Mite Biology and Management

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CALIFORNIA Walnuts®
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Spider Mite Management in Walnuts

- Which spider mites are present in the different walnut growing regions?
- What predators are present and is there any evidence that they can control spider mites?
- Is *G. occidentalis* the dominant predator species, as in other tree crops in the western region?

Walnut Spider Mites

Web-spinning spider mites	Non web-spinning spider mites
Tetranychus urticae (Twospotted Mite)	*Panonychus ulmi* (European Red Mite)
Tetranychus pacificus (Pacific Mite)	
Tetranychus turkestani (Strawberry Mite)	

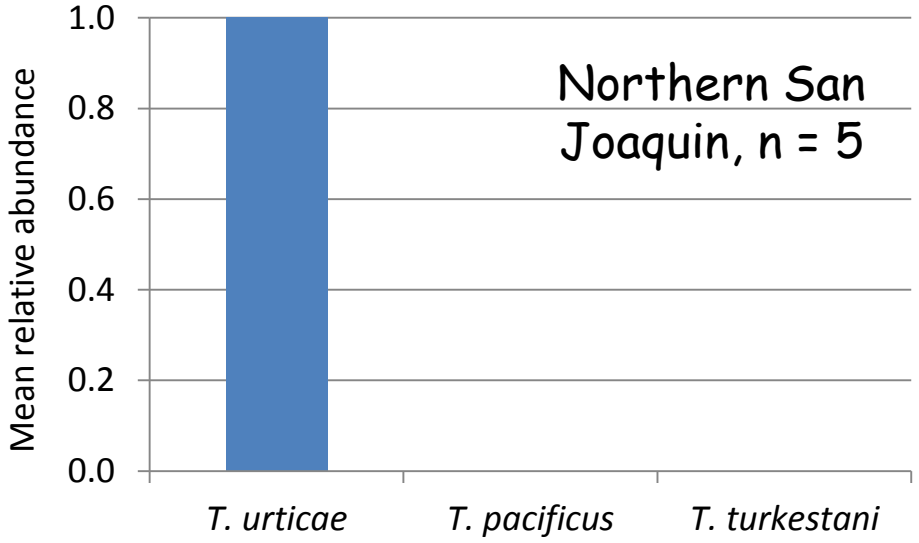
T. urticae

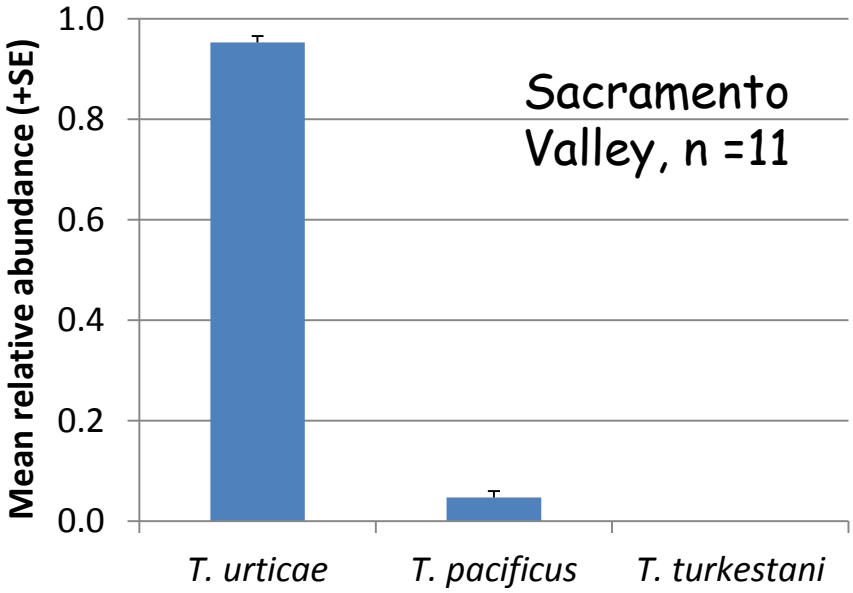
T. pacificus

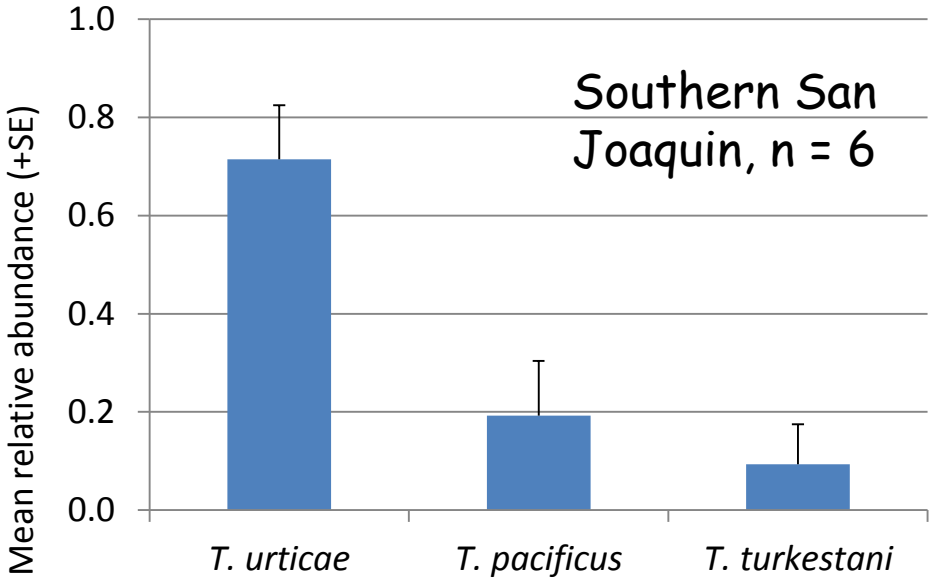
P. ulmi

Which *Tetranychus* Species in Walnuts?

