

Developing Sampling Methods for Pre-season Mite Detection in Almonds



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Background

- Three types of mite species reported in almonds (Fig. 1A-C):
 - European red mites
 - Brown almond mites
 - Webspinning spider mites (two-spotted, pacific, strawberry)
- Webspinning mites are the major arthropod pest species in almond growing area in California
- Mite feeding causes stippling and yellowing of the leaves which ultimately drop off from the trees under severe infestation (Fig. 2)
- During winter, spider mites overwinter in orchard floor and move back to the trees in spring/early summer



Fig. 1A. Spider mites Fig. 1B. Brown mites Fig. 1C. European red mite



Fig. 2. Feeding damage symptoms in almonds

Project Goal and Objectives

- The overall goal of the project was to develop a pre-season mite sampling method by quantifying overwintering mite population. The sampling method can be helpful to estimate the risks of seasonal mite infestation. The specific objectives were:
 1. Characterize mite overwintering locations in the soil in relation to the tree trunk
 2. Determine the soil depth in which overwintering mites are abundant
 3. Identify the time of the year in which spider mites are moving from soil to the trees (using trunk-band traps)

Methods

Soil sample collection and processing

- 3 sites representing San Joaquin Valley
Collected winter soil samples and processed (From one site: 7 samples each of 12 trees)
- ~1 square foot area and top 2-inch deep soil
- Additional soil sample taken from soil surface



Fig. 3. Soil sample collection and processing for the recovery of overwintering spider mites in almonds

Design and deployment of tree-band traps

- 5 sites. we used tree-band trap design that was used in the past (Zalom et al. 1995) with some modifications (Fig. 4)
- NSJV (Oakdale, Denair, Ballico, UCCE): Traps were deployed between 30 March-3 July (3-5 times)
- SSJV (Five Points): 6 April – 30 June (6 times)
- Traps were evaluated in the lab using microscope



Fig. 4. Tree-band traps for spider mite trapping

Results and Discussion

- More than 1000 cups of soil samples from almond orchards representing the northern and the southern San Joaquin Valleys were processed and inspected for overwintering spider mites.
- No overwintering spider mites were recovered from the soil samples regardless of distance from the tree-base and soil depth including the surface sample that includes soil plus dry vegetation and other debris.
- Spider mites were not captured from the tree-band traps, across all sites, however, substantial number of 'brown looking mite' species was captured in the trap.
- The new mite species resembles with the almond brown mite, *Bryobia rubrioculus* in appearance, but different in their biology including overwintering biology. No previous literature indicated the presence of almond brown mites in tree trunks. The initial identification indicates that the new species is clover mite, *Bryobia praetiosa*.
- Fig. 5-6 shows the abundance of brown looking mite (clover mite) in different sites
- There was no statistical difference in seasonal spider mite infestation on the leaf between banded and unbanded trees, meaning, tree bands are not effective in reducing seasonal mite population (Fig. 7).

