

A New Mite Problem in Avocados

Gary S. Bender

Farm advisor in Cooperative Extension, University of California, County of San Diego.

If your avocado grove currently has a problem with dropping leaves, fruit hanging bare out in the sun, and leaves looking like they have a severe case of the measles, your trees are probably suffering from one of the latest mite pests to invade California. This mite pest presents a dangerous situation for the typical avocado grove which normally has its pests under good biological control and does not have to be sprayed for pests.

History

The problem seems to have started in 1990, or perhaps earlier, on backyard avocados in Coronado, La Jolla, and other coastal towns in San Diego County. These trees had a problem with a mite that was assumed to be sixspotted mite (*Eotetranychus sexmaculatus*). Dr. James McMurtry, an acarologist from the University of California, Riverside, gave the mite a tentative identification in 1991 as *Oligonychus peruvianus*, a relative of the avocado brown mite, *Oligonychus punicae*. After further study and consultation with U. S. D. A. scientists in Beltsville, Maryland, Dr. McMurtry confirmed the identification of the mite as *O. perseae*, a mite pest of avocado apparently native to Mexico. The mite is known to cause damage to avocados in the more arid regions of Mexico; but it is not a major pest of Hass avocado in the state of Michoacan, an area which experiences daily rainfall during the summer.

Symptoms

The damage caused by the new mite is quite different from brown mite damage (the familiar bronzing on the tops of the leaves). The new mite causes small necrotic spots on the undersides of the leaves along the midrib and main veins. As the mite population increases, new necrotic spots begin to appear between the veins.

Each spot is covered by a fine webbing that shines silvery in the sunlight. Beneath the webbing, the mites are feeding and laying eggs and appear to be quite protected from feeding by *Amblyseius hibisci*, a predacious mite species which is common in California avocado groves. New colonies form on undamaged tissue when dispersing adult females cluster together in groups of up to 20 mites and begin feeding. The feeding damage leads to the formation of a new necrotic spot visible from both sides of the leaf.

Mite populations up to 1,000 mites per leaf are common on severely infested leaves. Leaves usually begin to defoliate when counts reach 500 mites per leaf. Mite populations peak during the summer months; populations decline rapidly in the cooler late fall and winter months, and after a prolonged rainy period may actually disappear

completely. Enough eggs remain, however, to allow rapid buildup of adult populations in the spring.

When conditions on the leaf become crowded, many of the mites will spin a strand of silk and waft through the air with the prevailing wind. This method of spread has usually been observed early in the morning, and the sharp-eyed observer can see the mites dangling from their silken threads while caught in spider webs. Hot temperatures in the summer (in the upper 90s) appear to reduce the populations dramatically, but a few mites can still be seen feeding on the leaves, and a lot of eggs have been laid on the leaves in preparation for the next generation.

This new mite is a cause for concern because, during 1993, we have found medium to high populations in all commercial groves in San Diego County and light infestations in some groves in Riverside County. Many growers reported considerable defoliation during 1992 followed by fruit drop. The fruit drop appeared to be a result of sunburn of the unprotected fruit.

Biological Control

Although mite damage is severe, we are beginning to see, in some groves, a buildup of a native predacious mite, *Galendromus annectens*, which is able to penetrate the webbing and feed on all stages of the mites. The annectens mite is wider and longer than the perseae mite and spreads very slowly. The fast-moving, shiny, *Amblyseius hibisci* predator mite is also increasing in population, but it can only feed on roaming perseae mites that are not protected by webbing. These mites are difficult to rear in an insectary.

A third predator mite, *Galendromus helveolus*, appears to have promise for eventually controlling the perseae mite. This mite was brought to California by Dr. McMurtry. It is found naturally in Central America and Florida on many plants, including avocado and citrus. It can be reared in an insectary, and it is well adapted to penetrating the webbing of the perseae mite.

Helveolus is currently being reared by Biotactics, an insectary based in Riverside. Since the predator cannot fly, the dispersal from tree to tree and from grove to grove is very slow. For that reason, predator mites ideally should be released on every tree, but economics may dictate that the predators be released on every tree in every other row. There has been no research conducted on the proper amount of predators to release per acre, but most growers are releasing at a rate of 5,000 per acre. This release rate is not high enough to achieve good control in a short period of time, but it does introduce the predator in the orchard. Biotactics has suggested that it may take three years to achieve good biological control with this predator at the rate.

