



# Whiteflies

Hemiptera: Aleyrodidae



Photograph courtesy of Jim Kalisch, University of Nebraska



**Why are they called  
whiteflies?**

**The adults are white. And they fly. and....**





# Common Whiteflies found in Greenhouses in North America

- Greenhouse whitefly (*Trialeurodes vaporariorum*)
- Sweetpotato whitefly (*Bemisia tabaci*)
  - B & Q Biotypes exist with differences in pesticide sensitivity



Photograph courtesy of David Shetlar, Ohio State University

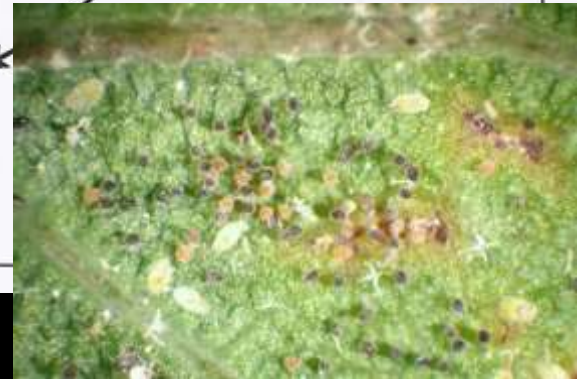
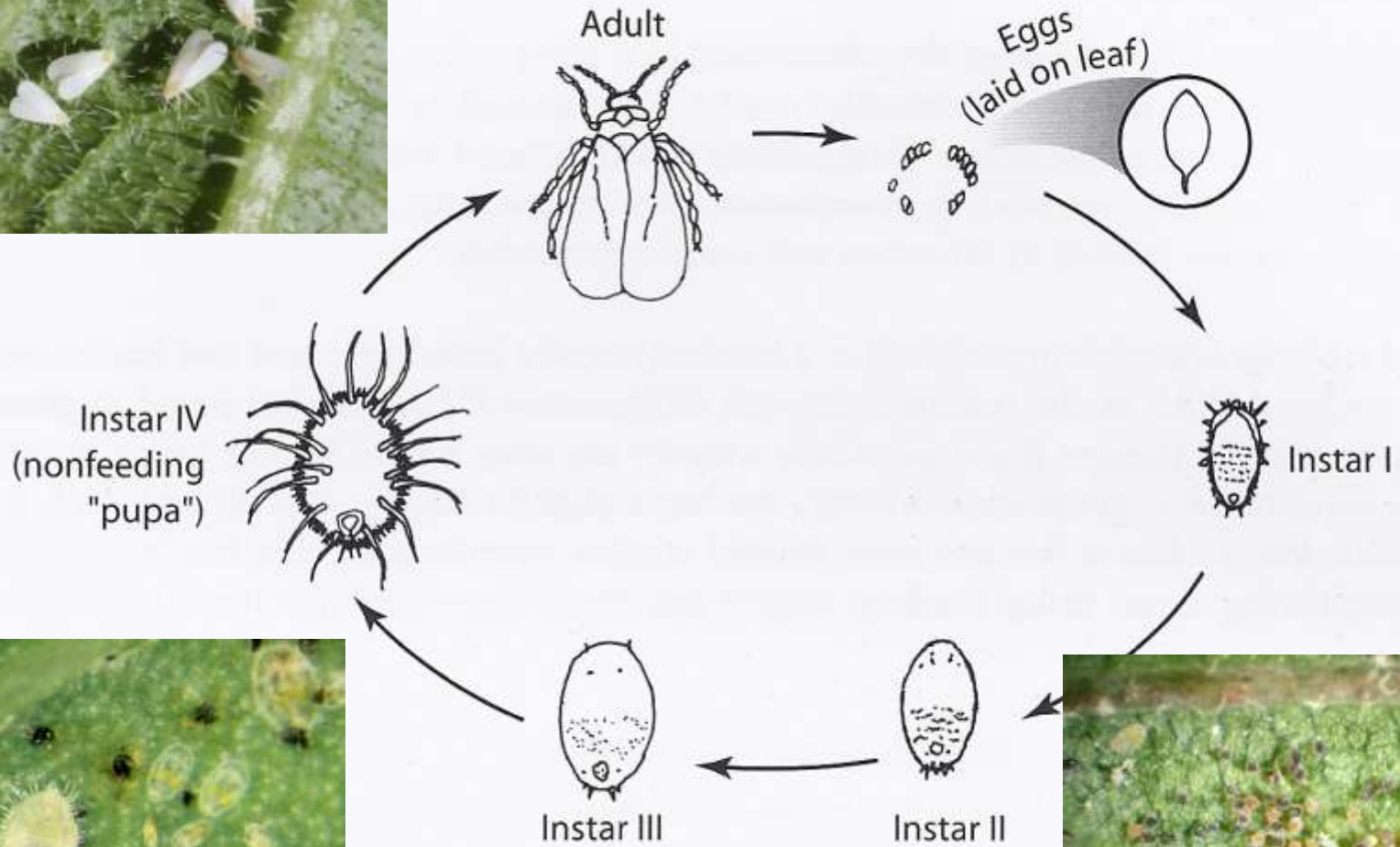


