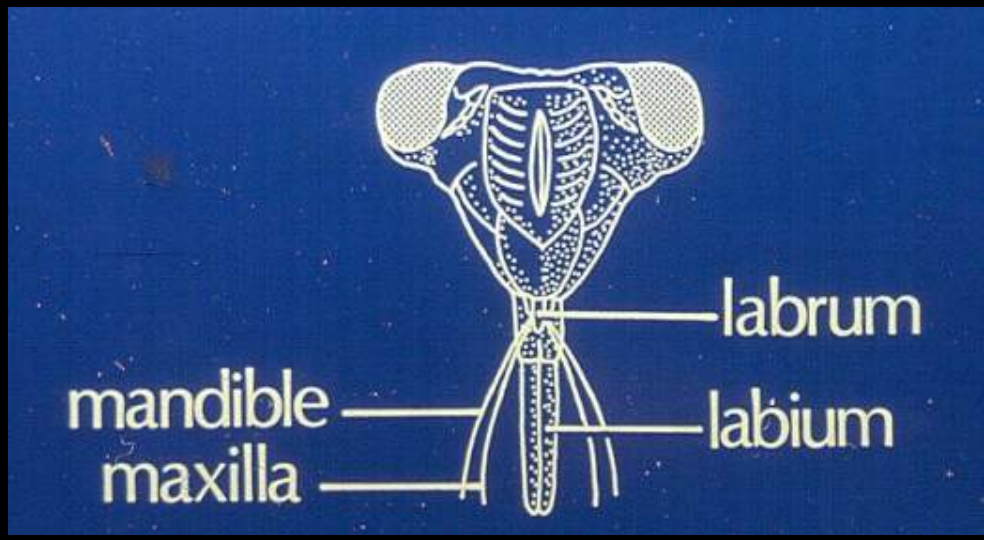
Two Major Types of Mouthparts

Chewing Mouthparts



Mandibles are like teeth for chewing.

Sucking Mouthparts



Mouthparts modified to function like an hypodermic needle for sucking plant juices or blood.

Examples of Insects with Chewing Mouthparts

Leaf-cutting Bee
(Megachile sp.)

