BioControl in the Greenhouse

e-GRO Electronic Grower Resources Online

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11:30 to 11:55 Eastern

INSECT PEST IDENTIFICATION

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Pest Identification







- Be Prepared – Know your enemy and recognize the damage that they cause
- Be familiar with the life stages & life cycle of the pest

Leafminer – *Liriomyza trifolii*

Leafminer - *Liriomyza trifolii*

Damage

- Punctures caused by females feeding and ovipositioning (*egg deposition*) will cause stippling of the leaves
- Major damage is caused by mining of the larvae within the mesophyll in an irregular (serpentine) pattern
- Start to see mines in 4 days
- Excessive mining can reduce the level of photosynthesis in the plant and cause premature leaf drop
- Generally unsightly

Life Cycle *(approx. 19 days)*

Egg: deposited just below the epidermis (2-3 days)

Larva: small, maggot-like worm that feeds on the mesophyll (3 instars feed)

4th Instar: Non-feeding stage before pupation.

Pupa: Formed within last larval skin~ hard pupal case

Adult: Females live 13-18 days
Males live 2-3 days

Females 35 eggs per day

Egg laying 12 – 30°C / 54 – 86°F

Aphids

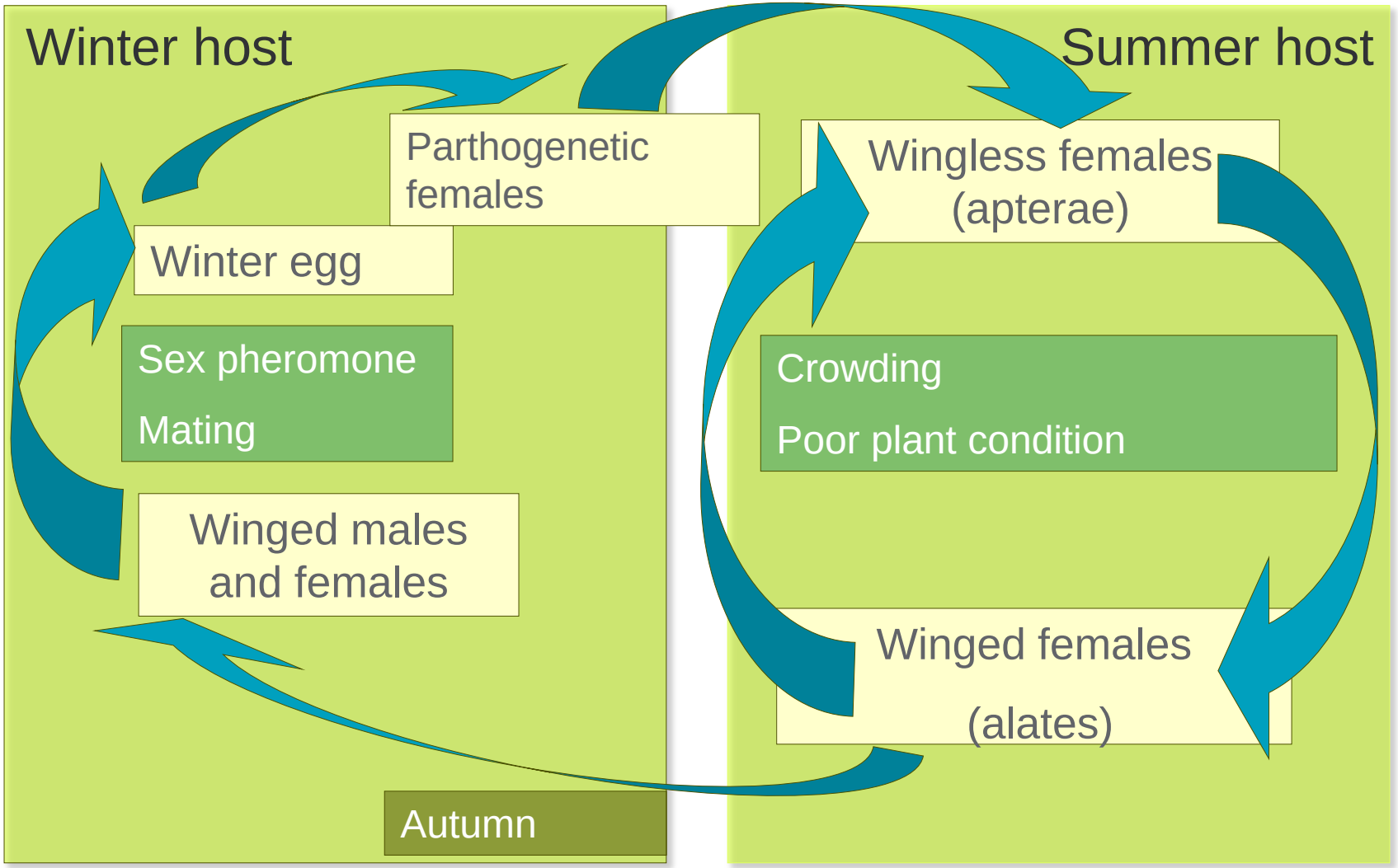
- Suborder of Homoptera, Family Aphididae
- Small pear-shaped, soft-bodied, sap-sucking insects (1-10 mm)
- Often green, but the color can vary by species and host plant they feed on
- Prefer to feed on young tips and terminals, flower buds, stems
- Asexual reproduction, gives birth to live nymphs
- When populations become high, winged aphids are produced and disperse to other plants

