University of California
Agriculture and Natural Resources
Cooperative Extension Glenn County

Orchard Facts

Sacramento Valley Walnut Newsletter

Spring 2015

In this issue:

Submitted by:

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Advances in Walnut Production Short Course

The Advances in Walnut Production short course will be held November 16 to November 20, 2015 at the University of California Davis. The course includes four days of instruction: lectures, lab exercises, and field demonstrations to illustrate the relationship between walnut biology and orchard management. This University of California Cooperative Extension (UCCE) course is delivered by experienced Farm Advisors, Faculty and Specialists who represent decades of research and work experience in California walnut production.

The course program allocates time for discussion at the end of every session, one on one time with instructors, and networking opportunities among participants. Participants will receive a hard copy of lecture slides and electronic resources. A one-day optional field tour through production areas is planned to complement the lecture classes on the last day.

The enrollment fee of $1,500 will cover classroom instruction, all course materials, breakfast, coffee breaks, lunches, and evening social. Reservations will be accepted on a first paid, first enrolled basis.

Registration will open on April 2, 2015. The course is expected to fill very quickly. Those interested in attending are encouraged to register as soon as registration opens. Please use online registration available on the UC Fruit & Nut Research & Information Center website: http://fruitsandnuts.ucdavis.edu

For additional information, brochures are available at your local UCCE office. Contact your local walnut farm advisor or registration coordinator Penny Stockdale at pastockdale@ucdavis.edu or 530-752-7672.

Walnut Orchard IPM Activities – Delayed-Dormant through July

Emily J. Symmes, UCCE Area IPM Advisor, Sacramento Valley

Insect Management:

- Ensure that adequate sanitation activities have been accomplished. Mummy nuts in the orchard and surrounding areas should be removed and destroyed by mid-March. Make sure that bins, huller waste materials, drying equipment, and buildings are also free of overwintering sources of navel orangeworm.
- If dormant monitoring indicated scale populations, treatments can be applied in the delayed-dormant period (March) or to coincide with the first crawler stage (see article this issue). Crawlers can be monitored using double-sided sticky tape, which should be applied by May 1st.
- Place codling moth pheromone traps no later than mid-March and check twice weekly until biofix. After biofix, begin accumulating degree-days and continue weekly trap checks.
- If using pheromone mating disruption for codling moth, apply distruptants ahead of the historical biofix date in your orchard.
- Start looking for spider mites and predators in late spring and map areas of concern for summer monitoring; begin summer monitoring in June or early July.
- Begin sampling for aphids and parasitism levels in May, examining upper leaf surfaces for dusky-veined aphids and the lower surface for walnut aphids.
- Place husk fly traps by June 1 and check twice weekly. Treat as needed according to trap increases or detection of eggs.
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Disease Management:

- First walnut blight sprays should be timed to coincide with early shoot emergence (see article this issue).
- If Botryosphaeria and Phomopsis canker are present in your orchard, the latest research suggests that in-season management beginning mid-May is most effective (see article this issue).

Weed Management:

- Assess weeds in late spring and identify any that escaped fall/winter treatments and manage accordingly.

Additional information on walnut IPM activities and treatment guidelines are available at: http://www.ipm.ucdavis.edu/PMG/selectnewpest.walnuts.html

Walnut Blight Management

Richard P. Buchner - University of California Tehama County
Doug Compton- Assistant Ag Commissioner Tehama County

Walnut blight caused by the bacterium *Xanthomonas arboricola* pv *juglandis* (Xaj).Walnut blight occurs in all walnut growing areas and can affect all cultivars, but it is most serious on early blooming cultivars. Walnut orchards with high populations of over wintering bacteria may be seriously damaged during years favorable to the development and spread of the pathogen.

Symptoms and Damage

All green tissue is susceptible to walnut blight infection, including buds, flowers, leaves but nut infections are the most serious, usually resulting in economic damage. Early in the spring, infected walnuts develop a dark sunken lesion at the blossom end (end blight) killing the developing kernel. As walnuts mature, blight lesions can develop elsewhere on the husk surface (side blight). Husk lesions begin as small water-soaked spots that later darken, enlarge, sink and often crack. Infections that do not invade the kernel may increase the possibility of secondary insect or disease damage.