- Data collected in 2012
- Season totals from 8 samples from Jun-Sep
- Orchard replication by region, n = 5-11







Spider Mite Predators

Predatory phytoseiid mites

Euseius stipulatus

Amblyseius similoides

Galendromus occidentalis

Insect predators

Stethorus picipes

Scolothrips sexmaculatus

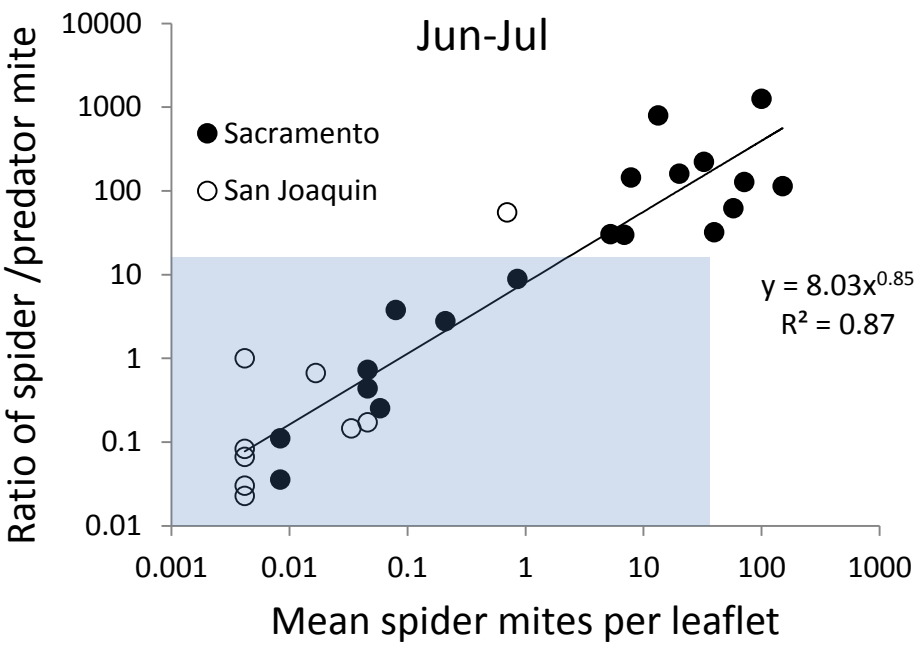
Which Phytoseiid Predators in Walnuts 2013-15?

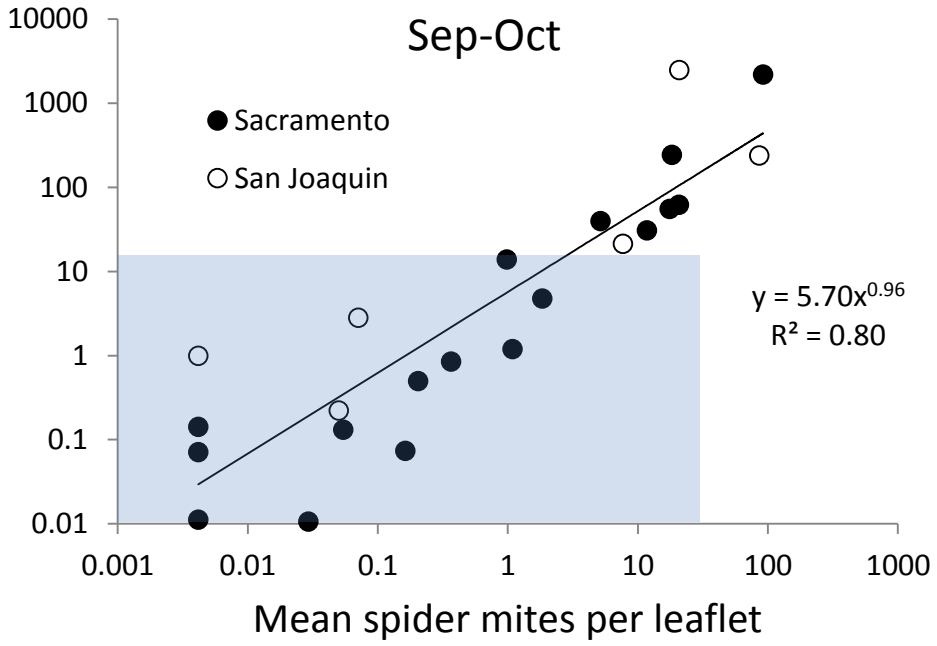
Type I - highly specific	Type II - broadly specific	Type III - generalist	Type IV - pollen feeders
Phytoseiulus persimilis	*Galendromus occidentalis*	*Amblyseius similoides*	*Euseius quetzali, E. stipulatus, E. tularensis*
	Neoseiulus californicus	*Metaseiulus citri, M. smithi*	
		Metaseius sp.	
		Neoseiulus barkeri	
		Typhlodromus caudiglans	

Most abundant species

Occasional species

Any Evidence for Spider Mite Control? Tetranychid and Phytoseiid Densities Early and Late Season 2015