Photograph courtesy of David Shetlar, Ohio State University

**Whiteflies have simple metamorphosis – but have considerable differences in appearance and habit in adult and nymphal stages.**



# Generalized Life History of a Whitefly





**Whitefly adult and many dozen eggs laid on underside of a leaf**



**Whitefly eggs**



**Whitefly eggs on leaf**



**Greenhouse whitefly eggs laid in a semicircular pattern**



**Mixed stages  
of whitefly  
nymphs**



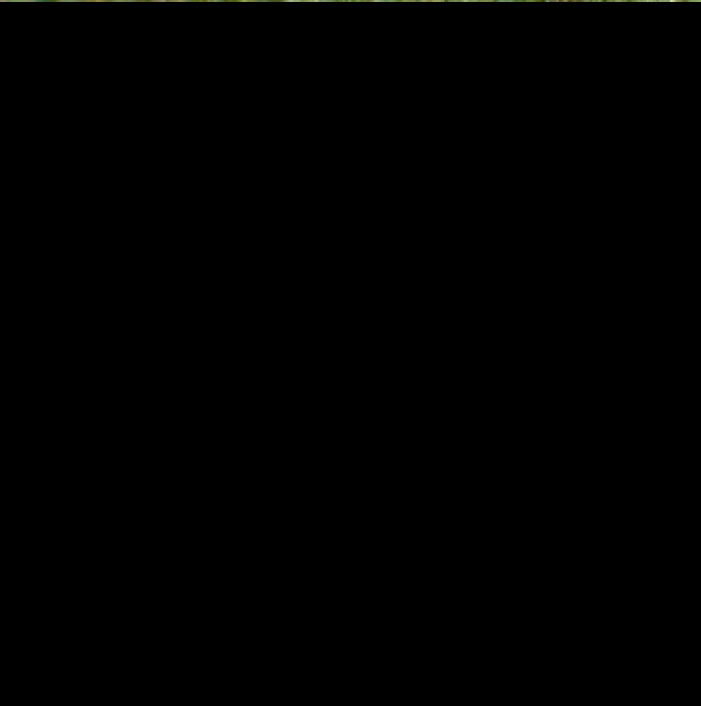
A microscopic photograph showing two insect instars on a green, textured surface. The instar on the left is smaller and less developed, while the one on the right is larger and more complex, with many long, thin, hair-like structures extending from its body. The background is a dense, green, fibrous material.

