



**Invasive Pests Now
and On the Horizon**

58th Lodi Grape Day

2 February 2010
Paul S. Verdegaal

Invasive Species

- "Invasive species" is a phrase with several definitions. The first definition expresses the phrase in terms of non-indigenous species (e.g. plants or animals) that adversely affect the habitats they invade economically, environmentally or ecologically. It has been used in this sense by government organizations as well as conservation groups

Exotic Pest

- Exotic pests are organisms that are introduced into an area beyond their natural range and become pests in the new environment. They are also referred to as alien, non-native, or introduced pests. Most introductions have been unintentional and accidental. Having evolved in a different ecosystem, these non-native species may have few natural enemies in their new locations, which can often lead to population increases that can overwhelm native species by out-competing them for resources (e.g., food, water, light, space).

Pest vs Pets



Invasive Species

- Insects
- Mites
- Diseases
- Plants
- Vertebrates
- Mammals
- Birds
- Aquatic
- Invertebrates

Introduction and Movement

- Equipment
- Planting Materials
- Biological Vectors
 - Animals
 - Birds
 - Invertebrates
- Self Mobility
- Produce
- Transportation Systems
- Flooding , Waterways, Wind

Cultural Practices

- Cultivation versus Non-Cultivation
- Irrigation Management
- More specific mode of action chemicals
- Weed Management vs Total Control
- Changing Varieties



Integrated Pest Management Principles

- Pest Identification
- Regular Monitoring & Population Assessment
- Control action Guidelines
- Problem Prevention (Early vs Late)
- Integrating Methods (“least disruptive”)

79 Grape Pests Listed

Minor pest is one that doesn't occur in your vineyard.

Major pest are all others.

Mostly diseases, insects and mites.

Also can include nematodes and vertebrates such as birds voles and coyotes.

Weeds (dozens to hundreds)

Grape Pest Management ANR Publication 3343

Weeds of California and the Western states ANR Publication 3488

Short List of Past Invasive Species

- Phylloxera
- Omnivorous Leaf Roller OLR
- Western Grape Leaf Skeletonizer WGLS
- Variegated Leaf Hopper VLH
- Argentine Ants
- Grape Leaf Roll associated Virus GLRaV
- Grape Fan Leaf Virus GFLV
- Starlings
- Many Weeds

Recent Arrivals and New Threats

- Variegated Leaf Hopper VLH 1988
- Glassy Wing Sharp Shooter GWSS 1990
- Western Grape Leaf Skeletonizer WGLS 1993
- Vine Mealybug VMB 1998-2000
- Spotted Wing Drosophila SWD 2009
- European Grape Vine Moth EGVM 2009
- Red Imported Fire Ant RIFA 2007

Vine Mealybug VMB

- Looks similar to other mealybugs
- More severe damage
- Later in the season
- Predator /Parasites lacking
- Some available chemical controls
 - Under scrutiny
 - Restricted
 - Costly Alternatives
 - New alternatives under scrutiny already

VMB vs Grape Mealybug



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Parasitism Impacts Infestation





