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FROM THE VINE

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Western Flower Thrips

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Abundant spring rainfall means no shortage of weeds to host critters, including western flower thrips. Western flower thrips (*Frankliniella occidentalis*) are native to western North America and are the most common thrips species of California. This thrips is found on hundreds of weed and crop hosts and can be particularly damaging in table grape vineyards during the period from bloom to early fruit set. Damage during this time can have a significant impact on the quality of table grapes at harvest.

Biology

Thrips are a group of tiny, elongate insects with fringed wings. They feed by scratching open the surfaces of plant cells with their rasping/sucking mouthparts, after which they drink the leaking fluids. In the lower San Joaquin Valley, western flower thrips populations can reach very high levels, especially in vineyards adjacent to cover crops or other resident vegetation, and in vineyards adjacent to grain fields, rangeland and/or foothills.

Western flower thrips have several developmental stages: egg, first and second instars (called larvae), two non-feeding stages (called pupae) and adult. Each adult female lays about 20 eggs singly into the parenchyma tissue of leaves, flowers or fruit. The larvae feed on the host plant until they are ready to molt into the pre-pupal stage. At this time, they drop to the ground and usually enter the soil or litter beneath the host plant. After pre-pupal development is completed, the insect molts into the pupal stage. When adult thrips emerge, they may migrate for more attractive and abundant sources of pollen, which during the bloom period can mean grapes.

Thrips Damage

Western flower thrips can cause injury to table grapes in two ways. The first type of damage is surface scarring of young berries. This damage is caused by thrips larvae feeding under the calyptra (flower cap) during the bloom period. Larvae cause this type of scarring (often referred to as 'starfish' scars due to their shape) only when the calyptras fail to fall off normally. The critical period for fruit injury occurs from late bloom through fruit set, as this is the time when thrips larvae reach their peak levels. With time, persistent calyptras are eventually pushed off with the berry expansion. There are several factors involved in the frequency and amount of fruit injury caused by western flower thrips; including larval population size, persistence of calyptras, berry color and length of time between the bloom and fruit set period. Generally, greater damage is observed when the weather during bloom is cool, lengthening the feeding time for larvae. Applications of gibberellic acid to increase the size of seedless table grapes, like Thompson Seedless, also exacerbate the problem. Gibberellic acid increases berry size by enhancing pericarp cell division and expansion and thus simultaneously increases the size and visibility of scar tissue.

The second type of damage caused by western flower thrips is halo spotting. Halo spots are caused by adult female thrips when they insert their ovipositor into the surface of developing berries. The result is a russet-colored surface blemish (puncture mark) at the oviposition site surrounded by a white, bleached out circular area. As the berries grow and the cells expand, the affected area enlarges and may crack during ripening on large-berried varieties (Redglobe), making the bunch vulnerable to secondary rot organisms. Furthermore, both halo spotting and surface scarring are much more obvious on green skinned varieties.

Monitoring and Treatment

In years of high winter and/or spring rainfall, ground cover is dense and will undergo dry-down mid to late spring forcing thrips migration into adjacent vineyards. Host reservoirs should be monitored for the presence of thrips and weed management can help reduce populations in vineyards. Furthermore, populations can be monitored within the vineyard by counting adults and nymphs knocked out of flower clusters. Normal counts range from 2 to 25 adults and 10 to 50 nymphs. Counts in excess of 150 adults and 300 nymphs per cluster are considered peak populations. There are no specific treatment thresholds for western flower thrips for several reasons including, population densities can change rapidly, it is unclear how many thrips are likely to cause significant fruit damage, the time and weather during bloom and fruit set varies from year to year and egg laying habits also vary throughout bloom. Therefore, decisions to treat should be based on monitoring, varietal susceptibility, observation of persistent flower caps and the vineyard's history of fruit damage.