Aphids

Damage

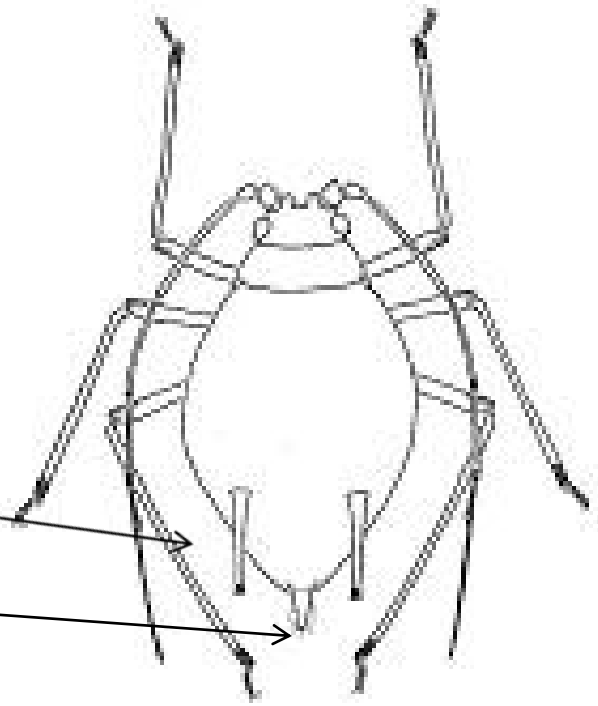
- Piercing-sucking mouth parts
- Feeding by aphids results in::
  - Reduction of plant vigor
  - Curled/distorted leaves > yellow foliage
  - Honeydew, sooty mold and cast skins found on leaves and fruits
  - Virus transmission
  - Unsalable plants
- Most common aphids in greenhouse
  - *Myzus persicae* → green peach aphid
  - *Aphis gossypii* → cotton aphid / melon aphid

General biology of aphids in nature

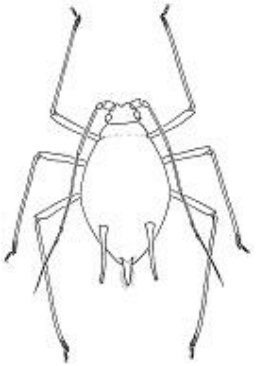


Characteristics of aphids

- Aphids can be identified by :
- Shape of body
- Color
- Length of antennae
- Fore head (antennal tubercle)
- Siphons / cornicle
- Cauda
- Length
- Hairs
- Shape
- Legs (length



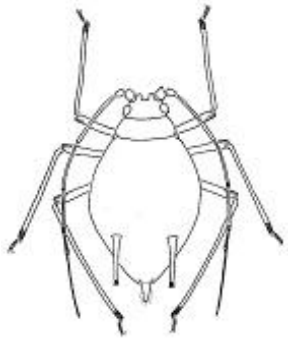
Potato Aphid - *Macrosiphum euphorbiae*



- Size: 2.5 -3.8 mm
- Most common green
- Dark stripe in the middle of the back
- Head without antennal tubercles
- Antennae longer than body
- Siphons long and cylindrical
- Cauda: colorless and long

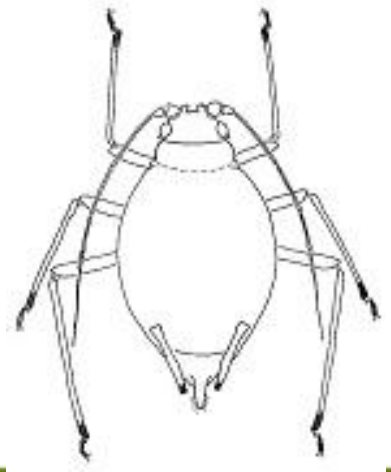
Foxglove Aphid - *Aulacorthum solani*

- Size: 2.8 - 3.0 mm
- Color varies from yellowish - green
- Fore head with curved antennal tubercles
- Antennae longer than body
- Cornicles long and cylindrical
- At the base of siphons a dark green spot
- Cauda: green and short