**Instar III**

**Instar IV  
“Pupa”**



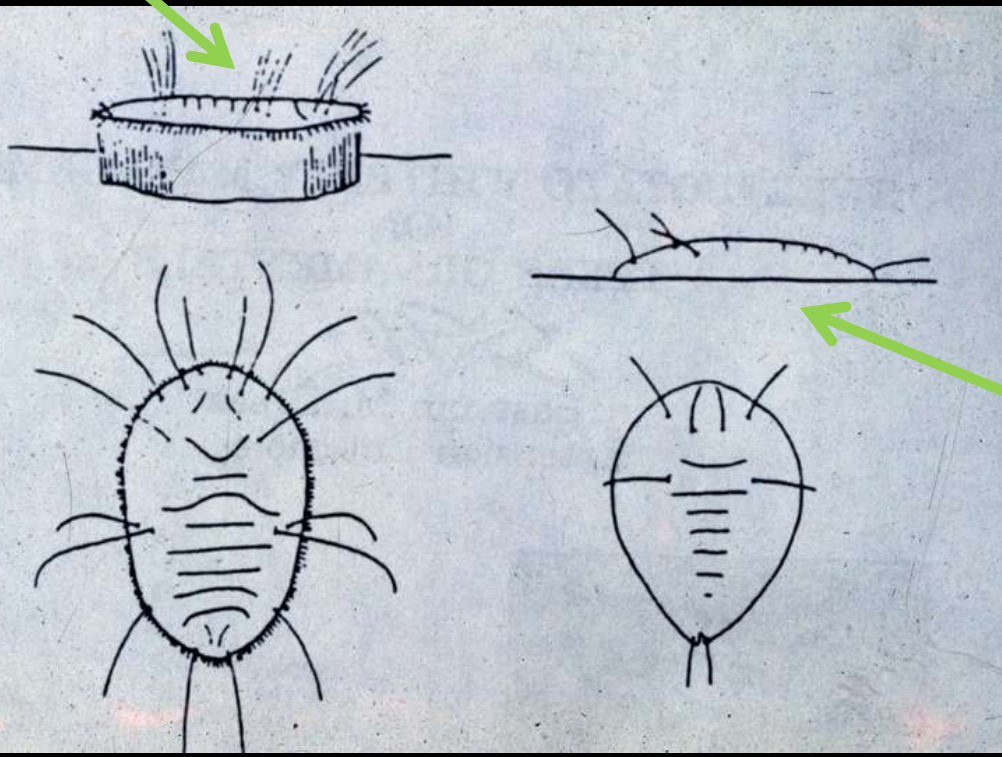
**Instar IV nymphs  
of whiteflies –  
“whitefly pupae”**



The Instar IV pupa is the stage that can be best used to determine which species of whitefly is present



