

Produced by:

Gurreet Brar
Farm Advisor
Fresno & Madera
Counties

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Pistachio Early Season Disease Management Guidelines

*Robert H. Beede, UCCE Farm Advisor, Kings County, and
Themis Michailides,
Plant Pathologist, UC Davis and the Kearney Ag Center*

If there is wet weather during pistachio shoot emergence and bloom, growers and PCAs will be questioning the need for fungicide applications against *Botrytis* and *Botryosphaeria*.

The following discussion about management of these two important diseases is based on UC research by Dr. Themis Michailides, with whom I recently reviewed his latest findings. The decision to treat early in the season is based upon the following:

1. Past Disease Pressure. *Botrytis* has been low for most growers in the southern San Joaquin Valley, since we have not had a really wet spring for awhile. *Botryosphaeria* (Bot) has been light to moderate in the south, but is present in significant quantities in some orchards, as evidenced by the damage it caused in 2009 following the significant rain infection event in May. Practically speaking, most growers have little idea as to how much Bot disease pressure they are under, because they have not taken the monitoring methods (winter strike removal and BUDMON assessment prior to leaf out) developed by Themis seriously, and thus wait to get hammered economically before they wake up to the problem. At that point, it becomes difficult to control Bot without spending lots of money, especially if one thinks it can be managed by repeated fungicide sprays. However, those of us in the research and education side of agriculture realize all too well that most farmers prefer to get smacked in the head with a crop disaster than subscribe to a little preventative disease management. It is the way of Man.

2. Understanding the Biology of the Disease. *Botrytis* can be thought of as an opportunist. This fungus hangs out on the bud scales and surrounding wood during the winter. During wet springs, the spores germinate and are splashed onto the emerging green tissue. *Botrytis* likes the male pistachios better than the females, especially the old male cultivars 02-16 and 02-18, which have large tighter clusters of pollen and higher sugar content. In persistent wet weather, the fungus infects the male flowers and the tender shoots of male and female trees, forming a tuff of buff-colored spores

around the base of the emerging shoot. The shoots then wilt, become a dark green, and resemble a shepherd's hook. Infected shoots are NOT hard, but flaccid to the touch. *Botrytis* also penetrates the shoots and flowers, and causes a canker to develop in the wood tissue. You can find it by cutting into the wood at the base of the flower or shoot. Rain continuing into the fruit set period can cause infections to the rachis tissue and subsequent loss of part or all of the cluster. The degree to which a given orchard suffers all the above awful symptoms again

depends on how much of a problem you have had in the past, how much rain you experience during bloom, and what male cultivars are present in the orchard. Honestly, the appearance of *Botrytis* looks worse than the effects it has on production. I am NOT saying, "don't treat for it", but don't hang yourself in the barn if you decide not to treat and you find



Botryosphaeria panicle and shoot blight in Pistachio nuts.

(Photo courtesy: Themis Michailides) have. *Botrytis* makes ranch managers and PCAs understandably uncomfortable, since the wilted shoots become focal points for those seeking to find fault.

Botryosphaeria is another matter. For reasons mentioned above, Bot is on the rise again in the south, and those cankers we keep telling you to get rid of during the winter are now capable of spitting out infecting pycnidia for SIX YEARS! Yep! Count'em! SIX! Now that I have your attention, here is what is going to happen to those pycnidia. Themis has developed a model to predict the conditions favoring spore dispersal. It shows that all

temperatures DURING THE RAIN, the amount of rainfall occurring during any event, and the time interval **between** rain events are very important. Here is how it works; if a given rain is 4 mm (.16 inches) or greater, and the temperature is at least 55°F, you begin accumulating hours of leaf wetness. Leaf wetness is a parameter which is actually measured by some weather stations, but unfortunately the CIMIS stations do not presently have this capacity, and will not in the near future due to budget constraints. Those of you wanting actual leaf wet-

ness data could obtain it through private weather stations which are relatively common in the south valley. The rest of us, for now, must rely on our intuition to estimate how long after a rain event the leaves remain moist. Obviously, if it rains at night, the hours are high, providing the threshold 55°F is met. If it rains early in the morning, and then the sun comes out and the wind blows, leaves may

only be wet for an hour or two. You can see from Themis' figure (see page 3) that it takes about 14 hours of accumulated leaf wetness at 55°F (11°C) to begin thinking about needing to treat for Bot. **DO NOT** forget about past disease pressure in making this decision!

