Biological Control

Authors:

Palm Beach Whitefly Task Force

RESEARCH SUPPORTED BY:

Floriculture & Nursery Research Initiative

American Floral Endowment
Funding Industry Solutions Through Research and Education

National Foliage Foundation Inc.

Driving Forces for Adopting Alternatives?

Regulations
Urbanization
Safety

100% Reliance on Pesticides =

RESISTANCE

Whiteflies Known to Develop Resistance!!

Silverleaf Whitefly

Whiteflies Known to Develop Resistance!! Silverleaf Whitefly

Biological Control

WHY?

Definition:

"Biological control is the use of parasitoid, predator, pathogen, antagonist, or competitor populations to suppress a pest population, making the pest less abundant and less damaging than it would be in the absence of the biocontrol agent."

The Concept:

Biological control does not cause immediate reduction in target pest populations. It can take months to years.

The Concept:

Biological control may only achieve partial suppression of the target pest, as a residual pest population is necessary to maintain natural enemies.

Successful!

- Silverleaf Whitefly
- Giant Whitefly
- Citrus Blackfly
- Schefflera Whitefly
- Ash Whitefly
- More than 64 species in Florida.

(**New Species Represent 10% Increase**)

Natural Enemies-the " Whom "

- **Predator-** consumes more than one prey item during its development
  - Lady beetle
- **Parasitoid-** lives in / on body of one host eventually killing it
  - Parasitic fly or wasp
- **Entomopathogen-** disease causing organism
  - Nematode, bacterium, fungus, protozoan, virus

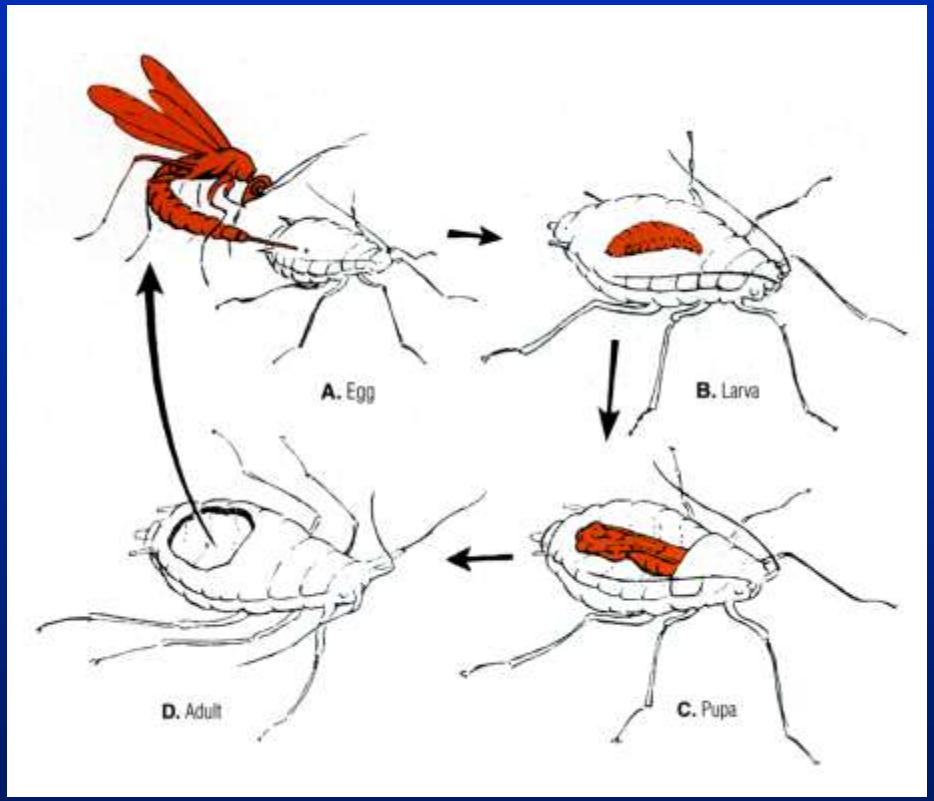
Biological Controls

Whiteflies

Parasites

Predators

Pathogens


A. Egg
B. Larva
C. Pupa
D. Adult

Accurate Identification of the Target Pest

Encarsia formosa
Greenhouse and Silverleaf Whiteflies (9)
New Whiteflies???

