



Current Report

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: osufacts.okstate.edu

Commercial Blackberry, Strawberry, and Blueberry Insect and Disease Control – 2015

Jackie Lee
Extension Entomologist

Phil Mulder
Extension Entomologist

Damon Smith
Former Extension Plant Pathologist

The amount of insecticide or fungicide to use is given in per gal/acre amounts for the home or backyard grower and in per 100 gal/acre amounts for the commercial grower. The home or backyard grower can determine the amount of spray needed to cover their plants completely by filling their sprayer with water and then spraying their plants until the water is almost ready to drip off the leaves. Determine how much water was

used and add the correct amount of chemical from the appropriate table below. Commercial growers should calibrate their sprayers by spraying a measured area, measure the amount of water needed to refill the tank. Divide this amount by the fraction of an acre sprayed to get the gallons applied per acre. Mix the amount of chemical desired per acre with water to give this much spray material.

BLACKBERRIES*

For commercial growers, use the rate/acre column regardless of the amount of water you are spraying per acre. Read and follow all label directions. For home gardeners, if no rate is given then the product(s) are not recommended for home use.

Application and Timing	Pests Involved	Amount of Materials Needed ²			
		Material ¹ (MOA Group)	Per Gallon	Per Acre	
DORMANT: February - before bud break. Remove and destroy dead canes. This is a critical spray for good disease control especially if these diseases have been a serious problem	Anthracnose	Lime-sulfur (M4)	See label	12-24 gal	
	Cane Blight	Kocide 50WP (M4)	See label	4 lbs	
	Spur Blight (raspberries only)				
	Phytophthora Root Rot	Aliette 80WDG (21) Ridomil Gold EC (4) (raspberries only)	See label	See label	
PRE-BLOOM: Just before blossoms open. To protect bees do not use insecticides during bloom.	Leafhoppers	Malathion 57EC (1B)	0.66-1.5tbs	1.5-3 pts	
	Aphids	Brigade 2ECr (3)		3.2-6.4 oz	
	Leafrollers	Mustang-Maxr (3)	–	4 oz	
		Adjourn/Asana(3)	–	4.8-9.6 oz	
	Raspberry crown borer ⁴		Altacor 35WG (28)	–	3-4.5 oz
			Brigade 2ECr (3) 3	–	6.4 oz
			Brigade WSB r (3)	–	16 oz
			Malathion 57EC (1B)	1.5 tbs	3 pt
	Strawberry Clipper		Malathion 57EC (1B)	0.66-1.5tbs	1.5-3 pts
			Sevin 80WSP (1A)		1.25-2.5 lbs
		Brigade 2EC r (3)	–	3.2-6.4 fl oz	
		Brigade WSB r (3)	–	8-16 oz	
		Danitol 2.4EC (3)	–	10.66-16 fl oz	

BLACKBERRIES (continued)

