Improving Integrated Pest Management of Spider Mites on Almond

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Introduction

Preventing economic damage from twospotted spider mite, *Tetranychus urticae* Koch, and pacific mite, *Tetranychus pacificus* McGregor, is a key component of annual arthropod management strategies in almond. Spider mite management strategy commonly consists of a preventative, or prophylactic, application of abamectin (often applied along with another insecticide targeting navel orangeworm) followed by one or two miticide applications prior to hull split. When applied in late April or early May, abamectin provides relatively long residual activity due to translaminar movement into the leaf surface where it is protected against solar degradation. A major drawback to the management strategy is that abamectin is toxic to the highly effective spider mite predator, sixspotted thrips.

This prophylactic strategy has strong support among pest control advisers and growers as an effective and cost-efficient tool. However, data do not exist supporting this use. Moreover, there is anecdotal evidence that resistance to abamectin has developed in some *T. pacificus* populations; most notably in southern San Joaquin Valley populations.

Objectives

1. Evaluate the effectiveness of a prophylactic, early-season application of abamectin to manage spider mite populations on almond.
2. Via laboratory bioassays, determine if San Joaquin Valley populations of twospotted and pacific mite have developed resistance to abamectin.
   a. Establish base-line LD50 for susceptible strains of twospotted and pacific spider mites to abamectin.
   b. Evaluate spider mite populations collected from various locations in the southern and central San Joaquin Valley against the susceptible strain.

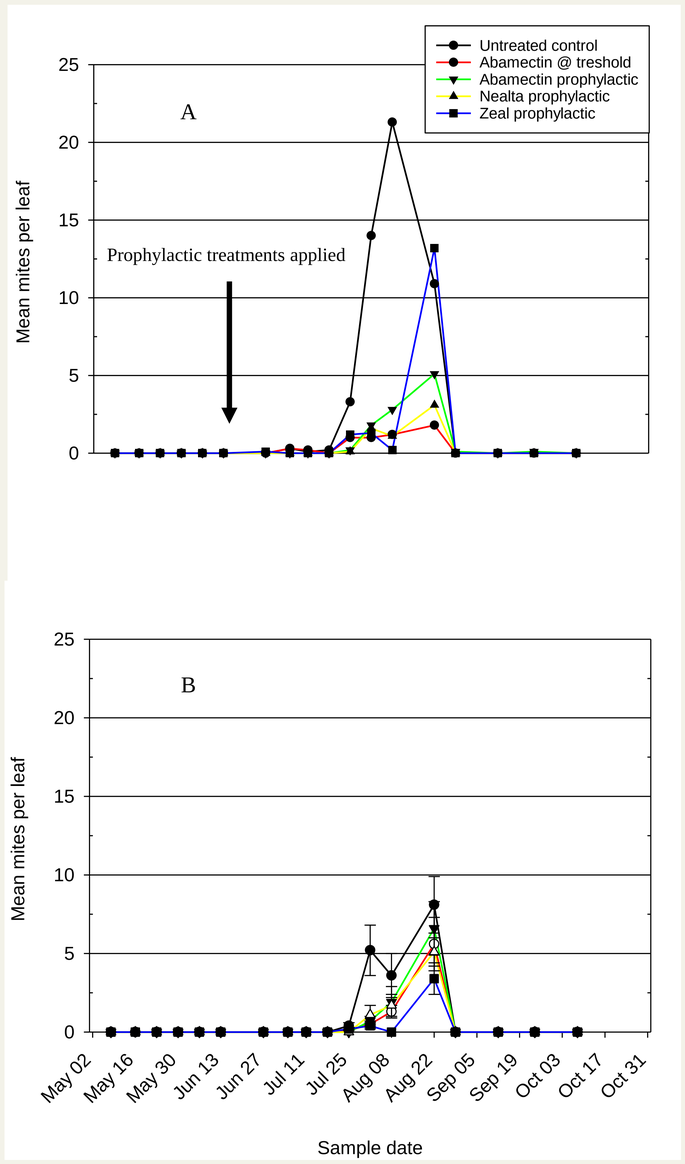

Fig. 1. Mean ± SE mites per leaf at two ~ 20-year-old almond orchards located in Kern Co, sites one (A) and site two (B). Means calculated from 9 trees (15 leaves/tree) per plot (135 leaves/plot). Treatments were replicated 3x.

Procedure

Objective 1.

- Establish plots (17 – 19 acres in size) at two almond orchard sites at Wonderful Orchards in Kern Co. Treatments replicated 3x each at two sites.
- **Treatments** 1) untreated control, 2) abamectin (applied at the University of California treatment threshold of ~ 2 mites/leaf), 3) abamectin (prophylactic), 4) Nealta (prophylactic), and 5) Zeal (prophylactic).
- Assess spider mite populations weekly from late-Mar to mid-Oct on 9 trees (15 leaves/tree) per plot (135 leaves/plot)

Objective 2.

- Establish abamectin-susceptible colonies of *T. urticae* and *T. pacificus* to determine abamectin susceptible baseline.
- Collect *T. urticae* and *T. pacificus* from field populations.
  - Conduct laboratory bioassays to determine if resistance to abamectin has developed.

Results and Discussion

Mean spider mite densities at sites one and two ranged between 0 and 0.2 mites per leaf until late July (Fig. 1, A and B). This was unusual, typically mite densities begin increasing in June throughout the San Joaquin Valley and Sacramento Valley region. Prophylactic treatments are generally applied in May; however, due to mite populations increasing late, we did not apply treatments 3, 4, or 5 until mid-June. In treatment 2 plots, mite densities did not reach the treatment threshold of ~2 mites per leaf until 22 Aug. Mean spider mites per leaf on 22 Aug ranged between 3.1 to 13.2 (Site 1) and 3.4 to 8.1 (site 2) (Fig. 1, A and B).

Beginning in late July to early Aug, populations of the natural enemy, sixspotted thrips, began to build and by 29 Aug, mean mite density in both sites did not exceed 0.1 per leaf in all treatments (Fig. 1, A and B), sixspotted thrips played a major role in the precipitous decrease of spider mite populations. Our data suggest that our prophylactic sprays were not beneficial for two reasons. 1) mites did not increase until well into hull split, the point at which miticides are not applied due to harvest (i.e. unneeded spray), and 2) sixspotted thrips rapidly lowered populations by late Aug. We are currently conducting laboratory bioassays to establish an abamectin susceptibility baseline for pacific mite.

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