E. formosa
Greenhouse and Silverleaf Whiteflies

Encarsia sophia

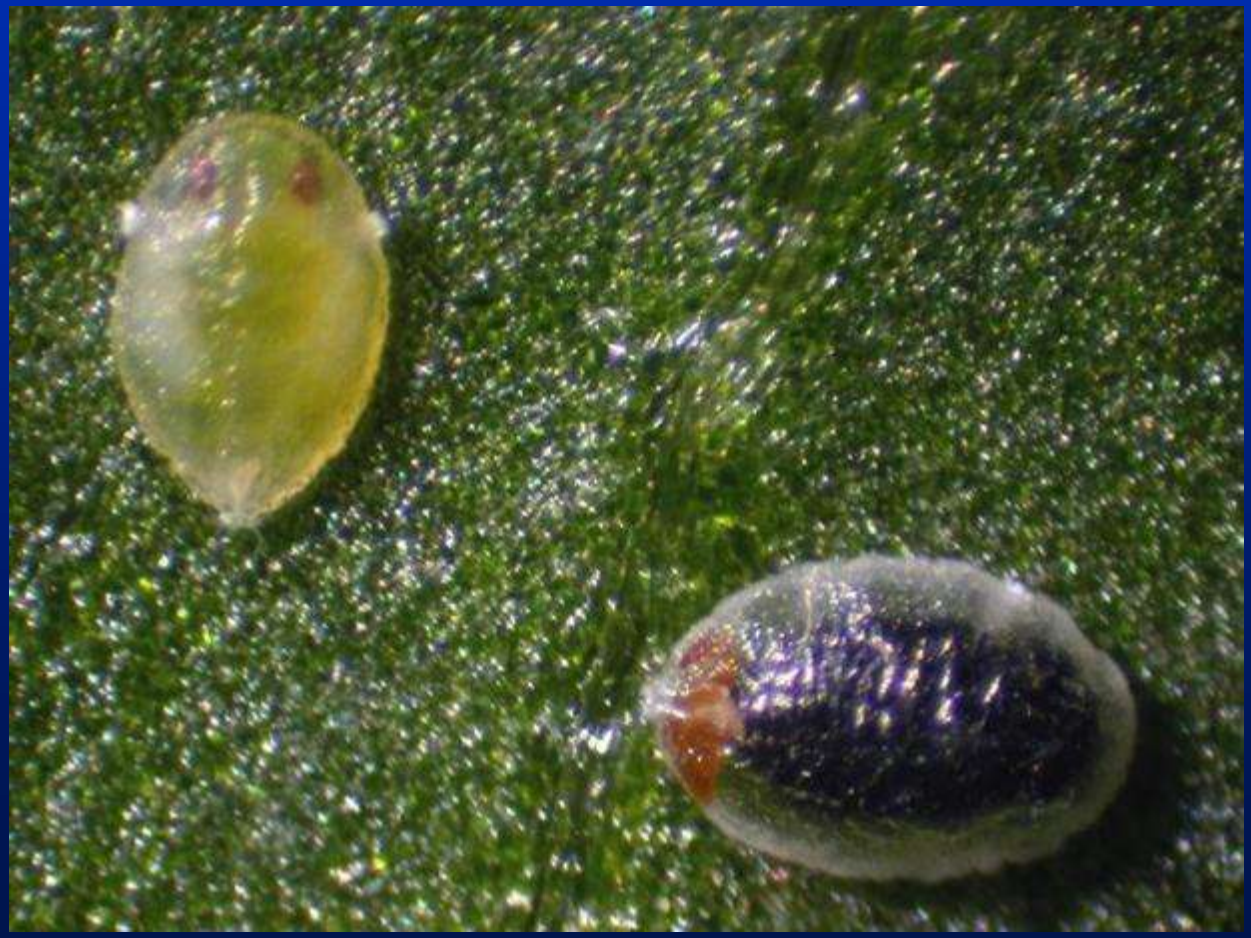
Silverleaf Whitefly and many others (17)

New Whiteflies???