Disease Cycle for Walnut Blight

The walnut blight pathogen, *Xaj*, survive the winter in the outer bud scales of dormant buds. As the new shoot elongates after bud break, *Xaj* are water transported from the outer bud scales to green tissue, flowers and developing nuts. Disease control requires applying spray materials to protect green tissue. If favorable conditions exist, secondary inoculum can lead to additional infection and inoculum buildup.If dormant bud populations are low and sprays protect the developing nuts and newly formed buds, infection does not occur. A successful walnut blight control program focuses on protecting developing shoots and flowers and decreasing *Xaj* bacteria over-wintering in dormant buds.

Disease Control

The probability of infection depends upon how much pathogen exists on individual buds and environmental conditions favoring bacterial spread and infection. First blight sprays are timed to coincide with early shoot emergence. This places a protective layer of bactericide on emerging green tissue. If bacteria are splashed from the outer bud scales to developing shoots and flowers, the bactericide barrier prevents infection. Since all shoots do not emerge at the same time, a good compromise is to apply the first spray application when 40% of the shoots on the tree are at the "prayer stage" when unfolded leaves resemble hands held in prayer. A second spray is applied about 7 to 10 days later to protect the remaining opening buds. Additional sprays may be necessary depending upon the initial inoculum, disease history, weather conditions and variety.

If you want to be more conservative and/or initial inoculum (disease pressure) is high, apply the first application at 20 % prayer stage or sooner, and a second application 7 days later. Either way, the early sprays are critical for success. Additional sprays are advised with high inoculum levels and wet weather particularly for sensitive varieties. Serious blight damage has often taken 2 years with an aggressive spray program to reduce blight damage in subsequent years. Good coverage is essential for walnut blight control. Spray materials have to cover walnut tissue with an adequate amount of spray material to protect the green tissue. It is possible that half spray programs favor increasing populations of Xaj and the half spray-sub lethal exposure approach is an excellent way to select for resistance to the only effective spray program we have for walnut blight.

Material Choice

Copper products tank mixed with Mancozeb is the best available spray for walnut blight management. Resistance to copper alone is very common in California walnut growing areas and is thought to be responsible for poor walnut blight control in the early 90's prior to EBDC tank mixes. Since 2012, Dr. Jim Adaskaveg at UC Riverside has been investigating *Xaj* sensitivity to copper plus Mancozeb tank mixes. Jim found a 2X to 6X shift in *Xaj* sensitivity to copper Mancozeb mixtures. Although a 2X to 6X shift is rather small, it indicates the potential for adaption of the pathogen that could lead to further decreased sensitivity. This research does suggest the crucial need for alternative materials for walnut blight management.

Our experience still suggests that any good quality copper compounds will provide good control when tank mixed with Mancozeb. Under heavy blight pressure, using maximum rates allowed by the label is suggested. Pesticide regulations change. If in doubt regarding pesticide labels, check with your local Agriculture Commissioner.

What Can Go Wrong

Over several years we have intensively monitored the amount of bacterial inoculum in dormant buds, grower spray programs and the percent of walnut blight damage for 30 orchards in Butte and Tehama counties. Varieties include Chandler, Howard, Hartley, Tulare, Vina and Ashley We observed the following possibilities when evaluating walnut blight control failures.

1) First spray timing too late.
2) Walnut blight bacterial population increases in dormant buds resulting in high initial disease pressure.
3) Material rates too low.
4) Poor spray coverage by air or ground.
5) Using a weak bactericide (non-coppper/Mancozeb mixture) in high blight potential orchards.
6) Not tank mixing copper compounds with a Mancozeb formulation.
7) Dense tree canopies.

Mancozeb Products Available for California Walnuts

For several years, manganese ethylenebisdithiocarbamate (EBDC) formulations have provided the backbone for walnut blight control in California. The California walnut industry currently has supplemental labels and special local need labels for Mancozeb use in California (figure 1.)

