Poster 23: Evaluation of Sixspotted Thrips, *Scolothrips sexmaculatus*, for Biological Control of Spider Mites in California Almonds

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Sixspotted thrips, *Scolothrips sexmaculatus* (Pergande) is one of the oldest species of thrips known from North America (Bailey, 1939). It is recognized as a specialist predator of spider mites whose field biology has been poorly understood for nearly a century. Published laboratory studies on sixspotted thrips in the 1970s suggest that adults can live 29 to 67 days depending on temperature with a generation time of 18 to 51 days (Gilstrap and Oatman, 1976; Coville and Allen, 1977). Laboratory studies also document that female thrips can eat 7 to 50 spider mite eggs per day, can eat 38 immatures or 16 adults per day, and can lay 90 to 166 eggs over their lifespan. When these laboratory data are combined, calculations show that sixspotted thrips can have population doubling times ranging from 2.7 to 8.7 days at temperatures that are typical in California almond orchards during the summer when spider mites are prevalent.

These laboratory data suggest that sixspotted thrips has great potential to provide biological control of spider mites under field conditions in California almonds. During the 2016 and 2017 growing seasons we conducted field research to document periods of the year when sixspotted thrips are present, population growth rates under field conditions, and relationships between pest and prey populations under unsprayed field conditions. Trials also evaluated 7 different colors and sizes of sticky cards that have potential for use by pest control advisors making field decisions about management programs.

The yellow strip trap (Great Lakes IPM) was the most effective trap for monitoring sixspotted thrips, capturing >5X more thrips that the other six cards tested. Weekly captures for the yellow strip trap exceeded 700 thrips per week compared to less than 150 thrips per week for the other six cards. The yellow strip trap was also superior to the other six traps when data were converted to thrips per square area to account for differences in the sizes of the cards.

Use of the yellow strip trap in subsequent studies showed that there is a significant relationship between spider mites and sixspotted thrips in commercial orchards, and that sixspotted thrips can provide complete biological control when conserved (Fig. P23.1). For example, in one field study spider mites increased from 4.8 to 16.2 per leaf from 14 Jul to 11 Aug with a population doubling time of 15.9 days. However, over the same period of time sixspotted thrips increased from 0 to 970 per sticky card per week with population doubling times of 4.2 days. By 25 Aug, mite populations had crashed to near zero while sixspotted thrips per card per week increased to over 2,700. The yellow sticky card also

caught adult spider mite destroyer beetles, *Stethorus picipes* Casey (Coleoptera: Coccinellidae). Similar relationships between predators and prey were also seen at other research sites, suggesting significant potential for conservation biocontrol as a viable method for spider mite management.

Fig. P23.1. Yellow strip trap counts of spider mites and sixspotted thrips in commercial almond orchards in California.

References

