Impact of NOW insecticides on mites in northern California almonds

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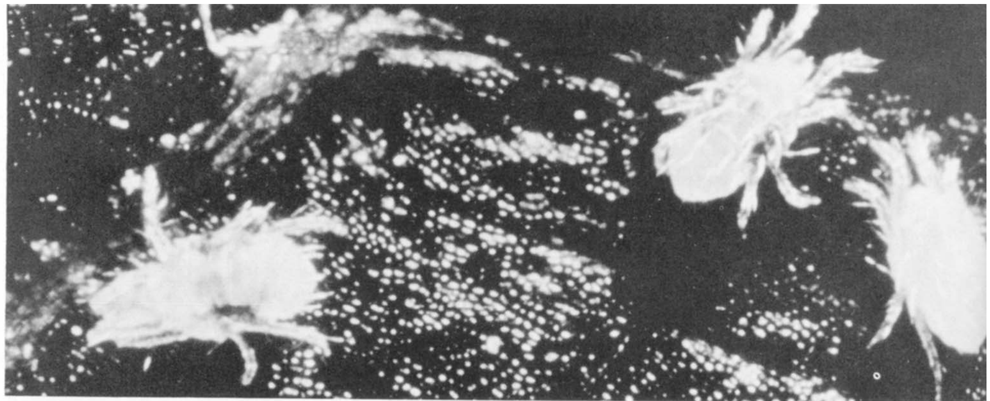
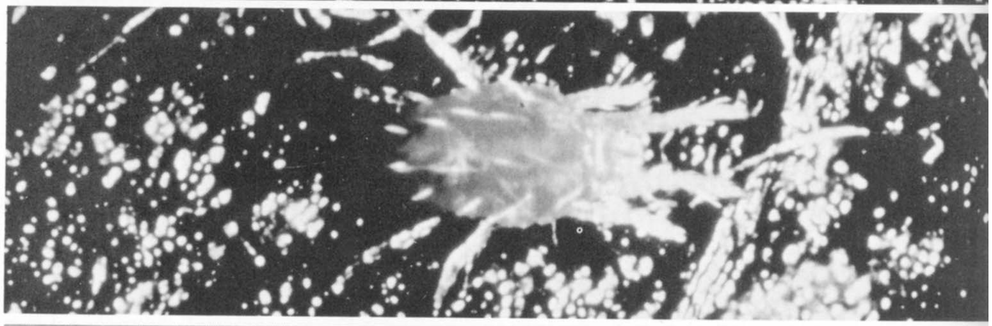
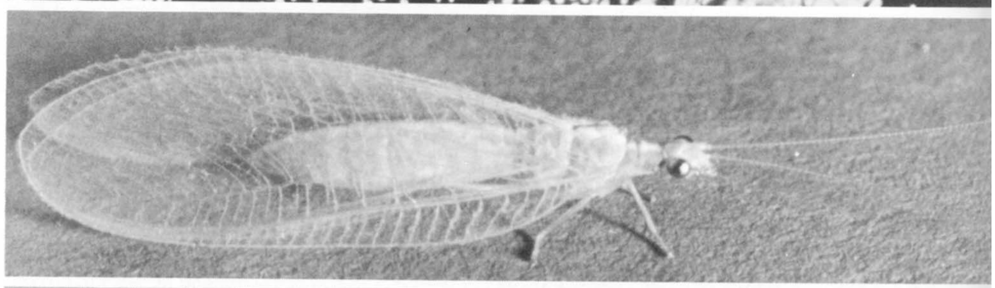


Twospotted spider mite *Tetranychus urticae* Koch



European red mite (ERM) *Panonychus ulmi*



California green lacewing *Chrysopa* sp.

Brown lacewing *Hemerobius* sp.

Spider mite destroyer *Stethorus picipes* Casey

Increasing losses caused by the navel orangeworm (NOW), *Paramyelois transitella* (Walker), have led to a research program to find better ways of controlling this serious pest of almond in California. Use of such pesticides as Guthion and Sevin has been resisted by some growers in the northern growing areas who believe that these pesticides increase spider mite populations. Because many growers in the northern areas can get through a season without treating for spider mites, there is an economic incentive to avoid unnecessary NOW treatments particularly if the pesticides increase spider mite populations and require additional costs for an acaricide.

The purpose of this project was to determine if the use of NOW pesticides would result in increased spider mite populations in northern California almond orchards.

Test plots

During 1977, five almond orchards were monitored for mites every two weeks, from April 26 through September 23. One Guthion application of 1 pound 50 percent WP per 100 gallons was made on May 26 to individual trees in four or six replicates in orchards using approximately 400 gallons per acre. Different individual trees in the same three orchards (also four or six replicates) had one Sevin application only, using Sevin 80S at a rate of 5.0 pound AI per acre made on July 27 using approximately 400 gallons per acre. Leaf samples of 30 leaves per tree were taken and held in an ice chest until the total number of mites per leaf were counted under a dissecting-microscope. One orchard near Yuba City was treated with Guthion only, but two orchards near Modesto and an orchard near Stockton had both NOW pesticide treatments. One orchard near Wheatland was monitored, but no pesticides were applied.