Mancozeb Registration status for California Walnuts as of 3/4/15

Product	EPA #	Formulation	Supplemental Label	SLN	Retreatment Interval (days)	Respirator for Mixing/Loading
Manzate Prostick**	70506-234	WP	Yes	Yes	7-10 with SLN	Yes (see note)
Manzate Max*	70506-194	Flowable	Yes	Yes	7-10 with SLN	No
Manzate Flowable*	70506-236	Flowable	Yes	No	10	No
Penncozeb 75DF**	70506-185	WP	Yes	No	10	Yes (see note)
Dithane F-45	62719-396	Flowable	Yes	No	10	No
Dithane DF	62719-402	WP	Yes	No	10	Yes (see note)
Koverall	67760-110	WP	Yes	No	10	Aerial only

Notes:
* - New Federally registered labels have retreatment interval of 7 days – **California approval pending**
** - New Federally registered labels have retreatment interval of 7 days and respirator requirement for mixers and loaders of aerial applications only - **California approval pending**

Figure 1. Mancozeb materials currently available for use in California. Supplemental Labels and special local need approvals could change prior to the 2015 walnut blight season. Check with your local Agricultural Commissioner's office for the most current Mancozeb information.

Until such time that the California Department of Pesticide Regulation (CDPR) approves amended labels, applicators must still use the old supplemental labels and Special Local Need (SLN) if applicable. All supplemental and SLN labeling must be in possession at the use site and are not delivered with the original product. These labels are available via the internet at sites like Agrian or CDMS; your County Ag Commissioner or pesticide dealer can provide a copy as well. **Supplemental and special local need labels often change so it is critical to double check with your local Agricultural Commissioner for updates regarding these products and other formulations if they become available.**

Preventing Walnut scale and Botryosphaeria canker and blight

Janine Hasey, UCCE Farm Advisor, Sutter/Yuba/Colusa Counties
Bob Van Steenwyk, Research Entomologist, UC Berkeley
Themis Michailides, *Plant Pathologist, UC Kearney Research and Extension Center, Parlier*

Botryosphaeria canker and blight, known simply as Bot, has been on the increase in walnut orchards statewide over the last several years. Growers have been noticing this disease in the form of blighted spurs, shoots, and branches on their walnut trees and brown to black nuts appearing around harvest time (Photo 1). Over the last decade, we also started noticing in Sacramento Valley walnut orchards increased incidences of scale (mainly walnut scale).

Often, but not always, where we saw scale problems, we also found Bot canker. In 2013, U.C. Plant Pathologist Themis Michailides confirmed that scale insects can increase Bot infection and canker development. Because of this association, we recommend controlling scale insects to help reduce Bot in orchards. In this article presented in two parts, a 2014 walnut scale insecticide study and 2014 research updates and fungicide trials to manage Bot canker and blight are summarized and trial procedures are listed for those wanting more details.

Part 1: Walnut Scale

Although there are several scale species found in walnut orchards, walnut scale (*Quadraspidiotus juglansregiae*) is the most common. It is found in crusted layers on trunks, scaffolds, and older branches in high populations. It is an armored scale (the cover is separate from the body) and completes two generations per year. When mature, walnut scale appears to have a 'daisy' shape which results from male crawlers that form elongated covers, settling under the margin of the female cover.

Before dying, walnut scale females lay eggs underneath the protective cover. These eggs hatch into an immature insect known as a 'crawler' which is very small, yellow, and mobile. The young crawlers move around the branches before selecting a new feeding location, settling down, secreting a protective waxy cover, and remaining sedentary for the remainder of their lives. Crawlers are usually active in May with another generation in late summer/early fall. Look for scale on prunings and the trunk during the winter. To monitor crawler emergence, use double-sided sticky tape applied to limbs in April through June for the first generation. For more information on scale insects and photographs see http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Walnut_News52111.pdf

Walnut Scale Insecticide Trial Results Summary:

Spring/Early June 2014:

- Centaur 70WDG applied post delayed dormant provided excellent control (Fig. 1 top). It had significantly lower walnut scale than all materials applied at crawler timing and lower scale than Seize 35WP, the standard delayed dormant material, which provided acceptable control.
- Assail 30SG (high rate), Centaur 70WDG, and Brigadier 2EC applied at crawler timing provided acceptable control.
- Assail 30WG at the low rate, Movento 2SC, and Sequoia 2SC were not significantly different from the untreated control.