http://www.honolulurosesociety.org/pests.html

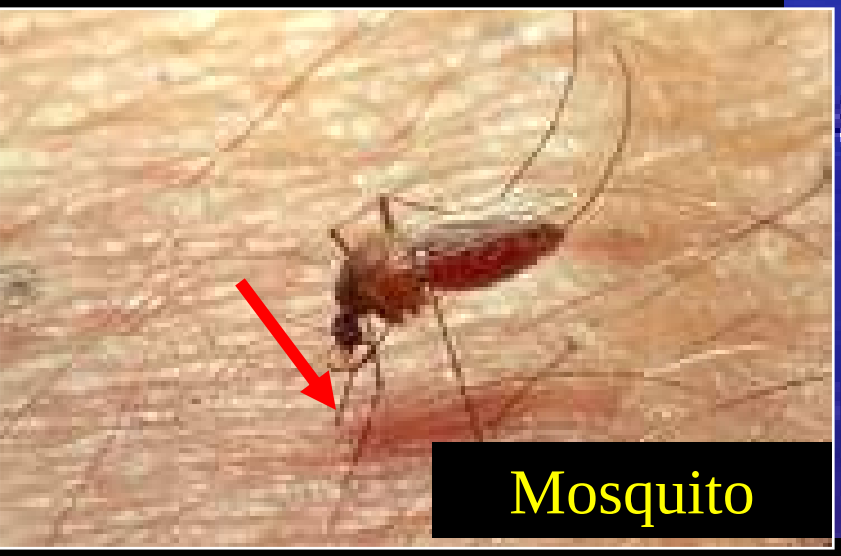
Chinese Rose Beetle

Walking stick

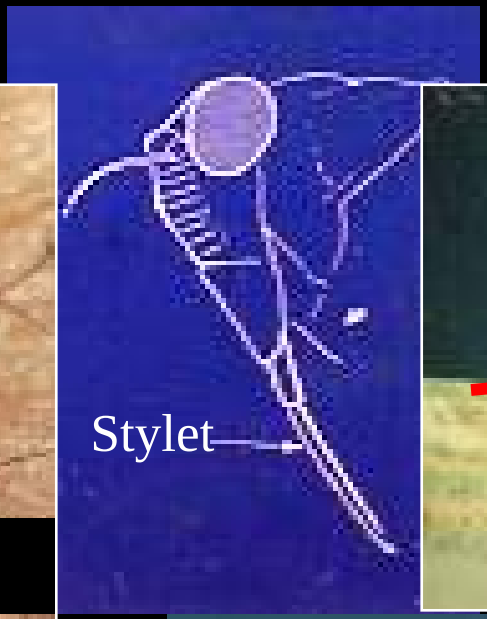
Katydid

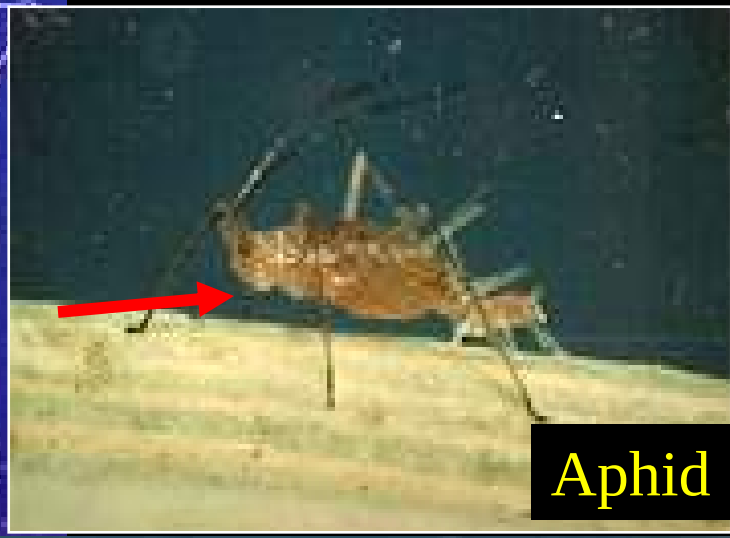
Fuller Rose Beetle

Examples of Insects with Sucking Mouthparts



Mosquito





Aphid

Stinkbug

Stink bug feeding damage to macadamia

Control Tactics

- **Cultural Control** - Sanitation by removal of plant parts or plant. Grow healthy plants. Stressed plants are more susceptible to pests.
- **Physical Control** - temperature, water.
- **Mechanical Control** - fly swatter, screening
- **Biological Control** - use of parasites, predators, or pathogens (fungus, bacteria, virus, nematode).
- **Biorational Control** - soaps, oil, insect growth regulators, softer/natural insecticides-neem, pyrethrins, rotenone.
- **Chemical Control** - Malathion, Diazinon, Dursban (OP) and Sevin (carbamate)

***Reduced-Risk Insecticides**: Insect Growth Regulators, neonicotinoids

Chinese Rose Beetle

Complete Metamorphosis

Chewing Mouthparts

Grubs

Pupa

Adult

Grubs do not attack live plant tissue, but preferably live in loose rich soil, leaf litter, or compost.

This beetle is nocturnal in habit. During the day they remain under leaf litter and emerge at dusk. Peak feeding and mating activity occurs about 30 minutes after sunset. It also prefers to feed on leaves with feeding or other types of damage, because these leaves release ethylene gas which serves as an attractant to beetles.

Non-Chemical Strategies for Chinese Rose Beetle

*Shadecloth surrounding plants will deter feeding.

*New transplants most susceptible to beetle.

