Pacific Spider Mite, Navel Orangeworm, Leaffooted Bug and Fire Ant Control in the lower San Joaquin Valley

David Haviland[1], Stephanie Rill[1], Brad Higbee[2] and Kris Tollerup[1] UCCE[1] and Paramount Farming Co. [2]

UC CE

Pacific Spider Mite

Introduction Spider mites are a significant pest of almonds, especially late in the season during hot, dry weather. During 2014 we completed a field trial in Shafter, CA to evaluate the effects of registered and experimental miticides for mite control in June (Fig 1).

- **Industry standards-** Envidor, Fujimite 5EC, Onager, Vigilant and Zeal all provided significant reductions in mite density for at least 3 to 4 weeks. This is consistent with trials provided in previous years.
- **Fujimite XLO (fenpyroximate)** is a new, lower-VOC formulation Fujimite. The new formulation performed statistically equivalent to the old formulation.
- **Magister (fenazaquin)** is a new METI I contact acaricide with the same mode of action (MoA) as Fujimite. In 2013 it provided excellent control of mites but in 2014 the control was not statistically different from the untreated check.
- **Nealta (cyflumetofen)** is a new METI II acaricide that is a new MoA for miticides. It provided excellent mite control in 2013 and 2014 trials.
- **PFR-97 and GOP-1** are experimental miticides that when used with oil resulted in mite densities similar to plots were oil was used by itself.

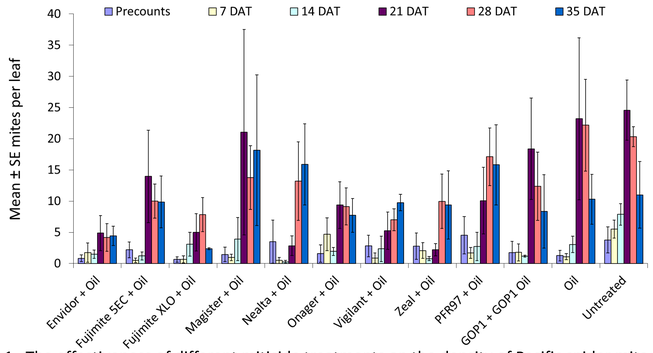

Fig 1. The effectiveness of different miticide treatments on the density of Pacific spider mite in almonds.

Predators of Spider mites

Introduction During 2014 three new lures were being evaluated for their attractiveness to predators of spider mites that included six-spotted thrips, spider mite destroyer beetle, pirate bug and lacewing. These lures would help growers and PCAs determine the density of predators they have within an orchard, and time miticide applications accordingly. Four lures were tested (Methyl Salycilate, Geraniol, Phenyl Ethanol and a combination of the three) and the effectiveness of each lure was evaluated against a yellow sticky card only trap.

Conclusions No significant difference of any of the lures was found (Fig 2 and 3).

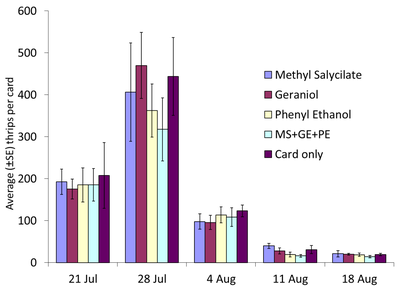

Fig 2. The effects of four lures on the density of six-spotted thrips in almonds.

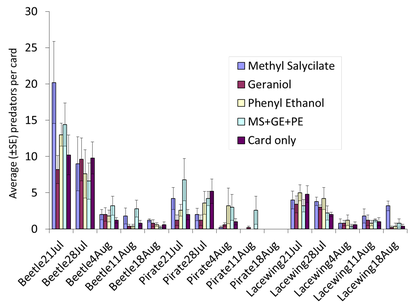

Fig 3. The effects of four lures on the density of spider mite destroyer beetle, pirate bug and lacewing in almonds.

Leaffooted Bug

Introduction During 2014 we conducted a series of trials to evaluate the effects of 10 different insecticides on leaffooted bug, *Leptoglossus zonatus* (Dallas). This included a laboratory bioassay to evaluate mortality of insects that were sprayed directly with the insecticides and a field study where adult bugs were caged on treated almond branches at weekly intervals after the foliage and nuts were treated. The goal was to determine the strengths and weaknesses of each insecticide and potential fits within an integrated pest management program.

Results (Fig 4, 5 and 6)

- **Lorsban Advanced (chlorpyrifos)** is the current industry standard for leaffooted bug management.
  - Within our trial it provided excellent contact activity and one week of residual activity on adults caged on treated foliage .
  - Lorsban prevented damage to nuts for one week.
  - Regulatory scrutiny of this product suggests that alternative options for control need to be explored.
- **Brigade (bifenthrin)** and **Warrior II (lambda-cyhalothrin)** provided excellent contact activity and residual activity for at least 4 weeks on adults caged on treated foliage.
  - No damage occurred to nuts, even when bugs were caged on treated foliage 4-6 weeks after treatment.
  - The primary concern with pyrethroids is the potential to flare mites following early-season applications.
- **Agri-Mek SC (abamectin)** provided excellent mortality when sprayed directly on leaffooted bugs.
  - Dry residues had no effect on leaffooted bugs and did not prevent damage at harvest.
  - This product is commonly used for spider mite control in almonds in the spring, but there are concerns over its detrimental effects on sixspotted thrips (a predator of spider mites).