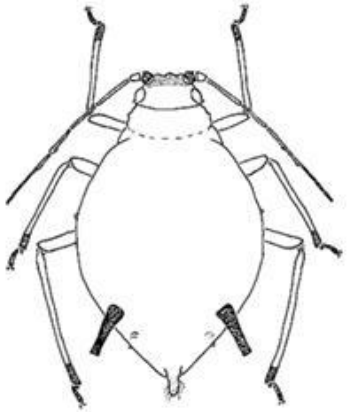


Green Peach Aphid - *Myzus persicae*

- Size: 1.3 – 2.5 mm
- Color: from yellow green- green
- Antennal tubercles
- Antennae about as long as body
- Cornicles: light green, at the end little bit darker
- Cauda elongated

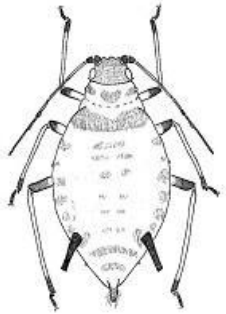


Melon Aphid - *Aphis gossypii*

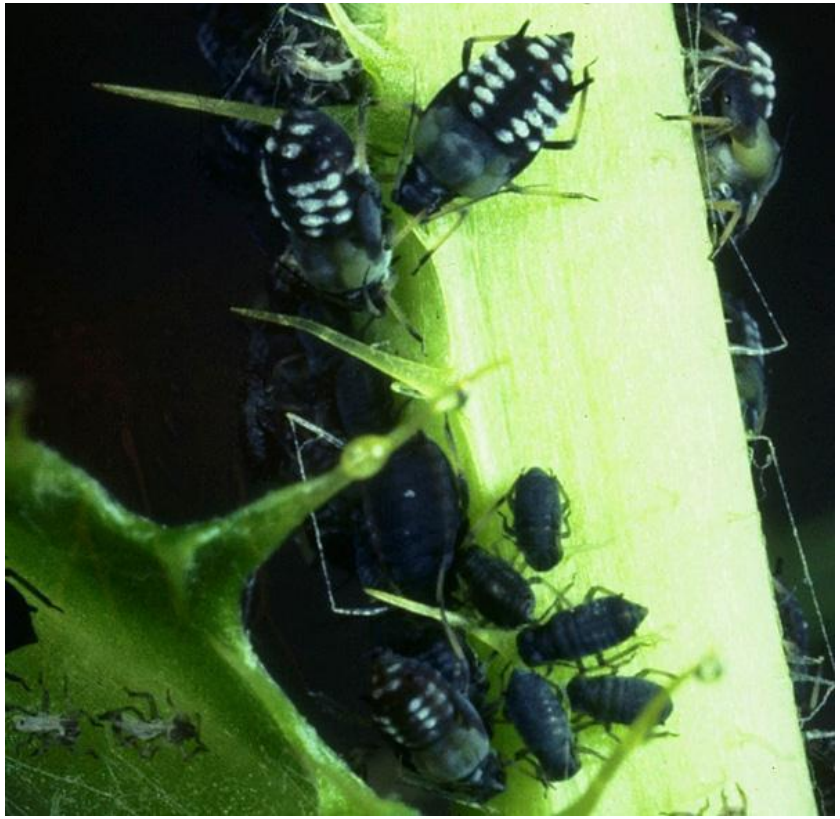


- Size: 0.9 -1.8 mm
- Body shape rounded
- Big aphids, dark green - black-green
- Young aphids light green - cream color
- Eyes are red
- Short legs
- Antennae fairly short
- Cornicles: black and short
- Cauda: short and light color

Black Bean Aphid - *Aphis fabae*

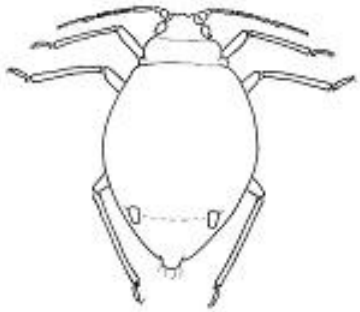


- Size: 1.5 – 3.1 mm
- Color: dark grey till dull-black
- Antennae and legs are light yellow
- Antennae shorter than 4/5 of length body
- Cornicles short, almost black and cylindrical
- Cauda: black and short



Leafcurl Plum Aphid – *Brachycaudus helichrysi*

- Size: 0.9 - 2 mm
- Color varies from green till yellowish brown
- Long legs. Color: yellow with black
- Short antennae
- Light colored cornicles are short and truncate
- Cauda: short



Thrips

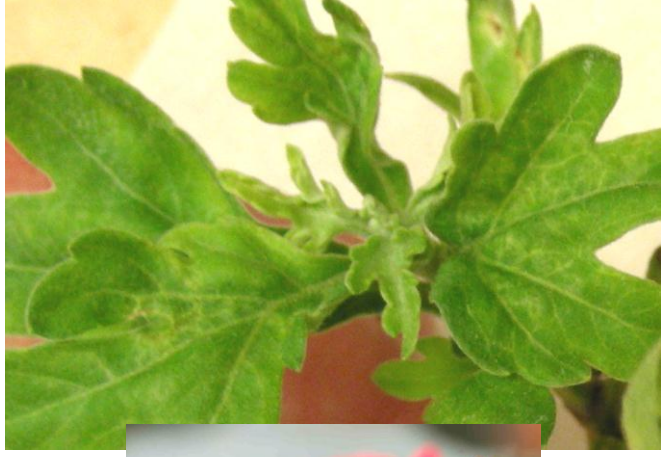
Identification

- Small, soft bodied insects ranging in size from 0.5 – 5 mm, with most being 1-2mm
- Yellow, black, red or a combination in color depending on species
- Typically attracted to flowers where they feed on pollen, both nymphs and adults can also be found feeding on young foliage and buds