2005 Field Trial

During spring 2005 we conducted an experiment to evaluate the effectiveness of a new insecticide, Success (spinosad), compared to one of the industry standards, Lannate (methomyl). The trial was conducted in a 'Redglobe' table grape vineyard in Mettler that had a history of thrips damage. We evaluated the effects of Success (6 oz/ac), Success (8 oz/ac) and Lannate (1 lb/ac) compared to an untreated check. Plots were sprayed on April 29th using an air-blast sprayer at 130 gal/ac. Thrips populations were evaluated prior to treatment and at 3, 10, 18, and 21 days after treatment (DAT). On each evaluation date, densities of thrips were evaluated using beat samples from 10 clusters per plot.

Table 1 shows the effects of insecticide treatments on the average number of adult thrips per cluster. There were no significant differences in precount thrips densities that ranged from 21.0 to 33.2 thrips per cluster. By 3 DAT, all treated plots had significant reductions in thrips (0.5 to 2.2 per cluster) compared to 10.2 per cluster for the untreated control. The same pattern held true for data 10 DAT. By 18 DAT and 21 DAT there were no significant differences in adult thrips counts among any of the treatments and the untreated check. A comparison of the 6 oz and 8 oz rates of Success revealed numerically lower adult thrips counts in the higher rate on both the 3 DAT and 10 DAT evaluation dates. However, this reduction was not significant on either evaluation date nor were there differences at either of the latter evaluation dates.

Table 2 shows the effects of insecticide treatments on the average number of nymph thrips per cluster. There were no significant differences in precounts which ranged from 5.6 to 14.2 thrips per cluster. Data 3 DAT showed significant reductions in nymph thrips density in all treatments compared to the untreated control. By 10 DAT, both of the 8 oz Success treatments and both of the Lannate treatments had significant reductions in thrips, whereas thrips densities in the lower rate of Success could not be statistically separated from either the treated or untreated plots. By 18 DAT, thrips densities were lowest in plots treated with the high rate of Success or Lannate. Thrips densities in plots treated with the low rate of Success were statistically lower than the untreated control, but statistically higher than in plots treated with the high rate of Success or Lannate. By 21 DAT there were no significant differences among any of the treatments.

Overall thrips densities during the trial were low. However, even under these low conditions this trial demonstrated comparable reductions in thrips density from the 1 lb rate of Lannate and the 8 oz rate of Success. The 6 oz rate of Success also provided control of thrips, but did not have the residual effect of the higher rate.

More information on thrips can be found in *Grape Pest Management*, Second Edition, University of California Division of Agriculture and Natural Resources, Publication 3343 or at www.ipm.ucdavis.edu. For the most up-to-date information on products available and treatment timing consult your area UCCE Entomologist or IPM advisor.

Table 1. Effects of insecticide treatments on adult thrips at bloom in 'Redglobe' grapes. Kern County, CA 2005.

	Mean ±SEM of the average adult thrips per cluster					
Treatment	Rate product Per acre	Precount	3 DAT	10 DAT	18 DAT	21 DAT
Success	6 oz	29.2 a	2.2 a	1.2 a	2.4 a	3.0 a
Success	8 oz	33.2 a	1.5 a	0.3 a	2.1 a	1.6 a
Lannate	1 lb	29.3 a	0.5 a	0.6 a	2.4 a	1.3 a
Untreated	-	21.0 a	10.2 b	3.4 b	2.2 a	0.6 a
P		0.3252	<0.0001	0.0002	0.9541	0.2544.

Table 2. Effects of insecticide treatments on nymph thrips at bloom in 'Redglobe' grapes. Kern County, CA 2005.

	Mean ±SEM of the average nymph thrips per cluster					
Treatment	Rate product Per acre	Precount	3 DAT	10 DAT	18 DAT	21 DAT
Success	6 oz	14.2 a	0.8 a	0.8 ab	6.4 bc	4.6 a
Success	8 oz	6.1 a	0.8 a	0.2 a	1.5 a	2.7 a
Lannate	1 lb	9.3 a	0.3 a	0.3 a	2.6 ab	3.5 a
Untreated	-	5.6 a	6.2 b	1.6 b	10.6 c	5.6 a
P		0.0867	<0.0001	0.0639	0.0012	0.4821

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