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Kern Pistachio Notes

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Cooperative Extension

Kern Agricultural Pavilion

3300 East Belle Terrace, Bakersfield, California 93307

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Research Associate Professor

New Mexico State University

"Pistachio Bushy Top Syndrome and Rhodococcus: What we know and on-going research"

Followed by Q&A session with Dr. Jennifer Randall and UC researchers

Wednesday, April 8, 2015

9:00 am – 11:30 am

Please register (free) @ http://ucanr.edu/pbts

IRRIGATING PISTACHIO

Pistachio has the ability to survive extreme drought but requires substantial irrigation to produce a large crop of split nuts (see Table 1). Irrigating at full ET_c in August has been shown to be necessary to insure adequate nut split. Estimates of mature pistachio ET_c appear in Table 1, and for immature pistachio trees in Table 2. Table 1 and Table 3 were developed by Dr. David Goldhamer. Use of cover crops will increase the irrigation requirement of the orchard substantially if they are irrigated through late spring, summer and early fall.

Table1. Long-term, historical average ET_c for mature pistachio trees under clean cultivation in the San Joaquin Valley.

Date	ET_o (in)	K_c [1]	ET_c (inches/period)	ET_c (inches/day)	ET_c [2] (gallons/tree/day)
Apr 1-15	0.16	0.07	0.17	0.011	2.0
Apr 16-30	0.18	0.43	1.16	0.077	13.8
May 1-15	0.21	0.68	2.14	0.143	25.7
May 16-31	0.24	0.93	3.57	0.223	40.1
June 1-15	0.25	1.09	4.09	0.273	49.1
June 16-30	0.26	1.17	4.56	0.304	54.6
July 1-15	0.27	1.19	4.82	0.321	57.7
July 16-31	0.26	1.19	4.95	0.309	55.5
Aug 1-15	0.24	1.19	4.28	0.285	51.2
Aug 16-31	0.22	1.12	3.94	0.246	44.2
Sept 1-15	0.19	0.99	2.82	0.188	33.8
Sept 16-30	0.16	0.87	2.09	0.139	25.0
Oct 1-15	0.12	0.67	1.21	0.081	14.6
Oct 16-31	0.09	0.50	0.72	0.045	8.1
Nov 1-15	0.06	0.35	0.32	0.021	3.8
TOTAL			**40.80**		

[1] Crop coefficient K_c for times ET_o for grass reference crop, $ET_c = (K_c)(ET_o)$

[2] Based on 17 x 17 ft tree spacing. The following equation can be used to calculate individual tree ET_c for other spacings: gal/tree/day = ET_c (in/day) x spacing (ft^2) x .622(gal/in/ft^2)

Table 2. Approximate irrigation requirement for immature pistachio[1] in the southern San Joaquin Valley.

Tree age (years)	Irrigation Requirement (acre-feet/year)	Approximate fraction immature tree ET_c of mature ET_c
0-1	0.2	.05
2	0.9	.24
3	1.6	.43
4	1.6	.43
5	2.3	.62
6	2.3	.62
7 +	3 - 3.8	1.0

[1] For trees spaced 18 ft in the row and 20 ft between rows. Since the evaporation component accounts for a much larger percentage of ET_c in young orchards, differences in wetted surface area and frequency will have relatively large effects on ET_c. Actual soil-water storage should be physically monitored in the field before scheduling irrigation.

Note in Table 3 below that regulated deficit irrigation in the shell hardening stage, which normally occurs in the period from mid-May through the end of June, appears possible without harming crop quality or yield. Reducing ET_c by 50% during this time period will save approximately 10 inches of water (0.83 acre-ft/acre). However, insure that trees are irrigated at full ET during the bloom and early nut set stage. Over-irrigating young trees (an unwanted luxury in a drought year) is one of the primary causes for poor tree growth.

Table 3. San Joaquin Valley pistachio water use (ET_c) for normal and proposed regulated deficit irrigation (RDI) regimes. Irrigation schedule early in the season must take into account stored winter rainfall.

Growth Stage	Approximate phenology	ET_o Period		Reference water use K_c (inches)	Crop Coeff. period	Normal ET_c level (inches)	Proposed RDI ET_c (%)	Proposed RDI (inches)
	Bloom	Apr	1-15	2.36	0.07	0.17	100	0.17
Stage 1	Leafout	Apr	16-30	2.36	0.43	1.01	100	1.01
	Shell Expansion	May	1-15	3.19	0.68	2.17	100	2.17
	Shell Hardening	May	16-31	3.40	0.93	3.16	50	1.58
Stage 2	Shell Hardening	June	1-15	3.84	1.09	4.19	50	2.09
	Shell Hardening	June	16-30	3.84	1.17	4.49	50	2.25
	Nut Filling	July	1-15	4.13	1.19	4.92	100	4.92
	Nut Filling	July	16-31	4.41	1.19	5.25	100	5.25
Stage 3	Nut Fill./Shell Split	Aug	1-15	3.54	1.19	4.21	100	4.21
	Shell Splitting	Aug	16-31	3.78	1.12	4.23	100	4.23
	Hull Slip	Sept	1-15	2.66	0.99	2.63	100	2.63
Harvest	Harvest	Sept	16-30	2.66	0.87	2.31	25	0.58
	Postharvest	Oct	1-15	1.71	0.67	1.15	25	0.29
Postharvest	Postharvest	Oct	16-31	1.83	0.50	0.91	25	0.23
	Postharvest	Nov	1-15	0.80	0.35	0.28	25	0.07
	TOTALS					**41.10**		**31.70**

