



University of California Cooperative Extension
PISTACHIO NOTES

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Pistachio Fungal Disease and Control Treatment Guide

Pistachio fungal diseases that attack shoots, and/or leaves, rachises and nuts, such as those caused by *Botrytis cinerea*, *Alternaria alternata*, and *Botryosphaeria dothidea*, are generally less of a problem in Kern County due to our lower humidity and infrequent rainfall compared the rest of the Central Valley of California.

Botryosphaeria blight of pistachio is almost unheard of in Kern County and growers should be saving their money and maintaining their fungicide efficacy by not treating for it in Kern County in 2005.

Alternaria late blight can be a problem in some location in Kern County, especially for orchards in humid locations such as those with poor air circulation as can occur in low-lying areas between raised canal walls, or in flood-irrigated fields with slow water infiltration rates, or orchards irrigated by trunk-to-trunk high-impact sprinklers. Delayed harvest can also increase the incidence of *Alternaria* late blight. *Alternaria* can infect green vigorous tissue in May, June and July under wet conditions, but easily colonizes brown, senescent tissue, such as nuts and drying leaves, in late August and September.

Botrytis shoot blight can be a problem in Kern County. *Botrytis* treatments are sometimes necessary if the weather is persistently wet and rainy during bloom in late March or early April. Intermittent rain during bloom is normal and if precipitation events are interrupted with periods of drying, treatment is seldom required. It takes more than a few blighted shoots per tree to negatively impact yield, and savings in fungicide treatment costs can add up.

The following tables are adapted from those present in the “Fungicide Efficacy and Timing for Deciduous Tree Fruit and Nut Crops and Grapevines - 2004”, which is a University of California publication authored by Jim Adaskaveg, Brent Holtz, Themis Michailides and Doug Gubler. This manual is available on the web at www.ipm.ucdavis.edu. I have added additional information that resulted in talking with Themis Michailides and in examining labels from the www.cdms.net website. These tables (Table 1 and Table 2) are meant as a guide only. Users of the following tables beware. Labels change, and typos and mistakes occur in newsletters, so read and follow the label that comes with the chemical before making any application.

TABLE 1. Pistachio- Fungicide Efficacy

Fungicide	Resistance risk ¹	Alternaria	Botrytis	Botryosphaeria
Abound ²	high	+++	----	+++
Bravo	low	++	----	++
Cabrio	high	+++	----	+++
Elevate	?	----	+++	----
Flint	high	+++	----	+++
Pristine	medium	++++	++ ³	++++
Topsin M ⁴	high	----	+++	++
Switch	?	++	+++	----
Copper	low	+	----	----
liquid lime sulfur ⁵	low	----	----	+/-

Rating:++++ excellent and consistent, +++ good and reliable, ++ moderate and variable, + limited and/or erratic, +/- minimal and often ineffective, ---- ineffective and/or not registered, and ? unknown or not available.

1. Rotate fungicides with different chemistries to reduce risk of resistance development
2. Field resistance of *Alternaria* spp. to Abound has been detected in pistachio.
3. Supplemental label - 2ee
4. Registered for bloom treatment only.
5. Dormant treatment only.

TABLE 2. Pistachio-Treatment Timing

Disease	Dormant	April	June	July	August
Alternaria ^a	----	----	+++	+++	++
Botryosphaeria ^b	+	++	+++	+++	++
Botrytis ^c	----	+++	----	----	----

Rating: +++ most effective, ++ moderately effective, + least effective, and ---- ineffective.

^a Three applications during the season is recommended

^b Botryosphaeria treatments in Kern County are usually unnecessary.

^c Female trees usually begin bloom when the first rachises are 1 - 2 inches long. For best botrytis control, fungicides should be applied shortly before bloom and/or before significant rainfall.

