

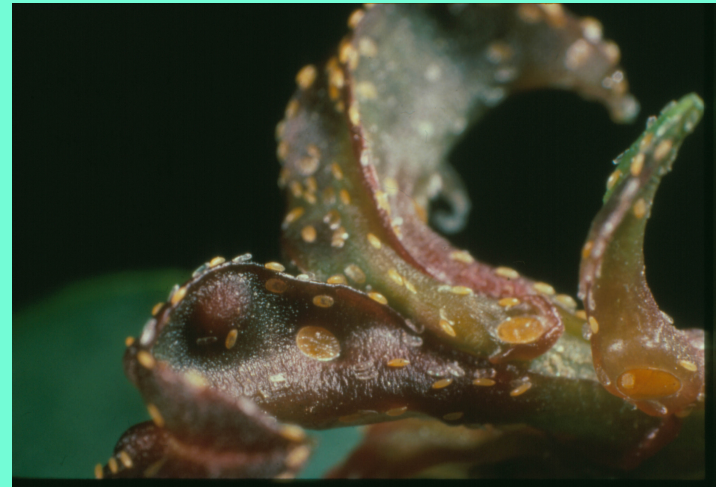
Management of Invasive Species in Landscapes

T.D. Paine, Department of Entomology, UC Riverside



Specialist Insects That Impact Specific Plants

- Established pests can be managed with conventional IPM
- New introductions may require different approaches, depending on type of damage and extent of the infestation



Invasive Threats - Pine

- *Tomicus ligniperda*: Pine Shoot Beetle – Introduced from Europe into North American Great Lakes region, but not in California, yet.



Invasive Threats - Pine

- *Sirex noctilio*:
Woodwasp - in North America, but not in California
- Introduces a pathogenic fungus into trees
- Tree dies and becomes suitable for larval development



Pine

- Maintain tree vigor
- Some success with barrier sprays of insecticides
- May be some of the new systemic materials that can be effective if will contact the insect
- New technologies being tested for application of anti-aggregation pheromones



Invasive Threats - Elm*

Banded Elm Bark Beetle

Scolytus schevyrewi



Eucalyptus

Beetles

Snout Weevil – *Gonipterus scutellatus*

Leaf Beetles – *Trachymela sloanei* and *Chrysopharta m-fuscum*

Longhorned Borers –
Phoracantha semipunctata
and *Phoracantha recurva*

Biological Control



Eucalyptus

Psyllids

Glycaspis brimblecombei,
redgum lerp psyllid

Eucalyptolyma maidenii
spotted gum lerp psyllid

Cryptoneossa triangula
lemon gum psyllid

Biological Control



New Pests and Old Problems

- New vector – aggravate the problem
- Glassy-winged Sharpshooter



UC Statewide IPM Project
© 2000 Regents, University of California

New Pests and Old Problems

New vector – create
new problem

Oleander Leaf Scorch

Olive Leaf Scorch

Liquidamber



UC Statewide IPM Project
© 2000 Regents, University of California

New Pests and New Problems

New vector – create
new problem
Oleander Leaf Scorch
Olive Leaf Scorch
Liquidamber



New Problems in Olive
Olive Psyllid: *Euphyllura olivina*
San Diego and Orange Counties
Olive Fruit Fly