Encarsia sophia

Silverleaf Whitefly and many others

New Whiteflies???



Encarsia sophia

Silverleaf Whitefly and many others

New Whiteflies???

Biological Controls

Whiteflies

Parasites

Predators

Pathogens

Delphastus sp. (adult)
Silverleaf Whitefly and many others
New Whiteflies (probably)

Delphastus sp. (larva)
Silverleaf Whitefly and many others
New Whiteflies (probably)

Delphastus sp. (larvae)
Silverleaf Whitefly and many others
New Whiteflies (probably)

Delphastus sp. (pupa)

Delphastus sp. (eggs)

Nephaspis (adults)
Rugose, Silverleaf and many other Whiteflies

Nephaspis (larva)
Rugose, Silverleaf and many other Whiteflies

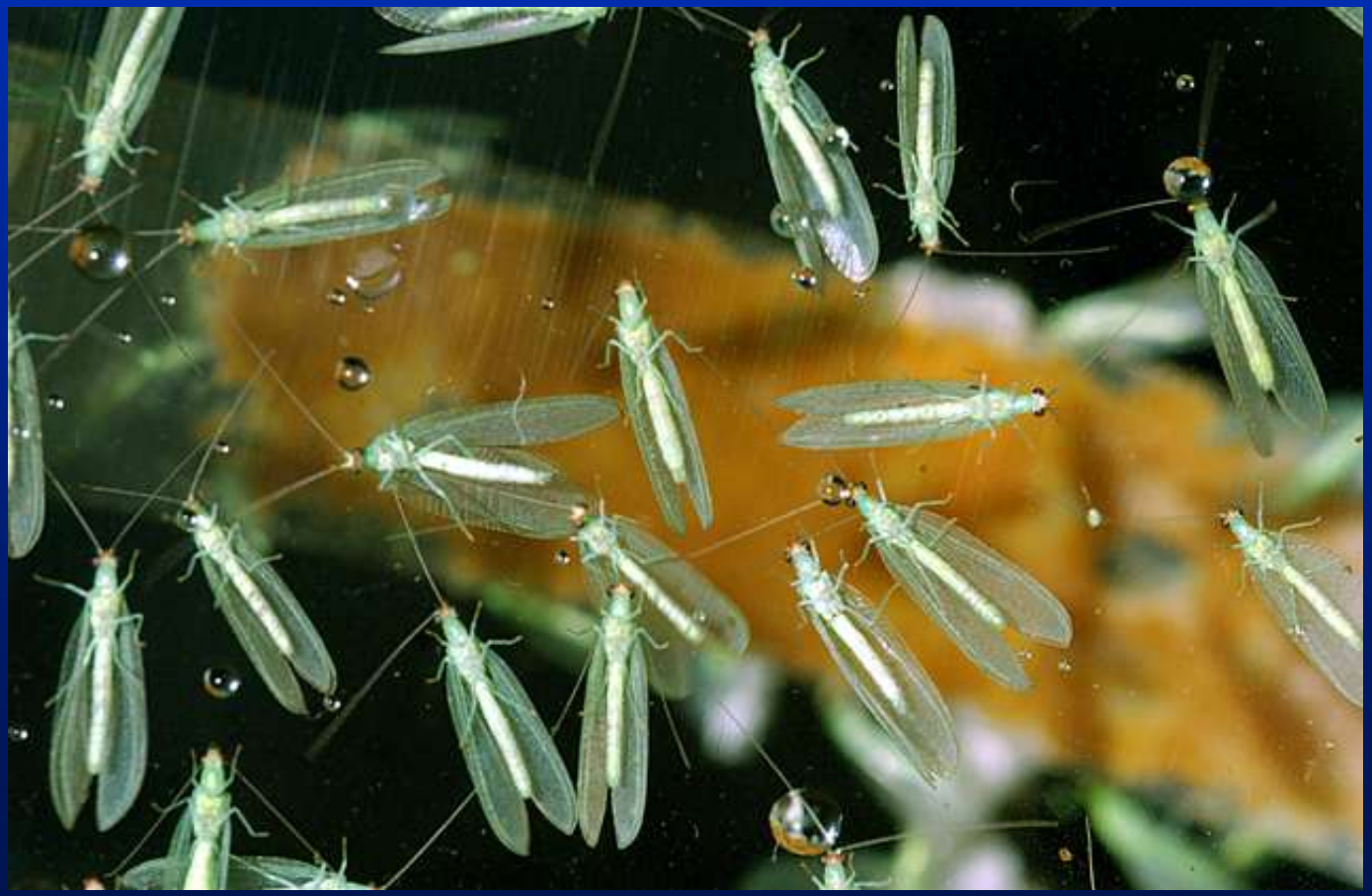
Nephaspis (adults)
Release site in Palm Beach