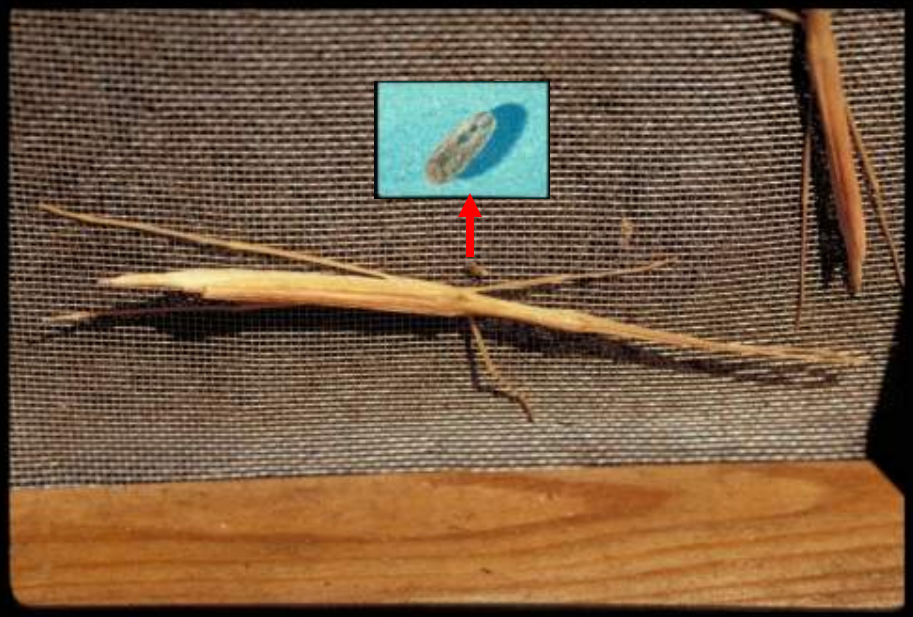
*Adult beetles are attracted to light and will deter feeding.

Screen Barrier

Plant under Street Light

Walking Stick, *Necrosia* sp. (Orthoptera: Heteronemiidae)

*First discovered in Hilo, Hawaii in 1994.
*Probably a South Pacific species.
*Walking sticks are nocturnal.
*Feeds on basil, strawberry, ti leaf, rose, ferns.
*Life cycle 5 to 9 months from 3 egg to adult.
*May be parthenogenesis (reproduction w/o males.



Bristly Roseslug, *Cladius difformis* (Panzer)

*First discovered on the Big Island in 1973 and has probably spread to other islands.
*Also known as sawflies, the larvae is not considered a caterpillar that develop to\ moths or butterflies, but the adult is a wasp-like.
*Bacillus thuringensis is not effective against rose slugs.
*Horticultural oil sprays is best for combatting rose slug (Pam Pierce SFGate.com).

Photos: Baldo Villegas

Aphids

Incomplete Metamorphosis
Sucking mouthparts

Orchid aphids

Banana aphids

http://www.honolulurosesociety.org/pests.html

Aphids on Roses

Aphid damage to day lily

Biology and Control of Aphids

*No male aphids occur in Hawai‘i.
*One aphid develops into an entire colony of aphids.
*Aphids transmit serious plant viruses, such as the papaya ring spot virus, banana bunchy top virus, and cucumber mosiac virus.
*Aphids easily develops resistance to insecticides.
*Aphids are under excellent biological control in HI by:

Exclusion of Aphids

Red ginger in wooven bags

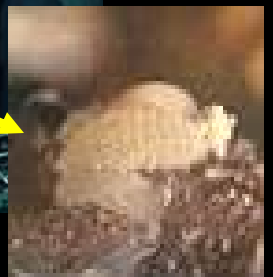
Papaya plants with plastic barrier

Papaya screen house in Taiwan

Mealybugs

Foliar

Root



Mealybugs

Life Cycle
(citrus mealybug)

Egg.....Hatch in 2 -10 days
Nymph.....17 - 44 days
Adult life span....90 days
Eggs per adult.....200 - 400 eggs
Egg to egg-laying adults.....20 - 44 days

Sooty Mold

Sooty mold is caused by a sweet substance called honeydew excreted by aphids, mealybugs, soft scales and whiteflies. Plants with sooty mold indicates severe infestations of one of the above insects.

Ecological Control Strategies

Ant Control

Ants feed on sweet honeydew excreted by aphids, mealybugs and soft scales. Ants nurture these pests by protecting them from predators and “cleaning house”. Controlling ants will reduce these pests.

Scale Insects

Armored

Rose scale.
Asiatic rose scale

Soft

Green scale

Cockerell scale

Asiatic rose scale, *Aulacaspis rosarum* Borchsenius

Hemiptera: Diaspididae (armored scales)

*Host specific to the plant family, Rosaceae, primarily *Rosa* spp.

*First recorded in Hawaii in 1895.