Application and Timing	Pests Involved	Amount of Materials Needed ²		
		Material ¹ (MOA Group)	Per Gallon	Per Acre
PRE-BLOOM: (cont'd)	Flower Thrips	Entrust SC (5)	–	4-6 fl oz
		Delegate 25WG (5)	–	3-6oz
		Assail 30SG (4A)	–	4.5-5.3 oz
	Red necked cane borer ⁵	Brigade 2EC r (3)	–	3.2-6.4 fl oz
		Brigade WSB r (3)	–	8-16 oz
		Malathion 57EC (1B)	1.5 tbs	3 pt
		Admire Pro	–	10.5-14 fl oz
Fungicide applications prior to bloom should not be necessary unless these diseases have been a serious problem. This especially true if a dormant application of lime-sulfur is made.	Anthracnose, Cane Blight and Spur Blight (reds only), *Raspberry leaf spot, *Septoria leaf spot	Abound (11)	–	6.2-15.4 oz
		Cabrio (11)	–	14 oz
		Pristine (11, 7)	–	18.5-23 oz
		Captan 80 WDG (M4)	–	See label
	Rusts, Powdery Mildew, *Raspberry leaf spot, * Septoria leaf spot	Rally 40WSP(3)	See Label	2.5 oz
		Cabrio (11)	–	14 oz
		Pristine (11, 7)	–	18.5-23 oz
BLOOM THROUGH HARVEST: During bloom make three fungicide applications. The first should occur no later than 5% bloom; make the second application at full bloom; follow with the third application as petals begin to fall. To protect bees do not use Insecticides during bloom.	Anthracnose, Cane Blight and Spur Blight (reds only), *Raspberry leaf spot, *Septoria leaf spot	Same as Pre-Bloom		
	Rusts, Powdery Mildew, *Raspberry leaf spot, *Septoria leaf spot	Same as Pre-Bloom		
	Botrytis fruit rot (only)	Rovral 50WP (2)	–	1-2 lb
		Elevate 50WG (17)	–	1.5 lb
		CaptEstate 68WDG (17, M4)	–	– 3.5 lb
		Pristine (11, 7)	–	18.5-23 oz
	Spotted Wing Drosophila ⁶	Brigade 2EC r (3)	–	3.2-6.4 fl oz
		Malathion 57EC (1B)	–	2-4pts
		Entrust 80WP (5)	–	1.24-2 oz
		Delegate 25WG (5)	–	3-6 oz
		Danitol 2.4EC (3)	–	10.66-16 fl oz
	Mites	Acramite 50WS (UN)	–	0.75-1lb
		Savey 50DF (3)	–	4-6 oz
	Stinkbugs	AsanaXL (3)	–	4.8-9.6 fl oz
	Plantbugs	Actara 25WDG (4A)	–	3 oz
ANYTIME AFTER HARVEST (Sept. 15-Oct. 1): Post harvest sprays are probably most important for leaf spot diseases. When diseases are severe, most defoliation occurs.	Red Necked Cane Borer ⁵	Remove and burn infested canes.		
	Raspberry Crown Borer ⁵	Brigade 2ECr (3)	–	6.4 oz
		Capture 2ECr (3)	–	6.4 oz
		Altacor 35WG (28)	–	3-4.5oz
		Malathion 57EC (1B)	1.5 tbs	3 pt
	Rusts, Powdery Mildew, *Raspberry leaf spot, *Septoria leaf spot	Same as Bloom through harvest		post harvest

r Restricted Use Pesticide

1 See Table 1 for date of last application prior to harvest.

2 tbs = tablespoon; lb = pound; gal = gallon.

3 Apply Brigade 2EC 2-4 qt/acre in a minimum of 100 gal of water as a drench to the crown area and lower canes. Drench will kill borers already hatched in soil. Applications made in fall Oct.-Nov. will have the best efficacy. Not recommended for homeowners.

4 Raspberry crown borer is a significant pest of caneberrries in Oklahoma and will eventually cause the demise of plants if left uncontrolled. Seasonal treatment each year is recommended. Capture applied in late October or early November as a soil drench to the lower canes and soil around the canes will provide excellent control if adequate (50-100 gallons/acre) water is applied with the material. This is a restricted use chemical, not recommended for home-owners.

5 Red necked cane borer – The red necked cane borer is a 1/4 inch long beetle with a black head and wing covers, and a reddish thorax. Adults are typically present in brambles from May until June. Larval stage red necked cane borers tunnel within canes in a spiral fashion, producing 3" long swollen, galled areas. Galled canes should be rouged out and destroyed whenever they are found. Insecticide applications are only effective on the adults. In blocks with a history of red

necked cane borer injury, scout for adults in May. Application of insecticides at petal fall and again in 10 to 14 days typically provides good control of red necked cane borer. Keep records to help refine pest management efforts in subsequent years.

- 6 Spotted Wing Drosophila (SWD) is a new invasive insect pest that has been detected recently in many states including Oklahoma in 2013. The adult females lay their eggs in ripe fruit. After hatching, the larvae feed and cause damage to the fruit. Monitoring traps and ripe fruit should be evaluated weekly from ripening until harvest. A spray program should begin when SWD is detected in monitoring traps or fruit. Sprays should be timed 7 days apart unless a rain event occurs then reapplication will be necessary.

* All diseases, information and fungicide treatments are applicable to both blackberries and raspberries unless otherwise noted.