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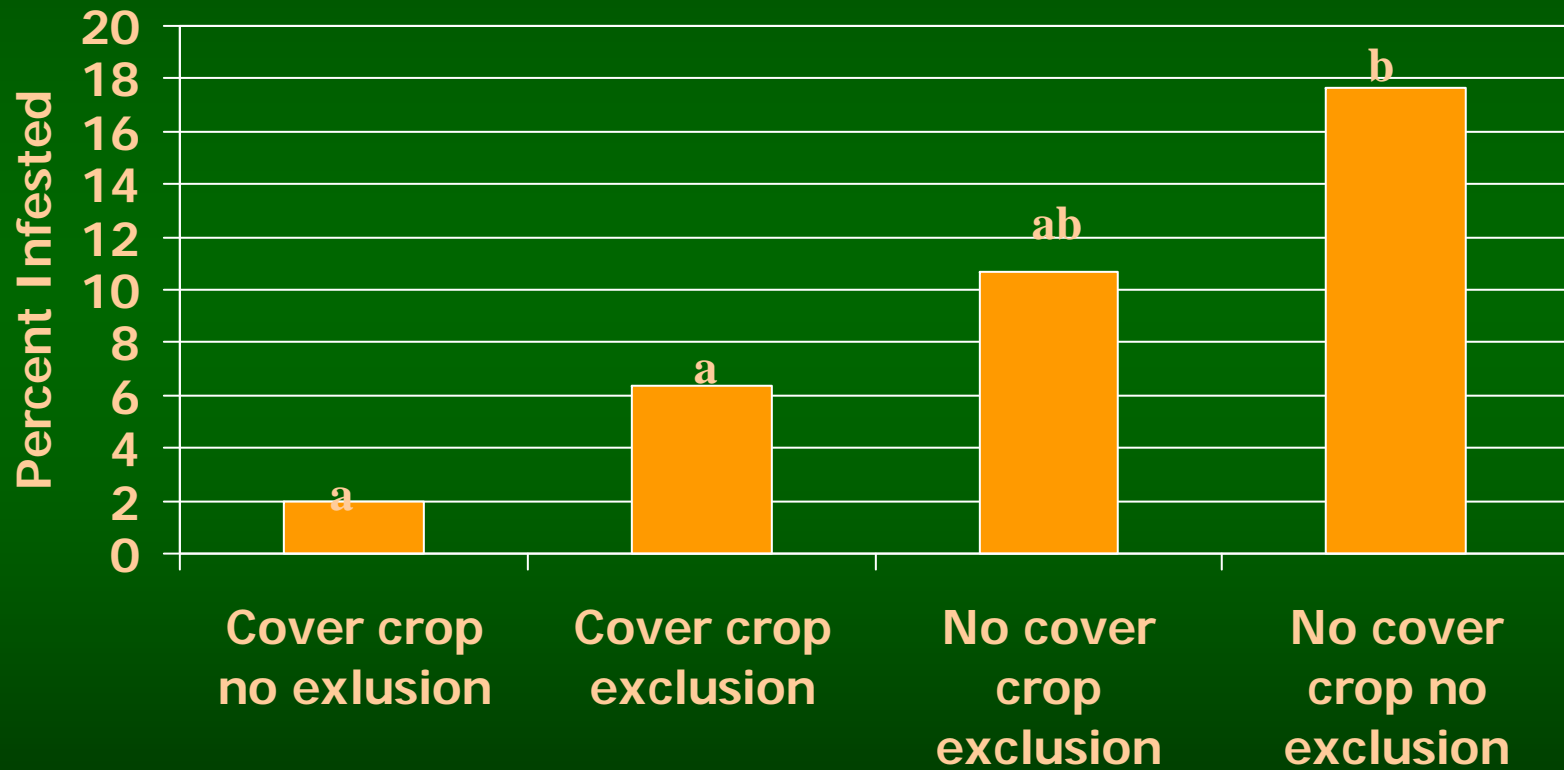
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Why Bother To Try

“An ounce of prevention is worth a pound of cure”.

- Costs
- Regulations
- Secondary problems (vectors for other problems)
- Resistance Management

Percent Infested Clusters, September, 1999



Gill's Mealybug



El Dorado grapes & Central Valley nut crops

Light Brown Apple Moth LBAM

- Wide range of hosts and crops
- Highly regulated response required
- Controversy and passion against control
- Actual damage and loss is possible, but manageable



LBAM



EGVM

European Grape Vine Moth EGVM

- Most recent finds in north coast
- Very similar to OLR or Orange Tortrix
- May move easily with equipment?
- May be potentially damaging
- May require more cost (prevention control)
- Many unknowns

Spotted Wing Drosophila SWD

- Extremely rapid spread
- Unregulated movement (non-quarantine)
- Wide range of crops
- Potential damage moderate to high
- Control possible ,but costly
- Limited alternative materials
- Many unknowns yet



SWD female



Glassywinged sharpshooter, *Homalodisca coagulata*



GWSS versus GLH and VLH



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Red Imported Fire Ant RIFA

- Not directly associated with vineyards
- Mostly moved by equipment, vehicles and often with bee hives.
- Damage from huge colony mounds
- Danger to people and animals
- Extremely difficult (and expensive) to control, as with all ants

RIFA



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4-6 in

12-18 in



Southern Fire Ant

Red Imported Fire Ant

Plants as Weeds

- Troublesome
 - Competitive (Years 1 through 3 or Old Vines)
 - Potential hosts
 - GWSS
 - VMB
 - Voles and Gophers
 - Hindrance
- Noxious
- Invasive

737 Plant Species Listed *



*Weeds of California and Other Western States

Particular Difficulties of Weeds

- No Thresholds
- Long term carryover
- Alternative materials costly
- Soil environment almost as restricted as water ways
- Hosts for vectors; diseases; vertebrates
- Fire hazards