January 2015 Follow-up:

- Centaur 70WDG and Seize 35WP (delayed dormant application) and Movento 2SC, Centaur 70WDG, and Brigadier 2EC (crawler application) provided excellent long-term walnut scale control at eight months after application (Fig. 1 bottom).
- Sequoia 2SC and Assail 30SG at the high and low rate were not significantly different from the untreated check.

Trial Procedures: The insecticide trial was monitored and sprayed in spring 2014 in a Yuba County 'Vina' orchard infested with walnut scale. There were nine treatments (Table 1) replicated four times using single tree replicates. Two limbs per replicate were wrapped with double-sided sticky tape March 25, 2014. First crawlers were caught on April 23.

Depending on the material, spray timing is either at delayed dormant (typically March) or after crawlers have emerged (typically May). Our delayed dormant treatments were the insect growth regulators (IGRs) Seize 35WP and Centaur 70 applied on April 8 (delayed due to rain). Treatments targeting crawlers were sprayed on May 6 at early crawler emergence. Sprays were applied using a hand held orchard sprayer at about 200 gal/acre. Good spray coverage is very important when applying IGR insecticides. Walnut scale crawlers per cm of sticky tape were counted weekly from May 5 to June 2 in a lab.

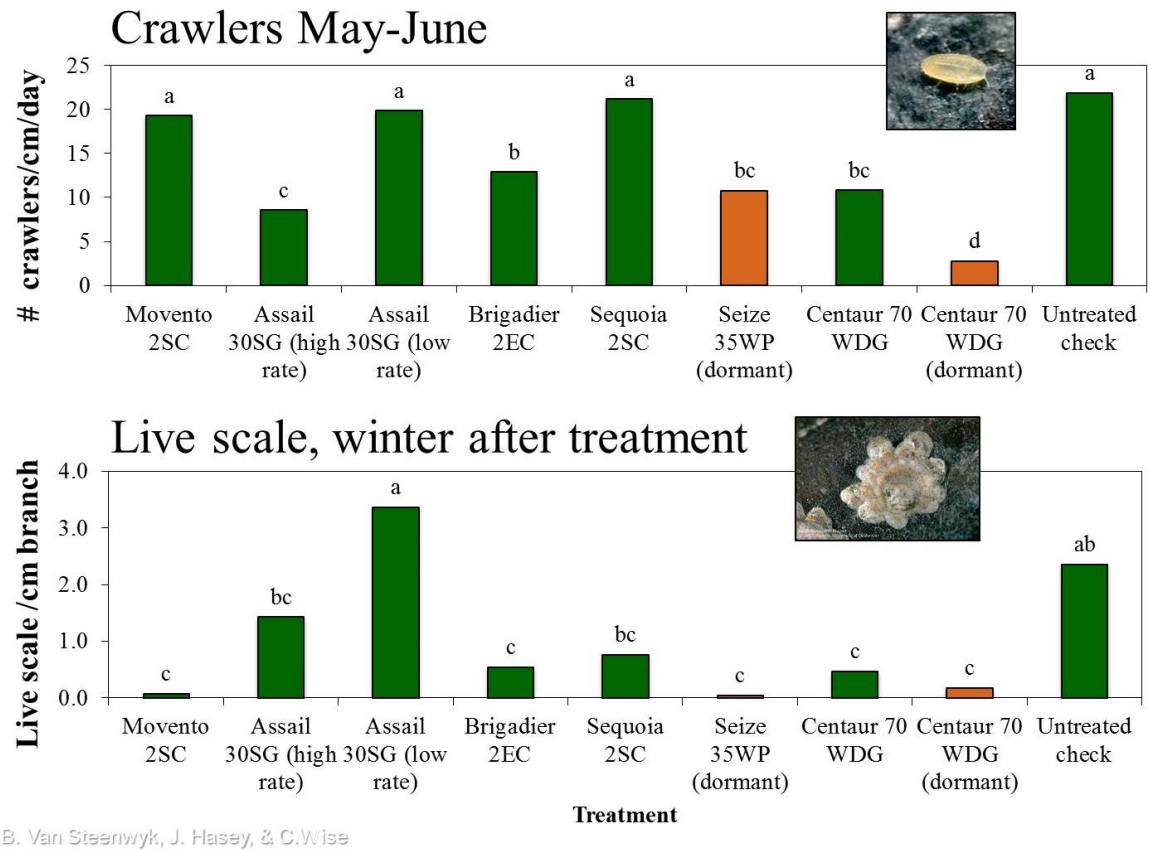
To determine possible delayed effects from the insecticides, in January 2015, small lateral branch sections were sampled per tree. The number of live overwintering second instar and adult female walnut scale were counted under magnification.

