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Elderberry Insect and Disease Management

This guide is the first known spray schedule to be developed for insect and disease control for field-grown elderberry in Missouri. Pesticide products labeled for greenhouse or high-tunnel-grown plants differ from those labeled for field-grown plants. Thus, product labels listed to control pests in this guide must be checked to determine if they may be applied legally when applied to elderberry grown under protected culture. Efficacy ratings for products are not listed in this guide as not all products have been tested at the University of Missouri. Only use pesticides after the pest is accurately identified. Scouting or trapping for pests will determine when a pesticide application is needed to prevent yield or plant loss.

Pesticides suggested in this publication have been labeled by the Pesticides Regulation Division of the Environmental Protection Agency. At the time this guide was developed, these pesticides were registered for use as indicated on the product label. However, these registrations can change at any time. It is the pesticide user's responsibility to carefully read and follow all current label directions for the pesticide being applied. Also, strictly adhere to use of personal protective equipment application rates, reentry periods after spraying, and pre-harvest intervals. The pesticide label is a legal document.

Some of the pesticides suggested in this guide are on the EPA Restricted Use List and users must be certified private applicators to purchase and apply these materials. The EPA requires records for restricted use pesticide applications. Pesticide training and licensing information is available at: https://agriculture.mo.gov/plants/pesticides/licensing.php. It is essential to keep accurate records of products used, rates and dates of application, areas treated, plant growth stages, targeted pests, and weather conditions. A form for record-keeping requirements for restricted-use pesticides is available at: https://extension.missouri.edu/publications/mp693. For more information, contact your local University of Missouri Extension specialist.

Table 1. Products labeled for control of common mites and insects on elderberry.

Pest/Problem	Material	Product/Acre	Comments
		Dormant to green tip	
Eriophyid mites **(Figures 1 and 2)**	Damoil	0.75 to 1.5 gal./100 gals. water	
		Pre-bloom	
Eriophyid mites	M-Pede	1% to 2% solution	Organic option. Apply before leaf curl occurs.
	PyGanic 5EC	4.5 to 15.61 fl. oz.	Organic option before leaf curl. No more than 10 applications/season.
	Trilogy	1% to 2% solution	Organic option.

Figure 1. Inward leaflet curl caused by eriophyid mites (*Phyllocoptes wisconsinensis*).

Figure 2. Stunted leaflets with interveinal puckering caused by eriophyid mites (*Phyllocoptes n. sp.*).

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Figure 3. Sawfly larvae and their feeding on elderberry.

Figure 4. Jessie's bug (*Neurocolpus jessiae*). (Cultur'Innov photo)

Figure 5. Necrotic growing point at elderberry shoot apex caused by Jessie's bug.

Figure 6. Stink bug feeding on an elderberry drupe.

Table 1. Products labeled for control of common mites and insects on elderberry. (continued)

Pest/Problem	Material	Product/Acre	Comments
Pre-bloom (continued)			
Sawfly **(Figure 3)**	Assail 30SG	4.5 to 5.3 oz.	Avoid making more than 2 consecutive applications and 26.7 oz. product/acre/year.
	Delegate 25SC	3 to 6 oz.	Do not apply more than 3 applications/year.
	Entrust 2SC	4 to 6 fl. oz.	Organic option. Do not apply more than 29 fl. oz./acre/season
	M-Pede	1% to 2% solution	Organic option.
	Neemix 4.5	4 to 16 fl. oz.	Organic option.
	Sevin 4F	1 to 2 qts.	
Jessie's bug **(Figures 4 and 5)** or Stink bugs **(Figure 6)**	Actara 25WB	3 oz.	Do not apply more than 12 oz./acre/season.
	Assail 30SG	4.4 to 5.3 oz.	Avoid making more than 2 consecutive applications and 26.7 oz. product/acre/year.
	Brigade WSB	5.3 to 16 oz.	Do not apply more than 80 oz./season.
	Danitol 2.4 EC	10.66 to 16 fl. oz.	No more than 2 applications or 32 fl. oz./season.
	Mustang	4.3 fl. oz.	No more than 25.8 fl. oz./acre/season.
	Neemix 4.5	4 to 16 fl. oz.	Organic option.
	PyGanic 5EC	4.5 to 15.61 fl. oz.	Organic option. No more than 10 applications/season.
	Sevin 4F	1 to 2 qts.	Sevin provides poor control of stink bugs. No more than 5 applications/year.
Thrips	Admire Pro	2.1 to 2.8 fl. oz.	No more than 14 fl. oz./acre/year or 5 applications/year.
	Assail 30SG	4.5 to 5.3 oz.	Avoid making more than 2 consecutive applications and 26.7 oz./acre/year.
	Aza-Direct	12.5 to 42 fl. oz.	Organic option.
	Delegate 25WG	3 to 6 oz.	Provides suppression only.
	Entrust SC	4 to 6 fl. oz.	Organic option. No more than 3 applications/season or 29 fl. oz./acre/season.
	M-Pede	1% to 2% solution	Organic option.
	Neemix 4.5	4 to 16 fl. oz.	Organic option.
	PyGanic 5EC	4.5 to 15.61 fl. oz.	Organic option. No more than 10 applications/season.