Results

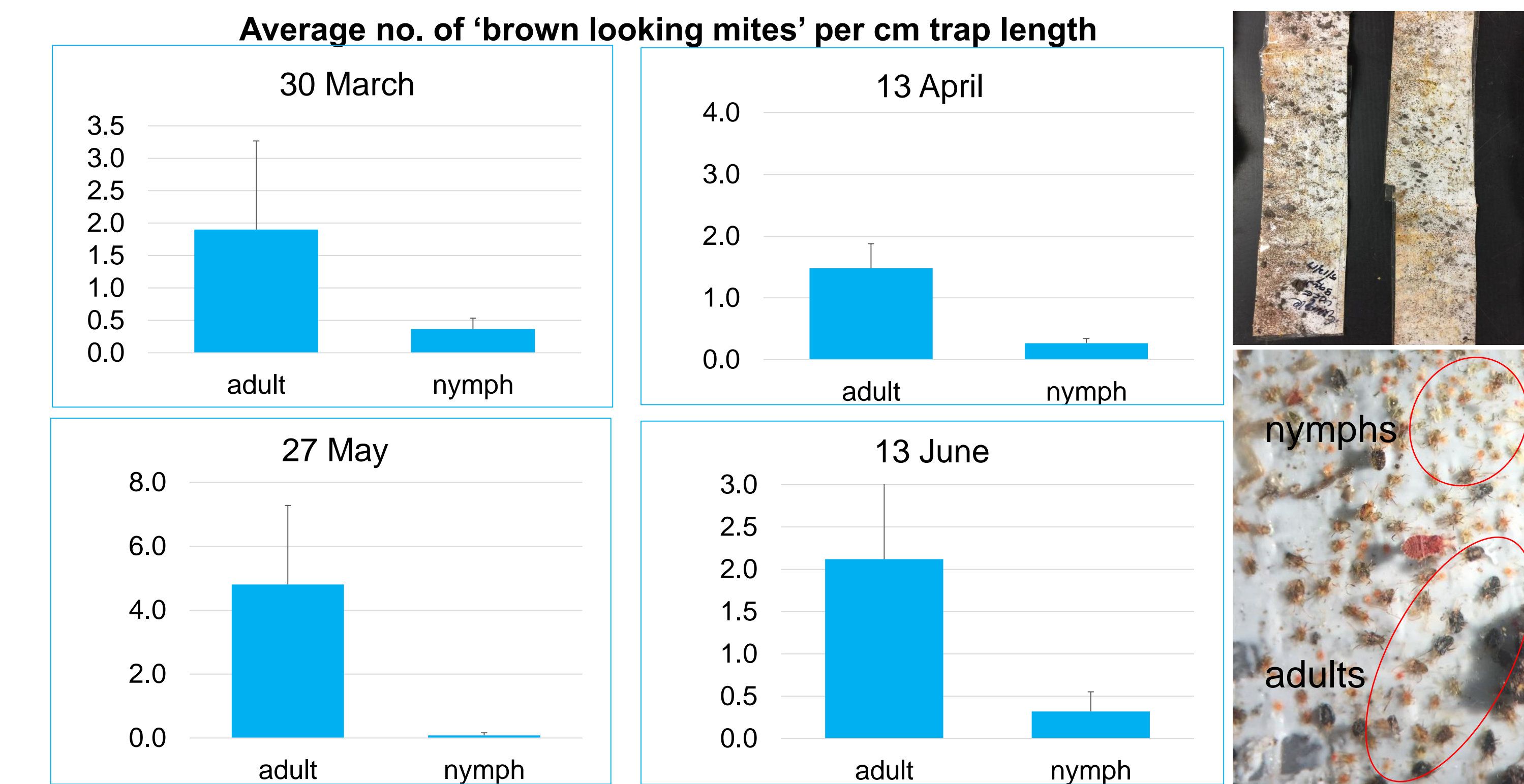


Fig. 5. Abundance of 'brown looking mites' in tree-band traps at Oakdale site, NSJV