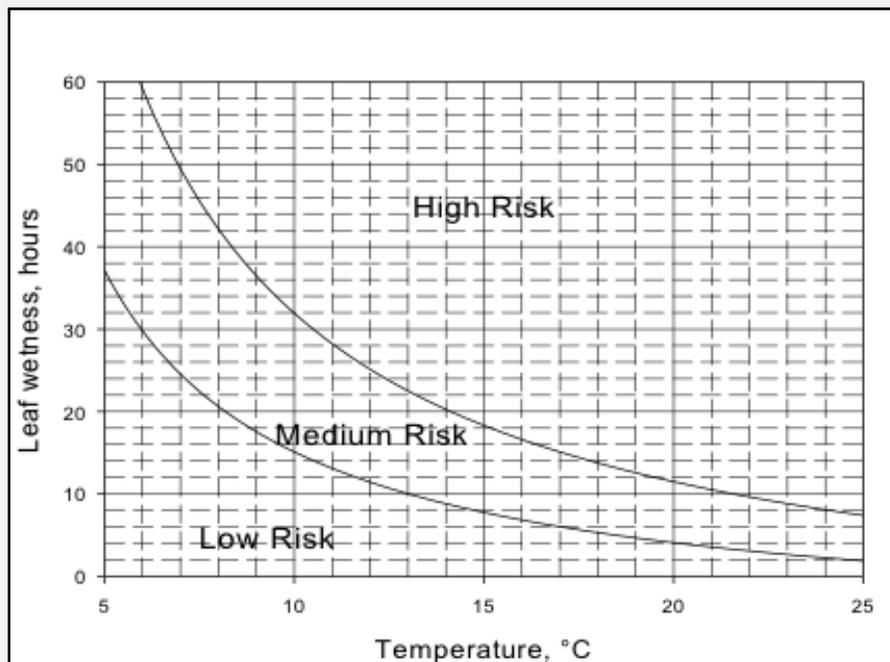
Another important component of the decision to treat for Bot now is the amount of leaf area present at the time of the rain events. This hypothesis may NOT be true for pistachio growers in the North, where Bot inoculum is very high, and ANY green tissue may be at risk of infection. Remember also that

the Bot battle is not won or lost on what you do NOW. Themis' research still shows that for most south valley orchards with Bot, a two-spray program in June and July is most effective for Bot as well as Alternaria. However, growers having neglected to monitor their Bot levels must pay attention to rains later in the spring, such as the one we had in May last year, which proved to be a significant Bot infection event. Note in the figure that only eight hours of leaf wetness at 77°F is a high risk event.

Remember that we are presently discussing INFECTION events, NOT SYMPTOM events. In the spring, the Bot pycnidiospores infect the leaves and nut clusters, but the infections do not express themselves until hot weather arrives. This is why the June-July treatment window has proven to be most effective. Fungicides applied at that time control the development of the infected tissue.

3. Understanding the Fungicides Registered for Disease Management. Again, the choice of fungicide applied now depends on what disease is most prevalent in your orchard. If you have not already done so, go to the following website link, download the pistachio pages, have them plasticized, and USE them to select the material best suited to your problem: <http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf>. Fungicides are most effective when applied PRIOR to a wet period, but

Themis indicates that many of today's materials still provide effective Bot control up to five days after a rain. Pristine is one of the most effective post-rain materials, but exercising this option regularly is really poor management relative to other diseases such as Alternaria. Remember that Bot is VERY LOW in resistance development, and Alternaria is VERY HIGH. Themis has shown Alternaria resistance within two to three years of repeated Pristine treatment. So, those of you treating during this wet weather need to study the chart you now have plasticized and in your hand to determine how best to



Potential infection events must be initiated by rain (total rain during event must exceed 4 mm or else disregard, but don't wait until 4 mm accumulated to start counting leaf wetness). Leaf wetness periods interrupted by less than 12 hours should be added together to obtain a single potential infection event.

minimize your rate of Alternaria resistance development. Note that it is NOT a matter of IF Alternaria resistance will occur in your orchard, but rather WHEN. If you have a dense canopy, poor infiltration, or delays in harvest, paying attention to Alternaria resistance management will save your crop someday soon. Reliance upon another wave of super fungicides to save your tail is NOT resistance management, it's foolishness! If you mix materials, make sure they have different modes of action. Themis says 10-14 treatment intervals for today's powerful fungicides are sufficient in wet weather and moderate disease pressure. Under drier conditions, one month is adequate.