STRAWBERRIES

Read and follow all label directions. For commercial growers, use the rate per acre column, regardless of the amount of water you are spraying per acre. For home gardeners, if no rate is given then the product is not recommended for home use.

Application and Timing	Pests Involved	Amount of Materials Needed ²		
		Material ¹ (MOA Group)	Per Gallon	Per Acre
PRE-BLOOM: Just before bloom (separation of blossom buds). Timing is important in controlling the strawberry weevil. To protect bees do not use insecticides during bloom.	Leaf Spot, Leaf scorch, Leaf blight, Powdery mildew, Anthracnose ³	Captan 50WP (M4)	–	6 lb
		Nova 40WP (3)	–	2.5 – 5.0 oz
		Cabrio 20EG (11)	–	14 oz
		Pristine (11, 7)	–	18.5 – 23 oz
		Abound (11)	–	6.2 – 15.4 oz
	Phytophthora diseases (red stele and Leather rot)	Ridomil Gold EC (4)	–	1 pt
		Aliette 80 WDG (21)	–	2.5-5 lb
	Strawberry root weevil	Brigade WSB (3)	–	8-32 oz
		Malathion 57% EC (1B)	0.66-1.5 tbs	1.5-2.5 pt
	Strawberry Clipper	Brigade WSB (3)	–	6.4-32 oz
		Danitol 2.4EC (3)	–	10 2/3 oz
		Lorsban 4E (1B)	–	1qt
		Sevin 4F(1A)	–	1-2 qt
	Tarnished Plant Bug Spittlebug	Sevin 4F (1A)	–	1-2 qt
		Danitol 2.4EC (3)	–	10.67 oz
Brigade WSB ¹ (3)		–	8.0-32.0 oz	
Malathion 57% EC (1B)		0.66-1.5 tbs	1.5-2.5 pts	
Flower Thrips	Assail 30SC (4)	–	4-6.9 oz	
	SpinTor 2SC (5)	–	4-6 fl oz	
	Radiant 1SC (5)	–	6-10 fl oz	
	Entrust 2SC(5)	–	4-6 fl oz	
Spider Mites	Acramite 50WS (UN)	–	0.75-1.0 lb	
	Kanemite 15SC(20B)	–	21-31oz	
	Portal (21A)	–	2 pt	
	Oberon (23)	–	12-16 fl oz	
	Danitol 2.4EC (3)	–	10.67oz	
	Agri-Mek 0.15EC (6)	–	16fl oz	
	Zeal 72WSP (10B)	–	2-3 oz	
BLOOM: This is the most critical period for control of Botrytis fruit rot with fungicides. To protect bees, do not use insecticides during bloom.	Botrytis Blossom Blight and Fruit Rot	Topsin M WSB (1)	–	¾-1lb
		Elevate 50WG (17)	–	1.5 lb
		Switch (9)	–	11-14 oz
		Captan 50WP (M4)	–	6 lb
		Pristine (11, 7)	–	18.5 – 23 oz
	Anthracnose	Abound (11)	–	6.2-15.4 oz
		Cabrio (11)	–	14 oz
		Pristine (11, 7)	–	18.5-23 oz
		Switch (9)	–	11-14 oz
		Captan 50WP (M4)	–	6 lb
	Leaf Spot, Leaf scorch, Leaf blight, Powdery mildew ³	Abound (11)	–	6.2-15.4 oz
		Cabrio (11)	–	14 oz
		Pristine (11, 7)	–	18.5-23 oz
		Rally 40WSP (3)	–	2.5-5 oz
		Procure 50WS (3)	–	4-8 oz

STRAWBERRIES (continued)