Monitoring results

The species and abundance of spider mite pests varied from orchard to orchard (table 1), and differed from the mite species found in orchards in the southern areas of the San Joaquin Valley. The two Modesto orchards predominately had the European red mide (ERM), *Panonychus ulmi* (Koch) whereas the orchard west of Stockton had essentially no ERM, but had the twospotted spider mite, *Tetranychus urticae* Koch, and the Pacific spider mite, *T. pacificus* McGregor. The treated orchard near Yuba City had a large brown almond mite population *(Bryobia rubrioculus)* (Scheuten), significant populations of the eriophyid peach silver mite, *Aculus cornutus* (Banks), and *T. urticae, T. pacificus,* and *P. ulmi* as well. The untreated orchard near Wheatland had few peach silver mites, many ERM, some brown almond mites and some *T. uriticae.* Thus, each orchard was different and the impact of the NOW insecticides can be explained in part by the species of mites present. The Stockton orchard had essentially no mites in it in May, and as a result the Guthion application there had no impact.

Guthion and Sevin did affect mite populations significantly in three of the four treated orchards. In two orchards pest mites (ERM) increased; in one orchard peach silver mite declined; and in one orchard there was no change.

Figure 1 shows the average numbers of ERM per leaf on trees treated with Guthion and Sevin and on untreated (check) trees in the Whitmore Avenue (Modesto) orchard. The peak on the Guthion trees is three times greater than on the check and Sevin trees (which had not yet been treated with Sevin). These differences are dramatic; some leaves had as many as 2,400 ERM. Decreases in the numbers of ERM during July are possibly due to the action of the numerous insect predators observed in the orchard, and to the impact of hot weather or to the conditioning of the leaves due to the high mite populations, or both. The most numerous predators were the coccinellid "spider mite destroyer," *Stethorus picipes* Casey; a species of brown lacewing, *Hemerobius* sp.; and the green lacewing,

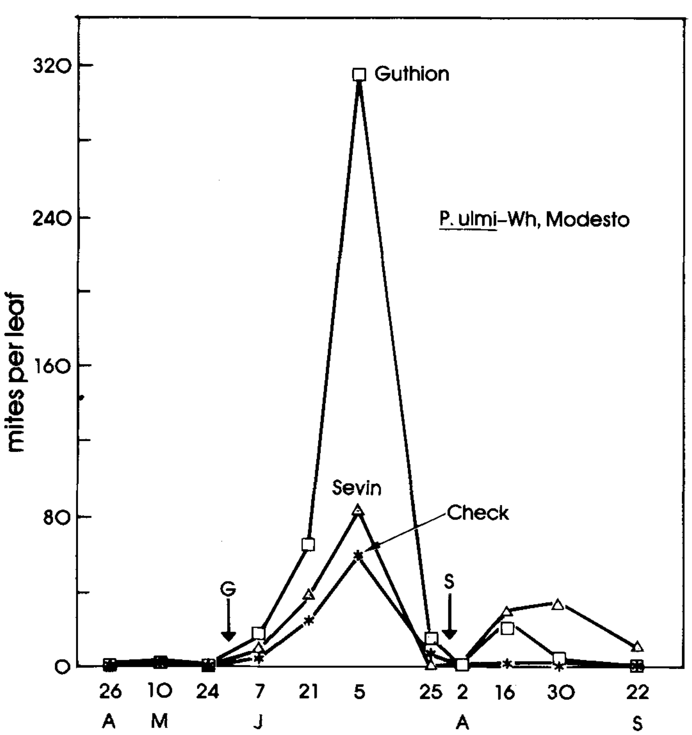


Fig. 1. European red mite numbers in the Whitmore Avenue orchard near Modesto. Guthion and Sevin were applied May 26 and July 27, respectively, to separate trees.

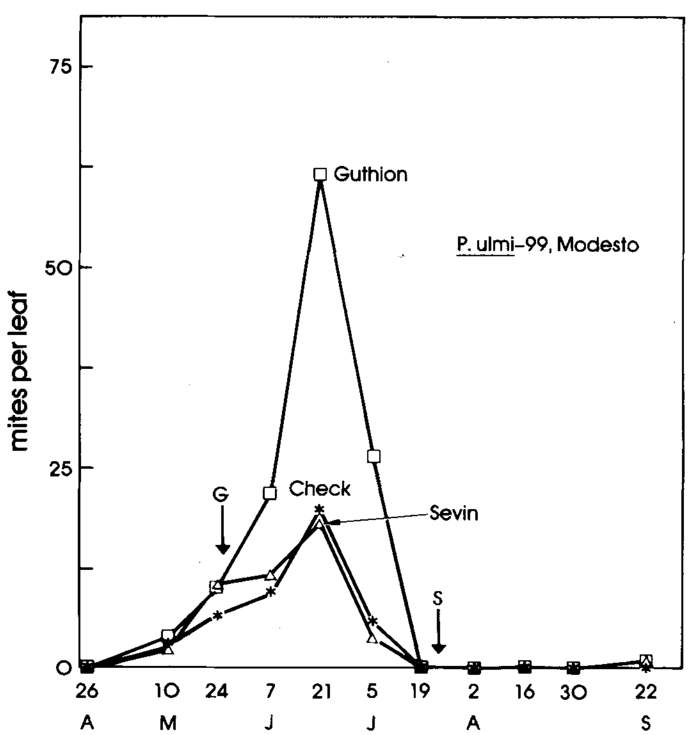


Fig. 2. European red mite in the Hwy. 99 orchard near Modesto. Guthion was applied May 26 and Sevin was applied July 27 to different trees. Application of Plictran in an adjacent block prevented assessment of the impact of Sevin on mites in late July.