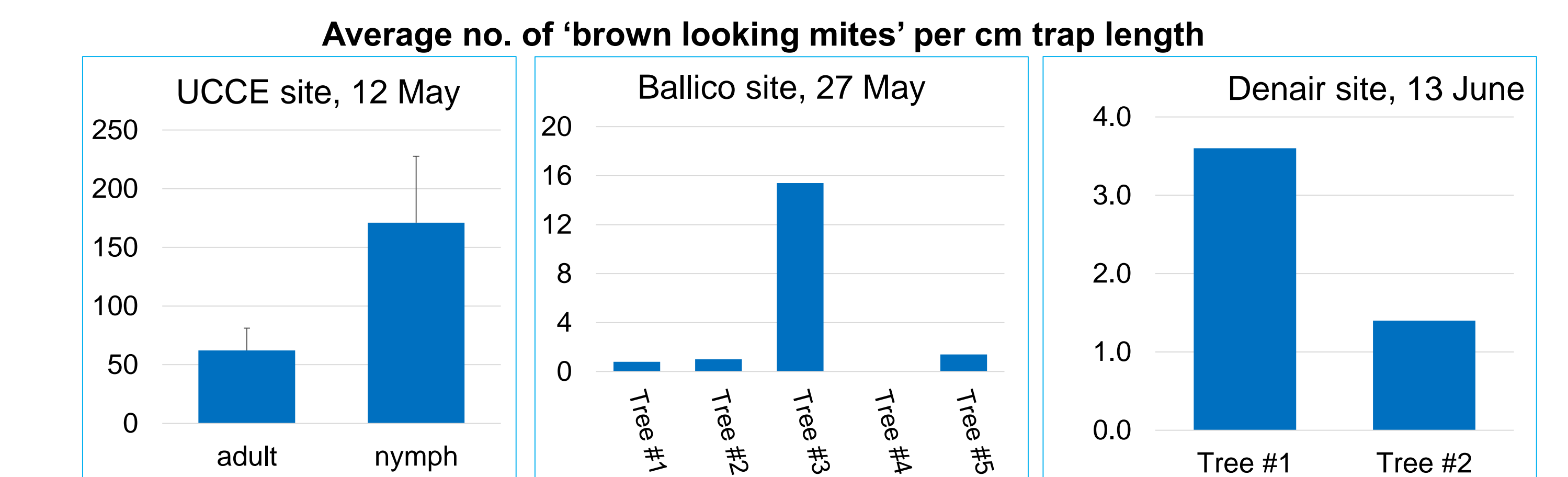


Fig. 6. Abundance of 'brown looking mites' in tree-band traps at three additional sites, NSJV

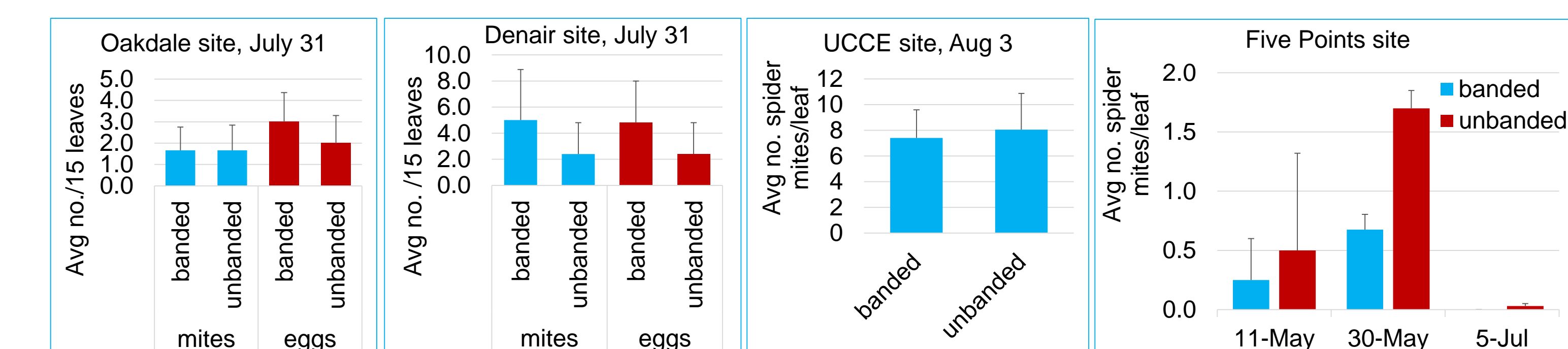


Fig. 7. Comparison of seasonal spider mite population between trees with and without band traps across four sites in San Joaquin Valley, 2017. No statistical difference ($P>0.05$) between banded vs. unbanded trees.

Conclusion

- Soil sampling and tree-band trapping were unable to recover overwintering spider mites. Therefore, utility of these methods for pre-season detection of the spider mites (two spotted, Pacific, Strawberry) appears to be minimal.
- Interestingly, tree-band traps captured a new type of mite (clover mite) from almond trees.
- Use of tree-band traps (i.e., 2-inch wide duct tape encircling the tree trunk) early in the season should help in detecting brown mite activities in almond trees..
- We will explore the utility of tree-band traps to monitor this new mite species in almonds in 2018-season.