<i>Application and Timing</i>	<i>Pests Involved</i>	<i>Amount of Materials Needed²</i>		
		<i>Material¹ (MOA Group)</i>	<i>Per Gallon</i>	<i>Per Acre</i>
POST BLOOM: After the blossoms have fallen.	Aphids	Brigade WSB ^r (3)	–	8.0-32.0 oz
		Malathion 57% EC (1B)	0.66 tbs	1.5 pts
		Pasada 1.6F (4A)	–	3.75 oz
		Thiodan 3EC (2A)	–	1.3 qt
		Admire Pro (4)	–	10.5-14 fl oz
		Provado 1.6F (4)	–	3.8 oz
		Actara (4)	–	1.5-3 oz
	Leafrollers	Danitol 2.4EC (3)	–	10.66 oz
		Javelin (B.t.) (11B2)	0.24-1.4 tsp	0.5-4.0 lbs
	Spittlebugs	Sevin 4F (1A) or	2-4 tbs	2-4 lb
		Malathion 57% EC (1B)	0.66-1.5 tbs	1.5-2.5 pts
	Sowbugs	Sevin 4F (1A) or	2-4 tbs	1-2 qts2-4 lb
		Malathion 57% EC (1B)	0.66-1.5 tbs	1.5-2.5 pts
	Tarnished Plant Bug	Rimon 0.83EC(15)	–	6.4-32oz
		Danitol 2.4EC (3)	–	10.67oz
		Brigade WSB ^r (3)	–	8.0-32.0 oz
		Malathion 57% EC (1B)	0.66-1.5 tbs	1.5-2.5 pts
	Spider Mites	Acramite 50WS (UN)	–	0.75-1.0 lb
		Kanemite 15SC (20B)	–	21-31 oz
		Portal (21A)	–	2 pt
Oberon (23)		–	12-16 fl oz	
Danitol 2.4EC (3)		–	10.67 oz	
Agri-Mek 0.15EC (6)		–	16fl oz	
Zeal 72WSP (10B)		–	2-3 oz	
Spotted Wing Drosophila*	Brigade WSB ^r (3)	–	6.4-32 oz	
	Danitol 2.4EC (3)	–	10.67fl oz	
	Malathion 57% EC (1B)	0.66 tbs	1.5 pt	
	Radiant SC (5)	–	6-10 fl oz	
Botrytis Blossom Blight and Fruit Rot	Same as Bloom. Subsequent applications may be necessary. Check label for recommendations and restrictions near harvest.			
Anthracnose				
Leaf Spot, Leaf scorch, Leaf blight, Powdery mildew ³				

1 See Table 1 for date of last application prior to harvest. If no number is provided then that chemical cannot be used on that crop

2 tbs = tablespoon; tsp = teaspoon; pt = pint; qt = quart; lb = pound; gal = gallon.

3 Rally is highly effective for control of powdery mildew and leaf blight. Captan and will not control powdery mildew. Cabrio, Pristine, and Abound are registered for Leafspot, Powdery Mildew and Anthracnose.

* Spotted Wing Drosophila (SWD) is a new invasive insect pest that has been detected recently in many states including Oklahoma in 2013. The adult females lay their eggs in ripe fruit. After hatching, the larvae feed and cause damage to the fruit. Monitoring traps and ripe fruit should be evaluated weekly from ripening until harvest. A spray program should begin when SWD is detected in monitoring traps or fruit. Sprays should be timed 7 days apart unless a rain event occurs then reapplication will be necessary.

BLUEBERRIES

For commercial growers, use the rate/acre column regardless of the amount of water you are spraying per acre. Read and follow all label directions. For home gardeners, if no rate is given, then the product is not recommended for home use.

<i>Application and Timing</i>	<i>Pests Involved</i>	<i>Amount of Materials Needed²</i>		
		<i>Material¹ (MOA Group)</i>	<i>Per Gallon</i>	<i>Per Acre</i>
DELAYED DORMANT: Just before bud break	Scale insects	Superior Oil or	4 tbs	3 gal
		Lime sulfur (M4)	7 tbs	5 gal
Phomopsis cane and Twig Blight Phytophthora Root Rot	Lime sulfur (M4)	7 tbs	5 gal	
	Ridomil Gold EC (4)	-	3.6 pt	
	Alliette 80WDG (21)	-	5 lb	

BLUEBERRIES (cont'd)

