



Agriculture: Walnut Pest Management Guidelines

# Walnut Blight

Walnut Blight: *Xanthomonas arboricola* (= *X. campestris*) pv. *juglandis*

## Symptoms and Signs

In walnut blight, one to several [black lesions](#) may appear on catkins. Infected nuts develop black, slightly [sunken lesions](#) at the flower end (end blight) when young; more lesions will develop on the [sides of the nut](#) as it matures (side blight). [Shoots](#) develop black lesions, and leaves show irregular lesions on blade.

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## Comments on the Disease

All green tissue is susceptible to walnut blight. Economically significant damage occurs when the developing nut is infected. The bacterium that causes walnut blight overwinters primarily in dormant buds. Rain is important for spreading bacteria and aiding infection. Early-leafing varieties are most severely affected, and the disease tends to be more severe in Northern California.

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## Management

Management of this disease depends on the application of protective sprays to buds, flowers, and developing nuts. In orchards with histories of walnut blight damage, protective treatments at 7- to 10-day intervals during prolonged wet springs are necessary for adequate disease control. In areas or years with less intensive rainfall, spray intervals can be stretched, and weather forecasts can help with spray timing. Full

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coverage sprays are recommended and important to resistance management.

Infection of *Xanthomonas arboricola* pv *juglandis* bacterium depends upon environmental conditions, the amount of the pathogen in individual buds (inoculum), and in the amount of walnut blight cankers present on some walnut varieties. Blight treatments are timed to coincide with early shoot emergence, which places a protective layer of bactericide on emerging green tissue. In most years, the first bactericide application can be delayed and should be applied when 30 to 40% of the buds reach the "[prayer](#)" stage (when terminal leaves of pistillate flower buds first unfold and appear like hands in a prayer position). A second spray should be done 7 to 10 days later to effectively treat the pistillate flowers that weren't sufficiently open during the initial application. Additional treatments can be timed using inoculum, disease history, variety, and weather forecasts. A spray prediction model ([XanthoCast](#)) is available to help determine the need for additional treatment.

Estimates of inoculum levels can be done by collecting 50 to 100 buds per orchard block and having them evaluated in a microbiology lab or by using the disease levels in the previous growing season. A disease rating scale can be used annually (e.g., each June: Low disease risk: less than 50 total blighted nuts per tree; moderate disease risk: 50 to 150 blighted nuts per tree; and high disease risk: 150 blighted nuts per tree or more). In orchards with varieties where catkins emerge before the pistillate flowers (e.g. Chandler), if there is disease incidence in the previous season and forecasted rainfall during bloom, consider bactericide application when 30 to 40% of the catkins emerge (note: this is usually 7 to 10 days before pistillate flowers emerge).

Common name	Amount per acre	REI‡	PHI‡
(Example trade name)		(hours)	(days)
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Common name	Amount per acre	REI‡	PHI‡
(Example trade name)		(hours)	(days)
<p><b>Not all registered pesticides are listed. The following are ranked with the pesticides having the greatest IPM value listed first—the <a href="#">most effective</a> and <a href="#">least likely to cause resistance</a> are at the top of the table. When choosing a pesticide, consider information relating to the pesticide's <a href="#">properties</a> and <a href="#">application timing</a>, <a href="#">honey bees</a>, and <a href="#">environmental impact</a>. Always read the label of the product being used.</b></p>			
<b>A. MANCOZEB</b>			
(Dithane F-45, Manzate Max)	58 fl oz	24	75
(Manzate Prostick)	2.4 lb	24	75
MODE-OF-ACTION GROUP NAME (NUMBER <sup>1</sup> ): Multi-site contact (M3)			
COMMENTS: This product must be tank mixed with a fixed copper product that is registered for use on walnuts. Do not apply more than 10 applications (18 lb a.i.) per season.			
<b>B KASUGAMYCIN</b>			
(Kasumin 2L)	64 fl oz	12	100
MODE-OF-ACTION GROUP NAME (NUMBER <sup>1</sup> ): 24			

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Common name	Amount per acre	REI‡	PHI‡
(Example trade name)		(hours)	(days)
<p>COMMENTS: Do not make more than two applications per year in California or four applications per year elsewhere (CA approval for 4 applications pending). Do not apply aerially or in orchards using non-composted manure. For optimum results, tank mix with mancozeb or a fixed copper product that is registered for use on walnuts.</p>			
<b>C. FIXED COPPER#</b>			
(Kocide 3000, Badge X2 and others)	Label rates	See label	0
MODE-OF-ACTION GROUP NAME (NUMBER <sup>1</sup> ): Multi-site contact (M1)			
<p>COMMENTS: <b>Resistance to copper is common in Sacramento Valley orchards and has been found in a few San Joaquin Valley orchards.</b> The use of surfactants does not increase the efficacy of copper materials. <b>Wettable powders</b> with 50% metallic copper: rates equivalent to 4 lb or higher metallic copper/acre are effective. <b>Dry flowable</b> formulations with less than 50% metallic copper (Kocide 3000, Badge X2, ChampION<sup>++</sup>, Cuprofix Ultra, Nordox) or liquid formulations (Copper-Count N, Champ, etc.): use label rates. If resistance is known to occur in the orchard, use higher label rates. Some <b>liquid</b> formulations of copper require less than 4 lb metallic copper/acre. When used at recommended label rates, some of these formulations provide the same control as that of wettable powders with 4 lb metallic copper. Not all copper compounds are approved for use in organic production; be sure to check individual products.</p>			
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Common name	Amount per acre	REI <sup>‡</sup>	PHI <sup>‡</sup>
(Example trade name)		(hours)	(days)
<b>D. BORDEAUX#</b>			
8-5-100	Label rates	See label	0
MODE-OF-ACTION GROUP NAME (NUMBER <sup>1</sup> ): Multi-site contact (M1)			
<p>COMMENTS: The three hyphenated numbers (8-5-100) represent the amount of copper sulfate, hydrated lime, and water respectively in the Bordeaux formula. The objective is to apply 4 lb metallic copper and 5 lb of calcium hydroxide in 100 gal water/acre. If using basic copper sulfate, which is 50% copper, apply 8 lb/acre. For hydrated copper sulfate, which is 25% copper, use 16 lb/acre. Not all copper compounds are approved for use in organic production; be sure to check individual products. For information on making Bordeaux mixtures, see <a href="#">UC IPM Pest Note: Bordeaux Mixture</a>, ANR Publication 7481. Adding 0.5 gal summer oil emulsion can reduce phytotoxicity.</p>			

<sup>1</sup> Group numbers are assigned by the [Fungicide Resistance Action Committee \(FRAC\)](#) according to different modes of actions. Fungicides with a different group number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode-of-action group numbers 1, 4, 9, 11, or 17 before rotating to a fungicide with a different mode-of-action group number; for fungicides with other group numbers, make no more than two consecutive applications before rotating to fungicide with a different mode-of-action group number.

# Acceptable for use on organically grown crops.

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‡ Restricted entry interval (REI) is the number of hours (unless otherwise noted) from treatment until the treated area can be safely entered without protective clothing. Preharvest interval (PHI) is the number of days from treatment to harvest. In some cases the REI exceeds the PHI. The longer of these two intervals is the minimum time that must elapse before harvest may occur.



## UC IPM Pest Management Guidelines: Walnut UC ANR Publication 3471

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