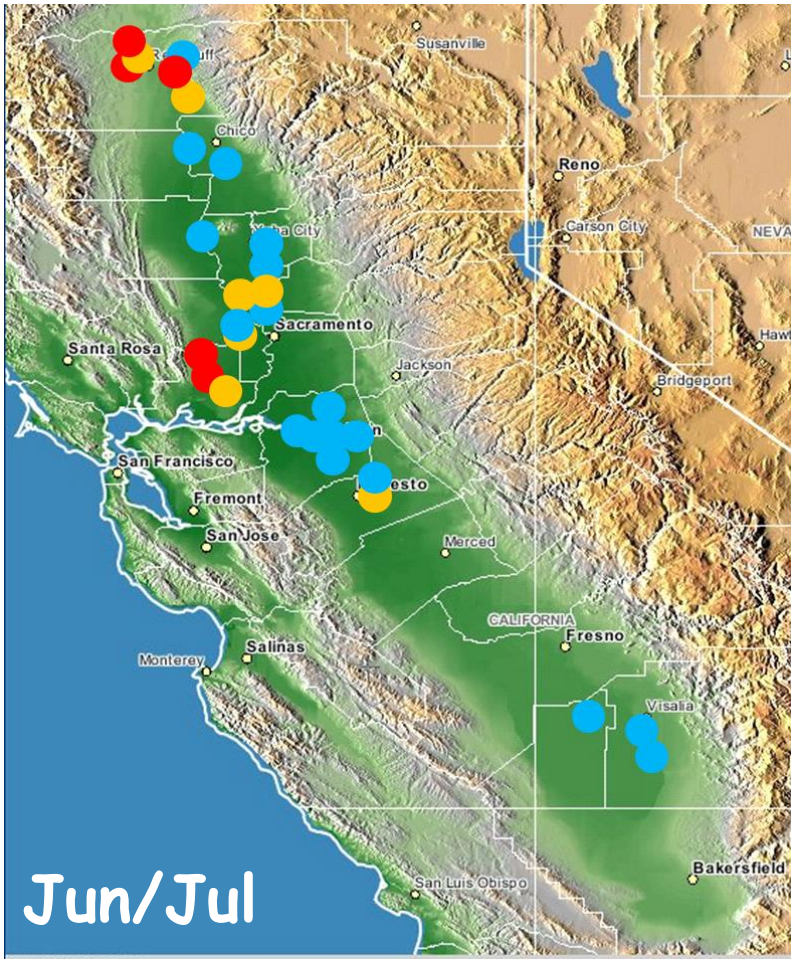


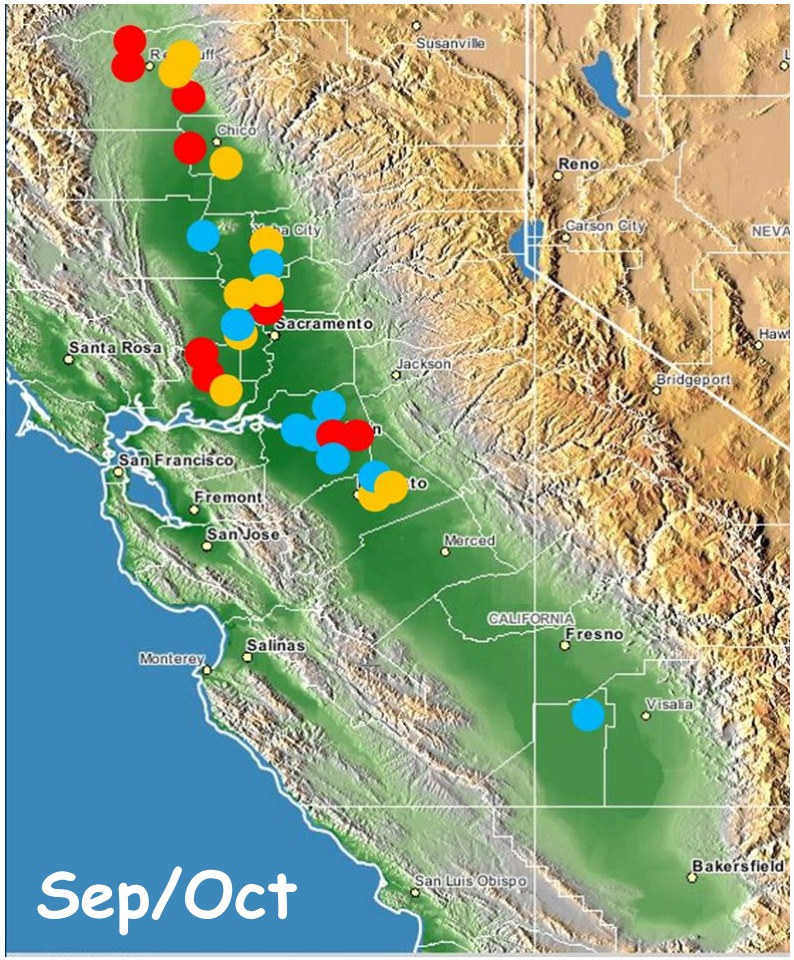


Blue shaded area defines:

1) Evidence of control - action threshold for *Tetranychus* (25/leaflet)
2) Limit to predation capacity of predatory mites (15 prey/ predator)

Is *Galendromus occidentalis* the Dominant Phytoseiid Predator?





Dominant lifestyle > 50% of individuals in the phytoseiid community:

Type II Type III Type IV

Why Isn't *Galendromus occidentalis* the Dominant Phytoseiid Predator?

- Walnut is so late to leaf out in spring that *G. occidentalis* are active before bud burst and can't find spider mites to feed on - disappearance followed by recolonization mid season

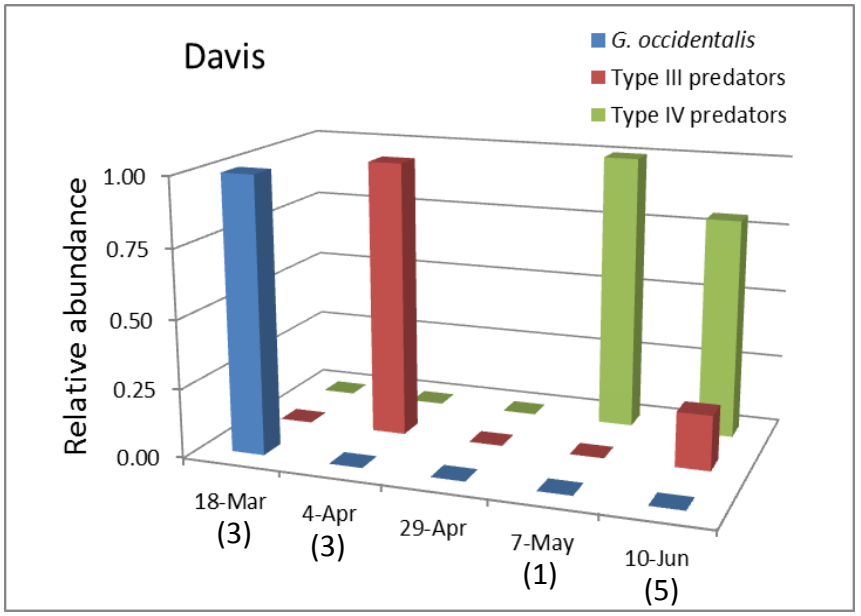
- Changes in pesticide use have created a less suitable environment for *G. occidentalis* – importance of selective materials