<i>Application and Timing</i>	<i>Pests Involved</i>	<i>Amount of Materials Needed²</i>		
		<i>Material¹ (MOA Group)</i>	<i>Per Gallon</i>	<i>Per Acre</i>
PRE-BLOOM: Just before blossoms open	Leafrollers	Javelin (B.t.) (11B2)	0.12-0.5 tsp	0.5-4.0 lb
		Mustang-Maxr (3)	–	4 oz
		Sevin 50W (1A)	2-4 tbs	2-4 lb
	Blossom weevil	Sevin 50W (1A)	2-4 tbs	2-4 lb
	Mummy berry (shoot blight phase)	Ziram 76DF (M4)	2 tbs	3 lb
Captan 50WP (M4)		-	5 lb	
Indar 75 WSP (3)		-	2 oz	
Stem Canker and Stem blight	Captan 50WP (M4)	-	5 lb	
	Ziram 76DF (M4)	-	3 lb	
MID-BLOOM: Do not use chemical insecticides during bloom.	Leafrollers	Dipel, Javelin or	2 tsp	2 qt
		Mustang-Maxr (3)	–	4 oz
		Thuricide (11B2)	1.5 tsp	1 lb
	Mummy berry (blossom infection), botrytis blight, Stem canker and stem blight, Anthracnose	Abound (11)		6.2-15.4 oz
		Cabrio (11)		14 oz
Pristine (11, 7)			18.5-23 oz	
CaptEvate 68WDG (17, M4)		-	3.5-4.7 lb	
Ziram 76DF (M4)	-	3 lb		
Botrytis blight	Elevate 50WG (17)	-	1.5 lb	
	CaptEvate 68WDG (17, M4)	-	3.5 – 4.7 lb	
FIRST POST-POLLINATION: (about May 25 to June 1)	Leafrollers	Javelin (B.t.) (11B2)	0.12-0.5 tsp	0.5-4.0 lb
	Leafhoppers	Mustang-Maxr (3)	–	4 oz
	Leaf Miners	(Leafrollers only)		
	Cherry Fruitworm	Lannate LVr (1A)	1 tsp	1.5-3 pt
	Aphids	Sevin XLR Plus (1A)	1 tbs	1.5-2 qt
	Plum Curculio	Adjournr(3)	–	4.8-9.6 oz
	Anthracnose, Stem canker and stem blight	Abound (11)	–	6.2-15.4 oz
		Cabrio (11)	–	14 oz
		Pristine (11, 7)	–	18.5-23 oz
		Captan 50WP (M4) ³	–	5 lb
SECOND POST-POLLINATION: 7-12 days after First Post-Pollination Spray	Leafhoppers	Same as First Post-Pollination Spray.		
	Leaf Miners			
	Leafrollers			
Cherry Fruitworm				
Anthracnose, Stem canker and stem blight	Same as First Post-Pollination Spray			
ADDITIONAL COVER SPRAYS: Apply every 7-12 days as needed.	Leafrollers	Guthion 50WPr (1B)	0.5 tsp	1.5 lb
	Leaf Miners	Javelin (B.t.) (11B2)	0.12-0.5 tsp	0.5-4.0 lb
	Fall Webworms	(Not for Leaf Miners or Leafhoppers)		
	Anthracnose, Stem canker and stem blight	Same as Second Post-Pollination Spray		
	Flatheaded Apple Tree Borer* Sevin 80S (1A)	Sevin XLR	–	1-2 qt
		–	1.5-2.4 lb	
	Spotted Wing Drosophila**	Imidan 70W	–	1.3 lb
Mustang Maxr (3)		–	4 fl oz	
Danitol 2.4EC (3)		–	16 fl oz	
Malathion 57% EC (1B)		0.66 tbs	1.5 pt	
Delegate WG (5)	–	3-6 fl oz		

BLUEBERRIES (cont'd)

<i>Application and Timing</i>	<i>Pests Involved</i>	<i>Amount of Materials Needed²</i>		
		<i>Material¹ (MOA Group)</i>	<i>Per Gallon</i>	<i>Per Acre</i>
MAGGOTS: When flies start to lay eggs (about June 28). Repeat every 10 days through harvest.	Blueberry Maggot	Malathion 25WP (1B)	2 tbs	4 lb
		Sevin XLR Plus (1A)	1 tbs	1.5-2 qt
		Lannate LV ^r (1A)	–	.75-1.5 pts
POST-HARVEST: If canker is a problem, apply post-harvest sprays at 4-6 week intervals until leaf drop in the fall.	Stem canker and stem blight	Captan 50WP (M4)	-	5lb

1 See Table 1 for date of last application prior to harvest.

2 tbs = tablespoon; tsp = teaspoon; pt = pint; qt = quart; gal = gallon; lb = pound³Apply only if these diseases are a problem. Observe harvest restrictions.

r Restricted Use Pesticide.

