1991.91-E5.Freeman.Ant Control in Almonds - Proceedings Report and Publication Submitted as Annual Report

19TH ANNUAL ALMOND RESEARCH CONFERENCE, DECEMBER 3, 1991

Project No. 91-E5 - Ant Control in Almonds

Project Leader: Mr. Mark Freeman (209) 488-3285
University of California Cooperative Extension
1720 S. Maple Ave.
Fresno, CA 93702

Cooperating Personnel: R. Coviello, H. Shorey, W. Bentley

Objectives and Summary:

Monitoring Method

A. A color pictorial guide for ant identification was published in "Almond Facts" and "Nut Grower" earlier this year.

B. We were unsuccessful in finding strong correlations between the number of fire ant nests (mounds) and kernel damage.

C. Most of our efforts were directed toward development of an effective bait station and bait. There were several bait station prototypes tested, varying from plastic cups on top of wooden stakes to the final "T" shaped PVC pipe station. The PVC pipe is inexpensive, versatile, and will withstand vertebrate pest attack (such as coyotes, rabbits, etc). The final prototype is designed as follows: 1 four inch section of 3/4 inch schedule 40 PVC pipe, 2 caps for each end, 1 eight inch spike (or nail) driven through the center, and two 3/8 inch holes drilled into one side of the PVC section (equidistant between the caps and the spike). The spike is driven into the ground so that the PVC pipe rests on the soil surface. In addition, this station gives some measure of protection to any bait within it, so non target animals could not easily reach a toxic bait used with this type of station.

   We tested numerous possible protein and lipid (fat) baits, some of which were used by researchers working with the imported fire ant, *Solenopsis invicta*. These baits included cereal soaked with corn oil, soybean, or cotton seed oil; peanut butter, tuna fish, cornmeal, almond "press cake", and almond kernels. Many of these baits were more attractive than almond kernels to all ant species and to fire ants. However, these baits turned rancid quickly, were awkward to use, or attracted vertebrate pests. The almond kernels were effective enough to attract ants from mounds 10 feet away. Plain Nonpareil variety almonds were more attractive to fire ants when compared to other kernel varieties, and to rancid and roasted nonpareil kernels.

E. We identified one natural ant repellent, farnesol, that would be worth testing. Unfortunately, it would be too expensive to treat the whole orchard floor. Ideally, it would be best to use it when protecting a point source, like a tree trunk, for example.

Chemical Control

A. We established a large plot that compared spray timing trials of Lorsban, Sevin, and Imidan applied during May and July. Final results are not completed, but most results indicate that July treatments controlled ant activity better than May treatments.

B. Two trials were established comparing Logic, a granular type insect growth regulator, with Lorsban. In one trial, there was no ant activity in the Logic treated areas after eight weeks. Ant activity returned in the Lorsban treated areas by the eighth week. Logic now has a California registration for non-bearing citrus.

Ant Guide

By Mark Freeman,
Richard Coviello and Curtis Sisk

Ants generally cause minor economic damage to almond crops compared to navel orangeworm and peach twig borer. In some orchards, however, ant damage may exceed 2 percent of graded samples. The damage can add up, especially when one considers the number of ant damaged nuts that may have been left unharvested.

During the last decade, ant damage and activity have increased in southern San Joaquin Valley almond orchards. Some management trends may have contributed to that increase, namely more non-tillage, more low volume irrigation, and nuts shaken earlier to avoid navel orangeworm.

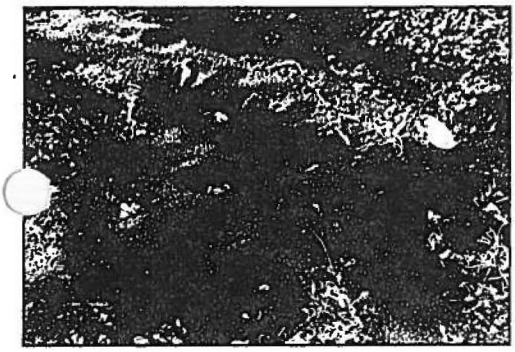
These trends do not represent bad management techniques. But growers must be aware of all the consequences when they change management techniques. Ants are survivors, and will adapt to new conditions.