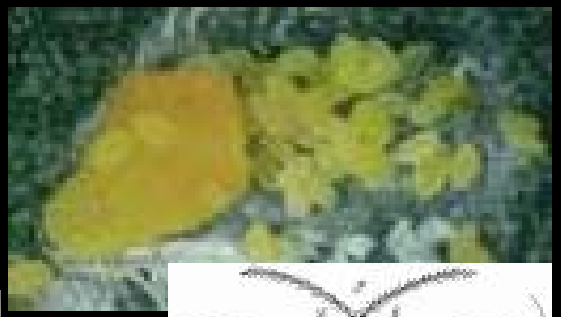
*Primary dispersal stage is the tiny crawler stage.

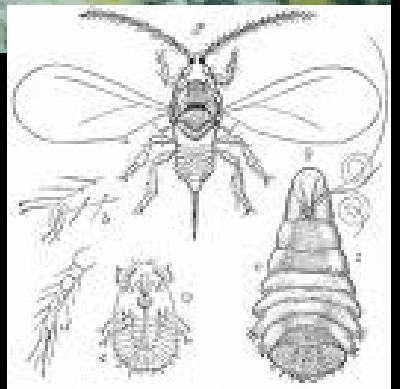
*Crawlers move to new areas of the plant or are dispersed by wind or animal contact. Mortality due to abiotic factors is high in this stage.

*Dispersal of sessile adults and eggs occurs through human transport of infested plant material.

*Each female of a related species lays 50-150 eggs.

*Based on a generalized life history of other tropical species, 30 days is the approximate time to complete the life cycle from egg to reproducing adult.





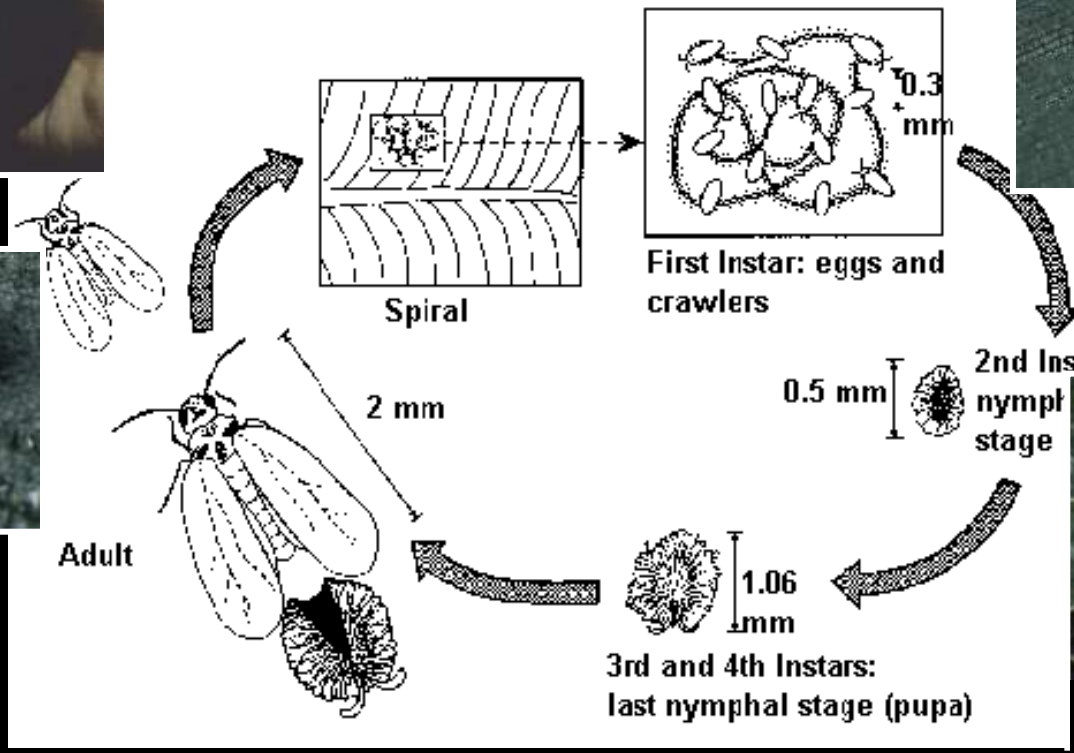
Whiteflies

*Major pests of vegetable and ornamental crops.

*Difficult to control chemically because of resistance to common insecticides and waxy secretions.

*Most species under excellent biological control.