Weed Management Keys

- Prevention most important
- Materials choice and rotation very important
- Monitor in fall and spring
- In season management need with drip systems

Yellow Star Thistle

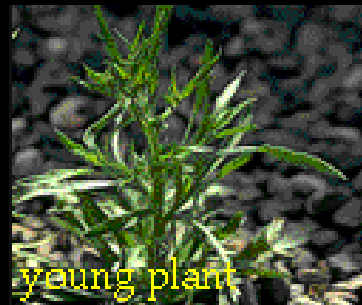




mature plant



flower heads

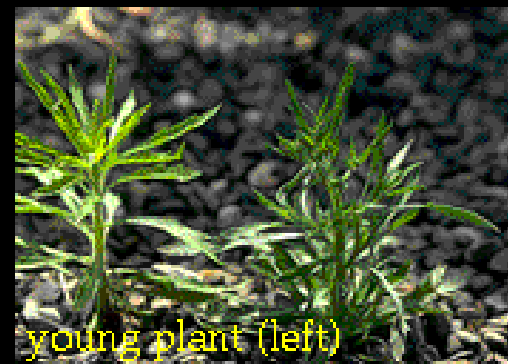


young plant

Fleabane



seedling



young plant (left)



mature plant

Mare's Tail

New Appearance of Old Culprits

- Mare's Tail e
- Flax leaf Fleabane
- Paniced willow herb n
- Fringed leaf willow herb
- Yellow Star Thistle
- Velvet leaf n
- Anoda cristata?
- Puncture vine

- Fitch's Spike Weed n
- Sandbur, longspined (native)

Yellow Nutsedge



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Long spine sandbur



Puncture vine

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Survey Considerations

- Late fall/Winter
- Monitor before any cultivation
- Perennials need more attention
- Check “wet spots” separate from general areas
- Check headlands and ‘nature’ areas, especially up wind
- Keep a record of weeds present
- Diagram/map/GPS of problems areas; helpful for perennials

Learn the Good Guys

Assassin Bug



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Damsel bug



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Big Eye Bug



Pirate Bug

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Green Lacewing

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Minute Pirate Bug

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Soldier beetle



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Syrphid fly



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Predaceous Ground Beetles



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- UC Integrated Pest Management
- <http://www.ipm.ucdavis.edu/EXOTIC/lightbrownapplemoth.html>
- Vine Mealybug
- <http://vinemealybug.uckac.edu/VMB.htm>
- Spotted wing Drosophila Fly
- <http://www.ipm.ucdavis.edu/EXOTIC/drosophila.html>
- European Grapevine Moth
- http://www.aphis.usda.gov/plant_health/plant_pest_info/pest_detection/downloads/pralbotranapra.pdf
- <http://www.ipm.ucdavis.edu/EXOTIC/eurograpevinemoth.html>
- Light Brown apple Moth
- http://www.cdfa.ca.gov/phpps/PDEP/lbam/lbam_main.html
- Invasive species Council of California
- <http://www.iscc.ca.gov/>
- National Invasive Species Center
- <http://www.invasivespeciesinfo.gov/unitedstates/ca.shtml>
- California Invasive Plant Council
- <http://www.cal-ipc.org/ip/inventory/index.php>
- Glassy winged sharp Shooter
- <http://news.ucanr.org/mediakits/gwsskit/gwsbrochure.pdf>
- UC Integrated Viticulture
- <http://iv.ucdavis.edu/>
- UCCE San Joaquin County
- <http://cesanjoaquin.ucdavis.edu/>

Summary

- Stay notified of updates and new information
- Train permanent employees to be on lookout
- Follow basic IPM practices
- Limit and monitor movement of equipment and people between blocks and ranches
- Maintain clean equipment
- Proactively manage riparian and nature areas
- Communicate with your neighbors
- Call UC Cooperative Extension or LWC or LDGGA

FOX COMPANY 2-10 AVN



PATHFINDERS





Land of the Free, Home of the Brave



*"You been
farming
long?"*

Invasive Pests

- "Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.
- "Alien species" means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

Vineyard Floor Management



Cultivated

Grass Perennial



Annual Incorporation

Chemical Control



Homoptera

- Grape Whitefly
- Three Cornered Alfalfa Hopper
- Scales



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Gray Field Ant Tending Mealybugs