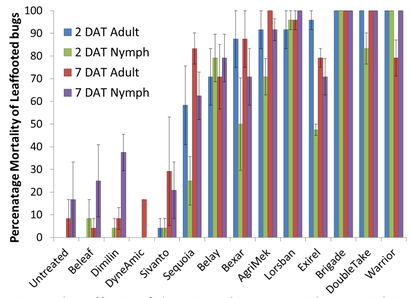

Fig 4. The effects of direct application on the mortality of leaffooted bugs.

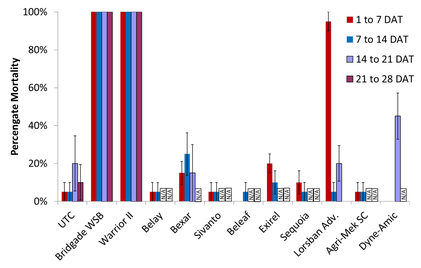

Fig 5. The effects of aged pesticide residues on the mortality of leaffooted bugs.

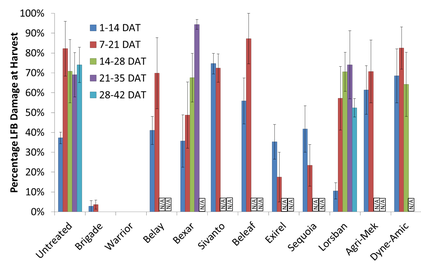

Fig 6. The percentage leaffooted bug damage on the almond kernel at harvest.

- **Belay (clothianidin), Bexar (tolfenpyrad), Sequoia (sulfoxaflor) and Exirel (cyantraniliprole)** caused moderate levels of mortality when applied directly to leaffooted bug.
  - Small to no effects when leaffooted bugs were caged on treated surfaces during the first week after application.
  - Residues of these products did not prevent damage to kernels at harvest.
- **Bexar, Sequoia, Exirel are not currently registered for use in almonds.**

Southern Fire Ant

Introduction Almond growers currently rely on three ant baits for control of southern fire ant (Clinch, Esteem and Extinguish). However, a lag time for effectiveness has caused many growers to adopt calendar-based application programs. Recently a faster-acting ant bait (Altrevin) and an organic ant bait (Seduce) were registered. Our objective was to see how fast and how long Altrevin and Seduce work compared to a grower standard (Clinch) using replicated 2.3-acre plots of almonds.

Procedures Clinch, Seduce and Altrevin were applied on 27 Jun. Hot dog baits were used to assess ant populations in a non-bearing almond orchard. Plots were evaluated weekly for 10 weeks.

Results The orchard contained large populations of southern fire ants that were fairly evenly distributed throughout the trial (Fig 7).

- **Altrevin (metaflumizone)** immediately reduced ant density up to 8WAT, and after this 8-week period levels were not significantly different than the untreated check.
- **Clinch (abamectin)** reduced some foraging ants at 4DAT, and 11DAT to 10WAT had a steady increase in ant control.
- **Seduce (spinosad)** had significant reductions in ant density at 4DAT and 7DAT, however, for all other evaluation dates there were no significant differences.

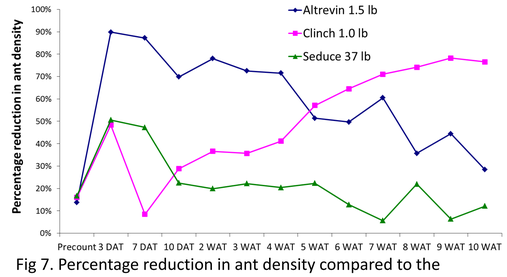

Fig 7. Percentage reduction in ant density compared to the untreated check for Altrevin, Clinch and Seduce.

Navel Orangeworm

Introduction Navel orangeworm is the most important pest of almonds in California due to its direct impact on the kernel and relationship with aflatoxins. Growers typically manage navel orangeworm through a combination of winter sanitation and one or more insecticide applications. Our trials evaluated 7 insecticides for their effects on NOW damage at harvest when trees were sprayed at hull split (27 Jun), two weeks later (11 Jul), or at both timings.

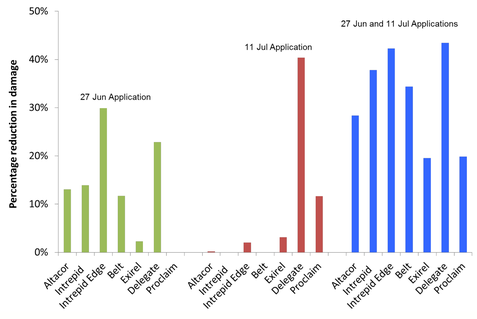

Fig 8. The percentage reduction in navel orangeworm damage.

Results Larvicides applied at hull split at the initiation of the 2nd flight of NOW mostly reduced damage by 10 to 20%. With the exception of Delegate, larvicides applied two weeks later (between the 2nd and 3rd flight) generally had minimal impact on NOW. However, when applications were made at both timings, larvicides reduced damage by approx. 20 to 40% compared to the untreated check (Fig 8).

University of California
Agriculture and Natural Resources