Thrips

Damage

- Typically found feeding on young foliage and flower buds
- They have rasping mouthparts that scape the surface of the plant and suck the juices from the damaged cells
- Feeding can cause curled, distorted, puckered leaves, chlorotic foliage,
- Irregular white spots form, the surface of the leaves may appear slivery or stippled appearance
- New growth and flowers will be deformed, discolored with feeding scars. Ability to transmit viruses – INSV & TSWV



Thrips

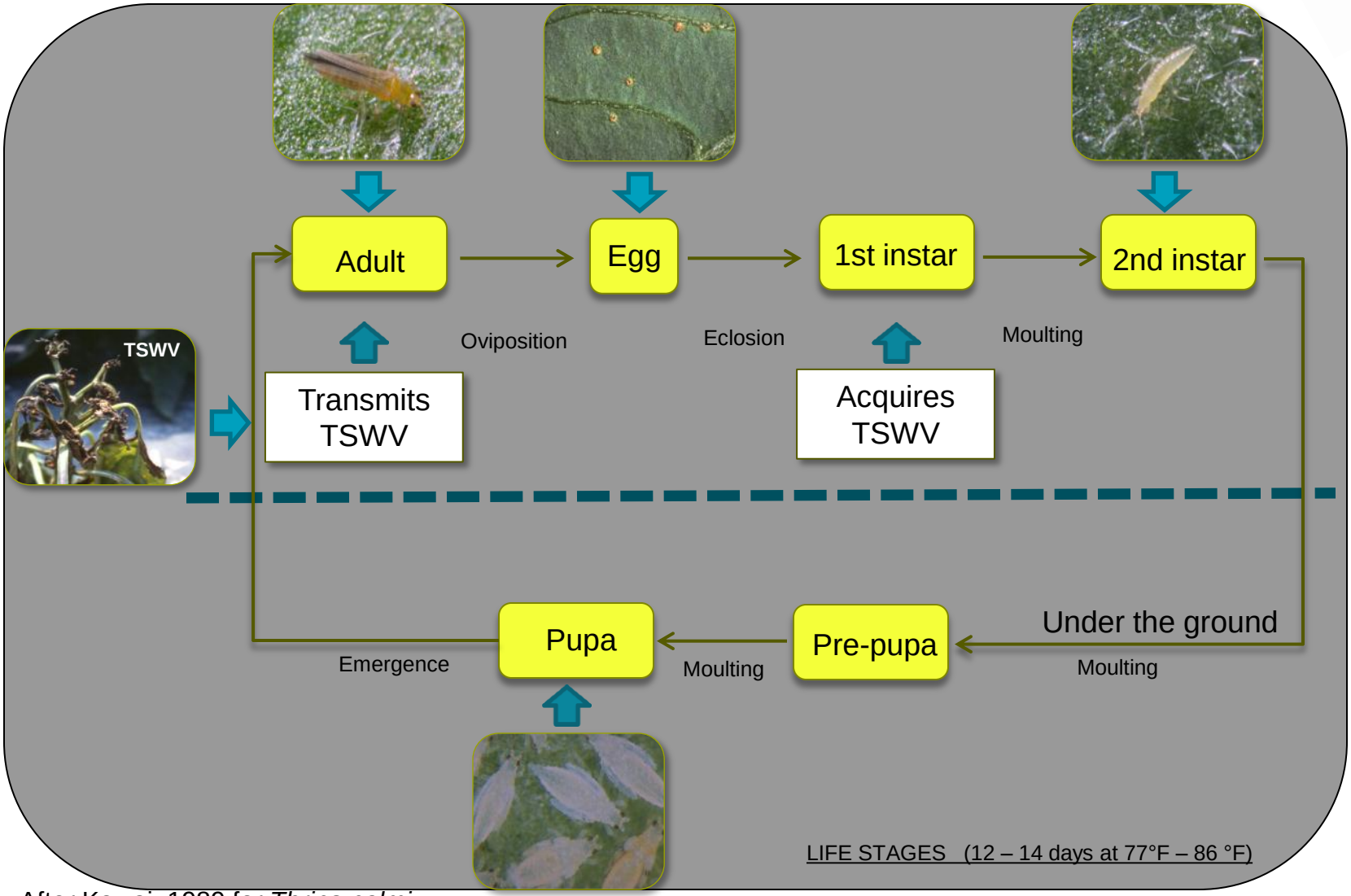
- Eastern Flower Thrips
  Frankliniella tritici
- Citrus Thrips
  Frankliniella bispinosa
- *Western Flower Thrips
  Frankliniella occidentalis
- *Onion Thrips
  Thrips tabaci
- *Tobacco Thrips
  Frankliniella fusca
- Echinothrips
  Echinothrips americanus
- Greenhouse Thrips
  Heliothrips haemorrhoidalis
- Chilli Thrips
  Scirtothrips dorsalis