Figure 7. Elder borer beetles (*Desmocerus palliatus*). (Clement Akotsen-Mensah photo)

Figure 8. Eastern flower thrips (*Frankliniella tritici*) on elderberry flower.

Figure 9. Japanese beetle (*Popillia japonica*).

Table 1. Products labeled for control of common mites and insects on elderberry. (continued)

Pest/Problem	Material	Product/Acre	Comments
Bloom			
Elderberries are primarily wind-pollinated. However, to protect bees and other pollinators, do not apply insecticides during bloom. Adult elder borer beetles emerge during bloom. If the planting is heavily infested with these beetles, Brigade or Admire Pro may be sprayed near the end of the bloom period. If other insects are causing major damage, insecticide may be sprayed late in the evening when bees are not foraging.			
Petal fall			
Elder borer beetle **(Figure 7)**	Brigade WSP	5.3 to 16 oz.	Do not apply more than 80 oz. per season.
	Or Admire Pro	2.1 to 2.8 fl. oz.	No more than 14 fl. oz./acre/year or 5 applications/year.
Sawfly	see above		
Stink bugs or Jessie's bug	see above		
Thrips **(Figure 8)**	see above		
Ten days after petal fall			
Elder borer beetle	see above		
Sawfly	see above		
Stink bugs or Jessie's bug	see above		
Thrips	see above		
Summer sprays			
Elder shoot borer moth	Altacor 35WG	3 to 4.5 oz.	No more than 9 oz. product/acre/year.
Japanese beetles **(Figure 9)**	Assail 30SG	4.5 to 5.3 oz.	No more than 5 applications/season.
	Aza-Direct	1.2 pts.	Only acts as a repellent.
	Neemix 4.5	7 to 16 fl. oz.	Organic option. Acts as a repellent.
	Mustang	4.3 fl. oz.	No more 25.8 fl. oz./season.
	Pyganic 5EC	4.5 to 18 fl. oz.	Organic option for short-term control only.
	Sevin 4F	1 to 2 qts.	Spray when adults emerge from soil & begin feeding on leaves.
Pre-harvest through harvest			
Spotted wing drosophila	Danitol 2.4EC	10.66 to 16 fl. oz.	Direct spray to soil only to fallen berries. See comments above.
	Delegate 25WG	3 to 6 oz.	No more than 3 applications/year with a minimum re-treatment interval of 7 days.
	Entrust SC	4 to 6 fl. oz.	Organic option. No more than 2 consecutive applications.

Figure 10. Adult spotted wing drosophila (*Drosphila suzukii*). (Cabi.org photo)

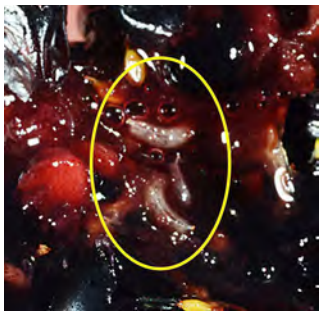

Figure 11. Spotted wing drosophila larvae in blackberry fruit. (John Obermeyer, Purdue University)

Table 1. Products labeled for control of common mites and insects on elderberry. (continued)

Pest/Problem	Material	Product/Acre	Comments
Pre-harvest through harvest (continued)			
Spotted wing drosophila **(Figures 10 and 11)**	Exirel 0.83SE	13.5 to 20.5 fl. oz.	Make no more than 2 successive applications.
	Mustang	4.3 fl. oz.	No more than 24 fl. oz./acre/season.
	PyGanic 1.4EC	16 to 64 fl. oz.	Organic option.
Stink bugs or Jessie's bug – see above			
Harvest			
Spotted wing drosophila – see above			
Stink bugs or Jessie's bug – see above			
Post-harvest			
Elder shoot borer moth	---		Prune infested canes and burn them.

Table 2. Insecticide common names, insecticide resistance codes (IRAC), pre-harvest intervals (PHI) and restricted entry intervals (REI).

Product	Common Name	IRAC	PHI (days)	REI (hrs)
Actara	thiamethoxam	4A	3	12
Admire Pro	imidacloprid	4A	3	12
Altacor	chlorantraniliprole	28	1	4
Assail	acetamiprid	4A	1	12
Aza-Direct	azadirachtin	--	0	4
Brigade	bifenthrin	3A	1	12
Danitol	fenpropathrin	3A	3	24
Delegate	spinetoram	5	1	4
Entrust	spinosad	5	1	4
M-Pede	insecticidal soap	--	0	12
Mustang	zeta-cypermethrin	3A	1	12
Neemix	azadirachtin	--	0	4
Pyganic	pyrethrins	3A	0	12
Trilogy	neem oil	--	1	4
Sevin	carbaryl	1A	7	12

Figure 12. Cane dieback disease (*Heterophoma novae-verbascicola*).