New chemical control methods for ants will be available this year for use in almond orchards. Chemical costs are the most expensive item in the budget for most almond growers. To successfully manage ants and avoid unnecessary costs, you must know your pest and know when and if you need to treat.

The first step is identifying the particular type of ant. Only two ants, the fire and pavement ants, are known to cause economic damage to almonds. The purpose of this ant identification guide is to help you identify what type of ants live in your orchard. This article describes five common ant species found in orchards.

For accurate field identification, ants can be inspected with a 10X magnifying lens. If you need further help, consult your local farm advisor's office, Agricultural Commissioner's office or PCA. A minimum of five ants should be collected and placed in rubbing alcohol (for preservation) before they are transported.

Ants feed only on the kernel. A small hole is made in the brown pellicle or skin, and the kernel is gradually removed. The pellicle may be left almost intact. Many of these damaged nuts are removed during the harvesting process due to their light weight. Partial damage is graded as a defect.



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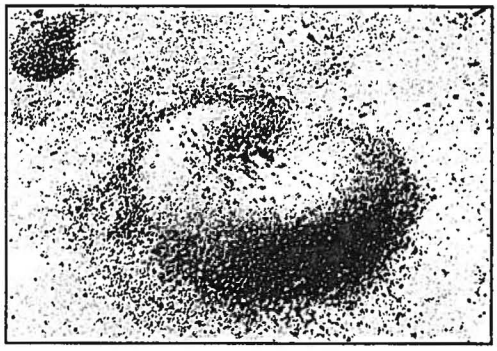

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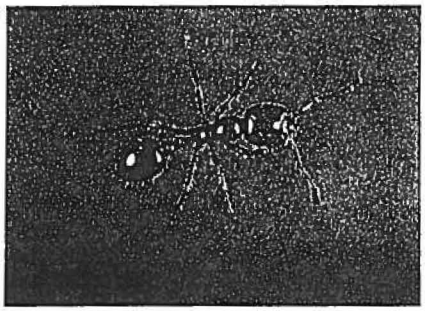
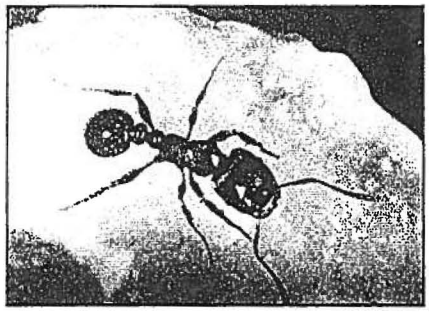
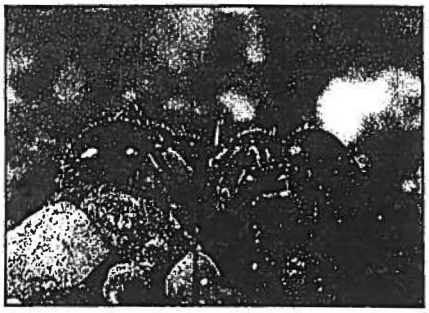


Fire ant



Pavement ant



Harvester ant

Damaging Ants

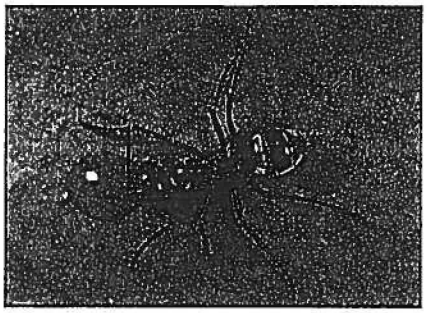
The native or California fire ant *(Solenopsis xyloni)* has a shiny red head and thorax with a black abdomen. The entire body is covered with golden hairs, and it has clubbed antennae. There are also two petiole nodes between the thorax and abdomen (Figure 1, page 14). Ant colonies are polymorphic, which means ants occur in two or more sizes. These sizes range from 2.5-4.5 mm.