Chilli Thrips

Echinothrips

Pictures courtesy L. Osborne-UFL

General biology of thrips



After Kawai, 1989 for *Thrips palmi*

Whitefly

- Small flying insects (1-2 mm), yellowish body with wax-coated wings
- Suborder of Homoptera, Family Aleyrodidae
- Immature stages are flat, yellowish-green scale-like insects on the undersides of the leaves
- Adults and Immature stages typically found feeding on the undersides of the leaves
- Piercing-sucking mouth parts that pierce the cells and remove plant sap
- Damage done by feeding
  - Honeydew & sooty mold on leaves and fruits
  - Virus transmission

Greenhouse Whitefly

Trialeurodes vaporariorum

Banded Wing Whitefly

Trialeurodes abutilonea

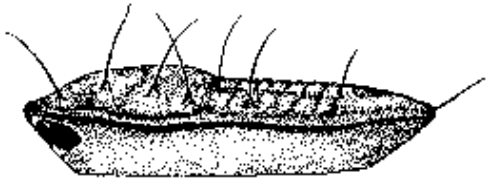
Sweetpotato/Silverleaf Whitefly

Bemesia tabaci – Biotype B or Q?

Identification of Immature Stages

UF/Liu

Trialeurodes spp.



UF/Liu

Bemesia spp.

Whitefly – *Bemesia spp.*

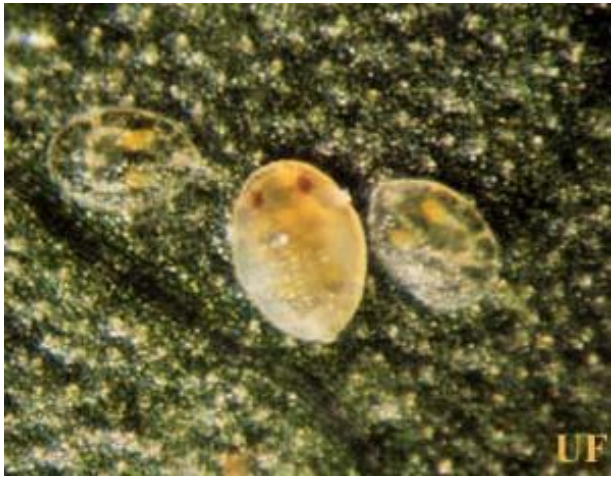
Life Cycle *(14-21 days)*

Egg: Yellow, Elliptical in shape (cigar), laid in clusters on the underside of the leaves. Turn brown when they are ready to hatch (5-7days)

Nymphs: 4-instars Crawler/1st, 2nd, 3rd (7 - 9 days)

Pupal Stage- 4th instar (red eyes) (2 - 4 days)

Adults: Females live 14 - 21 days 50 – 300 eggs (160 avg.)



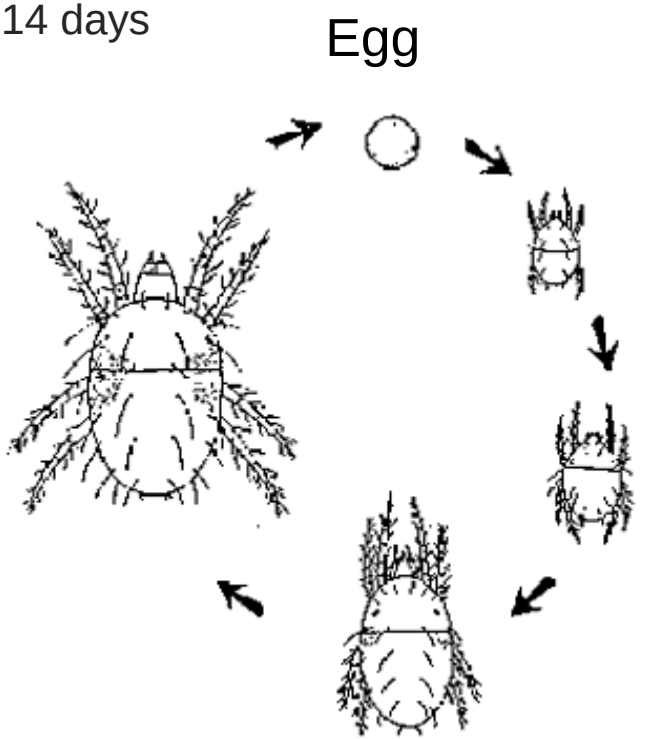
Two-spotted Spider Mites - *Tetranychus urticae*