ESTABLISHED!!!

Lacewing (larva)
Generalist Predators
(eat anything they can catch)

Lacewing (larva)
Generalist Predators
(eat anything they can catch)

Lacewing (adults) Generalist Predators (don't feed)



Lacewing (adults)
Generalist Predators
(don't feed)

Lacewing (eggs)

Lacewing (eggs)


CHARMS
BLOW POP
GRAP
Butterscotch
HARD CANDY

Predatory Mites
Generalist Predators
(whiteflies, thrips, scales, pollen…)

Predatory Mites
Generalist Predators
(whiteflies, thrips, pollen…each other)

Biological Controls

Whiteflies

Parasites

Predators

Pathogens

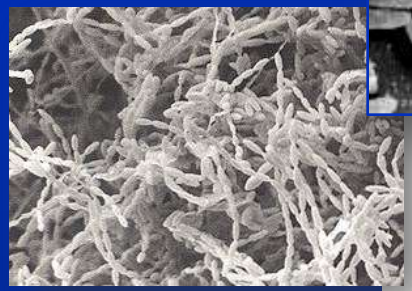
Aschersonia

Greenhouse and Silverleaf Whiteflies

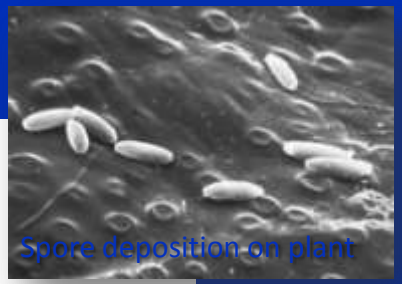
New Whiteflies???