4. Happy Farming!

Spring IPM Operations for Almonds and Walnuts

Gurreet Brar

UCCE Farm Advisor, Nut Crops

Fresno and Madera Counties

Almonds

Pests:

For the effective control of Peach Twig Borer (PTB), Bt sprays are timed during bloom to target overwintering larvae, which feed on exposed shoots and buds before they begin boring into the shoots. However, due to concerns about some IGRs affecting bee health, you may have held off bloom applications. Therefore, to follow up for proper management, flight activity should be monitored by setting up pheromone traps by April 1. Pheromone traps are placed to obtain first flight information about the moths (Biofix), which can further be used to make management decisions based on degree-day calculations. Place at least 2 traps per block distributing them uniformly throughout the orchard. The traps should be hung in shade, at 6-8' height and 1-3' inside the tree canopy in the northern quadrant of the tree. The trap should be at least 5 trees from the edge of the orchard. Check traps twice a week until the first adult moth is caught, and after that check traps on a weekly basis. Sprays can be made in May timed to the first flight – based on number of degree days after biofix. Biofix is established when two moths are caught in the the same trap. Optimum timing for the May spray is between 400-500 degree days after biofix when using the organophosphates; and when using an IGR, spray between 300-400 degree days after the first male is trapped in April. Use a pheromone trap and degree-days form to record trap catch- <http://www.ipm.ucdavis.edu/PMG/C003/almond-insectdegree-days.pdf>

If you did not remove mummy nuts during the dormant period, chemical control for navel orangeworm will be necessary at hull split. Therefore, to decide on optimum spray timing, egg traps must be set during the first week of April to

monitor the development of NOW during the season. This will help in timing the pesticide application at hull split. (FYI - One can time for May spray as well using softer chemistry products which won't induce mite flares).

To control San Jose Scale, monitor the pheromone traps that were set in late February to keep track of winged adult male activity. To catch crawlers, place sticky tapes in the trees during April. After the traps begin catching males consistently, start calculating the degree-days accumulation us-



A tent-shaped pheromone trap

ing 51° and 90° F as lower and upper thresholds, respectively. Between 600 to 700 degree-days after catching the first adult males, you can apply a treatment for crawlers if needed.

Fungal diseases:

Leaf blight fungus survives on dead leaf petioles and the spores spread during wet spring weather. If a treatment is warranted, make the first fungicide application during early leafing.

Anthrachnose is another serious disease to watch for during this time. This disease can be diagnosed from round, orangish, sunken lesions on the hull of young nuts with symptoms appearing three weeks after petal fall. You may also see gum balls with profuse gumming on young nuts. After the bloom time sprays, additional fungicide application may be needed if rains persist in late spring. Alternate the fungicide products according to mode of action (FRAC number on the label).

Monitor the leaves and young nuts for shot hole symptoms. These include tiny red lesions with dark center spots. The lesions enlarge as the infection spreads. On young leaves, the center of the lesions fall out leaving a shot hole, hence its name. On young nuts, the lesions are small with purplish margins. Remember that not only rain, but sprinkler irrigation can provide enough wetness for fungal spread. Carefully monitoring leaves and developing nuts during spring to make fungicide application decisions is important.

Walnuts

Pests:

For codling moth management, check pheromone traps (which were placed by mid-March) twice a week, and as soon as the first males are captured begin accumulating the degree days with a lower threshold of 50°F and an upper threshold of 88°F to predict its development.

Fungal diseases:

Monitoring for the occurrence of walnut blight is critical during the spring. The bacteria overwinter in the dormant buds and can be spread by

spring rains. The symptoms include black lesions on catkins and later black, sunken lesions can be seen on young developing nuts. If you have a history of blight in your orchard, a protective treatment of copper may be applied to buds, flowers and young nuts. If high rain persists during catkin flow-



A catkin affected by walnut blight

ering, apply treatments when 30-40% of the catkins have emerged. If there is no or little spring rain, the first application can be delayed until 30 to 40% buds reach 'prayer stage'. The subsequent application intervals can be adjusted according to the weather forecasts.