- Small, soft bodied insects
- Four pairs of leg
- Color can vary from orange, red, light yellow, or light-dark green depending upon temperature, time of year and the host crop
- Can be found feeding on the undersides of the foliage and young buds
- Prefer hot, dry conditions!
- Piercing-sucking mouth parts cause damage:Flowers: white stains, deformation

Injury caused by Two-spotted spider mites

Two-spotted Spider Mite Life Cycle

Development complete in 7-14 days (hot-moderate conditions)



Females can produce over 100 eggs

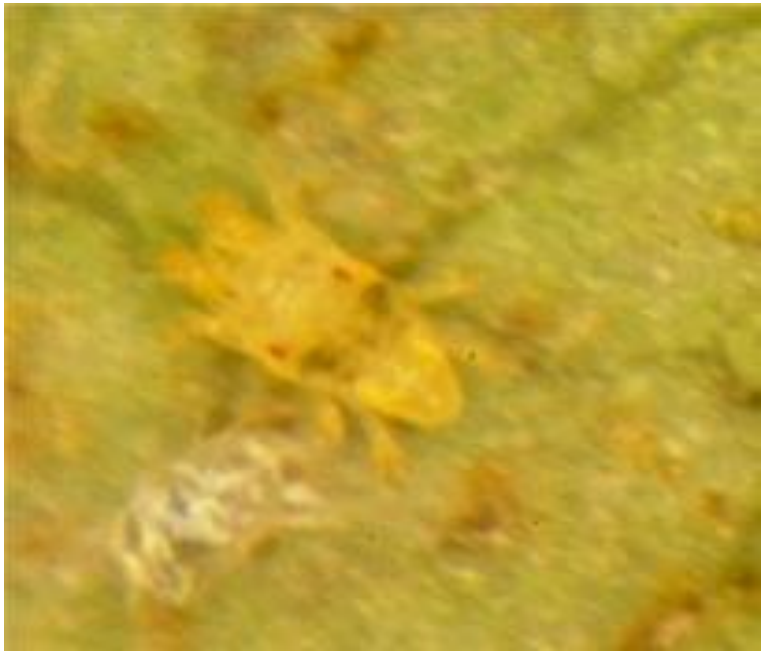
Spider mite populations are held in balance by natural enemies, weather and host quality.