PFR-97® Mode of Action

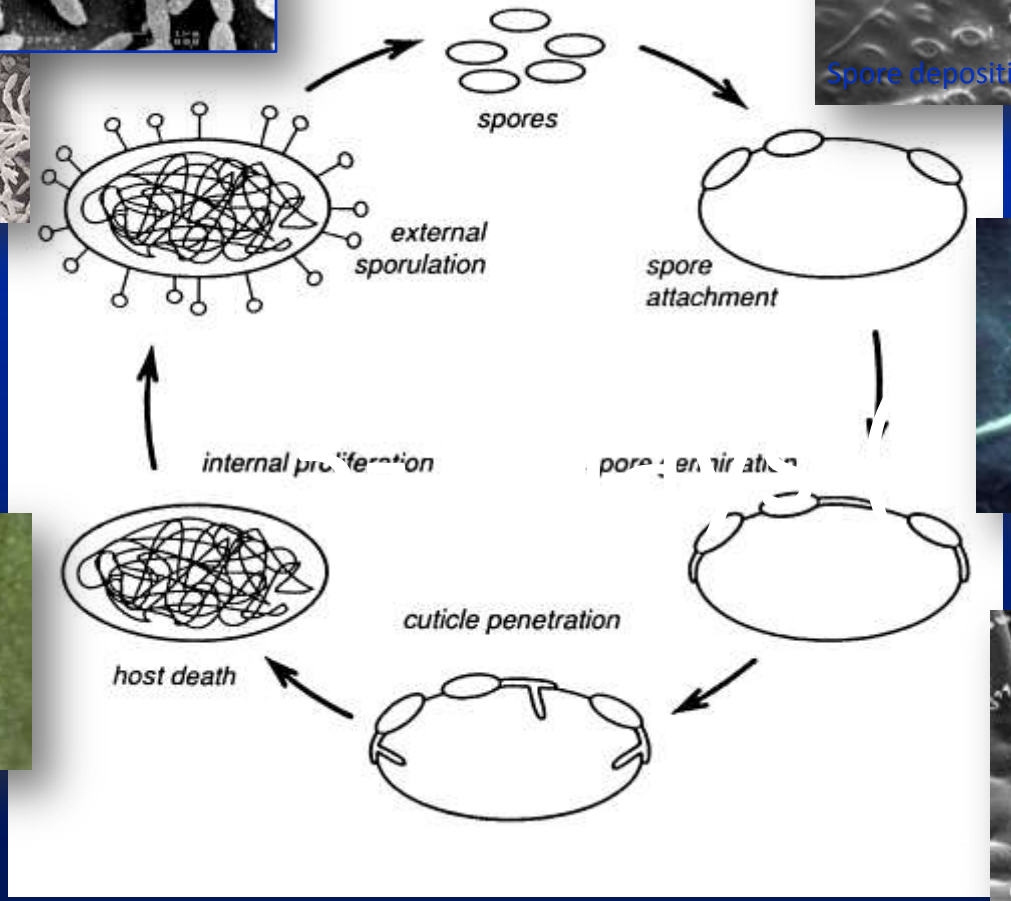
Formation of conidia (aerial spores)



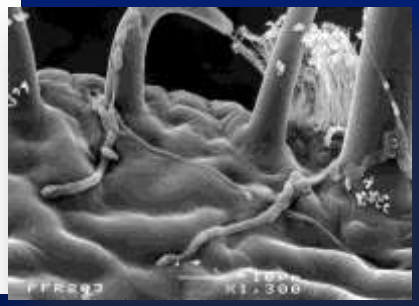
Mycelium emerging from whitefly nymph killed by PFR-97



Photos courtesy of Dr. Z. Landa, Univ. of South Bohemia, Czech Rep.



Bemisia nymph infected with PFR.



Isaria fumosorosea

Rugose, Ficus, Greenhouse and Silverleaf Whiteflies

Isaria fumosorosea

Rugose, Ficus, Greenhouse and Silverleaf Whiteflies

Isaria fumosorosea

Rugose, Ficus, Greenhouse and Silverleaf Whiteflies

Isaria fumosorosea

Rugose, Ficus, Greenhouse and Silverleaf Whiteflies

Isaria fumosorosea on an L4 *Rugose Whitefly* nymph

Isaria fumosorosea on an L4 *Rugose Whitefly* nymph

Isaria fumosorosea on a L4 *Rugose Whitefly* adult

Isaria fumosorosea
ULV application

Isaria fumosorosea
Low Volume Application

Impact of insecticides on natural enemies?

Assume anything you spray will have a negative impact on most natural enemies!

Sooty Mold

Manatee Tree Snail

www.jaxshells.org/

Owned, Created And Maintained by Bill Frank | Scientific Advisor Is Ha

Issues in Florida

What eats what?

Host ranges of the whiteflies and natural enemies.

Develop efficient rearing systems.

Can’t run experiments without access to colonies.

Can’t mass rear natural enemies until we can mass rear something for them to eat!

Experiments:

- Identify chemical interactions.
- Develop methods to establish natural enemies.
- Develop methods to augment natural enemies.
- Determine if the natural enemies we currently have are able to reduce whitefly populations to levels we can live with.

Current Status:

What eats what?

We are able to rear a number of other whiteflies on easy to grow host plants.