** Spotted Wing Drosophila (SWD) is a new invasive insect pest that has been detected recently in many states including Oklahoma in 2013. The adult females lay their eggs in ripe fruit. After hatching, the larvae feed and cause damage to the fruit. Monitoring traps and ripe fruit should be evaluated weekly from ripening until harvest. A spray program should begin when SWD is detected in monitoring traps or fruit. Sprays should be timed 7 days apart unless a rain event occurs then reapplication will be necessary. See the OSU SWD fact sheet for more information on monitoring and management of SWD.

TABLE 1. DAYS WAITING TIME - LAST APPLICATION BEFORE HARVEST

<i>CHEMICAL</i>	<i>Number of Days Before Harvest</i>		
	<i>BLACKBERRIES</i>	<i>STRAWBERRIES</i>	<i>BLUEBERRIES</i>
Abacusr	–	3	–
Abound	0	0	0
Acramite	–	1	–
Adjourn	–	–	–
Agri-mek 0.15 EC	–	3	–
Aliette 80 WDG	60	0	0
Atrapa 8E	1	3	1
Brigade 2ECr	3	–	–
Brigade WSB ^r	0	0	–
B.t. (Dipel, Javelin, Thuricide)	0	0	0
Cabrio	0	0	0
Captan	3	0	0
Dicofol 4E	–	2	–
Elrvate 50WG	0	0	–
Guthion ^r	14	5	–
Imidan 50WP or 70WP	–	–	–
Javelin	0	0	0
Kelthane	–	2	–
Lannate LV ^r	–	3 (Fresh)	3
		10 (Processing)	–
Lorsban 4Er	–	21	–
Malathion	1	3	1
Nova 40W	0	0	–
Pasada	–	7	–
Pristine	0	0	0
Procure 50WS	1	1	–
Ridomil Gold EC	60 (raspberries only)	–	–
Sevin	7	–	–
Switch	0	0	0
Thiodan 3EC	–	1	–
Topsin M WSB	1	1	–
Vendex 50WPr	–	4	–
Zeal	–	1	–
Ziram	–	–	14

r Restricted Use Pesticide.

*Guthion 2L - up to 3 oz - 0 days; above 3 oz - 7 days. Application by backpack or hand wand sprayers is prohibited. Re-entry period is 4-5 days, 5 days if area receives less than 24 inches of annual rainfall.

Publications that may be helpful: Fact Sheets HLA-6213, Weed Management in Small Fruit Crops; HLA-6214, Growing Strawberries in the Home Garden; EPP-7612, Plant Disease Diagnostic Service; HLA-6239, Commercial Blackberry Production; HLA-6215, Home Culture of Blackberries.

CULTURAL CONTROL METHODS

With more chemicals being removed from the market, growers must have successful ways of controlling disease and insects through cultural means. Disease and insects may be controlled or the effects of these pests can be reduced using cultural methods. The methods to consider are site selection, maintaining good soil conditions, sanitation, and purchase of healthy, and where available, resistant varieties.

A well chosen site includes good air drainage to reduce spring frost damage, circulation, and adequate soil water drainage. Sites with these qualities improve plant growth and decrease plant susceptibility to insects and disease. Orienting rows for good sun exposure and natural air movement will dry leaves and fruit quickly. Raised beds improve soil drainage and reduce infections by root diseases. Proper site selection to decrease plant stresses, such as cold injury and buffeting by winds, can reduce attack by insects and diseases. New plantings located near old established areas may have greater risks of insect and disease populations from the old sites than plantings on isolated areas. Destroying native plant species in the immediate area that harbor harmful insects or diseases can reduce pest problems.

An important disease and insect control procedure is the planting of adapted, healthy, disease and insect resistant varieties. Plants should be purchased from reliable sources, and only healthy looking stock planted. Variety selection should be based on adaptation to the area, such as cold hardiness, heat tolerance, adaptation to soils, and ability to produce acceptable yields of high quality fruit. Varieties will vary in the degree of susceptibility to an insect or disease. The nursery, supplier or county agent should have a recent list of adaptive and resistant cultivars that are available for planting in Oklahoma.