Table 1.

Treatment[a]	Rate Form/ac.	Date sprayed
Movento 2SC	9.0 fl. oz	6 May
Assail 30SG	9.6 oz	6 May
Assail 30SG	5.3 oz	6 May
Brigadier 2EC	12.8 fl. oz	6 May
Sequoia 2SC	5.75 fl. oz	6 May
Seize 35WP (delayed dormant)	5.0 oz	8 April
Centaur 70 WDG	46.0 oz	6 May
Centaur 70 WDG (delayed dormant)	46.0 oz	8 April
Untreated check	--	--

[a]Treatments include 0.25% v/v Latron B-1956

Figure 1. Top: Effects of insecticides on walnut scale crawlers in 2014. Bottom: Effects of insecticides on walnut scale 2nd instar and adult females in January 2015. Dormant = post delayed dormant spray timing; other treatments sprayed at early crawler stage.



Part 2. Botryosphaeria and Phomopsis Canker and Blight

What you need to know to reduce infection and spread of Bot this spring and summer.

Bot Basics - The Pathogens, Infection, and Predisposing Factors

- Bot can infect fruit (nuts), spurs, shoots, and branches.
- Fungi infect the nut, move into the peduncle (nut stem), and then kill the spur and next year's buds.
- Bot can enter through wounds such as leaf scars (Photo 2), bud scars, and peduncle scars, pruning wounds (Photo 3), blighted fruit and scale infested wounds. Infections will <u>not</u> occur below 50° F.
- Cankers grow slowly when temperatures are low. Above 80°F, cankers grow in 7-10 days.
- Bot fungi can spread by two kinds of spores: 1) sticky spores that spread by water and occasionally insects (pycnidiospores), and 2) spores spread by wind (ascospores). Pycnidiospores are the most common and widespread and they only need 1.5 hours of free water to germinate.

- Fungal inoculum sources on walnut trees include hulls, peduncles, dead buds, dead spurs, petioles, and cankers. Other hosts of *Botryosphaeria* - other nut crops, cottonwood, blackberry, Eucalypts, willow, etc., - can serve as inoculum sources.

New Research Results in 2014. Immature walnut fruit can be infected by Bot and infections remain latent (no noticeable symptoms), and lead to fruit blight as it matures in August and September. To determine how long pruning wounds remain susceptible to Bot infection, Dr. Michailides inoculated wounds at several intervals up to 28 days in Chandler, Vina, and Tulare. It was surprising that even four weeks after pruning, pruning wounds were still susceptible to Bot infections and canker development was the same as in the earlier inoculations. This means there should be at least one month between pruning and a rain event to avoid infection.

2014 Fungicide Trial Results Summary:

- Most of the treatments applied in mid-May, mid-June, and mid-July were effective in reducing Bot infections and cankered spurs (Fig. 3) and black or brown kernels (Fig. 4 & Photo 4). There was no clear benefit to adding a postharvest spray to the May+June+July treatment in the Colusa trial (Fig 3) or the bloom or postharvest spray in Sutter Chandler trial (data not shown).
- In the Howard orchard, sprays at bloom only, postharvest only, or bloom plus postharvest did not reduce disease significantly from the check (data not shown). Based on 2014 results, we do not recommend bloom or postharvest sprays alone.
- Other fungicides tested in Butte County trials in addition to those listed in table 2 that were effective included K Phite 7LP, Quash, Ph-D, Ph-D + Tebucon, Quilt Xcel, Pristine, Abound, Gem, Luna Sensation, and Manzate.(see 2014 Walnut Research Reports for the efficacy data)
- The fungicides applied in 2014 in Butte County also reduced blighted spurs and Bot infected buds collected in February 2015.