Fire ants are found both in open, sunny areas and in shaded areas throughout the orchard. They typically forage during mid-morning and early evening daylight hours. Ants remain underground during the warmest periods (above 90 degrees F) as they are sensitive to heat. Fire ants rapidly swarm out of the nests when disturbed by pounding the ground. None of the other four ants included exhibit this behavior. Fire ants will sting, but do not usually cause blisters like the imported fire ant found in the southeastern United States.

Soil mounds or nests can be found throughout the orchard, and nest locations will change during the season. This movement may be due to the fire ant's preference for soil moisture. Through mid-spring, mounds will be found scattered on the berms and orchard floor. Under low volume irrigation, mound activity then concentrates near the edge of wetted soil areas. Under flood and sprinkler irrigation, mound activity may be concentrated on the berms. New mounds will be created along soil cracks throughout the orchard between irrigations.

One colony can form many mounds which are clustered and overlap. The underground nest can extend a few feet deep and several feet in diameter. The above ground nest can range from a few inches to more than a foot in diameter. The mounds may be low to the ground or built up like a volcano. Some mounds are quite hard to spot, espe-

Pyramid ant



Field ant

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The pavement ant *(Tetramorium caespitum)* is small (2.0-3.0 mm) and its whole body is colored blackish brown to black. It has two petiole nodes and the head has parallel furrows.

This ant exhibits a slow, deliberate motion, and does not react much to disturbances. It only shows aggressive tendencies towards other pavement ant colonies when colonies are expanding during spring. It feeds on almond kernels.

The pavement ant is native to cooler areas of Europe. This fact may explain why it is only found in the cooler areas of the Central Valley, approximately Merced to Chico. Its mounds are commonly found near soil moisture, like the fire ant.

Ants *Not* Damaging

Bicolor pyramid ant *(Conomyrma bicolor)* is approximately 3.0 mm long, and it has a red head and thorax with a black abdomen. It has only one petiole node and a "pyramid" shaped bump on the base of the thoracic area. The pyramid ant resembles the small worker of the California fire ant, but it does not have the double petiole node and cannot sting.

Nests of bicolor pyramid ant are usually found in open, dry, sunny areas (orchard floor and boundaries) with one to a few cone- or volcano-shaped mounds. The mounds are variable, but range from 3 to 6 inches in diameter and are approximately 2 inches tall.

These ants can be observed moving quickly around the nest opening during most of the day. When disturbed, they move very rapidly with a somewhat jerky, random motion in and around the nest. They will not erupt from the nest in large numbers like the California fire ant. The bicolor pyramid ant generally feeds on honeydew and other insects, and ignores almonds.

The California harvester ant *(Pogonomyrmex californicus)* is one of the larger ants found in almond orchards, measuring up to 6 mm. It is completely red with a comparatively large head, has two petiole nodes, and delivers a very painful sting.

The California harvester ant is found in open, dry, sunny places, and builds a low, spreading nest composed mostly of dirt and sometimes decorated with tiny pebbles. The nests are usually fan shaped or oval with the nest opening near one edge.

Harvester ants tend to forage in-

Ant Species	Size	Nest Type & size (Soil Mounds)	Behavior (Type of Motion)	Soil temperature and moisture	Body Color	Time active	Feeds on Almonds
Fire ant	2.5-4.5mm	low mounds, small to large, w/ one to many clustered openings	long lasting, aggressive swarm when disturbed; can sting	near soil moisture, shade or sunny area	red and black	morning and evening	Yes
Pavement ant	2-3mm	One to many mounds, clustered	slow deliberate motion; not easily disturbed	Near soil moisture	black	primarily cool daylight hours	Yes
Pyramid ant	2.5-3mm	1-6 inch, cone shaped, mounds not clustered.	quick, active; easily disturbed but calm down quickly	hot, dry, open sunny areas	red and black	throughout day	No
Harvester ant	5.5-6mm	fan shaped mounds, usually not clustered 2-3 foot diameter	smooth, active motion; not easily disturbed; can sting	hot, dry, open sunny areas	red	throughout day	No
Field ant	4-7.5mm	small to large holes, w/ or w/o loose dirt around opening	quick, jerky, random motion over large areas; easily excited	protected area in partial sun	grey and brown	throughout day	No