For more information on spring pests and disease management in nut crops, go to <http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html>

— — — — In a Nutshell — — — —

Early Season Sampling for Efficient Nitrogen Budgeting

Based on the results of a four-year study led by University of California (Davis) plant scientist Patrick Brown and supported by the Almond Board of California and USDA, a new N management approach proposes that the growers establish a pre-season N fertilization plan by taking into consideration the yield estimates and nitrogen availability from groundwater. Then the results from sampling leaf tissue approximately 43 days after full bloom (± 6 days) in April combined with the yield estimates provides guidance in adjusting nitrogen applications through the season as per tree demand. The new protocol and the guidelines for April sampling can be found at <http://www.almondboard.com/Growers/OrchardManagement/PlantNutrition/Pages/Default.aspx>

Currently, the leaves are sampled for nitrogen content in July. However, researchers argue that this sampling time is too late to make fertilization decisions for the current season.

The average rate of nitrogen removal by nuts was 68 lbs N per 1,000 lbs of kernel yield, based on data from multiple sites. Plus, an orchard with greater than 70% light interception needs 20 to 40 lbs N per acre per year for vegetative growth. Finally, the results from April sampling tell you the N status within the tree. All these factors help growers get a better prediction of trees' nitrogen demand.

The overall goal for this approach is to develop a fertilization schedule, which matches the N application with the individual orchards' demand and productivity. This will help in reducing unnecessary fertilization costs for the growers as well as the excessive leaching of nitrates into the groundwater.

(Courtesy: The Almond Board of California)

New Video for Managing Almond Pests Using the Year-round IPM Program

Spring has sprung and your almonds are blooming. Not sure what you should be doing to manage pests for the upcoming season? Check out the year-round IPM program for almonds on the UC IPM web site. Need help using it? UC IPM has just published an online video to help you manage almond pests using the year-round program.

How to Manage Almond Pests Using the Year-Round IPM Program is a narrated how-to guide written for growers, PCAs, and others who work in almonds, showing what needs to be done throughout the season to stay on top of pest problems.

Going back and forth between the year-round IPM program and Pest Management Guidelines, the video gives an excellent look at how these two re-

sources are used together to manage key almond pests such as navel orangeworm, peach twig borer, and shot hole. The video takes you deeper into the Guidelines with tips on taking dormant spur samples, monitoring for shoot strikes, and looking for predators and parasites of key pests. Also included are instructions on using treatment tables to choose pesticides that are effective while examining effects on honey bees, natural enemies, and the environment.

The video is divided into six chapters so you can easily view the section of the year-round program that you need help navigating. You can find the online video on the Year-Round IPM Program for Almonds page at <http://www.ipm.ucdavis.edu/PMG/selectnewpest.almonds.html>. For more information about other year-round programs or for a more general video tour, see http://www.ipm.ucdavis.edu/IPMPROJECT/about_yrp.html

(University of California IPM)

Southern San Joaquin Valley Almond Symposium

Wednesday, June 12, 2013

Kerman Community Center

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Registration: \$10

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Questions or comments? Contact:

Gurreet Brar, (559) 600-7218
gurbrar@ucanr.edu

Registration Form

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Attendee Names:

Please enclose a check payable to:
UC REGENTS
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Registration and payments must be received by June 06, 2013

Meeting, Proceedings and Lunch: _____ x \$ 10 each = \$ _____

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A Picture Speaks A Thousand Words



Photo: Gurreet Brar, UCCE

A navel orangeworm larva feeding on a mummy almond nut. These larvae overwinter in the mummy nuts on the trees or on the ground during the dormant period, therefore mummy nuts must be removed from the trees by February 1 and destroyed on ground by disking or mowing by March 15.

'From the Shell' is produced by UCCE Nut Crops Farm Advisor Gurreet Brar. Contact him for further information, or to be added to the e-mail list, at (559) 600-7218; or e-mail: gurbrar@ucanr.edu

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