Nymphal stage



Biological Control Strategies for Scales, mealybugs and whiteflies

Ladybug

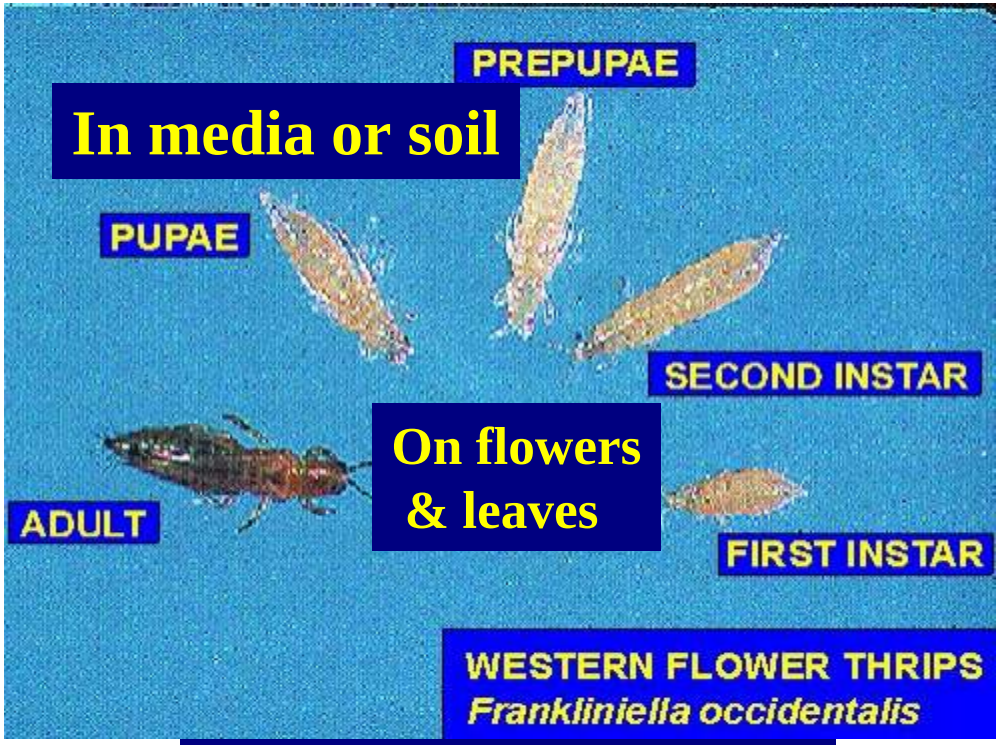
Fungal Diseases

Parasitic wasps

Thrips Damage on Rose Bud

Species of Thrips on Roses in Hawaii
*Hawaiian Flower Thrips
*Western Flower Thrips

Life Cycle of Thrips



Stages of Thrips

Control Strategies for Thrips

*Serious pest species of thrips in Hawaii include banana rust thrips, western flower thrips and melon thrips.

*Thrips are difficult to control because of their cryptic behavior, and are not susceptible to most contact insecticides.

*Control strategy should also target the pupal stage which occurs in the soil (insecticide, ground cover, etc.).

*Effective biological control agents, include anthocorid pirate bugs and predacious mites.

*For monitoring, thrips are more attracted to blue sticky cards than yellow sticky cards.

Pirate bugs prey on thrips
Heteroptera: Anthocoridae Orius sp.

Spider Mites on Roses

Mites on Roses	Egg to Adult	Eggs/female	Webbing
Spider Mite (elliptical)	7-10 Days	100-200	Yes

Natural Enemies of Spider Mites

Phytoseiid mites

Chemical Control of the Chinese Rose Beetle

*Sevin will control adult beetles, but residual activity is short lived.

*Neem products (azadirachtin) will deter feeding.

*A new systemic insecticide, Imidacloprid (Bayer Advanced, Merit, Marathon, Admire, Provado) will systemically control Chinese rose beetle.

Generic Name vs. Brand Name

Acetaminophen = Tylenol

Imidacloprid = Bayer Advanced, Merit, Marathon

Imidacloprid against Chinese Rose Beetle

Dying Chinese rose beetle after feeding on rose plant drenched with imidacloprid (Bayer Advanced) about 2 weeks earlier.