Bot Management - Main Points

Because of the large size of walnut trees and fruitwood distribution, we recommend both cultural and chemical controls.

- Avoid sprinkler irrigation that wets the canopy and also spreads the disease.
- Control scale insects.
- Prune dead branches back to healthy green wood during the summer or immediately following harvest allowing at least one month before heavy rains can spread inoculum to susceptible pruning cuts.
- Removing infected wood from the orchard floor can reduce the inoculum load and is mainly important in orchards with light-to-medium Bot infection.
- Apply a fungicide spray mid-May, mid-June, and mid-July to reduce Bot infections.

Trial Procedures: There were five replicated fungicide trials, one each in Butte and Colusa Counties (both Chandler), and three in Sutter County (two Chandler and one Howard). Table 2 lists the fungicides and rates used in the Colusa and Sutter County trials. Using a spray volume

of 100 gal/acre, applications were made using airblast sprayers except in Butte County where a hand gun sprayer was used. Nut data was taken at harvest after shaking and spur/shoot infection data on November 13 (Colusa) or December 9, 2014 (Sutter). Treatments were applied in mid-May, mid-June and mid-July except in Howard trial. A post-harvest spray was also applied at the Colusa County site and post-harvest and bloom sprays at one Sutter County site.

(All photos by Themis Michailides.)

Photo 1. Blighted fruit caused by Bot showing pycnidia taken on September 3, 2014.

Photo 2. Leaf scar infection taken in fall 2014.

Photo 3. Pruning wound infection covered by pycnidia.

Photo 4. Bot infected kernels: top row black, middle row brown, and third row, mycelia of the fungus present but kernels are not infected.

Table 2.

Fungicide	**Rate Form/ac.**
Merivon	6.5 fl oz
Luna Experience	10.0 fl oz
Quadris Top	14.0 fl. oz
Fontelis + Tebucon	20.0 fl. oz + 8.0 oz
Untreated check	----

Figure 3. Effects of fungicides on Bot in spurs/shoots. Top: (Colusa Co.); either 3 sprays-May 16, June 16, July 16 or 4 sprays-plus a postharvest (PH) October 15 (harvest Oct. 13); Bottom: (Sutter Co.) 3 sprays-May 15, June 23, July 23.