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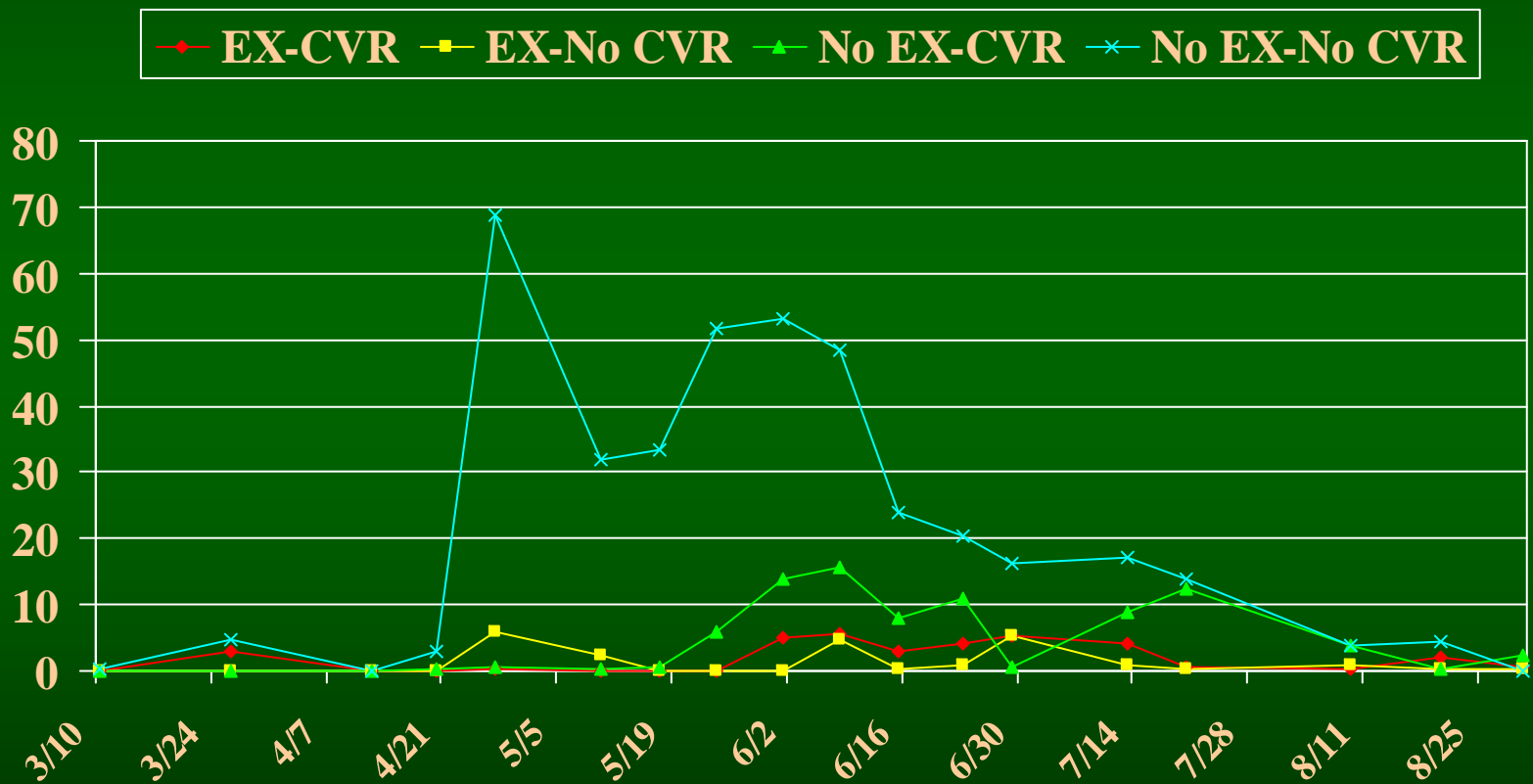
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Three cornered alfalfa hopper



- Aphids
- Minor Cicada
- Potato Leafhopper

Ant Counts on Vine



New and "Reduced Risk" Pesticides

- Intrepid
 - Methoxyfenozide an IGR, molting accelerator
- Avaunt
 - Indoxacarb causes feeding cessation
- Assail
 - Acetamiprid effective on sucking insects
- Calypso
 - Thiacloprid a neonicotinoid for sucking insects
- Diamond
 - Novaluron affects chitin synthesis



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Seeds



Seedling



Flower



Mature plant



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Summary

- Monitor and Identify Friend and Foe
- Allow or Don't Disrupt Biological
- Cultural Practices
- Use specific materials to target pest
- Time applications of more general materials
- Spot treat when possible