New growth with no beetle damage

Homeowner Formulations of Imidacloprid with fungicide

701262A

701260B

PASADENA TOURNAMENT of ROSES
EXCLUSIVE Rose Care Products

AMERICAN ROSE SOCIETY TESTED & ENDORSED

All-In-One Rose & Flower Care

3 systemic products in one

1) Insect control
2) Disease control
3) Fertilizer

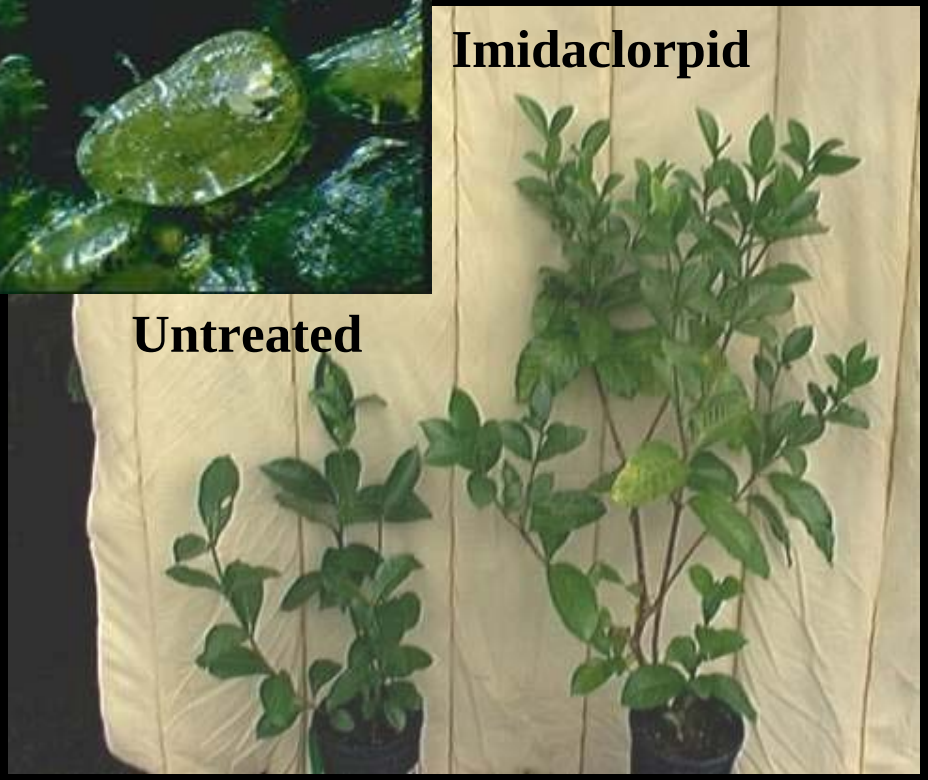
- Systemic rainproof protection lasts up to 6 weeks
- No spraying – just measure, mix & pour around plant base
- Prevents Japanese Beetle damage
- Actives: 0.15% Imidacloprid, 0.80% Tebuconazole; Analysis: 9-14-9

Imidacloprid (Bayer Advance) is highly effective against aphids, Chinese rose beetle, azalea lacebug, soft scales & whiteflies. Moderately effective against mealybugs.

Green scale,
Coccus viridis

Applied as a drench, by 21 DAT >90% mortality of green scales observed on gardenia plants. Control lasted for approximately one year.

Growth difference of gardenia due to control of green scale.



2-In-1 Insect Control Plus Fertilizer Plant Spikes

Protects and feeds up to 8 weeks without spraying

- 2-in-1 formula kills insects while feeding your plants
- For indoor and outdoor potted plants
- Active: 2.5% Imidacloprid; Analysis: 8-11-5 slow release fertilizer

10 Spikes	701710A	Treats ten 5" potted plants

1. Load spike into applicator

2. Push loaded applicator tip into soil

3. Release and water in

701710A

Dual Action Rose & Flower Insect Killer

Lasts up to 3X longer than competitive products[2]

- Kills insects on contact PLUS protects against listed pests up to 30 days
- Controls Aphids, Japanese Beetles (adult), Leafminers, Rose Midge Whiteflies, and others
- Rainproof 1 hour after application
- Perfect for indoor houseplants
- Actives: 0.0015% β-Cyfluthrin, 0.012% Imidacloprid

24 oz. Bottle	Ready-To-Use	5025708

5025708

[1]YTD POS May 2008 vs. 2007 [2]Based on product label comparisons

Spinosad Insecticide

Commercial Products:

*Conserve - Ornamentals

*Entrust – Organic certified crops

Unique features:

- Organic active ingredient, produced by fermentation
- New chemistry for insect control
- B.t. replacement, more effective pest control
- Can be used on vegetable & fruit crops, ornamentals, and turf.
- Controls caterpillars as well as beetles?, leafminers, thrips and more!