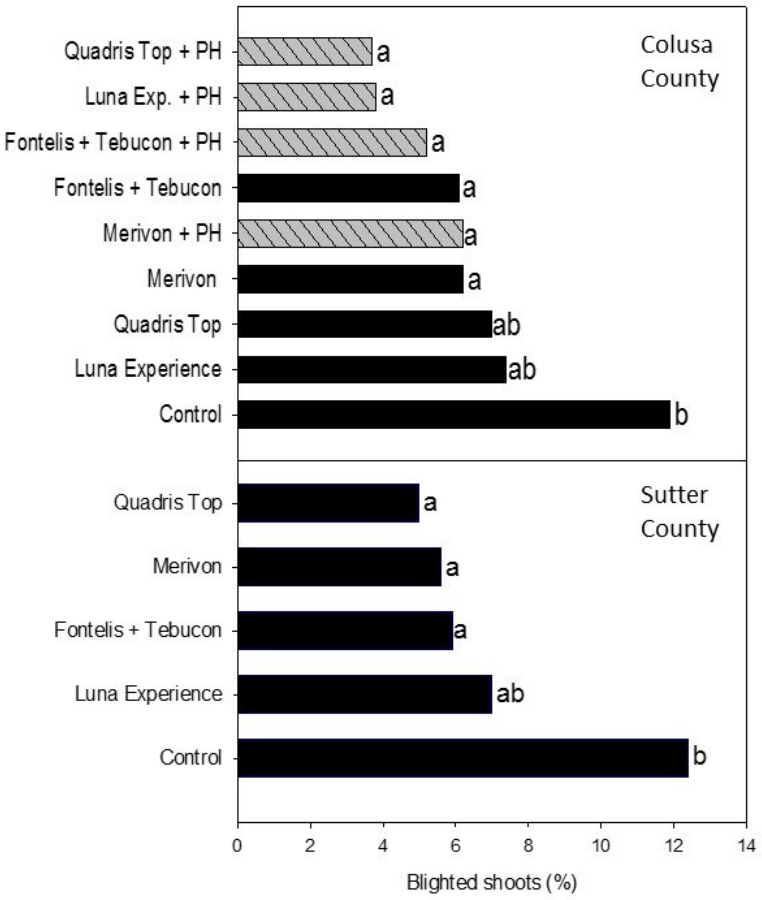
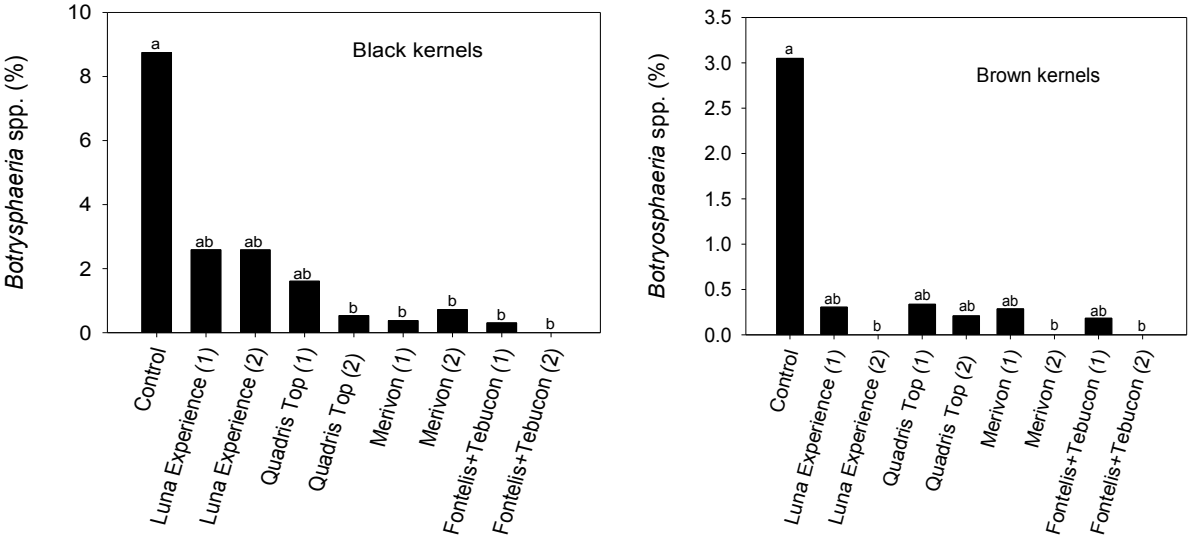


Figure 4. Effects of fungicides on Bot in black and brown kernels (Colusa Co.) sampled at harvest, October 13, 2014. (1) and (2) represent repeats of the same treatment.



Herbicide Registration on California Tree and Vine Crops -*(updated February 2015 - UC Weed Science)*