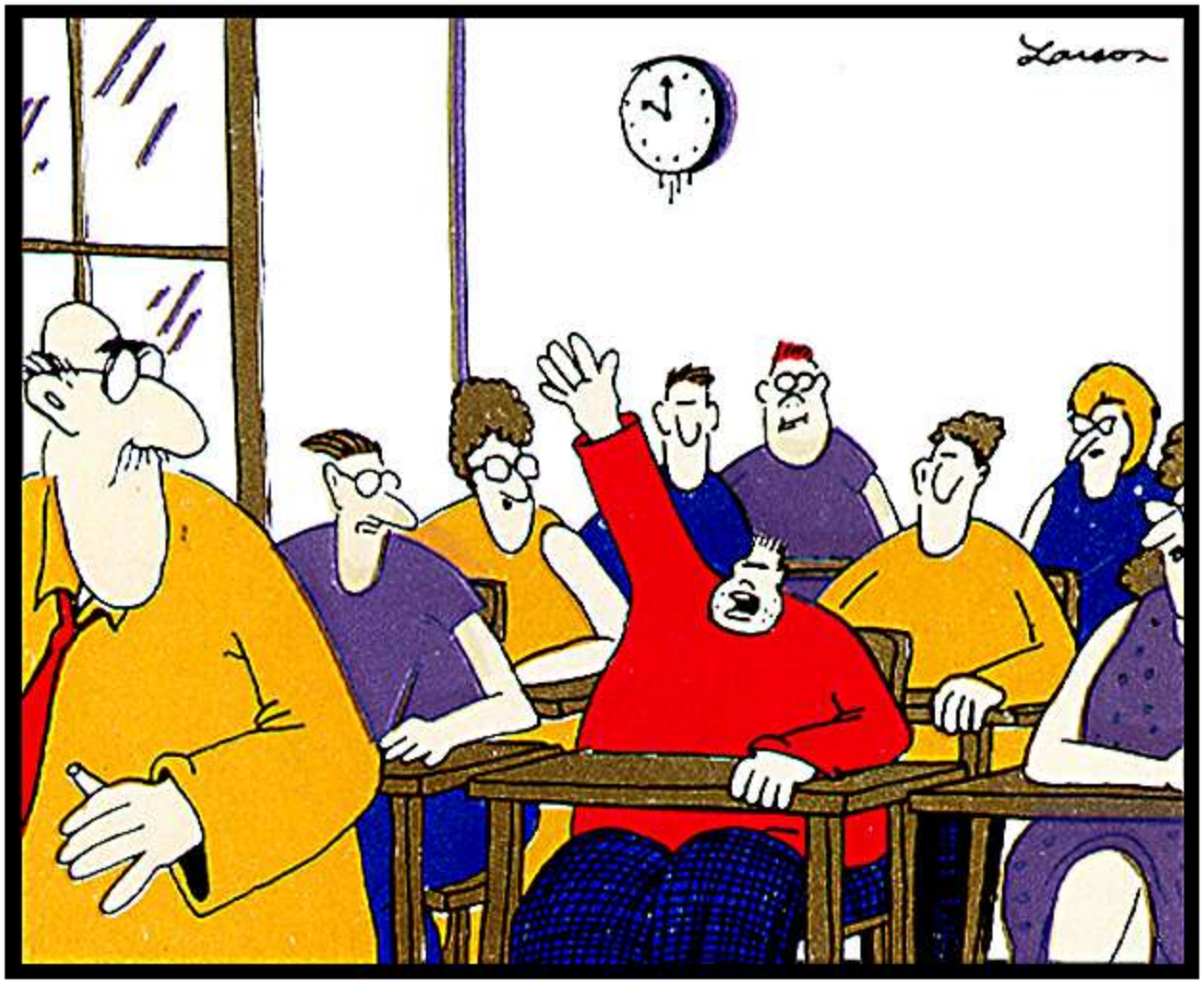
Develop efficient rearing systems.

We have large colonies of at least three whiteflies.

Small scale rearing of two beetles and one parasitoid!!!

Needs far exceed the supply.

We have a system that was used years ago



"Mr. Osborne, may I be excused?
My brain is full."

Thank you!

MREC.IFAS.UFL.EDU/LSO