Control with the helveolus mite appears to be erratic at this point. Helveolus appears to establish and feed on perseae mites at most release sites; however, some growers report that helveolus cannot be found on their trees after release. Clearly, there is a need for more research to determine the best release method, the proper amount to release, and the expectations for control with this predator.

The predator mites are cannibalistic. When releasing predator mites, it is extremely

important that the mites be released on the same day that they arrive. The mites should be kept in a cooler while they are being carried to the release site in the grove.

Chemical Control

Only three materials are currently registered for mite control on commercial avocados in California: sulfur, narrow range oil, and propargite (Omite®). Because the mite feeds on the undersides of the leaves, helicopter applications of sulfur have not been very effective. During the fall of 1992, sulfur applied by helicopter dropped the mite populations only about 10 percent. As temperatures warm into the 80 degree range, better control by sulfur is achieved, but coverage is still poor; sulfur applied in 40 gallons of water per acre will coat the tops of most of the leaves, but very little sulfur can be seen on the undersides of the leaves.

Sulfur applied as a handgun spray from the orchard floor is effective at killing all stages of the mites, but mites will begin to appear again in six to eight weeks. Burn can occur to the leaves and fruit if temperatures are in the upper 90s. Sulfur will kill predator mites. Sulfur is available as a liquid (Uniflo*) applied at five gallons per acre, or as a powder (Thiolux®) applied at 16-30 pounds/acre. Both materials should be applied in enough water to wet the leaves thoroughly.

A narrow range 415 oil (Unipar®) is mixed at a rate of one gallon of oil per 100 gallons of water and sprayed at a rate of at least 10 gallons of mix per tree. This spray should be applied using a ground rig with a mechanical agitator to mix the oil with the water.

Faced with a soaring population of mites and ineffective control by sulfur, the California Avocado Society and Cooperative Extension of the University of California joined forces to prepare the paperwork for a Section 18 registration for the use of propargite (Omite) on avocados. The Section 18 was approved on July 14, 1992, for use on avocados in San Diego and Riverside Counties, and was renewed on July 16, 1993.

Because Omite has been known to cause skin rashes in people who contact the foliage, this chemical must be applied by helicopter or an enclosed cab ground sprayer. Irrigators must stay out of the grove for 48 hours after the spraying, and there is a 28-day waiting period before picking may resume. The law requires that a licensed pest control advisor write the recommendation for propargite, and a county agricultural inspector may visit the grove before application is allowed.

Cultural Control

Very little research has been conducted on cultural control. A trial using raised sprinklers inside the tree canopies gave inconclusive results. Heavy mite populations have been seen on both well-watered, well-fertilized trees as well as on drought-stressed trees. The former trees will regrow leaves after mite-induced leaf drop much more rapidly than the latter trees; therefore, mite-stressed trees should be kept well watered with applications of fertilizer applied during leaf flush.

Hosts

Hass, Gwen, and Reed avocados seem to be the preferred hosts of the perseae mite, but the mites will develop populations on Fuerte, Bacon, and Zutano avocados. Other hosts include:

grapes (Thompson and Flame seedless, Chardonay)

deciduous fruits (apricot, peach, nectarine, persimmon, plum)

citrus fruit (not leaves)

sumac

milkweed

lamb s quarters

camphor

liquidamber

rose

acacia

Current Strategy

If you see leaves in your grove covered with small necrotic spots, we suggest that you (1) verify mite feeding in the spots, using a hand lens, and (2) watch it closely. If you have a good set in your grove for next year, you may want to protect the crop by spraying. As the mites start to reappear after spraying, predacious mites should be released. If the set is light, you may want to release the predator mites and let nature take its course. Mites should come under biological control in one to three years. The ultimate solution will be to find a predacious mite that can dig into the webbing to attack the perseae mites and reproduce itself in high numbers. The California Avocado Society is currently funding efforts to look for new types of predator mites in Mexico.

By the way, we strongly suspect that perseae mites can be moved around on equipment and clothing. Pickers could be major culprits in the spread. The mites do not seem to infest older fruit, but they can be found on leaves falling into bins. Bins should be carefully cleaned before they are delivered to the grove to prevent the spread of mites to uninfested areas.