Evaluation of Nine Advanced Selections From the Pistachio Breeding Program

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Introduction and Procedures

A pistachio breeding program was initiated in 1989 in response to concerns by Dr. Parfitt and Joseph Maranto, other horticulturists, and many growers that the pistachio industry in California is based largely on one female (Kerman) and one male (Peters). Goals of this breeding program included developing new varieties with: 1.) superior characteristics in terms of yield, nut size, split nut percentage and other quality factors, 2) earlier or later maturity to spread out the harvest season to better utilize harvesting machinery, personnel, and hulling facilities and 3.) increased genetic diversity to avoid a possible catastrophic disease epidemic or insect infestation. Initially, 40 female and 43 known males (representing much of the available genetic material in the U.S.) were used to make crosses. The resulting seedlings were evaluated at three sites (near Bakersfield, Parlier and Winters) for a range of characters having commercial value. Nine female and two male seedlings were initially selected for advanced evaluation on PG1 and UCB-1 rootstocks in 1996. Randomized, replicated and blocked experiments were established for evaluating these nine selections against Kerman in northwestern Kern County in 1997 on a calcareous, boron silty-clay loam soil and in Madera County in 1999 on a neutral sandy loam. Forty trees of each advanced female selection are present at the Kern County site and 20 trees at the Madera site. The Kern County and Madera experimental plot consists of two replications each containing 20 trees (Kern) and 10 trees (Madera). Within each of these two replications, one-half of the trees are planted on PG1 rootstock planted side-by-side next to the other half planted on UCB-1 rootstock. Peters males and the selected early and late blooming males are present in both the Kern County and Madera locations. These advanced selections have been producing commercial yields at the Kern County site since 2002 (6th leaf) and at the Madera site beginning in 2004 (6th leaf). Nut quality factors were evaluated and graded commercially, in the same way as those from a grower's harvested load, by established protocols and trained personnel at a hulling facility.

Results

Three female selections and the early-blooming male selection appear to have characteristics of value based on current evaluations. The three female selections are identified as B22-31, B19-12 and B5-8 and the early-blooming male as B15-31.

Based on their performance to date, B22-31 especially, and possibly B19-12, have commercial potential when planted with the associated B15-31 and the Peters male. Notable characteristics of B22-31 included: earlier maturity (by about 30 days in 2004), greater yield (1244 lbs per acre or 41% greater for B22-31 than Kerman in 2004 and higher average yield from 2002 through 2004), and higher split nut percentage (83.4% for B22-31 and 63.4% for Kerman from 2002-2004 in Kern County), while retaining nut size and a shell-hinge strength similar to Kerman. B22-31 performed well in the crop-disaster year of 2003 suggesting that it may have a lesser chill requirement than Kerman. Based on current results, B22-31 does not appear to be inferior to Kerman in any important characteristic.

The notable characteristics of B19-12 included: earlier maturity (by about 20 days in 2004), possible lesser chill requirement, higher split nut percentage (86.7 % for B19-12 and 63.4% for Kerman from 2002-2004 in Kern County), and larger nut size than Kerman. Shell hinge strength is inferior to that of Kerman resulting in greater waste at hulling and more loose shells and kernels after processing.

B5-8, which is also earlier maturing than Kerman, has been equal to or inferior to Kerman in several characteristics that, at least to date, would limit its commercial acceptability. B5-8 produced high yields in 2002 and 2004, although not statistically greater than B22-31.

The process has been initiated that may lead to the release of B22-31, B19-12 and B15-31 by the University of California as official pistachio varieties. However, one of the strengths of Kerman is the long time period that Kerman has been grown successfully in California. The performance of the new advanced selections has been encouraging but is based on a time period of only three years. Evaluations of these three advanced female selections and the early-blooming male will continue.

The Plant Bugs: They Can Really Take a Bite When You're Not Looking

Every year in Kern County I am called to orchards, usually in April, to look at nuts in the newly developing crop that are blackening and dropping. Now some of this blackening and dropping of small nuts is normal, and occurs naturally as the tree adjusts its crop load. However, it may also be the result of feeding of plant bugs such as lygus, calocoris, and phytocoris. If I am called to an orchard later in April and May, the nuts in question will have sunken, brown to black scars containing dead or dying tissue. If one of these affected nuts is cut open, a blackish pit can be seen on the inside of the shell opposite the scar outside. This distinctive damage is called epicarp lesion. Generally, the adult stage of the insects that are responsible for this damage are small, about ¼ inch long, brownish or greenish in color, with a small, triangular shaped marking on the back. For descriptions and pictures of these small plant bugs, biological information and treatment options, look in the UC Pest Management Guidelines for plant bugs in pistachio located at www.ipm.ucdavis.edu. These small bugs can only damage the crop from bloom in early April and until shell hardening, which occurs in late May and early June.

Typically, by the time I am called to the orchard, the plant bugs can no longer be found but the damage remains. Often, lygus can migrate into an orchard, feed and be gone before this pest is even detected. Monitoring weeds such as Russian thistle or other annual weeds in or adjacent to the orchard can help determine pest levels. The worst damage that I have seen has been associated with disruptions in weeds or crops adjacent to pistachio orchards. In one case, the grower had disced a weedy block located in between two blocks of pistachio in late April in preparation for planting an annual crop. Apparently during discing, the plant bugs living in the weeds flew north as the nuts on the trees on the south border of the block to the north were decimated, while the nuts on the trees on the north border of the southern block were untouched. Had the weeds remained undisturbed, it is unlikely that the pistachios on either side of weedy field would have been damaged economically. Pistachio blocks adjacent to alfalfa fields can be at considerable risk from cultural and harvest activities taking place there. A few years ago, when wine grape prices sank, I saw extensive bug damage in the nuts of trees bordering two different vineyards where irrigation had ceased prior to the vines being pushed out. Generally, the pistachio tree can compensate for light to moderate plant bug activity and pesticide treatments are unnecessary. Often, a pistachio tree will have more potential nuts on it after bloom than can reasonably be expected to set and fill. Compensation for plant bug damage is possible early in the season because the tree will selectively drop damaged nuts, and retain those that otherwise might have shed normally due to excessive crop load. However, in situations like those described above where bug pressure can be unusually severe, insecticidal treatments would probably be warranted.

