

Biology And Management Of The *Ferrisia gilli* Mealybug In Pistachios

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INTRODUCTION

Ferrisia gilli Gullan is a new mealybug that is spreading throughout pistachio production regions of California. It was first noticed in pistachios in the late 1990s in Tulare County near the city of Tulare. Initial infestations remained localized for several years and then began to spread rapidly. As of late 2005, over 3,000 acres of pistachios in at least eight counties have become infested.

Due to the new nature of this pest, very little was known about its biology and how it affects the pistachio crop. Even less was known about monitoring and control strategies. As a result, this project was developed in response to the threat this new pest poses to the California pistachio industry. Objectives centered on the biology and management of the mealybug. They include: 1) developing basic biological information on *F. gilli* in pistachio, including information on seasonal biology, within-tree distribution and naturally-occurring biological control; 2) evaluating chemical control with insecticides; and 3) determining the effect of mealybugs on yield and quality.

RESULTS

We determined that *F. gilli* has three discrete generations per year. The overwintering generation spends the dormant season in the nymphal stage hiding in cracks and crevices. In spring, at the time of bud break, they move out and begin to feed on the new buds. They continue feeding at this location throughout the spring until they mature in May. In late May through mid June, adult females produce large numbers of crawlers that feed on the rachis and hulls. This first in-season generation matures in about six to seven weeks and produces crawlers of the second in-season generation in mid July. With each passing generation, there is an exponential population growth and the mealybug density of the second in-season generation, which feeds almost exclusively on hulls, can reach into the hundreds, and sometimes thousands, per cluster. This second generation matures and begins to produce crawlers at approximately the same time as harvest. In some cases the mealybugs produce these crawlers directly in the tree canopy, while in other cases the adult females move to the trunk, aggregate

together, and then produce the crawlers. These crawlers are very mobile and seek out hiding places where they will overwinter as young nymphs.

Chemical control trials showed that Imidan® and Sevin® are not very effective against *F. gilli*. However, the newly registered Centaur™ (buprofezin) and Assail (acetamiprid), an insecticide with potential to be registered in 2007, are both highly effective if used around June 1, when mealybugs are in the crawler stage. These products are both soft on parasitic wasps, should they play a role in the management of this pest in pistachios.

Mealybugs had a significant impact on nut quality. Trees that had 111 mealybugs per cluster in September, compared to trees with clean clusters, had a 15.3% reduction in grower paid weight. This is a difference of \$1,539 per acre based on a \$2.00 per pound price and the average grower paid weight of 4,634 pounds per acre from our trial. Most of the losses were in the percentage of split inshell nuts. Mealybug feeding caused a portion of these nuts to be downgraded into shelling stock and closed shell classifications.

CONCLUSIONS AND PRACTICAL APPLICATIONS

1. An understanding of the mealybug life cycle will allow us to determine its strengths and weaknesses, and know when to best utilize chemical and other control strategies. For example, chemical control with insect growth regulators that are active against small instar larvae are most effective if applied around the first of June when the mealybugs are all in the crawler stage. Also, knowledge that trees are full of the mealybug crawlers at harvest, when equipment is being drug through and placed under trees while they are shaken, has provided us with a better understanding of how this pest is likely being moved from location to location.
2. Data on the within-tree distribution of the mealybug will help pest control advisors know where to look for mealybugs and help us understand how they cause damage to the crop.
3. Biological control of mealybugs in pistachios is minimal. Some predation by lacewings and a predatory ladybird beetle do exist, but parasitic wasps, which are extremely effective against this mealybug in almonds, persimmons and grapes, have not been found in pistachios. This is likely to continue until there is an alternative to broad-spectrum insecticide use against true bugs.
4. We determined that Centaur™ (registered for pistachios in 2005) and Assail (likely to be registered in 2007) are both highly effective against the mealybug when applied around late May through June. A single application of either product will keep the crop clean for the remainder of the season. Insecticide applications of Imidan® or Sevin® are only about 50% effective

against the mealybug, but will provide some level of control if being used for other pests, such as soft scale or navel orangeworm.

5. Documentation that mealybugs can cause significant reductions in the value of the pistachio crop will lead to the development of treatment thresholds for this pest. These thresholds, however, must be documented at multiple sites over multiple seasons to ensure their accuracy. As far as this year is concerned, a density of three mealybugs per cluster in June was sufficient to cause a 15% reduction in the grower paid weight per acre. This was mostly due to a decrease in the percentage of total edible split inshell nuts.

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