

### **Rhodococcus-Associated Nutlet Drop of Bearing Trees**

Instances of *Rhodococcus*-associated nut drop of bearing pistachio trees have now been identified in three bearing orchards in Kern County, with a possible fourth occurrence awaiting additional observation and testing after bloom. The symptoms of ‘nut drop’ or perhaps, more properly ‘nutlet drop’ appear to be limited to only the dropping of newly developing nuts. The leaves and branches look normal. The nuts drop early in their development, with most dropping by early May. A few nuts remain on most clusters and many of these are blank and show an early darkening discoloration (see Photo 1). The nuts that do not drop become more distinctive with time as the hull develops gray rough patches by summer (see photo 2).



Photo 1. Cluster showing nut shriveling and failure to develop in bearing pistachio trees.  
Picture taken April 29, 2014. Photo by Craig Kallsen.



Photo 2. Cluster of affected tree showing gray discoloration and roughness of the hulls of the nuts.

Photo taken July 18, 2014. Photo by Craig Kallsen.

In all three of these three orchards, the affected trees are immediately adjacent to one another suggesting the malady came into the orchard on budwood. The majority of the nutlets on the tree drop and very little useful yield remains on the tree. In one orchard, the nut dropping phenomenon has occurred on these trees for, at least, the past five years. The malady does not appear to be spreading, or if so, at a slow rate. The affected trees show no other obvious symptom other than the nutlet drop. If anything, they are larger, probably because carbohydrate, instead of going into nut production, is going into tree growth. A root system of one tree was exposed and pressure washed. The roots were massive, with a healthy color. Root samples, unlike the leaf and twig samples, came back negative for *Rhodococcus*. Rootstocks of these affected trees include those produced clonally or from seed. Again, observations of where these trees are located in the tree row, suggests that the malady came in on budwood.

The association of a *Rhodococcus* bacterium with this ‘nutlet drop’ malady in bearing trees was first detected by Dr. Maher Al Rwahnih, project scientist at U.C. Foundation Plant Sciences, during a survey in a commercial orchard. We were sampling trees that had exhibited growth problems in the past and that were on my I-can’t-find-out-what’s-causing-this-list that I have assembled over the years. Dr. Maher’s investigations involve the use of genetic tools to find foreign DNA in plant samples. This project has funding from the California Pistachio Research Board (CPRB). Dr. Al Rwahnih’s *Rhodococcus* findings were further confirmed as *Rhodococcus fascians*, from samples that I sent to Dr. Randall at New Mexico State University, taken from affected and normal trees in this orchard and two additional orchards. Between these two scientists, *Rhodococcus* bacteria were found on the leaves and bark of the affected bearing trees and not on unaffected trees that were retaining their nuts.

Dr. Randall, who is currently leading an investigation (also with funding from the CPRB) into this organism in both rootstock material, young grafted trees, and in these bearing trees, found the first association of *Rhodococcus fascians* with pistachio disease symptoms in a clonally produced UCB-1 rootstock in early 2014. She, and her cooperating group, has since proven that this organism is the causal agent of pistachio bushy-top syndrome.

The observation that *Rhodococcus fascians* was found only on affected trees and not unaffected trees in all three orchards does not mean that it is the causal agent of nutlet drop, but it is certainly suspicious and warrants further investigation. We (scientists from U.C. and N.M.S.U) are setting up a trial to explore this phenomenon further including some early investigations into what might be done about it.

We, also, are trying to get an idea of how prevalent the ‘nutlet drop’ syndrome is. Obviously, growers should be on the lookout for trees exhibiting this condition. Seven affected trees (all in a row) in one orchard have since been removed. In general, these affected trees resemble the ‘bull trees’ which we have been observing for years as isolated individuals in orchards. Bull trees are large trees, often male, that exhibit vigorous growth, but produce few flowers. I would appreciate being notified e-mail ([cekallsen@ucdavis.edu](mailto:cekallsen@ucdavis.edu)) or phone (661-868-6221), if you suspect you have trees with dropping nutlets or males dropping flowers early. I am sure that they are out there, because if this malady is transmitted by budwood, the budwood in the three orchards, described above, came from somewhere. Furthermore, if it did come from budwood, those trees would have been planted in the late 1990’s.

## Chill Deficit

For Kern County at least, it looks like our chill accumulation for the year is over based on the weather outlook. Although it is becoming increasingly clear that we don’t know much about the topic, it appears this year’s chilling is going to be on the deficient side for pistachio in most areas of the county. Fog, this fall and winter, was, again, mostly absent, and we had a lot of high temperatures through the winter in excess of 60 ° F. We even had a few record highs for individual dates. It appears that we are going to have two years in a row of seriously deficient chill and what result this will have on the trees is anybody’s guess. A lot of dormant oil went out in late January and early February and is still going on at this writing. In fact, 470-weight oil was tough to get.

A number of growers sprayed half a block and left the other half untreated. Thanks to the cooperation of an interested grower, we were able to establish a replicated trial with dormant oil, which included unsprayed controls, treating both the male (Peters) and female (Kerman) trees, or treating only the male trees. It should be interesting to compare results in this trial with other trials during bloom and later at harvest.

I have received a number of calls asking why the Shafter CIMIS station was ‘reading’ much cooler than other CIMIS stations this winter. I contacted the person responsible for the station and discovered that a temperature-recording sensor (we don’t use thermometers anymore) was defective in December and replaced. Temperatures recorded since this time should be accurate. In an often uncertain world, installing a temperature recording device of your own in your own orchard is a good idea; I just wish we knew more about what to do with this data once downloaded.

## Pollination Boost?

Interestingly, the presence of the Randy male in our U.C. advanced selection variety trial located in an isolated orchard near Buttonwillow may have improved the performance of Kerman within the trial area last season. Randy males exist in this orchard only within the trial area located in an extreme corner of the orchard. The Kerman trees in the remainder of the orchard were pollination-dependent on Peters, which, as a result of the low chill, demonstrated very sparse and late bloom. During bloom evaluation within the trial area in 2014, it was observed that full-bloom of Peters and Randy were six days later than their female counterparts Kerman and Golden Hills, respectively. As a result, full-bloom of Randy matched full-bloom of Kerman almost exactly. At harvest, our grower cooperator kept track of yield of the orchard outside of the trial area and Kerman yield averaged less than 1000 lbs. per acre, while our individually-harvested Kerman plots, all adjacent to Randy males, yielded close to 2400 lbs. per acre. This is not scientific proof that Randy was responsible for the yield increase, merely an association.

I recount this observation because I am aware that some growers are planning to graft some Randy budwood into their Kerman orchards, either into existing juvenile orchards or orchards on the drawing board, based on their own observations of bloom timing in their Golden Hills and Kerman orchards last season. These growers feel that lack of chill may be becoming a trend in the southern San Joaquin Valley. Keep in mind that in a 'normal' chill year, whatever that might be, or at least in years like 2003, Randy was through blooming, before Kerman started blooming. We have also observed in pollen germination testing, that pollen produced late in the bloom period (i.e. a few days following full bloom) often demonstrates poor or poorer germination. For this reason, Randy should not replace Peters as a Kerman pollinizer, but should be considered an adjunct pollinizer for low-chill years.

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