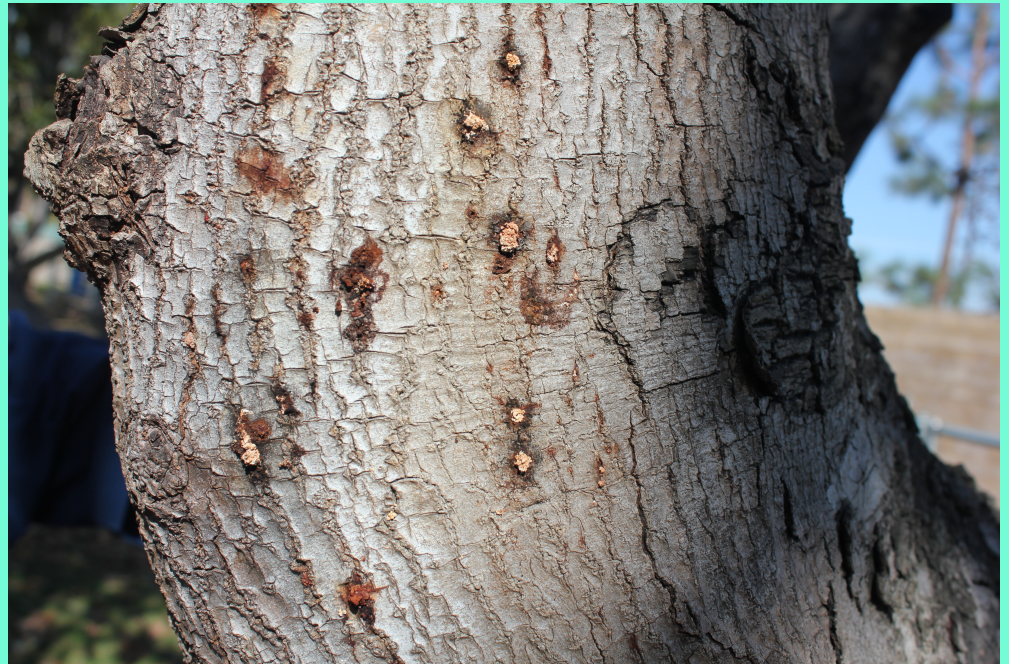
New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



Beneath the Bark



Strategies to Limit Movement and Tactics for Management

- Routes of facilitated movement – identification and reduction
- Previous efforts with similar species – where are the successes



Trapping

- Assess population activity and relative abundance
- Trap design – purple prism, multiple funnel, yellow card
- Attractive lures ?



Cultural Control and Sanitation

- Tree removal
- Treatment of slash and debris
- Chipping or grinding
- Solarization and composting
- Firewood movement



Cultural Control and Sanitation

- Tree removal
- Treatment of slash and debris
- Chipping or grinding
- Solarization and composting
- Firewood movement



Joseph O'Brien, USDA Forest Service, Bugwood.org

Chemical Control

- Insecticides and bark beetles – getting the material to the target
- Systemic insecticides – new materials and delivery, injections or drenches
- Contact insecticides – barrier sprays
- Value of trees and cost of treatments



UC Statewide IPM Project
© 2000 Regents, University of California

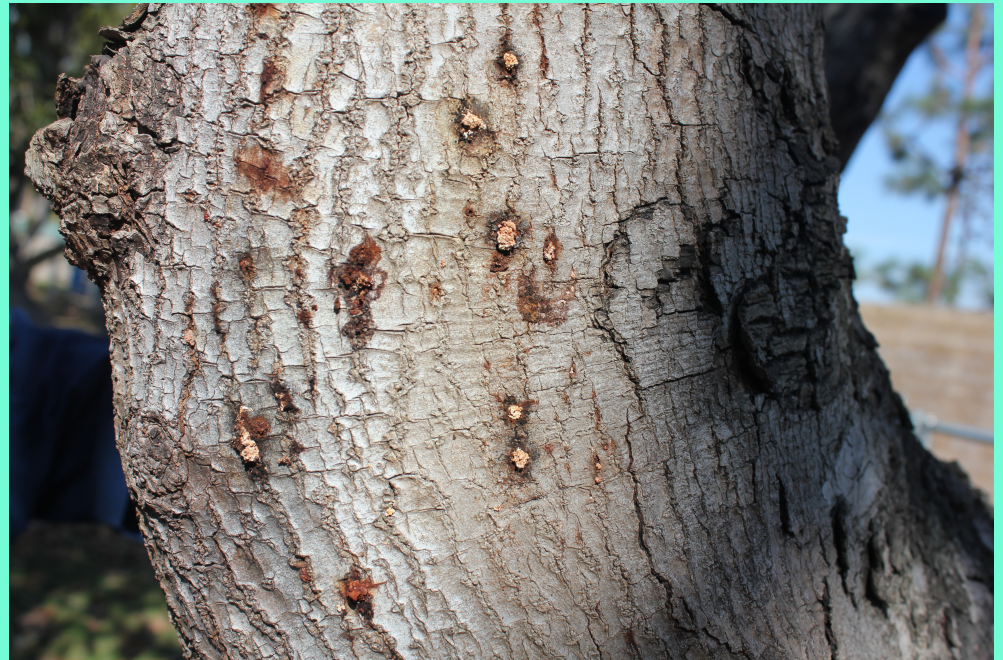
Biological Control

- Native natural enemies shifting to a polyphagous invasive species
- Potential for introduced natural enemies
- Biological control of fungal associates
- Entomopathogenic fungi



