



This defoliated tree was treated with chemical program.



Healthy looking tree was under biological pest management. Fresno Bee/Ron Gobbi

# Mite

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willing to take a little crop damage in that first transition year," Michael said. "It could cost a grower from \$15 to \$30 an acre to get the predators established. That all depends on how much chemicals a grower used in the past."

—Michael's most recent convert to biological warfare was Superior Farming Co., in Kern County. The firm, one of the leaders in the industry, has some 7,000 acres of almonds and was experiencing problems with navel orangeworm and mite infestations.

"A couple years ago Superior turned over 320 acres of almonds to Michael on a trial basis. They identified the parcel as "Block 88." Management wanted to see what he could do there with his biological mite control program.

"Today, Bill Duncan, the manager of crop protection for Superior, is encouraged by the results. And he's not alone. There were a lot of outsiders watching Block 88 too. County farm advisers and university researchers were among them. Plus the many employees who work at Superior were aware of what was happening.

Duncan said his management staff and team of employees have worked hard on Block 88 to make it Michael's program work.

"We had sustained heavy mite pressure on these acres in the past and decided if program was any good we'd really give it the acid test from the start," he said. "It (Block 88) was tough to irrigate and the water penetration there is poor which only compounds the mite problems."

This year without applying any chemical sprays for mite or NOW the damage was only about 3 per cent.

"We can live with that much damage, he added.

For 1983 Michael will have 2,000 acres of Superior Farming Co. almonds to treat with the six-spotted thrips and predaceous mites — another predator he uses.

"In my own mind I see a three or four-year plan in getting the (biological control) program established in all our almonds," Duncan said. "But the rate of expansion will depend on how effectively we can keep the navel orangeworm damage down through cultural methods."

Controlling NOW is an important element in the overall program, said a member of Duncan's management team.

"Most of the pesticides for navel orangeworm knock out everything," he said. "We've found that it was a mistake to rely totally on the new synthetic pyrethroids. We could control the NOW, but the mites blew up and defoliated the trees. The new generation of pesticides created a lot of problems for us.

"We found NOW control was possible when we had a timely harvest and initiated a good sanitation program and removed all the 'stick-tights' (nuts) from the trees. That way we don't have to worry about aggravating the mite problem with a NOW spray," he said.

"It is easier to go out and spray than to consistently monitor the pest and predator activity in the field," said Michael. "Some growers can't take the pressure when the mites begin building up. The first year they have to be willing to take some damage."

A normal spray program in almonds might be to treat twice for NOW and three or four times for mites. The difference between Block 88 (untreated with chemicals) and the adjoining orchard was like night and day. Surrounding acreage that had been under the routine spray program was nearly defoliated.

The biological approach isn't just a matter of getting some good bugs into the field. It takes a concerted effort on the part of management to coordinate the irrigation schedule, plant the proper cover crop and maintain good plant nutrition.

"We believe we can cut costs by at least \$100 an acre if we don't have to spray our almonds," said the man from Superior.

"We analyze the whole situation, studying the orchard carefully," Michael explained. "We find that a healthy tree or vine is not so attractive to the mite, so we do petiole analysis yearly to monitor the nutritional needs of an orchard."

Michael and his chief assistant, Gary Smith, make weekly field releases of six-spotted thrips (which have the ability to fly from tree to tree) and predaceous mites (they only crawl) and other mite predators which they rear at their laboratory facility and greenhouses in Fresno.

The thrips are reared on bean plants in a greenhouse and then those plants are placed throughout the orchard where the predators are freed to search for prey.

In grapes the leafhopper (*Erythroneura elegantula*) is a major pest. This is another case where chemical applications to control it aggravate the mites.

"To avoid using chemical applications we establish the tiny (almost microscopic) wasp called *Anagrus epos*," Michael said. "These wasps are particularly valuable because of their amazing ability to locate and attack grape leafhopper eggs. Their extremely short life cycle enables them to reproduce much faster than the hoppers."

"Anagrus can produce nine or 10 generations during the grape season," he said. "So by avoiding spraying for the leafhoppers, farmers can give the mite predators

a chance to get established and maintain good control."

Delano area grower Jim Andreas has been using predators for hoppers and mites in his Thompson seedless for the last decade. And it means extra money in his pockets. He has been selling his raisins to Bonner Packing Co., Fresno, for \$50 a ton higher than the going price because they are organic.

"The organic market is very good and none of my raisins go into the reserve pool," Andreas said. "That means I get paid for the whole crop on delivery."

The normal raisin grower this year will see 57 percent of his crop go into the reserve pool and he is only initially paid on the 43 percent free tonnage.

"Some neighbors think I'm crazy and aren't interested in what I'm doing," the farmer said. "Some do show an interest but change comes about slowly."

Andreas and his two brothers, John and Roger, farm slightly more than 1,200 acres of cotton, table grapes, wine grapes, and grain crops.

"We like to justify what we are doing in the vineyard and must be able to show good results," Andreas said.

"We have to build a relationship with them (growers) and they need to learn that they can trust our judgment," added Smith.

"Sometimes you feel like you're beating your head against a wall because the majority of farmers won't believe that the program works," he recalled. "A lot of growers think we're about three bricks shy of a full load."

"But I like that challenge," interrupted Michael. "It is exciting to me to see them come around to a new way of thinking. And it is good to remember that it is benefiting the entire industry, not just one grower."