	Herbicide-Common Name *(example trade name)*	Site of Action Group[1]	Almond	Pecan	Pistachio	Walnut	Apple	Pear	Apricot	Cherry	Nectarine	Peach	Plum / Prune	Avocado	Citrus	Date	Fig	Grape	Kiwi	Olive	Pomegranate
			----- tree nut -------				- pome -		---------stone fruit ---------												
Preemergence	dichlobenil *(Casoron)*	L / 20	N	N	N	N	R	R	N	R	N	N	N	N	N	N	N	R	N	N	N
	diuron *(Karmex,Diurex)*	C2 / 7	N	R	N	R	R	R	N	N	N	R	N	N	R	N	N	R	N	R	N
	EPTC *(Eptam)*	N / 8	R	N	N	R	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N
	flazasulfuron *(Mission)*	B / 2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N
	flumioxazin *(Chateau)*	E / 14	R	R	R	R	R	R	R	R	R	R	R	NB	NB	N	NB	R	N	R	R
	indaziflam *(Alion)*	L / 29	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	R	N
	isoxaben *(Trellis)*	L / 21	R	R	R	R	NB	NB	NB	NB	NB	NB	NB	NB	NB	N	NB	R	NB	NB	NB
	napropamide *(Devrinol)*	K3 / 15	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	R	N	N
	norflurazon *(Solicam)*	F1 / 12	R	R	N	R	R	R	R	R	R	R	R	R	R	N	N	R	N	N	N
	oryzalin *(Surflan)*	K1 / 3	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R
	oxyfluorfen *(Goal, GoalTender)*	E / 14	R	R	R	R	R	R	R	R	R	R	R	R	NB	R	R	R	R	R	R
	pendimethalin *(Prowl H2O)*	K1 / 3	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	R	R
	penoxsulam *(Pindar GT)*	B / 2	R	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	pronamide *(Kerb)*	K1 / 3	N	N	N	N	R	R	R	R	R	R	R	N	N	N	N	R	N	N	N
	rimsulfuron *(Matrix)*	B / 2	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	N	N
	sulfentrazone *(Zeus)*	E / 14	N	N	R	R	N	N	N	N	N	N	N	N	R	N	N	R	N	N	N
	simazine *(Princep,Caliber 90)*	C1 / 5	R	R	N	R	R	R	N	R[2]	R	R	N	R	R	N	N	R	N	R	N
Postemergence	carfentrazone *(Shark)*	E / 14	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	clethodim *(SelectMax)*	A / 1	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	N	R	N	N	NB	N	NB	N
	clove oil *(Matratec)*	NC[3]	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	2,4-D *(Clean-crop, Orchard Master)*	O / 4	R	R	R	R	R	R	R	R	R	R	R	N	N	N	N	R	N	N	N
	diquat *(Diquat)*	D / 22	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
	d-limonene *(GreenMatch)*	NC[3]	R	R	R	R	R	R	R	R	R	R	R	N	R	N	R	R	R	N	N
	fluazifop-p-butyl *(Fusilade)*	A / 1	NB	R	NB	NB	NB	NB	R	R	R	R	R	NB	R	NB	NB	R	N	NB	NB
	glyphosate *(Roundup)*	G / 9	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	glufosinate *(Rely 280)*	H / 10	R	R	R	R	R	N	N	N	N	N	N	N	N	N	N	R	N	N	N
	halosulfuron *(Sandea)*	B / 2	N	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	paraquat *(Gramoxone)*	D / 22	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R
	pelargonic acid *(Scythe)*	NC[3]	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N
	pyraflufen *(Venue)*	E / 14	R	R	R	R	R	R	R	R	R	R	R	N	N	R	R	R	R	R	R
	saflufenacil *(Treevix)*	E / 14	R	N	R	R	R	R	N	N	N	N	N	N	R	N	N	N	N	N	N
	sethoxydim *(Poast)*	A / 1	R	R	R	R	R	R	R	R	R	R	NB	NB	R	NB	NB	R	N	NB	NB

Notes: R = Registered, N = Not registered, NB = nonbearing. This chart is intended as a general guide only. Always consult a current label before using any herbicide as labels change frequently and often contain special restrictions regarding use of a company's product.

[1] Herbicide site of action designations are according to the Herbicide Resistance Action Committee (letters) and the Weed Science Society of America (number) systems. NC = no accepted site of action classification; these contact herbicides are general membrane disruptors.

[2] Simazine is registered on only tart cherry in CA.

Weed susceptibility information and the most up to date version of this table can be found at the Weed Research and Information Center (http://wric.ucdavis.edu)

Herbicide Chart

The 2015 registration status of Herbicides in Trees and Vines was recently updated by Extension Weed Specialist, Brad Hanson, UC Davis, and is included for your reference. Weed susceptibility information can be found at the Weed Research and Information Center (http://wric.ucdavis.edu). The "Susceptibility of Weeds to Herbicides" chart can also be accessed through the Pest Management guidelines at the UCIPM website at http://ucipm.ucdavis.edu. Go to the weed section under each individual crop. For winter weeds go to http://ipm.ucdavis.edu/PMG/r881700311.html#WINTER.

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