Greenhouse whitefly

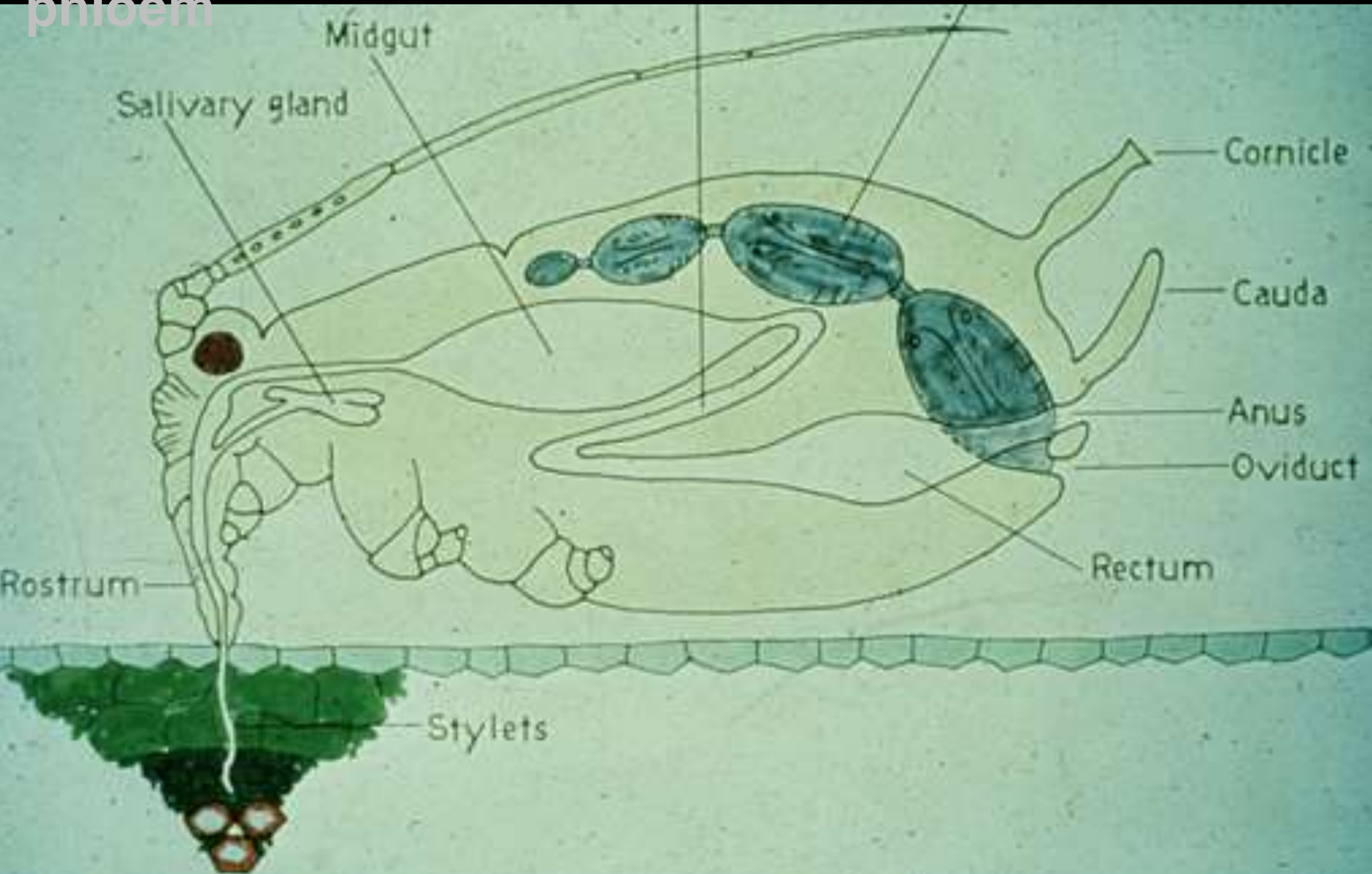


Sweetpotato whitefly



**Adults, last stage nymphs and old skins of nymphs of whiteflies**

# Whiteflies (like aphids) suck fluids from the phloem



**Whiteflies do excrete some honeydew as a waste product**





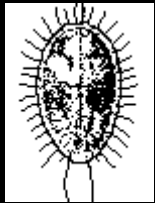
**Sooty mold associated with high numbers of whiteflies**



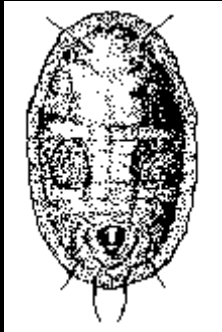
## Whitefly Life Cycles



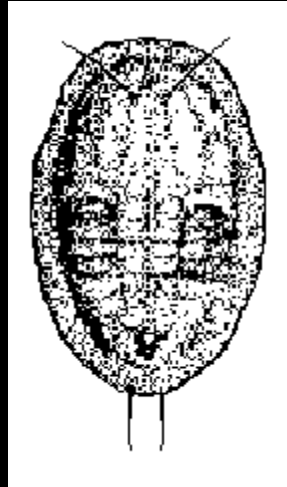
Egg



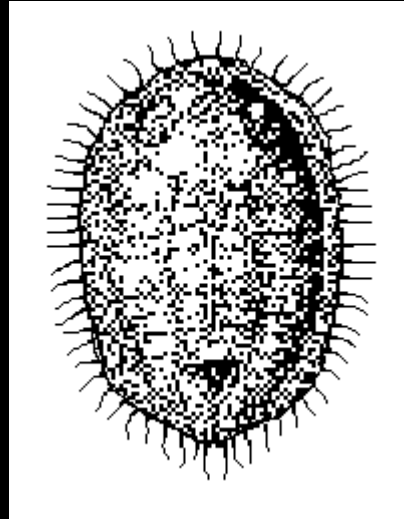
Nymph I  
(=crawler)