Sometimes certain plant bugs can act as beneficial insects. Farm Advisor Bob Beede in Kings County, Dr. Dick Rice, Extension Specialist Walt Bentley and others have shown that *Phytocoris relativus* can be an important predator of some scale insects that can reduce pistachio yield and quality, such as Lecanium scale.

Some Citrus Pre-emergent Herbicides and Pistachio Don't Mix

Pistachio trees, young and old, are not tolerant of rates of pre-emergent herbicides, such as simazine, diuron, and bromacil, which are commonly used in citrus orchards. Pistachios downhill from citrus or across an access road often display herbicide-related phytotoxicity symptoms. The most typical symptom seen is leaf drying, dying and dropping, although in the worst-case scenario entire trees may die. Pistachio trees have a prolific root system, and in one instance where a pre-emergent herbicide containing diuron and bromacil was applied to a decomposed granite road, some pistachio trees three rows in from the road showed distinct leaf drying and loss. In another example, baby pistachios in a swale draining an uphill citrus grove died, and replants would not grow for several years even after a ditch was constructed to divert drainage water away from the affected field. Besides digging protective ditches, pistachios can be protected by the use of alternative preemergent herbicides in citrus, such as oryzalin, that is also registered for bearing pistachios. Other pre-emergent or post-emergent herbicides that are potentially less phytotoxic to pistachios also exist, and could be used in place of the more phytotoxic materials by an understanding neighbor.

Mealybugs in Pistachios: Prevention should be on Everybody's Mind

By David Haviland, Farm Advisor, Entomologist – UCCE/Kern County

For several years now, many pistachio growers in the southern half of Tulare County have been dealing with infestations of *Ferrisia gilli*, a new mealybug to the Southern San Joaquin Valley. This new pest has now been found in pistachios, a few almond blocks, one vineyard, and has the potential to become a pest in any deciduous crop grown in California. Since this pest appears to be spreading the quickest through



pistachio production areas throughout the state, all pistachio growers should be quick to adopt cultivation practices that do not encourage the spread of this pest and be vigilant to find and deal with new infestations as quickly as possible.

Identification:

Ferrisia gilli (which is properly named Gilli mealybug) has two pink stripes down the dorsal side of its back, and has two white tails. It is most easily identified by the white waxy secretions found covering its body. During the winter Gilli mealybug aggregates on the trunks of the trees and gives the bark the appearance of cotton candy or cotton balls. Since Gilli mealybug is the only mealybug that would be found in pistachios, there should be no reason to confuse it with other pests.

Preventing the spread:

Mealybugs are notorious for on all kinds of equipment. The greatest spread of this pest are around harvest this time of the year, mealybug are at their highest, the trees are sticky honeydew, and large amounts of are moving within the orchard and different orchards. While it is not very sanitation of equipment to occur within a orchard, it is highly recommended that and harvesters wash down equipment infested block is completed and before the next location. It is also

recommended that tarps be used to cover loads of nuts being transported out of an infested orchard, and that bins are hosed down before moving back to a new orchard. Growers also must recognize that harvest time is not the only time that equipment can spread this pest. Other equipment such as mowers should be cleaned when moving among different blocks whereas work crews, such as those that do pruning, should not be moved to infested blocks after working within one known to have this pest.



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Management:

Once Gilli mealybug has become established within an orchard it is likely impossible to eradicate. Currently, phosmet and carbaryl are the only insecticides registered in pistachios that are effective against this pest. Research is underway to determine the best application timings of these registered products as well as other insecticides not yet registered such as buprofezin, imidacloprid, and acetamiprid. Other research is also underway to document the effects of this pest on the crop, the role biological control can plan in controlling this pest, and in the development of monitoring tools such pheromone traps.

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Disclaimer: Discussion of research findings necessitates using trade names. This does not constitute product endorsement, nor does it suggest products not listed would not be suitable for use. Some research results included involve use of chemicals which are not currently registered for use, or may involve use which would be considered out of label. These results are reported but are not a recommendation from the University of California for use. Consult the label and use it as the basis of all recommendations.

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