Research and Implementation

- New species and new environment
- Start with the experience of others – related species or different environments
- Adapting methods to the California conditions and California stakeholders



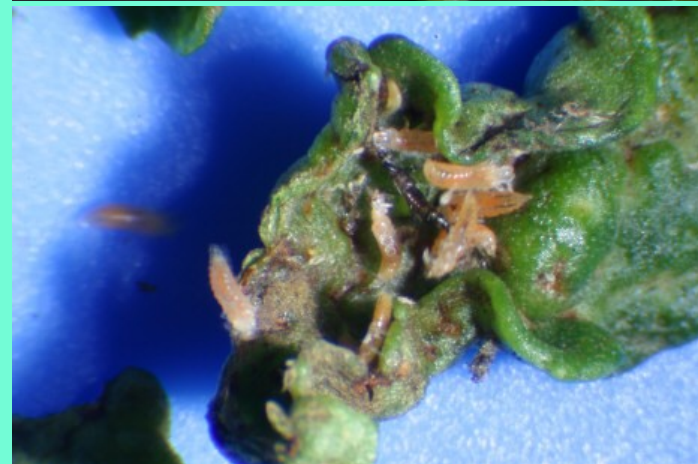
New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- **Diaprepes root weevil**
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



[Gevork Arakelia](#)

New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- **Asian citrus psyllid**
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- **Asian Woolly Hackberry Aphid**
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



UC Statewide IPM Program
© 2002 Regents, University of California



UC Statewide IPM Program
© 2002 Regents, University of California

New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- **Walnut twig beetle**
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests in New Systems

- *Josephiella*
- Tea* shot hole borer
- Diaprepes root weevil
- Myoporum thrips
- Tipu psyllid
- Asian citrus psyllid
- Asian Woolly Hackberry Aphid
- Goldspotted oak borer
- Walnut twig beetle
- Spotted wing Drosophila
- Blue gum gall wasp



New Pests on Horizon

- Erythrina gall wasp
- Redbay ambrosia beetle
- Eucalyptus gall wasps
- Wood borers



New Pests on Horizon

- Erythrina gall wasp
- Redbay ambrosia beetle
- Eucalyptus gall wasps
- Wood borers



New Pests on Horizon

- Erythrina gall wasp
- Redbay ambrosia beetle
- Eucalyptus gall wasps
- Wood borers



New Pests on Horizon

- Erythrina gall wasp
- Redbay ambrosia beetle
- Eucalyptus gall wasps
- Wood borers



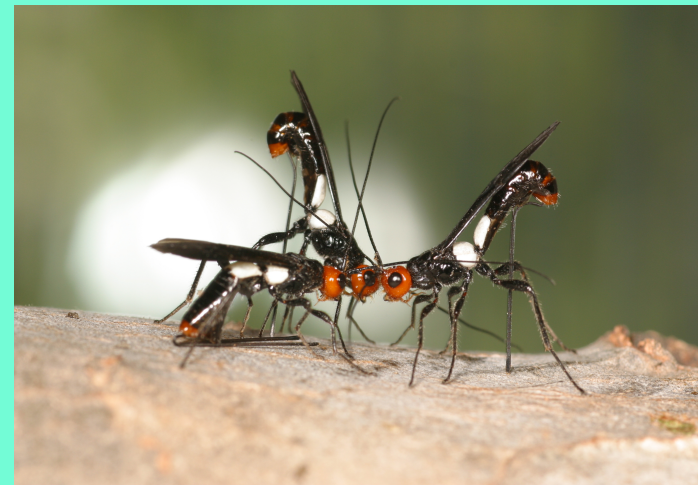
Impact on Pest Management

- Why are invasive species often such damaging pests?
- Escape from natural controls – environmental and biological



Impact on Pest Management

- Damage to species or systems that were previously pest free
- Confound an existing IPM program
- Resolve conflicts between short term protection and long term management



Observe and Report

- Constant introduction of new pests
- Need to know when they arrive and where they are found as soon as possible – plea for information
- Research can be initiated to provide management options