Figure 13. Elderberry rust (*Puccinia sambuci*) on leaf petiole.

Figure 14. Elderberry rust lesions on the alternate host, sedge.

Table 3. Products labeled for control of common diseases on elderberry.

Disease	Product	Product/Acre	Comments
		Green tip	
Heterophoma (infection usually occurs at temperatures below 75°F) **(Figure 12)**	Abound	6 to 15.5 fl. oz.	No more than 46 fl. oz. of product/acre/season.
	Cabrio EG	14 oz.	No more than 56 oz./acre/season or 2 sequential applications.
	Pristine	18.5 to 23 oz.	No more than 92 oz. product/acre or 4 applications/year.
	Switch 62.5WB	11 to 14 oz.	No more than 56 oz./acre/year or 2 sequential applications.
Puccinia rust (infection occurs at temperatures between 48 and 64°F) **(Figures 13 and 14)**	Abound	6 to 15.5 fl. oz.	No more than 46 fl. oz. of product/acre/season.
	Bumper 41.8EC	6 fl. oz.	No more than 30 fl. oz./acre/season.
	Propiconazole 3.6EC	6 fl. oz.	No more than 30 fl. oz. of product/acre/season.
	Propicure 3.6F	6 fl. oz.	No more than 30 fl. oz. of product/acre/season.
	Cabrio EG	14 oz.	Suppression only. No more than 56 oz./acre/season or 2 sequential applications.
	Pristine	18.5 to 23 oz.	Suppression only. No more than 92 oz. product/acre or 4 applications/year.
	OSO 5SC	6.5 – 13.0 fl. oz.	Organic option.
	Quadris Top	12 to 14 fl. oz.	No more than 56 fl. oz./acre/year or 4 applications/season.
	Quilt Xcel	14 to 21 fl. oz.	No more than 63 fl. oz./acre or 3 applications/season.
	Regalia	---	Organic option for small plantings. 1.47 to 5.88 tbsp./1000 sq. ft.
	Tilt	6 . oz.	No more than 30 fl. oz./acre/year.
		Pre-bloom	
Alternaria (optimum temperature range for infection is 77 to 86°F)	Abound	6 to 15.5 fl. oz.	No more than 46 fl. oz. of product/acre/season.
	Bumper 41.8 EC	6 fl. oz.	No more than 30 fl. oz. of product/acre/season.
	Cabrio EG	14 oz.	No more than 56 oz./acre/season or 2 sequential applications.
	Luna Tranquility	13.6 to 27 fl. oz.	No more than 54.7 fl. oz./acre/year or 2 sequential applications.

Figure 15. *Alternaria* sp. lesion on an elderberry leaflet at an early stage of infection.

Figure 16. Elderberry leaflet infected with *Alternaria* in the summer.

Figure 17. Shriveled berry symptom of *Alternaria*.

Table 3. Disease Management (continued)

Disease	Product	Product/Acre	Comments
	Pre-bloom (continued)		
Alternaria (optimum temperature range for infection is 77 to 86°F) *continued* **(Figures 15, 16 and 17)**	Neem oil	see label	Organic option.
	OSO 5SC	6.5 to13.0 fl. oz.	Organic option.
	Pristine	18.5 to 23 oz.	No more than 92 oz. product/acre or 4 applications/year.
	Propiconazole 3.6EC	6 fl. oz.	No more than 30 fl. oz. of product/acre/ season.
	Propicure 3.6F	6 fl. oz.	No more than 30 fl. oz. of product/acre/ season.
	Rovral 4F	1 to 2 pt.	No more than 4 applications/season.
	Quadris Top	12 to 14 fl. oz.	No more than 56 fl. oz./acre/year or 4 applications/season.
	Quilt Xcel	14 to 21 fl. oz.	No more than 63 fl. oz./acre or 3 applications/season.
	Regalia	---	Organic option for small plantings. 1.47 to 5.88 tbsp./1000 sq. ft.
	Switch 62.5WB	11 to 14 oz.	No more than 56 oz./acre/year or 2 sequential applications.
	Tilt	6 fl. oz.	No more than 30 fl. oz. of product/acre/ season.
	Trilogy	see label	Organic option.
Colletotrichum (infection occurs at 68°F, but most common at or above 77°F)	Abound	6 to 15.5 fl. oz.	No more than 46 fl. oz. of product/acre/ season.
	Bumper 41.8EC	6 fl. oz.	No more than 30 fl. oz./acre/season.
	Cabrio 20EG	14 oz.	Suppression only. No more than 56 fl. oz./ acre/year.
	Neem oil	see label	Organic option.
	OSO 5SC	6.5 to 13.0 fl. oz.	Suppression only. Organic option.
	Pristine	18.5 to 23 oz.	No more than 92 oz. product/acre or 4 applications/year.
	Propiconazole 3.6EC	6 fl. oz.	No more than 30 fl. oz. of product/acre/ season.
	Propicure 3.6F	6 fl. oz.	No more than 30 fl. oz./acre/season.
	Regalia	---	Organic option for small plantings. 1.47 to 5.88 tbsp./1000 sq. ft.
	Quadris Top	12 to 14 fl. oz.	No more than 56 fl. oz./acre/year or 4 applications/season.