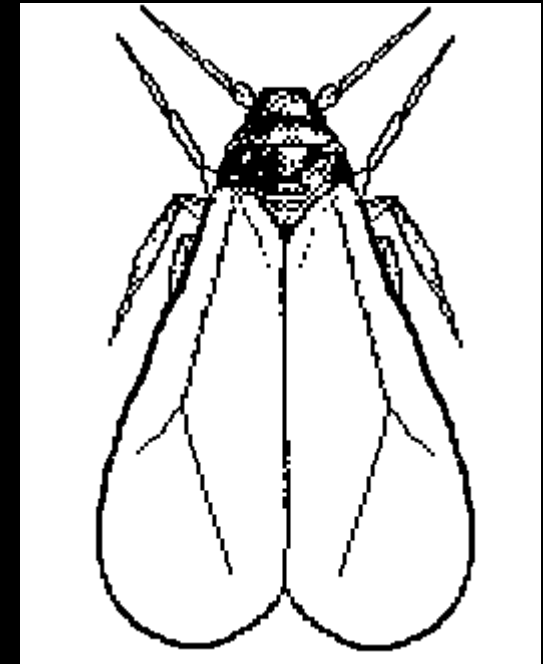
Nymph II  
(="scale")



Nymph III  
(="scale")



Nymph IV  
(="Pupa")



Adult

**At 70°F, the greenhouse whitefly life cycle takes: 6-10 days for egg hatch, 3-4 days as a nymph I, 4-5 days as nymph II, 4-5 days as nymph III, 6-10 days for the pupa. Adults can live for 30 to 40 days.**

# Development Times for Greenhouse Whitefly

| <b>Temp<br/>(°F)</b> | <b>Egg<br/>Hatch</b> | <b>Nymphs<br/>I-II-III</b> | <b>“Pupa”<br/>(nymph IV)</b> | <b>Female<br/>Preoviposition</b> |
|----------------------|----------------------|----------------------------|------------------------------|----------------------------------|
| <b>85°</b>           | <b>3</b>             | <b>7</b>                   | <b>7</b>                     | <b>1</b>                         |
| <b>75°</b>           | <b>6</b>             | <b>8</b>                   | <b>7</b>                     | <b>1</b>                         |
| <b>70°</b>           | <b>8</b>             | <b>11</b>                  | <b>8</b>                     | <b>1</b>                         |
| <b>65°</b>           | <b>11</b>            | <b>17</b>                  | <b>12</b>                    | <b>2</b>                         |
| <b>60°</b>           | <b>18</b>            | <b>25</b>                  | <b>24</b>                    | <b>2</b>                         |

# Cultural Control - Exclusion

- **Greenhouse whitefly is a tropical/  
subtropical species**
  - **Outdoor survival does not occur where  
there are cold winters**
  - **Developing stages require living plants**
  - **Adults survive about 3 days without  
plants**



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**CAREFULLY**  
**INSPECT TRANSPLANTS**