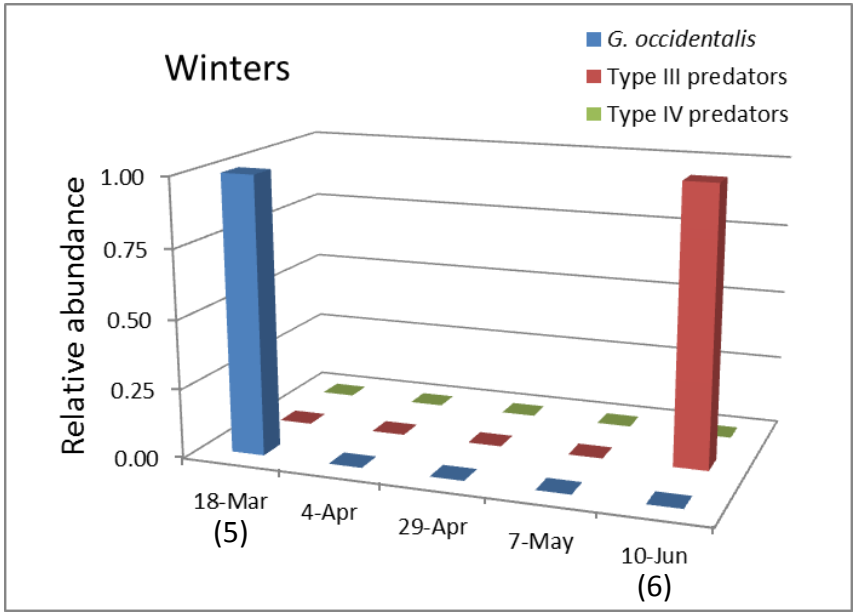
Overwintering Success of *G. occidentalis*

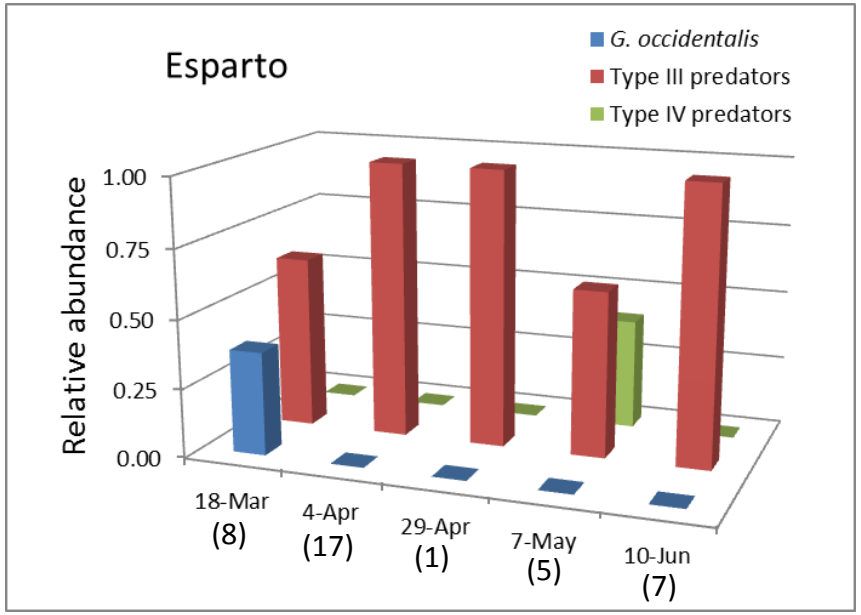
- Three orchards sampled from Mar-Jun in 2015 and 2016
- Four spurs (leaves after Jun 1) sampled from each of 20 trees in each orchard
- Spurs (leaves) searched visually for mites

Overwintering Success of Predators -Spring 2015

- *G. occidentalis* present in all three orchards before bud burst
- Only Type III and IV predators present after bud burst