Mite Populations in Five Northern California Almond Orchards in 1977

Orchard location	Mite species				
	ERM	Brown almond	Two-spotted	Pacific	Peach silver
Whitmore Ave., Modesto	+ + + + +	+	+ +	+	+ +
Hwy 99, Modesto	+ + + +	+	+	+	+
Hwy 132, Stockton	+	+	+ + +	+	0
Wheatland	+ + +	+ +	+	0	+ +
Yuba City	+ +	+ + +	+	+	+ + +

+ + + = abundant
+ = present, but low
0 = not found

Chrysopa carnea Stephens. These predators were very active.

The increase in ERM in the trees treated with Sevin (fig. 1) is statistically significant, although less dramatic. This may be due to suppression of ERM numbers in very hot weather. Few predators were found in these trees during August.

Figure 2 shows the mite trends in the other Modesto orchard (near Highway 99), exhibiting an increase in ERM after the Guthion treatment. However, drift of Plictran applied on July 14 to adjacent blocks of trees prevented an assessment of the impact of Sevin on this orchard.

As noted above, Guthion applications in the Stockton orchard had no impact because so few mites were present in May. The Sevin application did not cause a significant increase in *T. urticae* or *T. pacificus* numbers, but drift of the acaricide Plictran applied aerially to an adjacent block affected the assessment.

The Guthion application in the Yuba City orchard decreased peach silver mite numbers dramatically, but there were no significant differences in *T. urticae* or ERM numbers.

The untreated orchard in Wheatland had a diverse array of pest mites and predators. ERM, brown almond mite, and twospotted spider mite were present, but no dramatic outbreaks of these mites occurred. Coccinellids, chrysopids, and thrips were common predators, but spiders and predatory hemipterans and phytoseiids were also found, though not commonly.

Conclusions

Results of this single season's work showed that the use of NOW insecticides in northern almond-growing areas can increase ERM pest populations significantly. The reasons for the ERM population increases were not determined in this study. Several hypotheses could explain these increases: for example, the NOW insecticides might destroy insect predators of the mites, or might stimulate ERM reproduction.

Because the economic injury levels for ERM, the dominant pest mite during 1977 in four of the five orchards sampled, have not yet been determined for almonds, it is not clear when acaricide applications are justified. However, growers in these northern growing areas should be aware that NOW insecticide applications may dramatically affect ERM populations. Furthermore, the variability in mite species and their relative abundance in northern almond orchards make it difficult to devise a uniform almond pest management program. Careful monitoring of orchards will be necessary to ensure appropriate action in any almond pest management program.

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Effectiveness of Osmocote fertilizer influenced by placement and dosage

Ruth A. Coleman ■ Tom Mock ■ Tok Furuta

Incorporation of Osmocote into a soil mixture for the culture of plants in containers and subsequent storage of that mixture for more than a week or so is not a recommended nursery practice due to the release of nitrogen from the Osmocote fertilizer and subsequent buildup of soluble salts in the soil mixture. This buildup could injure newly transplanted plants unless leaching is practiced to reduce the level of soluble salts. Such leaching, while insuring the health of the transplanted plants, wastes fertilizer and, should the leaching water run off the nursery, could result in undesirable pollution of the surrounding area.

Yet, the use of the controlled-release fertilizer Osmocote for the culture of ornamental plants in containers is a desirable practice. More efficient use of the applied fertilizer, reduction of environmental pollution with nitrogen, and the systemization of fertilization practices are reasons for its use. Due to the problem of storing soil mixtures containing the controlled-release fertilizer, placement methods that are an alternative to incorporation at the time of preparation of the soil mixture are desirable. The desirable method should be one that permits application of the fertilizer at the time of planting, would not increase the cost of applying the fertilizer, and would not interfere with efficient soil handling or transplanting practices.

Experiments were conducted at the South Coast Field Station to compare two possible methods of application with total incorporation. The methods studied were placing the fertilizer—14-month Osmocote—on the surface of the soil, and placing the fertilizer—14-month Osmocote—in one lump within the soil mass beneath the newly transplanted plant (liner).

Also, because previous experiments had demonstrated that the results of experiments studying fertilizer placement and dosage could be influenced by irrigation procedures and practices, two types of irrigation systems—overhead sprinkling and drip—were used.

Plant growth was used as an indicator of the effectiveness of the treatments. Although many factors were studied, a factorial experiment was not used. Rather, selected combinations were