Southern San Joaquin Valley Bracing for Big Leaffooted Bug Year

David Haviland and Kris Tollerup
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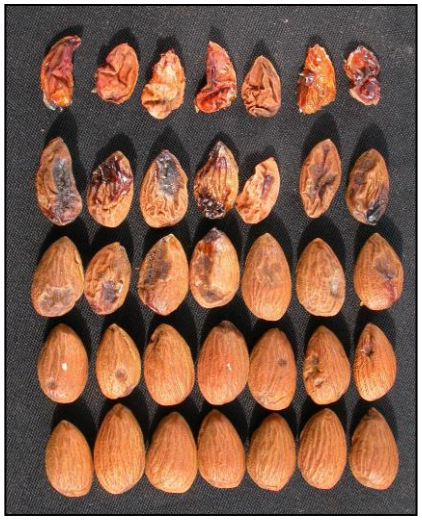
Leaffooted bugs are a sporadic pest of almonds, pistachios and pomegranates. In some years they are rarely seen while in other years they can cause significant damage. During the spring of 2014 leaffooted bug populations were relatively low across the San Joaquin Valley. However, that all changed by the end of the year.

During most years leaffooted bug has three to three and a half generations per year. It is common to see a majority of the first generation in almonds, much of the second generation in pistachios, and the majority of the third generation in pomegranates in the fall. However, in 2014, due to the above-normal accumulation of heat units, it appears that leaffooted bug completed a third as well as a full fourth generation in pomegranates. As a result, leaffooted bug populations entering into the winter were at all-time highs, and likely even higher than in the fall of 2005 that led to widespread damage during the 2006 season. Additionally, during the winter of 2014-15 it never got cold enough to kill overwintering bugs. This means that overwintering bugs are currently waiting for spring to begin moving into almond, so growers and their pest control advisors should be on high alert.

Almonds- During spring leaffooted bugs typically move into the crop from late March through April. Leaffooted bugs prefer to feed during this period because kernels are developing and the shell has not yet hardened. Nuts that are fed on at this time develop gummosis at the site of penetration and will be aborted by the tree. Almonds that are stung from late May through June stay on the tree and have a shriveled appearance or black spot on the kernel.



There are three ways to monitor for leaffooted bugs in almonds. The hardest (but best) method is to visually survey for the presence of bugs. This can be done by looking for them, particularly with the aid of a long pole to knock the upper canopy branches causing them to fly. Also their presence can be detected by listening for the bumble-bee sound they make while flying. An easier sampling method is to look for gummosis on the almond kernels. However, by the time gummosis is seen, damage has already occurred. If this method is used, be sure to cross-section the area with gummosis to ensure that it was caused by the penetration of an insect stylet, and not by some form of physiological damage. The easiest way to sample is by looking for aborted nuts on the ground. However, if a grower doesn't notice the problem until nuts are aborting, that same grower probably already missed the ideal time for management.

Pistachios- After almond hulls become hard leaffooted bug likes to move to pistachio trees during the summer at the time that kernel fill begins. Pistachio nuts that are fed on can have an aborted kernel, a kernel with necrosis, or a kernel that rots (stigmatomycosis) due to bacteria or fungi that enter the penetration site. Leaffooted bug can be monitored by visual searches using a pole and listening for adults in flight. Additionally, beat samples of the clusters often reveal the presence of nymphs.

Pomegranates- During the fall pomegranates are highly attractive to leaffooted bugs that penetrate the fruit skin with their stylets to feed on the seeds as they develop in the aryls. Leaffooted bugs produce multiple egg masses that can lead to hundreds, and sometimes thousands of leaffooted bugs per tree. Recent data show that trees with elevated leaffooted bug populations have a higher incidence of soft rot of the fruit. Some people suspect that damaged fruit may have a reduced shelf life in storage, though data have not been generated to confirm if this is true.

Chemical control- The primary control method for leaffooted bug is insecticides. Cultural controls have not been developed and biological control is limited to parasitoids that attack the eggs in the spring and summer. During the 2014 season research was conducted in almonds and pistachios to determine the relative effectiveness of insecticides against leaffooted bugs. These studies determined that the pyrethroids bifenthrin (Brigade) and lambda-cyhalothrin (Warrior II) have excellent contact activity. Residues on the plant continued to control adult bugs for two to four weeks. The organophosphate chlorpyrifos (Lorsban Advanced) also had excellent contact activity; residues on the leaf were effective for one week. Three reduced-risk insecticides containing abamectin (Agri-Mek), sulfoxaflor (Sequoia) and clothianidin (Belay) provided moderate to excellent activity when sprayed directly on the bugs. However, once residues were dry on the tree none of these three products provided any residual control. We did not test the efficacy of methomyl (Lannate) because it is not used in almonds or pistachios, even though it is the primary insecticide used against leaffooted bug in pomegranates.

Growers that use insecticides should only do so if monitoring programs indicate that leaffooted bug is present and is causing damage. First and foremost consult product labels to determine if a product is registered and to determine potential risks of product use to beneficial organisms, including bees, and to air or water quality. For more information on these topics please consult the UC IPM Pest Management Guidelines for Almonds, Pistachios and Pomegranates at http://ucipm.ucanr.edu/PMG/crops-agriculture.html.

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