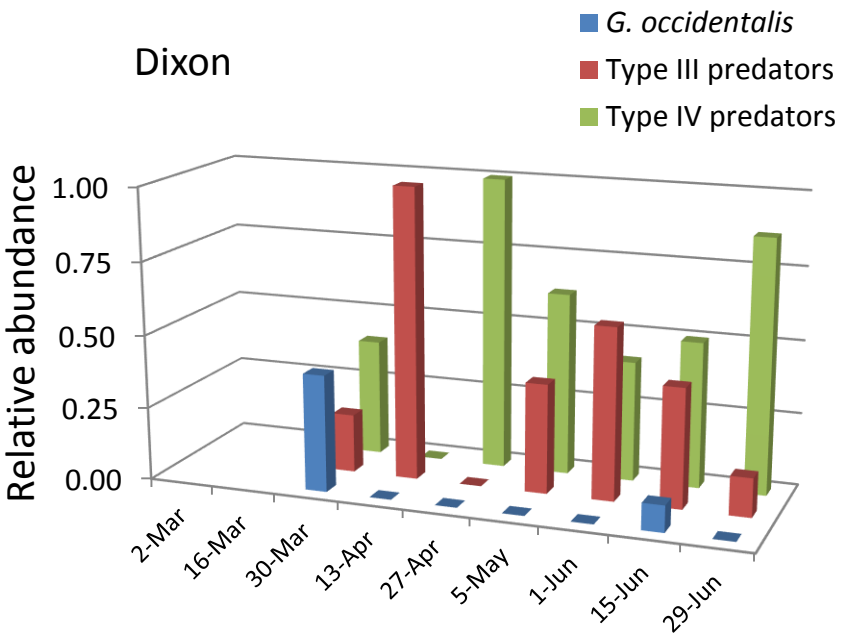


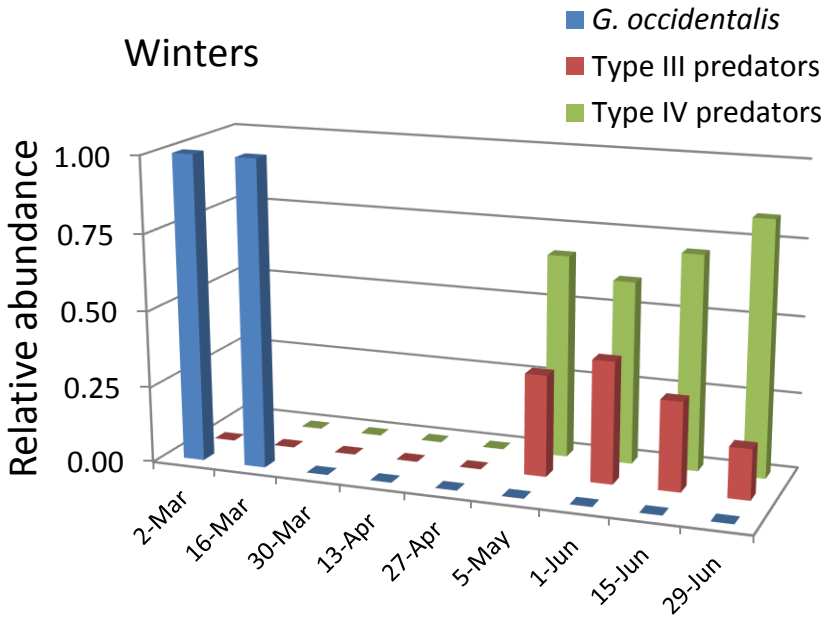


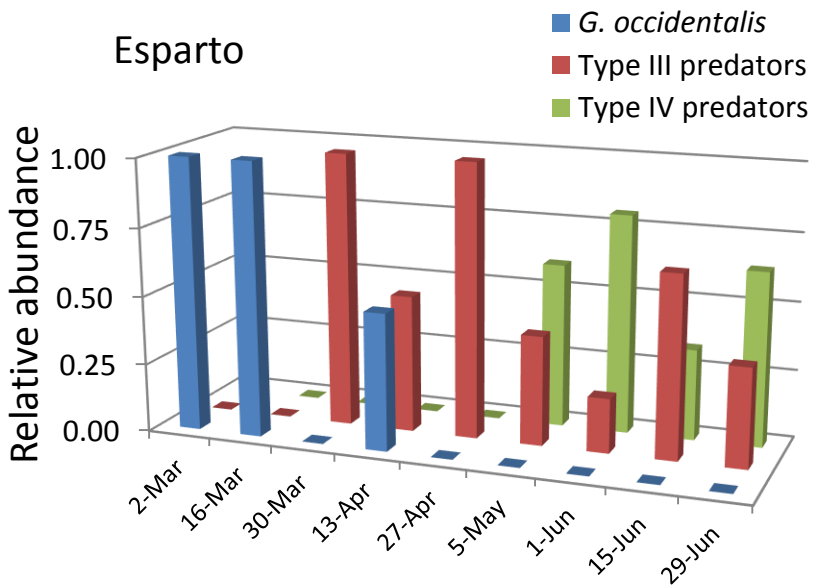


Overwintering Success of Predators -Spring 2016

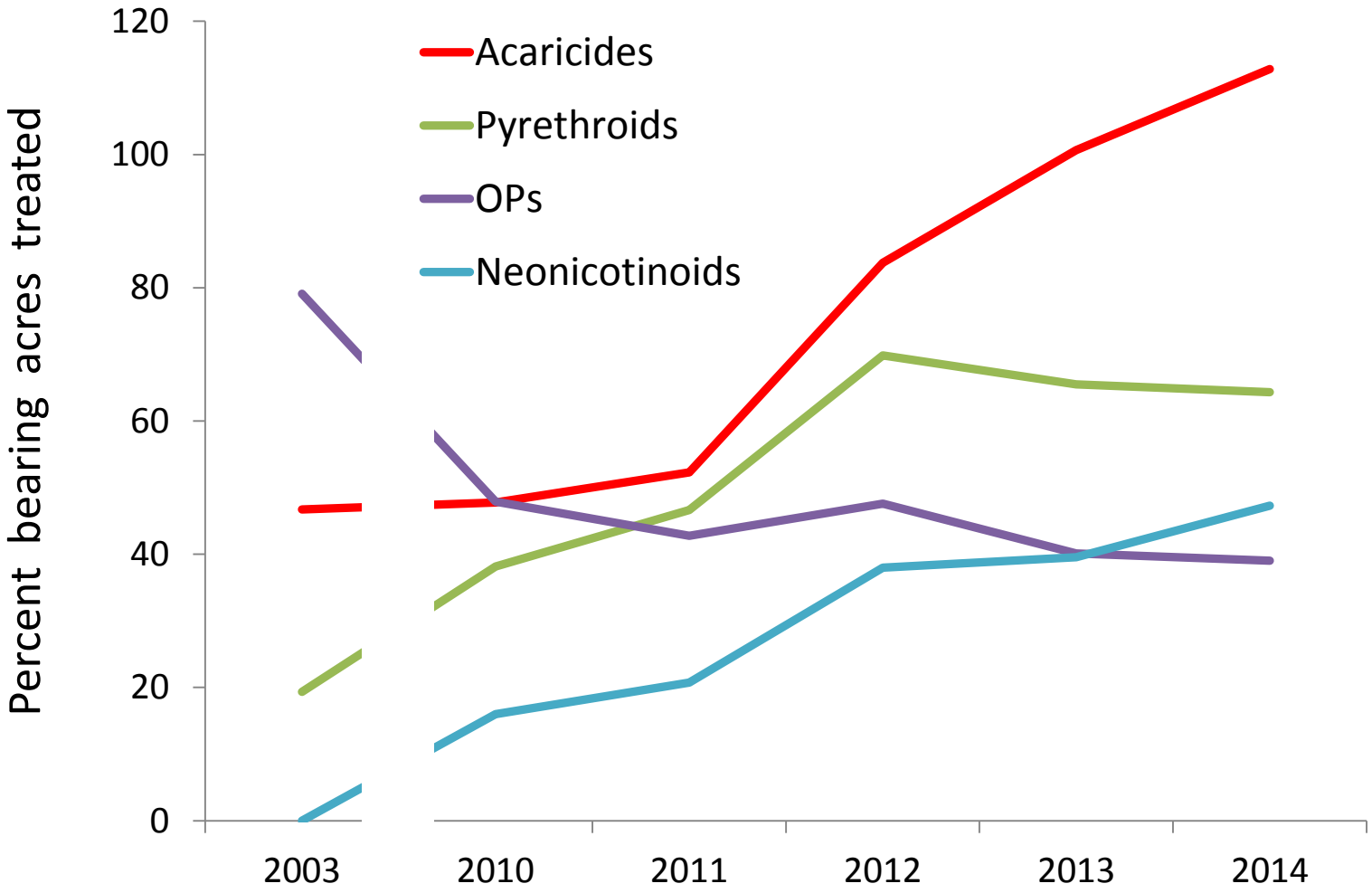
- Same pattern observed in the 2nd year
- Walnut orchards appear not to support *G. occidentalis* through early season