Comparison of eggs from Tetranychid and Phytoseidae Mites

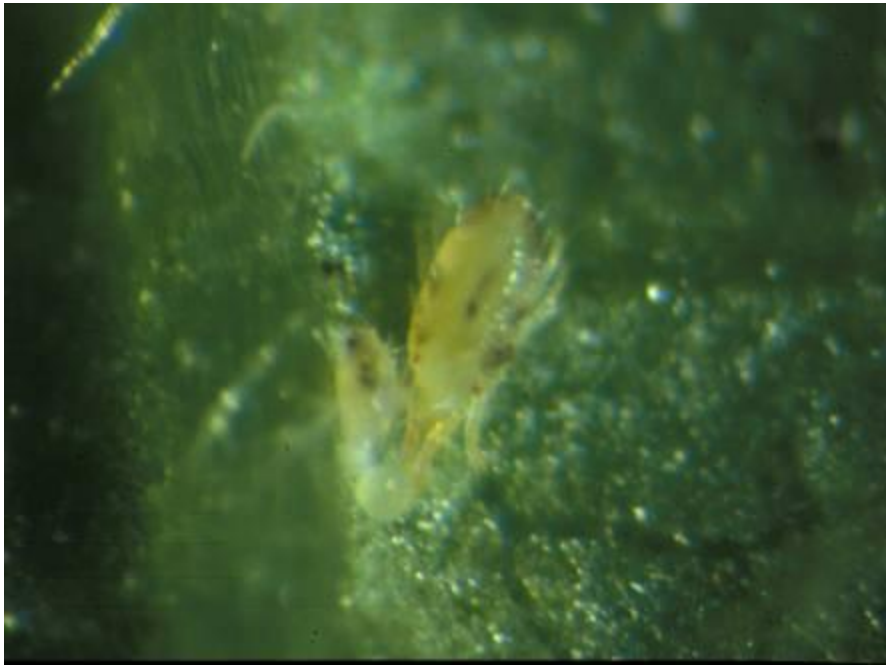
Amblyseilus californicus

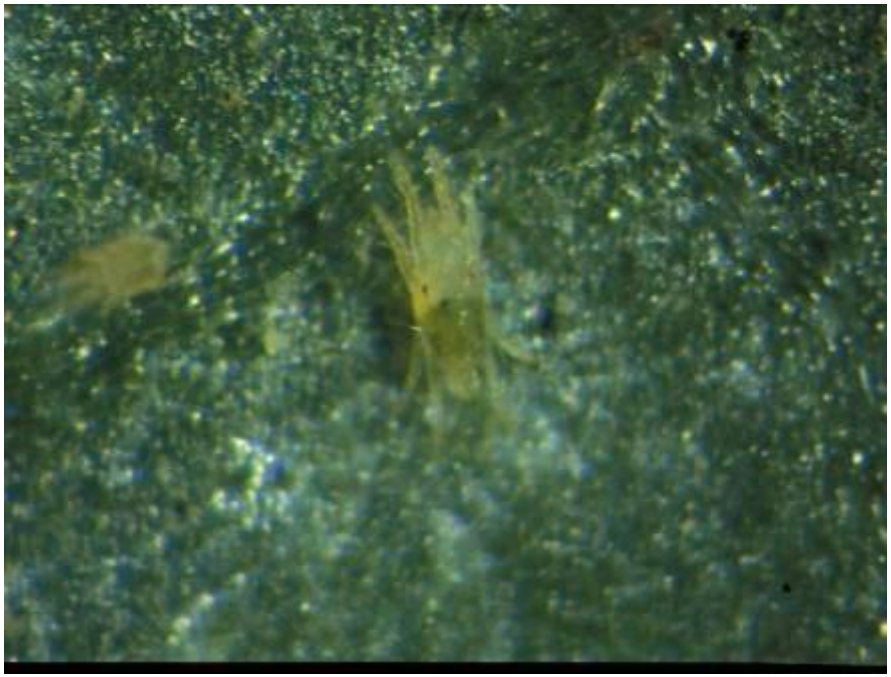
Tetranychus urticae

Adult Male & Female Mites



Lewis Mite - *Eotetranychus lewisi*





- **Smaller than two spotted spider mite.**
- **Small markings on body.**
- **Damage resembles nutrient deficiency**

Lewis Mite Damage on Poinsettia

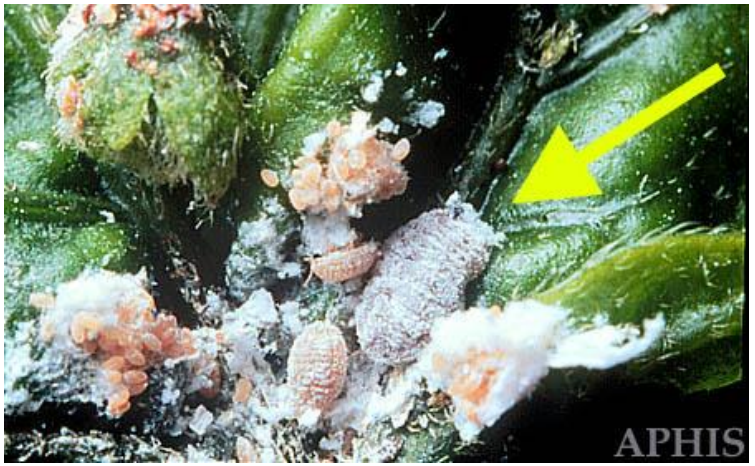
Cyclamen Mite Damage

- Feeding occurs in plant terminals
- Foliage tends to curl upward, be distorted and have a bronze, brittle appearance
- Plant tissue feels hard

Broadmite Injury

Mealybugs

- Family Pseudococcidae- type of scale insect
- Derive their name from the white, cottony wax secretion covering their body.
- Female soft, flat, oval, 1-4mm long, with distinct segmentation very similar to the immatures.
- Many produce marginal filaments of wax that are spine-like or wedge shaped
- Female retain their legs and are mobile throughout their life.
- Most tend to feed on the tender shoots, leaves, axils (above ground) > Root Mealybugs



Mealybug Damage

- Piercing-sucking mouthparts that tap into the phloem feed on plant sap
- Feed on roots, leaves, stems, fruits, flowers
- Reduces vigor, causes stunting, leaf distortion, yellowing, loss of foliage, stem dieback and even death
- Some species inject toxins as they feed causing plants to be severely distorted, shortened, thicken internodes and cause severe defoliation > plant death
- White cottony substance coats leaves and stems
- Produce honeydew > sooty mold

Longtail Mealybug
Pseudococcus longispinus

- Common interiorscape mealybug)
  (tropical/subtropical environments)
- Most prominent characteristic long anal filaments that make up tail.
  Also long lateral filaments.
- Does not produce an ovisac- Believe to bear live young. Nymphs are similar to adults
- Development at 70°F about 30-35 days.
- Broad host range.
- Body – Gray / Body Fluid - Clear

Mexican Mealybug
Phenacoccus gossypii

- Used to be common mealybug on ornamentals
- Adult females yellow-orange in color with medium size waxy filaments around the body
  > Three parallel rows of small waxy tufts down the back >No stripes
  > Short-tailed mealybug -Caudal filaments do not exceed ¼ of the body
- Waxy ovisac narrow and longer than female
- Development time – approx. 47 days at 77°F

