

**Fungicides Registered for Use on Hop Diseases in Wisconsin, 2015. Compiled by Amanda Gevens, University of Wisconsin-Madison
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Disease	Active Ingredient	Rate/a of Commercial product	Days to harvest	Fungicide activity (FRAC #)*	Remarks
Downy mildew (<i>Pseudoperonospora humili</i>)	ametoctradin + dimethomorph	11.0-14.0 fl oz Zampro	7	Systemic and protectant (45,40)	Do not apply >40 fl oz per acre/season. Apply no more than 3 applications per season. Do not make >2 sequential applications before alternating to a different effective mode of action fungicide.
	fosetyl aluminum	2.5 lb Aliette 5.0 lb/100 gal spray volume Linebacker	24	Upregulates resistance in the plant (33)	Do not tank-mix with coppers. Initiate application when weather conditions favor disease (warm and humid). Avoid mixing with foliar fertilizers or surfactants.
	cymoxanil	3.2 oz Curzate DF	7	Locally systemic (27)	Apply with a protectant fungicide such as copper hydroxide. Rainfast in 2 hours.
	dimethomorph	6.0 fl oz Forum	7	Systemic (40)	Do not make more than 3 applications per season. Addition of an adjuvant to spray mix is recommended. Good antisporeulant. Rainfast.
	cyazofamid	2.1-2.75 fl oz Ranman	3	Protectant, limited systemic (21)	Apply prior to or at first sign of disease. Follow resistance management guidelines. Rainfast.
	pyraclostrobin and boscalid	14.0 oz/100 gal spray volume Pristine	14	Contact and locally systemic (11,7)	Use preventatively and apply at 14-21 day intervals as needed. Follow resistance management guidelines.
	famoxadone and cymoxanil	8 oz Tanos	7	Locally systemic, curative (27,11)	Use with a tank-mix partner. Apply preventatively and on a 6-8 day spray schedule. Follow resistance management guidelines. Excellent curative activity. Good leaf protectant. Rainfast.
	mandipropamid	8.0 fl oz Revus	7	Systemic (40)	A non-ionic surfactant is recommended with use of this product. Follow resistance management guidelines.
	mefenoxam	0.5 pt Ridomil Gold SL	45	Systemic (4)	Label allows drench and foliar applications. Follow resistance management guidelines. Can be highly effective and is 2-way systemic, however, downy mildew pathogen may have resistance.
	Extract of <i>Reynoutria sachalinensis</i>	1.0-4.0 qt Regalia	0	Induced systemic resistance (P5)	Use preventatively and apply at 7 day intervals as needed. Emergence to wire-touch 1.0-2.0 qt recommended/wire-touch through harvest 2.0-4.0 qt. OMRI approved. Has some contact fungicidal activity.
	potassium bicarbonate	2.5-5.0 lb/100 gal spray volume Armicarb 100	0	Protectant (NC)	Do not exceed mix rate of 5.0 lb/100 gal of water. Do not store unused portion of spray for more than 12 hours prior to use.

	copper oxychloride and copper hydroxide	1.8 pts Badge SC 0.75 lb Badge X2	14	Protectant (M1)	Treat after pruning but before training.
	copper oxychloride and basic copper sulfate	C-O-C-S WDG 4.0-6.0 lb	14	Protectant (M1)	Apply soon after training vines.
	copper hydroxide	1.33 lb Champ Dry Prill 1.33 lb Champ Formula II Flowable 1.06 lb Champ WG 0.75-1.5 lb Kocide 3000 1.5 lb Kocide 2000 2.0 lb Kentan DF 1.33-2.67 pt NuCop 3L	14	Protectant (M1)	Apply after pruning but before training. Apply again as needed on a 10 day basis after training.
	copper ammonium complex	2.0 qt Copper Count N	14	Protectant (M1)	Apply after pruning but before training. Apply again as needed on a 10 day basis after training.
	cuprous oxide	2.0 lb Nordox	14	Protectant (M1)	Apply after pruning but before training. Apply again as needed on a 10 day basis after training.
	copper octanoate	0.5-2.0 gal Cueva in 100 gal water	14	Protectant (M1)	Apply soon after training vines.
	basic copper sulfate	1.0-1.25 lb Cuprofix Ultra 40 Disperss	14	Protectant (M1)	Apply after pruning but before training. Apply again as needed on a 10 day basis after training.
	mono and dipotassium salts of phosphorous acid	1-3 qt/100 gal water Fosphite 1.0-2.0 qt/acre in a spray volume of 25 gal water Fungi-phite	0	Protectant, induces plant resistance and therefore is sometimes referred to as systemic (33)	Apply at 2 to 3 week intervals. Do not apply at an interval less than 3 days. Apply when conditions favor disease when shoots are 6-12 in high, after training at 5-6 ft tall, about 3 weeks after 2nd application, and during bloom.