dividually, and are active around the nest during most of the day. They are only slightly agitated when disturbed, unlike the fire ants. The California harvester ant feeds mainly on seeds, but has not been shown to cause damage to almonds.

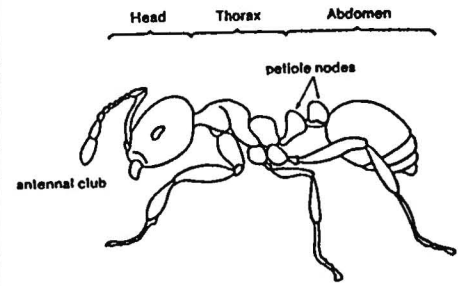
Field ants *(Formica aerata)* are the largest ants found in almond orchards, measuring up to 7 mm. They have one petiole node, are colored brown or grey, and do not sting.

Field ants feed on other insects and are active during most daylight hours. Individuals will travel long distances from the nests. These ants move quickly in random, jerky motions. Field ants generally do not trail or feed on almonds. They do not sting.

Field ant nests are found near the base of trees and near weeds on the orchard floor. Nests are often difficult to spot, especially when located on berms as the above ground nest consists of small holes with very little dirt around them. Nests located on the floor can consist of fairly large holes with dirt randomly scattered around them.

The two most similar appearing ants are the fire and pyramid ants. Both ants are red and black, but the fire ant's body is shiny. The fire ant also has clubbed antennae, two petiole nodes, and its body is covered with hairs. The pyramid ant has a distinctive pyramid-shaped bump on its thorax. The behavior and nests of fire and pyramid ants are easily distinguishable. □

Figure 1



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Predicting Ant Damage

Research assistant Curtis Sisk loads bait into the ant monitoring model.

The monitoring device is pushed into the ground.

The fire ants go after the bait in the monitoring station.

Counting ant nests in an almond orchard is one way of predicting the amount of damage they will cause, but where cover crops are used it's harder to spot the nests. University of California researchers are trying to develop a method of monitoring to identify and estimate the number of damaging ants in an orchard.

Not all ants damage almonds, so simply detecting their presence may not justify the expense of treatment. For example, the field ant is often seen running up and down the tree, but it doesn't feed on almonds, according to Fresno County farm advisor Mark Freeman.

Freeman has devised a monitoring station using 3/4-inch, schedule 40 pvc pipe. A six-inch length of pvc pipe, which holds the bait, is sealed off with a No. 3 rubber cork, then connected with an elbow to a 8-12 inch piece of pvc. The cork keeps the bait from slipping down the other pipe. Two holes are drilled into the side of the short pipe to provide the ants access to the bait, then the end is capped. The long section is pushed into the ground to secure it.

Using this model, Freeman hopes to accomplish three goals: select for fire ants, accurately gauge the level of damage they may cause, and see if a pheromone or bait can be used with a poison that the ants will carry back to the queen and the rest of the colony.

Studies have revealed tunafish is the most attractive bait to fire ants, which are the most prevalent damaging ants in the southern San Joaquin Valley. The researchers are now comparing different almond formulations with the tuna as many species will feed on it.

Because fire ants tend to build their nests near wetted soil areas with low volume systems, that is the best place to put monitoring stations. Ants are most active during the cooler hours of the day, below 90° F. The best times to see them are from 7:30-10 a.m. and 6-8 p.m.