Madeira Mealybug
Phenacoccus madeirensis

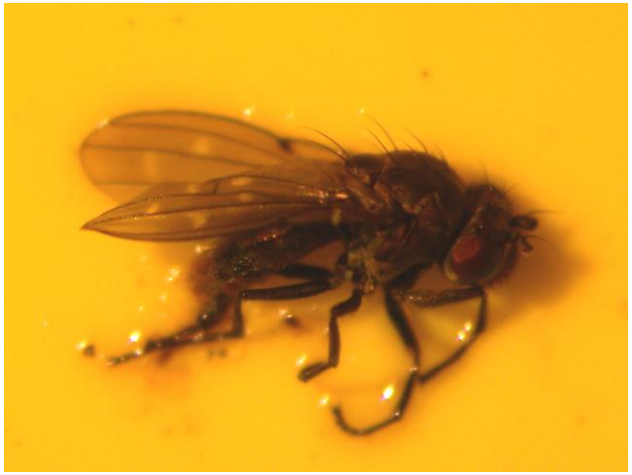
- Body is slightly purple in color with three rows of white tufts on the back
- Two dark stripes on the body
- Wide Host Range, most difficult to control
- Produces an irregular ovisac that covers most of the body
- Fringe short,
- Body Fluid- pale green

Citrus Mealybug
Planococcus citri

- Most common mealybug on ornamentals
- Adult females have yellow-orange or purplish body with medium size waxy filaments around the body. Faint dark purplish line down center of body
- Waxy ovisac seldom cover female (eggs yellow)
- Development time approx. 30 days - 77°F
- Body Fluid – clear to slightly yellow

Fungus Gnats & Shore Flies

- Small black flies frequently found around container grown plants and in greenhouses
- Attracted to damp locations where fungi and algae are apt to flourish
- Flies are considered a nuisance
- Both have been found to carry and distribute spores of fungal pathogens such as Rhizoctonia, Fusarium, Thielaviopsis & Pythium



Fungus Gnats - *Bradysia sp*

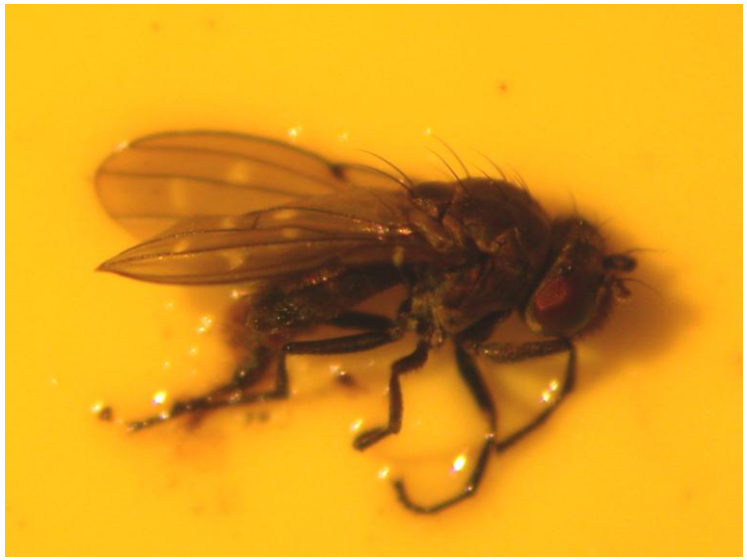
Identification

- Adults are dark-brown, mosquito-like flies with long slender legs and antennae
- Thin abdomen, long knob-like antennae
- Distinct Y-shaped vein on each wing
- Larvae have clear, worm-like body with shiny black head capsule
- Internal digestive system is visible through body wall

Shore Flies – *Scatella stagnalis*

Identification

- Adults are dark-brown body
- Round abdomen, short, flat antennae
- Five pale spots on each wing
- Larvae have plump, maggot-like body with no distinct head capsule and forked air tube at the end of their abdomen
- Their body is opaque and yellowish-white in color
- Feed on algae



Life Cycle

FUNGUS GNATS

Life Cycle: (Approx. 3 weeks @ 72°F)

EGG: 3-5 days
75-150 eggs laid in clusters in upper surface of the soil

LARVAL STAGE: 2 weeks
Four larval instars.

PUPAL STAGE: 4-5 days

SHORE FLIES

Life Cycle: (2 weeks @ 72°F)

EGG: 2-3 days
White eggs laid separately in the upper surface of the soil.

LARVAL STAGE: 3-6 days

PUPAL STAGE: 4-5 days

Early Detection is Critical

- Check incoming plant material for eggs, immature stages and adults (check underside of leaves)
- Monitor the growing area with yellow sticky cards
- Scout the crops regularly
- Beware of Ants – indicates the presence of sucking pests= aphids, whitefly, scale,
- Presence of honeydew and/or sooty mold indicates a heavy population of sucking pests!!

e-GRO Electronic Grower Resources Online

Coming Up Next: 12:00 to 12:30 Eastern

Biological Control on Herbs

Stanton Gill

Time	Topic
12:30 to 12:55	Lunch Break
1:00 to 1:25	Proactive Approach with a Biological Control Strategy

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