

SEMINAR — SERIES —

BIOLOGICAL CONTROL IN AVOCADOS



JIM DAVIS | Entomological Services, Inc.

The use of biological organisms to suppress pests









- The use of biological organisms to suppress pests
- **×** Predatory and parasitic insects









- The use of biological organisms to suppress pests
- **×** Predatory and parasitic insects
- × Pathogens of the pest









- The use of biological organisms to suppress pests
- **×** Predatory and parasitic insects
- **×** Pathogens of the pest
- Herbivorous insects for weed control









TYPES OF IMPLEMENTATION

× Classical



TYPES OF IMPLEMENTATION

× Classical

× Augmentation



TYPES OF IMPLEMENTATION

- × Classical
- × Augmentation
- × Conservation





× New pest is discovered







- × New pest is discovered
- Researchers look for pest's country of origin





- × New pest is discovered
- Researchers look for pest's country of origin
- × Begin search for natural enemies







- × New pest is discovered
- Researchers look for pest's country of origin
- × Begin search for natural enemies
- × Ship live natural enemies to quarantine

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- × New pest is discovered
- Researchers look for pest's country of origin
- × Begin search for natural enemies
- × Ship live natural enemies to quarantine
- × Study these candidates for possible negative impacts







- × New pest is discovered
- × Researchers look for pest's country of origin
- × Begin search for natural enemies
- × Ship live natural enemies to quarantine
- × Study these candidates for possible negative impacts
- If okay, release natural enemies into the area where the new pest has established









 Mass rear and release Biological Control Agents (BCAs)





- Mass rear and release Biological Control Agents (BCAs)
- × Cost
- × Timing
- × Evaluation





× Actions that preserve or enhance BCAs





- × Actions that preserve or enhance BCAs
- × Use soft pesticides if needed
- × Alternate row pruning
- × Provide floral resources





× Predators





× Predators

These insects eat multiple prey over the course of their lives





× Predators

These insects eat multiple prey over the course of their lives

Senerally fast moving, spend much time searching for prey







Ladybugs

Examples of Predators



Lacewings



Hoverflies



Praying mantis

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Predatory thrips



Predatory mites



Insects that consume only one prey to reach adulthood







Insects that consume only one prey to reach adulthood

× Endoparasites







- Insects that consume only one prey to reach adulthood
- × Endoparasites
- × Ectoparasites





Parasitoids



Lysiphlebus





Encarsia





Tamarixia





Microorganisms that cause disease in pests







Microorganisms that cause disease in pests

× Fungi that eat insects





Microorganisms that cause disease in pests

- × Fungi that eat insects
- × Viral and bacterial diseases of insects
- × Protozoan pathogens (Nosema)



PATHOGENS



- Microorganisms that cause disease in pests
- × Fungi that eat insects

PATHOGENS

- Viral and bacterial diseases of insects
- × Protozoan pathogens (Nosema)

Rust in nutsedge

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× Lacewings for Avocado Thrips





- **×** Lacewings for Avocado Thrips
- × N. californicus for Persea Mite





- × Lacewings for Avocado Thrips
- × N. californicus for Persea Mite
- **×** *Trichogramma* for Looper and *Amorbia*







- x Lacewings for Avocado Thrips
- **×** Release rates:
- × 10 to 20,000 / acre







- × Lacewings for Avocado Thrips
- × Release rates:
- × 10 to 20,000 / acre
- × Release methods:
- × Hang squares







- x Lacewings for Avocado Thrips
- × Release rates:
- × 10 to 20,000 / acre
- × Release methods:
- × Hang squares
- × Blower / sprayer







- × N. californicus for Persea Mite
- **×** Release rates:
- × 10,000 / acre +





- × N. californicus for Persea Mite
- **×** Release rates:
- × 10,000 / acre +
- × Release timing:
- × When pest is beginning





- × N. californicus for Persea Mite
- **×** Release rates:
- × 10,000 / acre +
- × Release timing:
- × When pest is beginning





- × N. californicus for Persea Mite
- **×** Release rates:
- × 10,000 / acre +
- × Release timing:

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- × When pest is beginning
- × Application methods



- × Trichogramma for Looper and Amorbia
- × Release rate:
- × 100,000 / acre +





- × Trichogramma for Looper and Amorbia
- × Release rate:
- × 100,000 / acre +
- × Release timing:
- × Over 250 / trap / week







- × Trichogramma for Looper and Amorbia
- × Release rate:
- × 100,000 / acre +
- × Release timing:
- × Over 250 / trap / week
- × Release method:
- × Hang squares





BCAS IN YOUR IPM PLAN × Considerations:





- **×** Considerations:
- × Pesticide residues





- × Considerations:
- × Pesticide residues
- × Future pesticide use





- **×** Considerations:
- × Pesticide residues
- × Future pesticide use
- × Efficacy





- **×** Considerations:
- × Pesticide residues
- × Future pesticide use
- × Efficacy
- × Risk





- **×** Considerations:
- × Pesticide residues
- × Future pesticide use
- × Efficacy
- × Risk
- × Timing





- × Considerations:
- × Pesticide residues
- × Future pesticide use
- × Efficacy
- × Risk
- × Timing
- × Logistics





Biological control agents can effectively control important pests of avocados



SUMMARY



Biological control agents can effectively control important pests of avocados

SUMMARY

 Plan ahead and work with experienced professionals

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