**JUST SAY NO!**

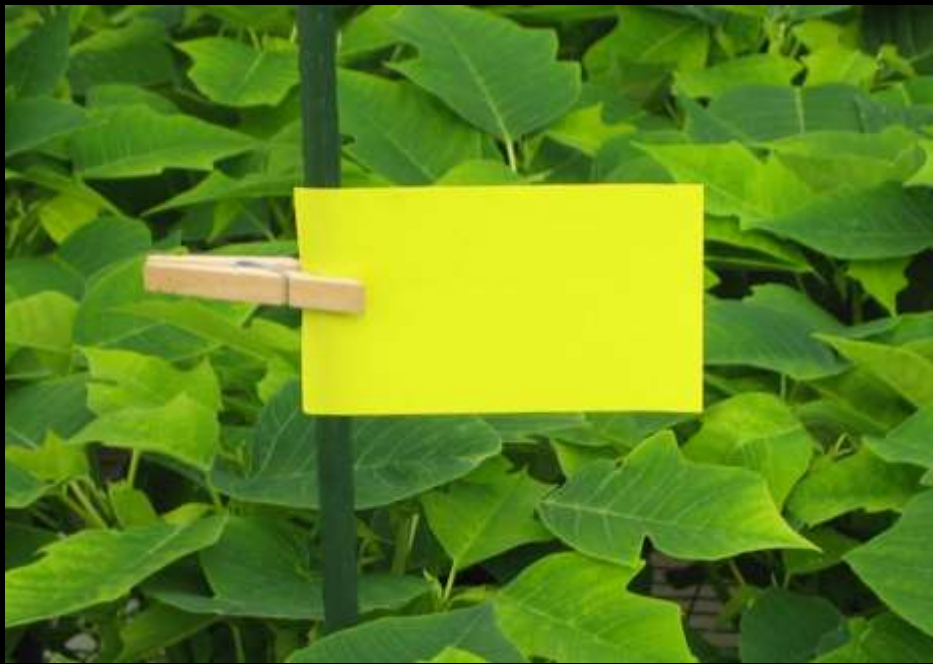


# Sticky Traps for Whiteflies



# Can sticky traps control whiteflies?

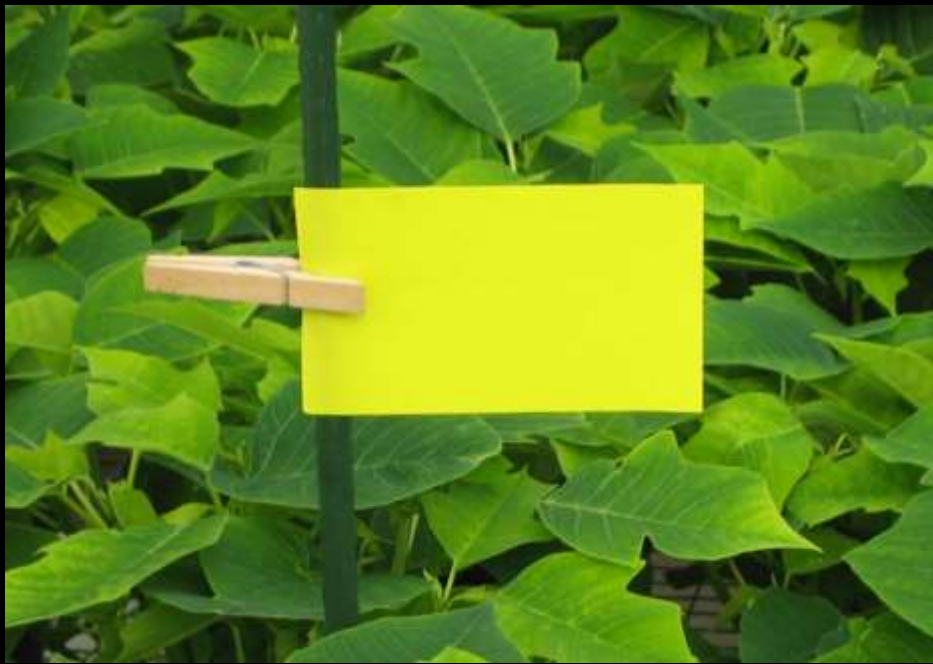




## **Sticky traps for whiteflies can:**

- **Capture some adult whiteflies**
- **Be used to monitor changes in populations of whiteflies**





**Sticky traps for whiteflies *can not:***

- **Capture immature stages of whiteflies**
- **Capture all adult whiteflies**

**Sticky traps can be one component of a whitefly control program.**



# Whiteflies

## Biological Controls

- **Parasitic Wasps**
  - *Encarsia formosa*
  - *Eretmocerus eremicus*
- *Beauveria bassiana*





**Whitefly parasites –  
Parasitic wasps that  
selectively attack  
whiteflies**





***Encarsia formosa*-  
parasitized whitefly  
'pupae'**

**Left: Card containing  
parasitized whiteflies  
for release**



**Whitefly parasite –**  
**Effective only in warm**  
**temperature**  
**greenhouses – Above**  
**about 72F average**



# Whiteflies

## Biological Controls

- **Parasitic Wasps**
  - *Encarsia formosa*
  - *Eretmocerus californicus*
- *Beauveria bassiana*



# *Beauveria bassiana* Products (Naturalis, Botanigard)





## Whiteflies

# Chemical Controls

- **Horticultural Oils**
- **Azadirachtin**
- **Imidacloprid (soil-applied, systemic)**
  - Label restrictions may prevent use on many food crops – check the label!!!
- **Pyrethroids (e.g., permethrin)**
  - Active against adults primarily
  - Label restrictions may prevent use on many food crops – check the label!!!