Figure 18. *Colletotricum kahawae* subsp. *ciggaro* lesion on elderberry leaflet.

Figure 19. *Colletotrichum acutatum* disease symptoms on elderberry.

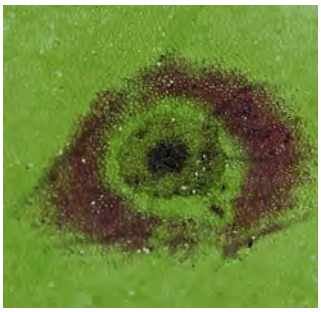

Figure 20. *Colletotrichum salicis* lesion on elderberry leaflet.

Table 3. Disease Management (continued)

Disease	Product	Product/Acre	Comments
Pre-bloom (continued)			
Colletotrichum (infection occurs at 68°F, but most common at or above 77°F *continued* **(Figures 18, 19 and 20)**	Quilt Xcel	14 to 21 fl. oz.	No more than 63 fl. oz./acre/year or 3 applications/year.
	Regalia	---	Organic option. 1.47 to 5.88 tbsp/1000 sq. ft.
	Rovral 4F	1 to 2 pts.	Suppression only. No more than 4 applications/season.
	Switch 62.5WG	11 to 14 oz.	No more than 56 oz./acre/year or 2 sequential applications.
	Tilt	6 fl. oz.	No more than 30 fl. oz./acre/year.
	Trilogy	see label	Organic option.
Heterophoma	see products listed above		
Puccinia Rust	see products listed above		
Bloom to petal fall			
Alternaria	see products listed above		
Colletotrichum	see products listed above		
Ten Days after petal fall			
Alternaria	see products listed above		
Colletotrichum	see products listed above		
Summer sprays			
Alternaria	any product listed above may be used except for Rovral 4F		
Colletotrichum	see products listed above		
Pre-harvest			
Alternaria	see products listed above		
Colletotrichum	see products listed above		

Table 3. Disease Management (continued)

Disease	Product	Product/Acre	Comments
		Harvest	
Alternaria or *Colletotrichum*	Abound	6 to 15.5 fl. oz.	No more than 46 fl. oz. of product/acre/season.
	Cabrio EG	14 oz.	No more than 56 oz./acre/season or 2 sequential applications.
	Luna Tranquility	13.6 to 27 fl. oz.	No more than 54.7 fl. oz./acre/year or 2 sequential applications.
	Neem oil	see label	Organic option.
	OSO 5SC	6.5 to13.0 fl. oz.	Organic option.
	Pristine	18.5 to 23 oz.	No more than 92 oz. product/acre or 4 applications/year.
	Rovral 4F	1 to 2 pt.	No more than 4 applications/season.
	Switch 62.5WB	11 to 14 oz.	No more than 56 oz./acre/year or 2 sequential applications.
	Trilogy	see label	Organic option.

Table 4. Fungicide common names, fungicide resistance codes (FRAC), pre-harvest intervals (PHI) and restricted entry intervals (REI).

Product	Common Name	FRAC	PHI (days)	REI (hrs)
Abound	azoxystrobin	11	0	4
Bumper	propiconazole	3	30	12
Cabrio EG	pyraclostrobin	11	0	12
Luna Tranquility	fluopyram + pyrimethanil	7 + 9	0	12
OSO 5SC	polyoxin D	19	0	4
Pristine	pyraclostrobin + boscalid	11 + 7	0	12
Propiconazole 3.6EC	propiconazole	3	30	12
Propicure 3.6F	propiconazole	3	30	12
PropiMax EC	propiconazole	3	30	12
Quadris Top	azoxystrobin + difenoconazole	11 + 3	7	12
Quilt Xcel	azoxystrobin + propiconazole	11 + 3	30	12
Regalia	Reynoutria sachalinensis	P5	0	4
Rovral 4F	iprodione	2	0	24
Switch 62.5WG	cyprodinil + fludioxonil	9 + 12	0	12
Tilt	propiconazole	3	30	12
Trilogy	neem oil	4	0	4

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