		2.0-4.0 pt Helena Prophyt 2.5 pt Phostrol 1.0-3.0 qt in 20 gal water Confine Extra			
	mono potassium phosphate and mono potassium phosphite	2.0-4.0 qt Phorcephite 1.0-3.0 qt in 20 gal of water Rampart	0	Induces plant resistance, some protectant activity (NC)	Apply when conditions favor disease when shoots are 6-12 in high, after training at 5-6 ft tall, about 3 weeks after 2 nd application, and during bloom.
	<i>Bacillus pumilis</i> QST 2808	2.0-4.0 qt/100 gal spray volume of Sonata	0	Protectant (44)	Use when conditions favor disease and apply at 7-14 day intervals as needed. OMRI approved.
Powdery mildew (<i>Podosphaera macularis</i> and <i>humili</i>)	trifloxystrobin	1.0 oz with every 15-30 gal spray volume Flint	14	Surface- systemic or translaminar (11)	Apply preventatively for best results. Apply on a 10 to 14 day interval. Follow resistance management guidelines.
	tebuconazole	4.0-8.0 fl oz Monsoon, ONSET 3.6L, Orius 3.6F, Tebustar 3.6L, Tebuzol 3.6F, Toledo 3.6F	14	Systemic (3)	Apply at 10 to 14 day intervals. Follow resistance management guidelines.
	pyraclostrobin and boscalid	14.0 oz/100 gal spray volume Pristine	14	Systemic, protectant, curative (11,7)	Use preventatively and apply at 14-21 day intervals as needed. Follow resistance management guidelines.
	metrafenone	15.4 fl oz Vivando	3	Systemic, protectant (U8)	Do not apply more than 2 applications of Vivando per year. Do not mix with horticultural oils.
	myclobutanil	2.0-10.0 oz Rally	14	Systemic, protectant, curative (3)	Emergence to training label rate is 2-4 oz/training to wire is 4-6 oz/wire to 14-day prior to harvest is 6-10 oz. Follow resistance management guidelines. (Old product name was Nova)
	quinoxifen	4.0-8.2 fl oz Quintec	21	Protectant (13)	Follow resistance management guidelines, including 'do not apply more than 4X per season.' Minimum spray interval is 7 days.
	triflumizole	12.0 fl oz Procure 480SC	7	Protectant, systemic, curative (3)	Use prior to or at disease onset for best results and reapply on a 14 day schedule.

	potassium bicarbonate	2.5-5.0 lb/100 gal spray volume Armicarb 100 2.5-5.0 lb Kaligreen	0	Protectant (NC)	Do not exceed mix rate of 5.0 lb/100 gal of water. Do not store unused portion of spray for more than 12 hours prior to use. Apply when weather conditions favor disease and repeat on a 7-10 day basis.
	sodium bicarbonate	4.0 oz/10 gal water spray volume Milstop	0	Protectant (NC)	Begin application when weather favors disease and apply at 1 to 2 week intervals. Tighten intervals when disease pressure heightens.
	copper octanoate	0.5-2.0 gal Cueva in 100 gal water	14	Protectant (M1)	Apply soon after training vines.
	mono and dipotassium salts of phosphorous acid	1-3 qt/100 gal water Phosphite 1.0-3.0 qt in 20 gal of water Rampart	0	Protectant, induces plant resistance and therefore is sometimes referred to as systemic (33)	Apply at 2 to 3 week intervals. Do not apply at an interval less than 3 days.
	sulfur	4.0-6.0 lb Thiolux	See labels	Protectant (M2)	Do not apply after flowering and grower should verify with processor before use. Do not use within 2 weeks of oil spray. Sulfur is fungitoxic in its vapor phase and, therefore, is effective only when air temperatures promote volatilization. Sulfur volatilizes above 65°F but becomes phytotoxic above 95°F. Using it above 85°F is not recommended. See label for details on rates and reentry intervals. Kumulus and Microthiol Disperss are labeled for spider mite control in hop.
	Extract of <i>Reynoutria sachalinensis</i>	1.0-4.0 qt Regalia	0	Upregulates resistance within the plant (P5)	Use preventatively and apply at 7 day intervals as needed. Emergence to wire-touch 1.0-2.0 qt recommended/wire-touch through harvest 2.0-4.0 qt. OMRI approved. Some contact fungicidal activity.
	<i>Bacillus subtilis</i> QST 713 strain	4.0-6.0 qt/100 gal spray volume of Serenade ASO	0	Protectant (44)	Use when conditions favor disease and apply at 7 day intervals as needed. OMRI approved.
	<i>Bacillus subtilis</i> QST 713 strain	2.0-3.0 lb/100 gal spray volume of Serenade MAX	0	Protectant (44)	Use when conditions favor disease and apply at 7 day intervals as needed. OMRI approved.

	<i>Bacillus pumilis</i> QST 2808	2.0-4.0 qt/100 gal spray volume of Sonata	0	Protectant (44)	Use when conditions favor disease and apply at 7-14 day intervals as needed. OMRI approved.
	neem oil	0.5%-1.0% in 25-100 gal water spray volume of Trilogy	0	Protectant (NC)	Use when conditions favor disease and apply at a 7-14 day interval as needed. OMRI approved. Also a miticide/insecticide.

OMRI-approved products are typically acceptable by organic certifiers. Several copper formulations may be approved for organic use, but this status can change. Check with your organic certifying agency prior to selection of fungicides for the production season.

*FRAC code numbers are used to classify fungicides by their chemical structures and modes of action. This information is useful because the codes can be used to consider appropriate fungicide alternation strategies to manage fungicide resistance.