What are Insect Growth Regulators (IGR)?

*Interfer with the molting process of insects

*Molting process is regulated by two hormones:

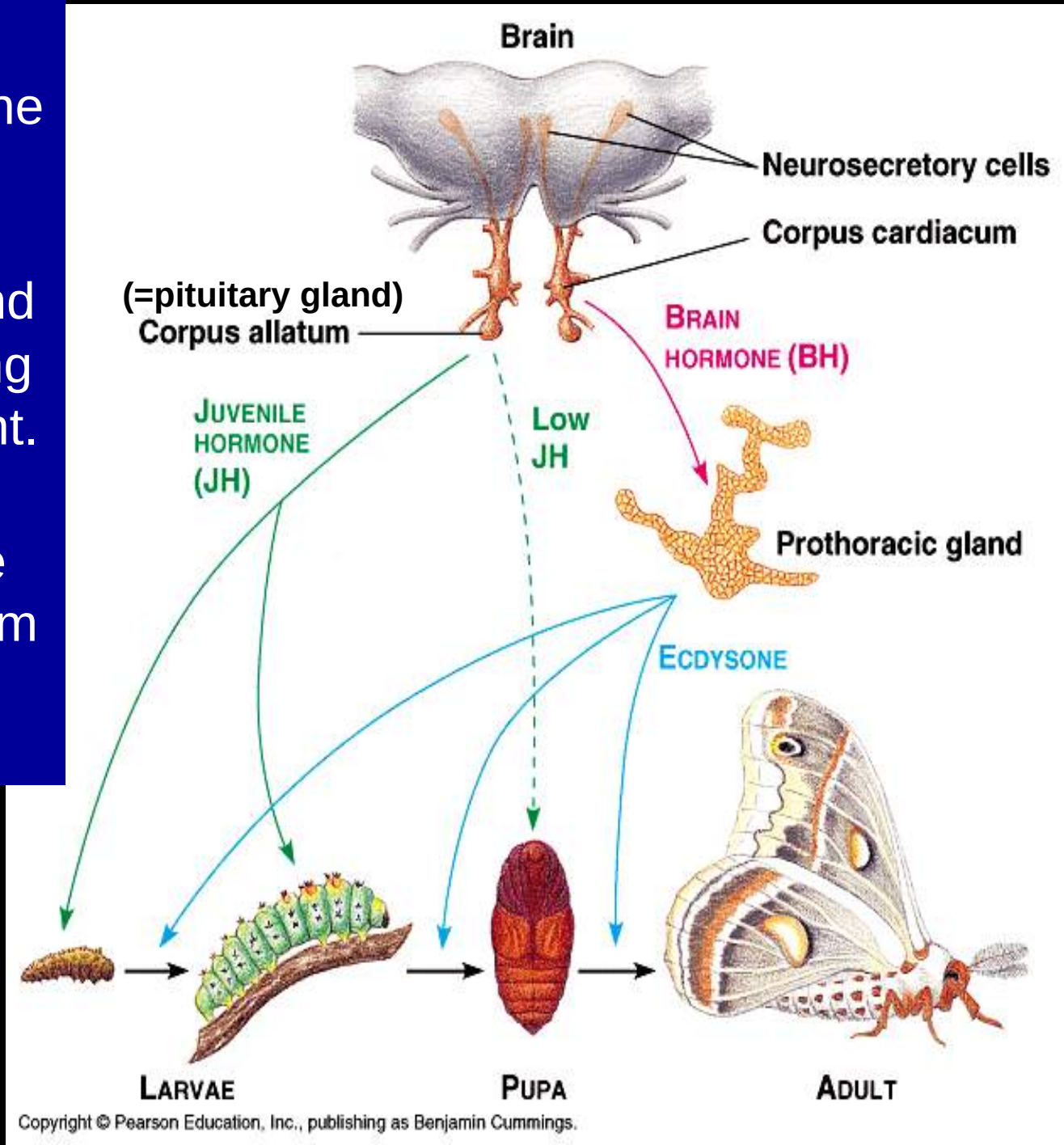
1. Juvenile Hormone
2. Ecdysone

- **Chitin** is the main constituent of the shell of insects & contributes to strength and protection to the insect.
- Insects like crabs and lobsters must shed (molt) their chitinous shells or exoskeleton in order to grow.