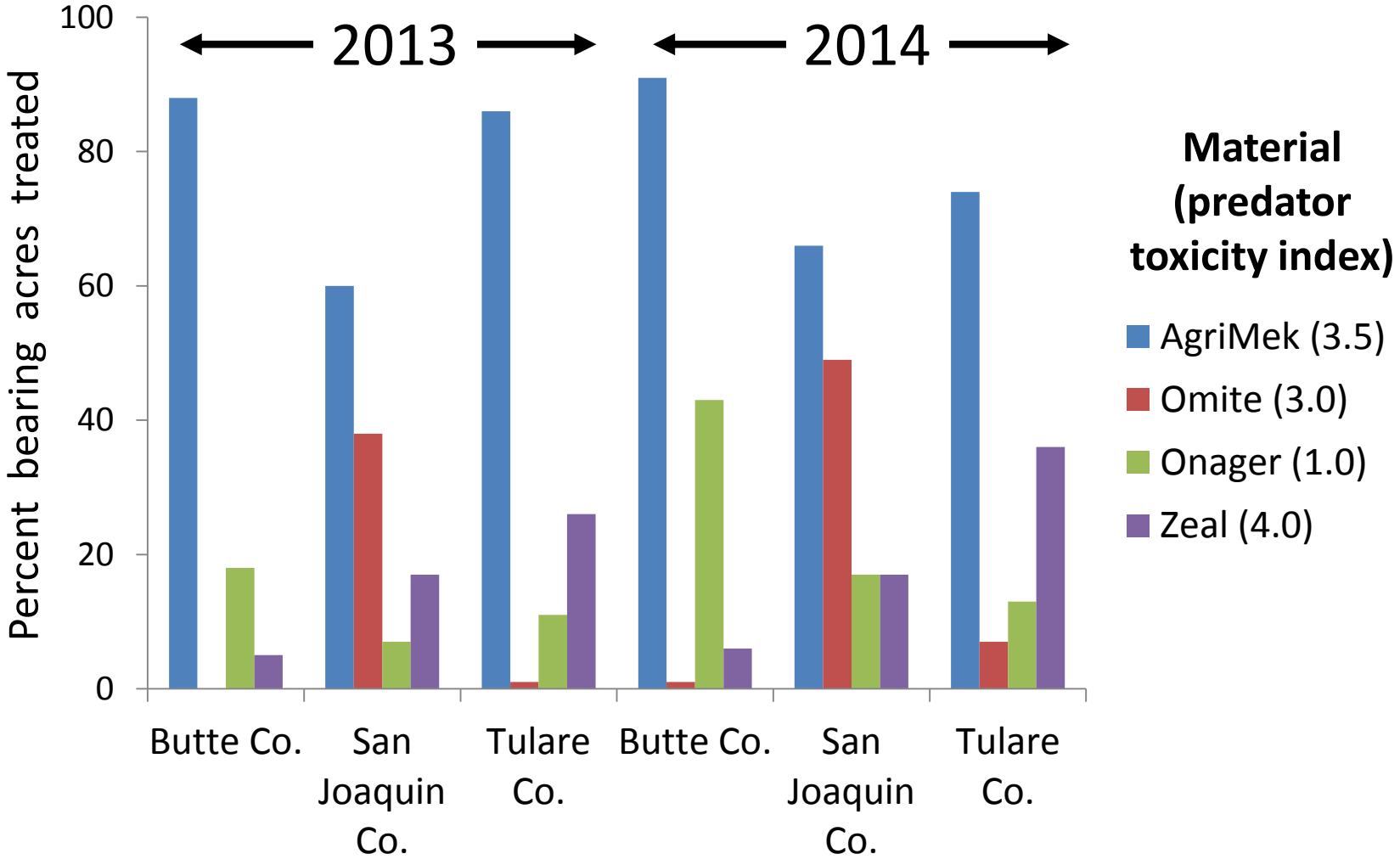




CDPR Pesticide Use Reports for Walnuts



CDPR Regional Acaricide Use in Walnuts



Acaricide Effects on Spider and Predator Mites Field Trial 2016

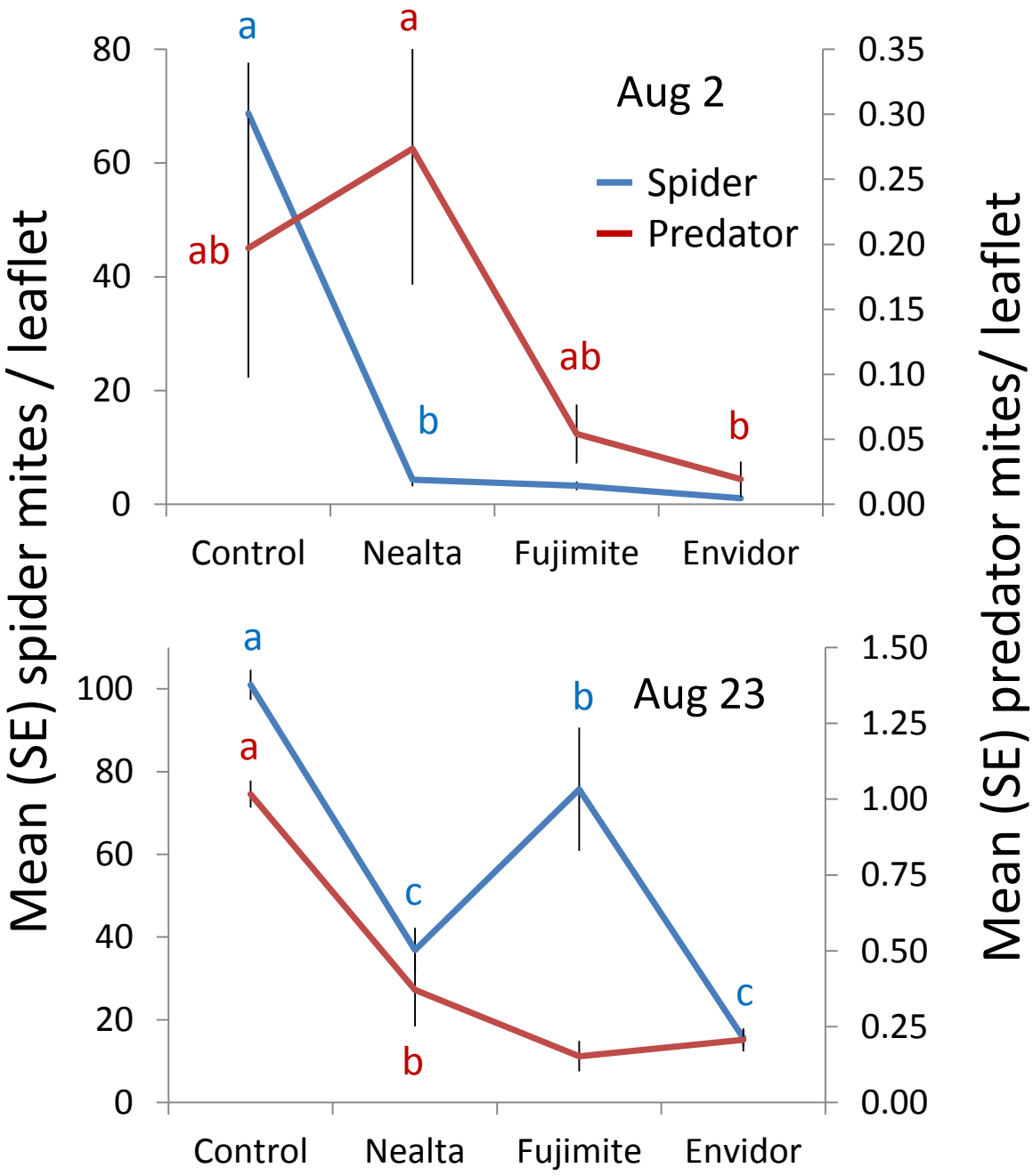
Location:
Lodi, Howard block

Treatments:
Control, Fujimite, Nealta, Envidor
– applied Jul 30

Replicate plots:
3 within each treatment

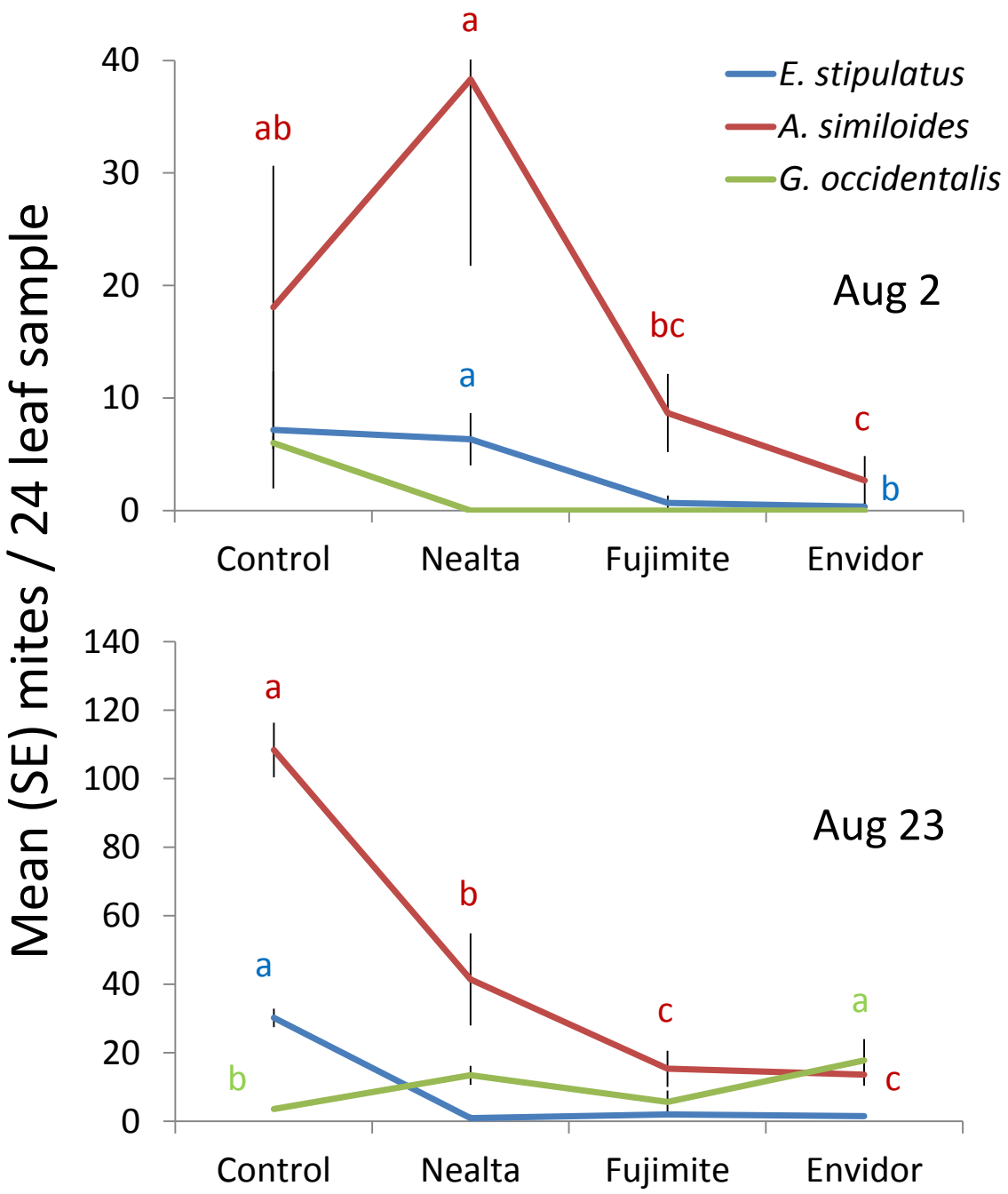
Acaricide Trial: Spider and Predator Mite Densities

- Nealta application created low prey:pred ratio (18:1)
- Nealta kept TSM lower than Fujimite, almost as low as Envidor