"Late June through July, once they identify that they have fire ants—and up north, pavement ants—then they can go ahead and treat," he said, as long as the preharvest interval is noted. Currently, growers can use Lorsban 4E, Pounce or diazinon granules, which will not be produced for use in almonds after Aug. 31. The Lorsban label advises using 4-8 pints, which Freeman said works best with 50-100 gallons of water to move it into the soil. "On the soil surface the active ingredient evaporates, by irrigating the ants will contact it as they burrow," he said. □

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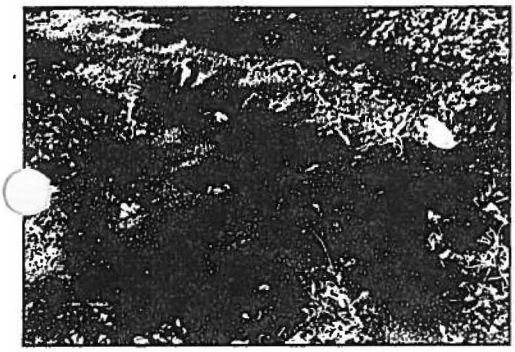

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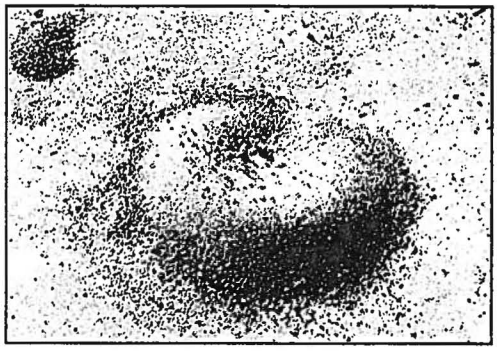

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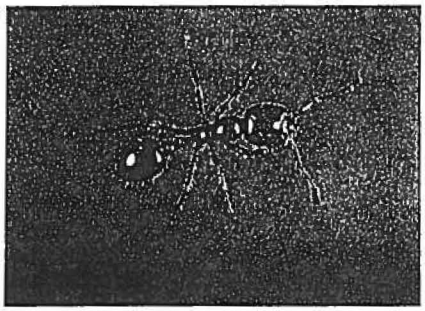

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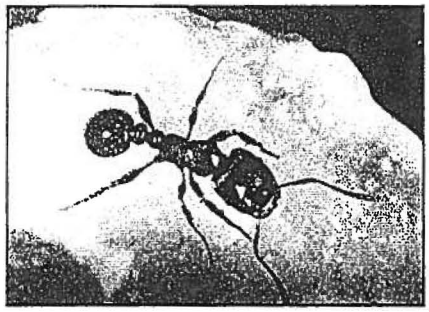

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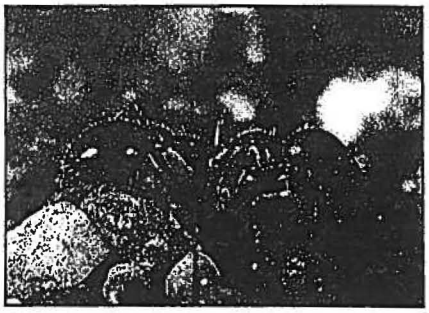

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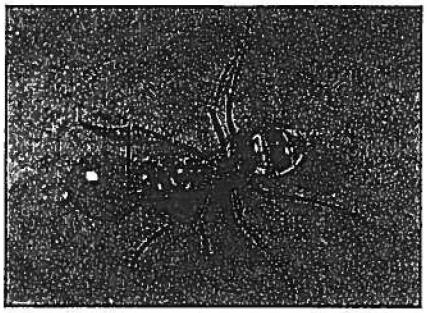

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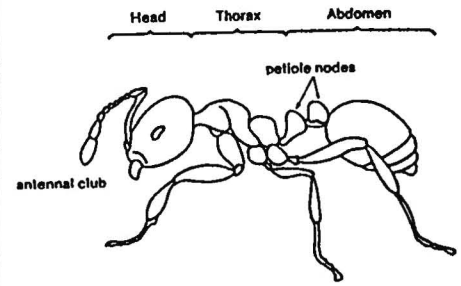

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