*Levels of juvenile hormone & ecdysone regulate insect development.

*IGRs mimics JH and ecdysone preventing normal development.

*IGRs are very safe to humans because our hormonal system is very different from insects.



Distance® Insect Growth Regulator

(JH mimic)

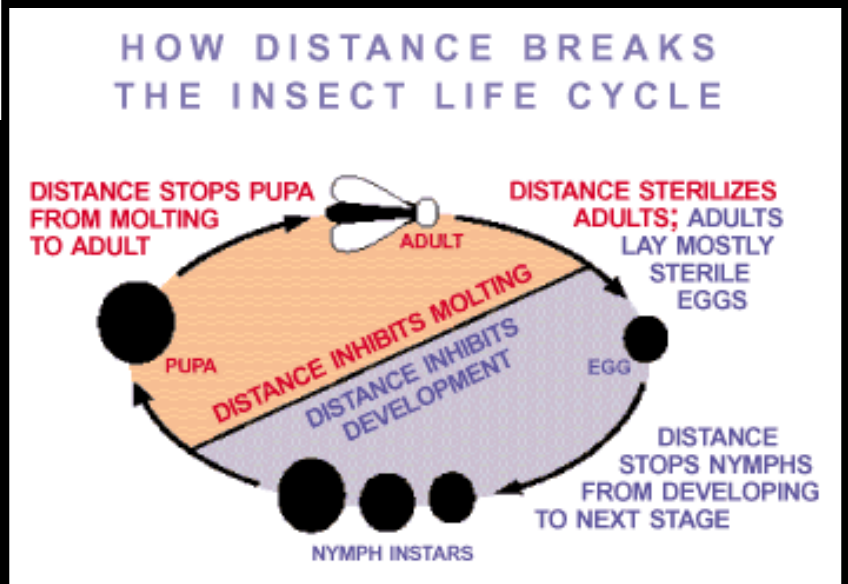
*Good control of whiteflies and armored scales.

*Also control fungus gnats,shore flies and suppresses aphids and mealybugs.

*Directly inhibits egg and larval development, and adult reproduction.

*Exhibits translaminar movement in plant leaves, providing insect control on the underside of leaves as well as the top.

$230.00/quart
Should be effective against the Asiatic Rose Scale



Distance (pyriproxyfen) against Spiraling Whitefly, *Aleurodicus dispersus*
27 Days After Treatment

Untreated

Treated

8 oz/100 gallons = 0.4 oz/5 gallons; $230.00/quart
$2.88 per 5 gallons of finished spray

Buprofezin

Insect growth regulator

Talus = ornamentals, Sepro

Applaud = food crops, Nichino

Should be effective against the Asiatic Rose Scale.

*Inhibits chitin synthesis which interrupts molting, suppresses oviposition & reduces egg viability.

*High level of activity against most homopteran insect pests including whiteflies, mealybugs, soft scales, armored scales, leafhoppers and planthoppers.

*Vapor activity allows buprofezin to reach the undersides of leaves and new growth.

Whiteflies	Mealybugs	Soft Scales	Armored Scales
Silverleaf	Longtailed	Black	Coconut
Greenhouse	Citrus	Brown	Cockerell
Sweet potato	Mexican	Hemispherical	Fern
Ash	Obscure	Wax	Boisduval
	Comstock	Tessellated	White peach
			Cycad
			Rose Scale

Talus 40 SC $158.00/quart

21.5 fl. oz/100 gallons for scale insects

$1.06 per gallon of finished spray

Summary of Pest Control Strategies

- **Cultural Control** - Sanitation by removal of plant parts or plant. Grow healthy plants. Stressed plants are more susceptible to pests.
- **Physical Control** - temperature, water.
- **Mechanical Control** - fly swatter, screening
- **Biological Control** - use of parasites, predators, or pathogens (fungus, bacteria, virus, nematode).
- **Biorational Control** - soaps, oil, insect growth regulators, softer/natural insecticides-neem, pyrethrins, rotenone.
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➢ **Reduced-Risk Insecticides**: Insect Growth Regulators, neonicotinoids

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