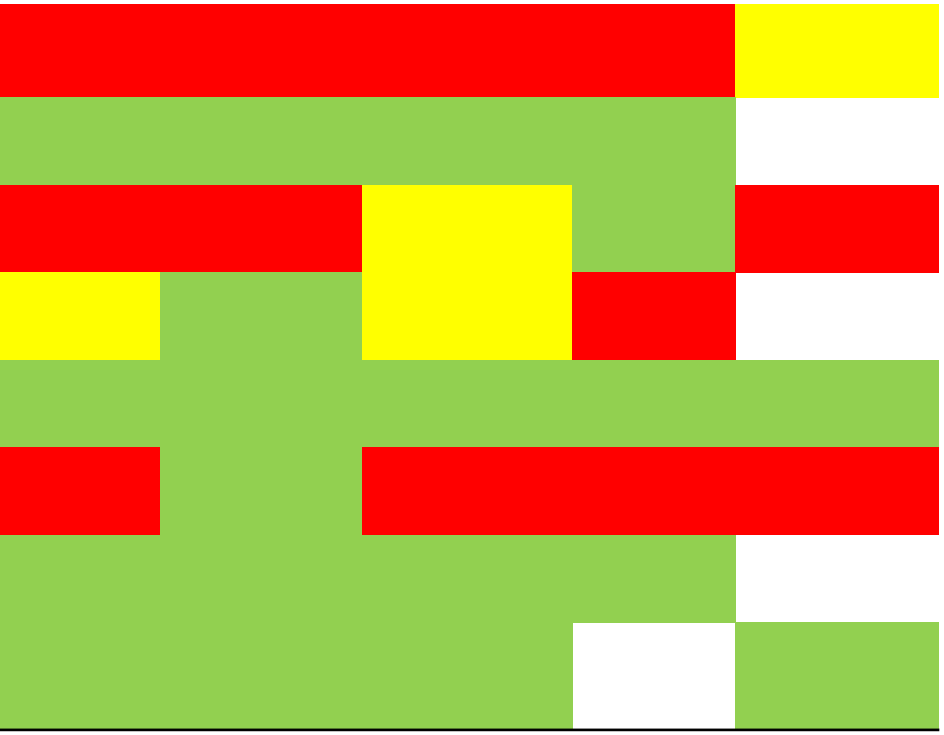


Acaricide Trial: Predator Species

- *Galendromus* and *Euseius* impacted by all treatments, *Amblyseius* more tolerant
- *Amblyseius* not effective in Control, may have played a role in Nealta



Product	Active ingredient	% walnut acres treated 2014	Type I specialist	Type II specialist	Type III generalist	Type IV pollen	*Galendromus occidentalis*
Acaricides							
Agri-Mek	Abamectin	58					
Onager	Hexythiazox	17					
Zeal	Etoxazole	12					
Omite	Propargite	8					
Acramite	Bifenazate	7					
Fujimite	Fenpyroximate	4					
Apollo	Clofentezine	3					
Envidor	Spiridiclofen	3					



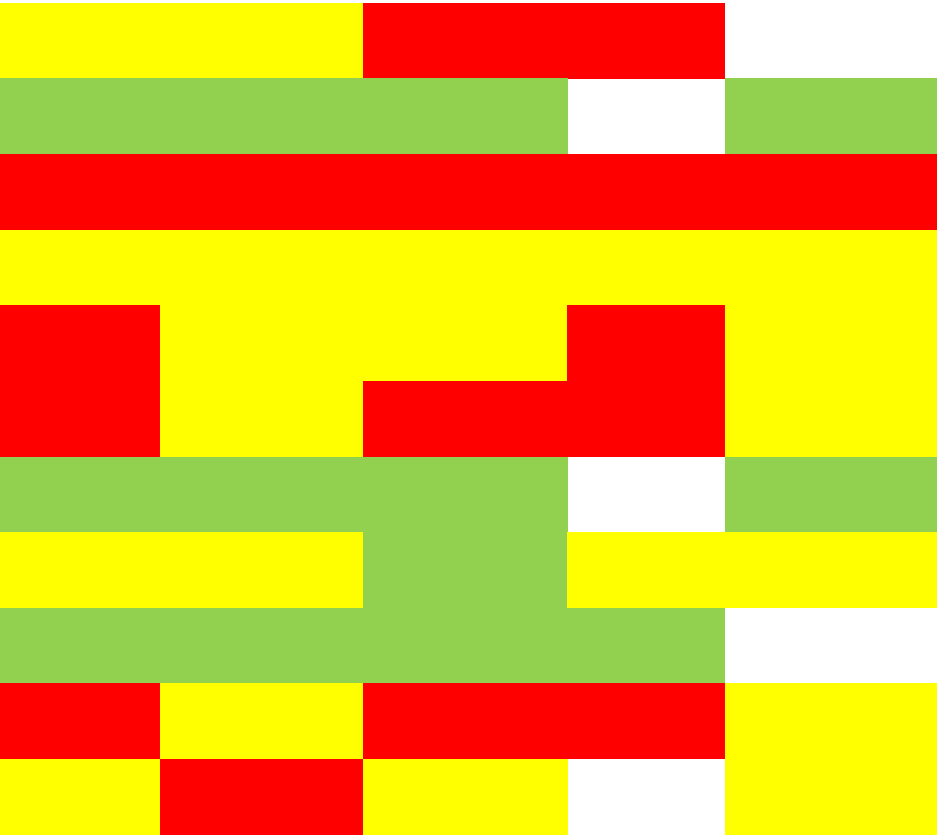
IOBC toxicity rating:
extent of mortality in lab bioassays

Low, < 50%

Moderate, 50-74%

High, > 75%

Product	Active ingredient	% walnut acres treated 2014	Type I specialist	Type II specialist	Type III generalist	Type IV pollen	*Galendromus occidentalis*
Insecticides							
Lorsban	Chlorpyrifos	35					
Altacor	Chlorantraniliprole	29					
Brigade	Bifenthrin	26					
Assail	Acetamiprid	22					
Provado	Imidacloprid	22					
Warrior	Lambda-cyhalothrin	19					
Intrepid	Methoxyfenozide	16					
Movento	Spirotetramat	13					
Seize	Pyriproxyfen	9					
Asana	Esfenvalerate	8					
Delegate	Spinetoram	8					



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Conclusions

- Most web-spinning mites in walnuts are twospotted mites, although Pacific mite is common in southern SJV
- High diversity of predatory mites in walnuts, but predatory insects have disappeared
- Some evidence that predatory mites contribute to control, but spider mite outbreaks are increasing
- *G. occidentalis* is not the dominant predator – late leafing, changes in pesticide materials
- Selective acaricides are available, but husk fly sprays remain disruptive