Thrips Management in Blueberries
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Thrips

- “fringe wings”
- small, narrow
- gradual metamorphosis
- rasping/sucking mouthparts
- 4 wings- both pairs narrow straps fringed with hairs
- mostly plant pests, some beneficial

Thysanoptera
Citrus thrips life cycle

- Eggs deposited in leaf tissue
- Eggs become larvae
- Larvae feed on new flush
- Prepupae
- Adult
  - Male smaller than female
  - Have wings
Citrus thrips vs. Flower thrips

**CITRUS THRIPS LARVA**

- about 99% on new leaves and small fruit
- maturing larvae broadly oval shaped, light amber in color, very active, very small spines or hairs, hardly visible with hand lens
- adults extremely active; abdomen rounded, light orange yellow

**FLOWER THRIPS LARVA**

- about 99% in blossoms, disperses after petal fall
- larvae slender, cigar shaped; pale yellowish to white, slow moving; spines or hairs visible with hand lens
- adults relatively sluggish; abdomen straight, cigar-shaped; straw colored or dark brown
Seasonal Biology

- Navel Orange
- Up to 8 generations per year
- First appear in March
- May/June (small fruit) critical in citrus
- 3rd generation begins around June 1
- Multiple pesticide applications in non-bearing citrus
Average number of citrus thrips per beat sample

Average number of citrus thrips per yellow sticky cards
Notes:
- Samples taken in the canopy
- Probably miss the entire first, and possibly second generations on the suckers from March through May
- In the upper canopy by mid June
- Natural cycling out by late September (no more egg hatch)
- Populations crash by mid October
Effects of using tunnels on thrips densities in the spring

![Graph showing thrips densities over time with different symbols and error bars]
Damage to blueberries

• Do not appear to directly damage fruit
  – Down on suckers, not near fruit
• Feed on new flush
  all summer
  – Shoot stunting
  – Leaf deformation
  – Shortened internodes
  – Stem scarring
  – Varies by variety
Damage to blueberries
Beat samples

• 10 shoots per sampling area
• Sample most sensitive variety
• Select top 6-8 inches of new flush
• Choose new shoots with few laterals
  – Make sure terminal is alive (try to standardize sampling)
• Beat onto a black acrylic card
  – Also clipboard, notepad, your hand
• Count thrips
  – On hot days, count adults quickly, then nymphs
  – Best if done in the morning
  – Problematic when fruit is present
    • Solution could be to sample suckers
Star, Wonderful, particularly susceptible. Advisable to avoid these varieties. Mechanism of selectivity not known.
High pressure water

![Graph showing the effect of high pressure water on thrips per beat]

- **Success**
- **Water**
- **Water/Ecotrol**
- **Untreated**

Legend:
- *ns* indicates non-significant differences.

- **a, b, c** indicate significant differences among treatments at different time points.
High pressure water

![Graph showing the average number of thrips per beat sample over time. The graph compares Adult, Nymph, and Total samples treated with Success, Water, and Untreated conditions. The x-axis represents dates from 17-Aug to 4-Sep, and the y-axis represents the average number of thrips per beat sample.]
Biological Control

• None naturally occurring
• Insectary
  – Pred mites
  – Generalists
• Entomopathogens
  – *Beauveria* being investigated
  – Pathogen of pupal stage in soil

![Graph showing infection rates]

- Infection rates over different distances from the plant base.
- Highest infection rates near the plant base (0cm).
- Lower infection rates at 0.1 - 12.7cm and 12.8 - 25.4cm from the plant base.
- Pupated on plant shows lowest infection rates.

n=231
Damage Treatment Thresholds

So… how serious of an issue is this?
August 2007
- Thrips at/past threshold on Aug, 1
- Not treated for 1 month
- Measured thrips weekly
- Measured length of new growth

Spring 2007
- Evaluated yields and quality
Correlations between citrus thrips density in August and the amount of new flush growth in August for three blueberry varieties.

- **Misty** (diamonds) with an $R^2 = 0.8743$
- **Georgia** (squares) with an $R^2 = 0.6876$
- **Oneil** (triangles) with an $R^2 = 0.5506$
Shoot growth
and Thrips vs. Yield
(based on 240 plants = 1.5 million berries)

For every 10 thrips average for 1 month, 0.91 lb/plant reduction in yield (5.26%)
Control plots-
- 3.2 lb/plant reduction (18.4%)
- ~$16,000/acre in losses
Yield Studies Summary

• Impact
  – Reduced growth (2 yrs)
  – Reduced number of berries
  – Reduced yield per plant

• No impact
  – Size of berries
  – Quality of berries
  – Shift in harvest date
Conventional Insecticide Trial

![Graph showing thrips per beat sample over time for different insecticides.](image-url)
Conventional Insecticide Trial

![Graph showing thrips per beat sample over time for different insecticides.]
Conventional Insecticide Trial
Conventional Insecticide Trial

![Graph showing the effect of different insecticides on thrips population over time.](Image)

- **Carzol**
- **Success/Delegate**
- **3Movento**
- **2Assail**
- **2Novaluron**
- **VeratranD**
- **Lannate/Diazinon**
- **2Untreated**
New Shoot Growth (Star)

\[ y = -0.1586x + 5.9812 \]

\[ R^2 = 0.5129 \]
Treatment Program Summary

• Don’t worry until harvest is over
• Monitor, treat at about 20 thrips per beat sample
• Success/Delegate
• Follow up with Movento (June? Reg,) ~2-3 wks later
• Alternate with Assail, Veratran D (NR?)
• In the clear by late September
Other Insect Pests

White Grubs
Pacific Flatheaded Borer
White Grubs (Chafers)

- May beetle, scarab, chafer, white grub, June bug, etc.
- C-shaped grub
- Brown adult (attracted to lights in the summer)
- One generation per year
- Highly polyphagus
Grub biology

- Adults present during the summer (June? to July?)
- Lay eggs on soil surface
  - Attracted to organic matter
- Grub emerges, feeds through the fall
  - Numerous host plants
  - Usually feed on feeder roots
- Overwinters as large grub
- Pupates in the spring
- Emerges as an adult
Management

• Biological Control
  – Nematodes
    • *Heterorhabditis bacteriophora*
    • *Steinernema carpocapsae*
    • Timing?, Heat/moisture sensitivity issues

• Insecticides
  – Imidacloprid (Admire)
  – Diazinon
  – Timing likely best in ~August when grubs are small
Pacific Flatheaded Borer

- Adults emerge April-July
- Lay eggs on bark
  - Usually weak or sunburned areas
- Feed within wood
- One generation per year
Pacific Flatheaded Borer

Management

• Insecticides ineffective in most crops
• Pruning
• Destroy prunings
• Sunburn prevention
  – White wash or paint
  – Avoid summer pruning