Maintaining proper soil moisture and fertilization can insure healthy plants. These plants will be more resistant to disease and insect damage than plants over or under fertilized or watered. Annual leaf analysis and soil analysis can be used to determine fertilization rates. Rainfall and soil moisture should be monitored to determine when to irrigate plants. Tensiometers, watermarks or some other form of measuring soil moisture may be used to determine when irrigation is necessary in larger plantings. This may not be necessary in smaller plantings where rainfall and stress of plants can be monitored directly.

Sanitation is important in controlling some insects, and especially in controlling diseases. Diseased and dead branches should be removed and when necessary, entire plants should be removed to reduce overwintering sites for insects and pathogens. These infected materials should be burned or removed from the site. Unharvested fruit, leaf litter and pruning's should be removed to decrease the spread and population increase of insects and diseases. Pruning equipment should be disinfected before, during and after use to avoid transmitting disease during pruning. A solution of 10% chlorine bleach and 90% water is a good disinfectant. Weed control is essential for plant growth and production.

Economic losses due to weeds are sometimes greater than those caused by insects or diseases. Weeds compete directly with crops for nutrients, water and light and serve as hosts for insects and diseases. Weeds may also interfere with pesticide application, harvesting and air circulation in planting. To control weeds, an integrated program using cultural practices (such as pulling or hoeing weeds) along with herbicides is the most effective. Suitable herbicides for weed control in small fruit plantings are listed in Fact Sheet 6243, "Weed Control in Small Fruit Crops."

The above cultural practices along with timely applications of pesticides will produce high quality fruit. It is usually necessary to use each of these cultural methods along with pesticides to attain good control leading to healthier plants, higher quality fruit and greater yields.

Following is a list of specific cultural methods for controlling various insects and diseases in blueberry, strawberry and blackberry production. These methods can be used alone or in conjunction with insecticides and fungicides to limit the spread of insects and diseases.

BLUEBERRY

Red and necrotic ringspot and blueberry stunt
Plant disease-free stock. Remove and burn diseased plants. Control insects which may be vectors of disease.

Phytophthora root rot

Limit movement of soil and water to lessen disease damage.

Anthracnose

No cultural method of control.

Botrytis, blossom and fruit rots

Ensure good air circulation and sun exposure to quickly dry wet leaves.

Phomopsis twig and cane blight

Prune and burn diseased wood.

Stem canker (various fungi)

Purchase disease-free stock. Purchase resistant varieties. Remove dead and dying branches 6-8 inches below diseased wood.

Climbing cutworm

Hand pick off of blossom when they become numerous enough to warrant control.

Blueberry bud mite

Selectively prune out old canes to reduce populations. Choose non-susceptible varieties.

Fall webworm

Destroy webs by hand.

STRAWBERRY

Strawberry weevil

Use the same bed less than three years. Plow under old beds immediately after harvest. Renovate existing beds by mowing or removing foliage and mulch.

Mites

Purchase mite-free stock. Isolate new plantings from established plantings. Make sure plants are healthy and well-watered. Use a water hose to wash mites from plants.

Lygus bugs

Control weeds in and near planting to reduce host plants from insects and disease.

Weeds or alfalfa that have been growing should not be removed during the strawberry blossom period, because the insects will move into the strawberries.

Leaf spot

Plant disease-free stock.

Powdery mildew

Kill or burn leaves which fungal structures are on. Purchase resistant varieties.

Leaf scorch

Frequent renewal of plantings. Purchase resistant varieties.

Anthracnose

Remove plant debris and mulch. Purchase resistant varieties, where available. Use only enough fertilizer to establish plants, but do not over fertilize them. If any signs of anthracnose occur, discontinue all applications of nitrogen and potassium.

BLACKBERRY

Anthracnose

Remove and burn old canes.

Cane borers

Remove and burn infested canes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, and Title IX of the Education Amendments of 1972 (Higher Education Act), the Americans with Disabilities Act of 1990, and other federal and state laws and regulations, does not discriminate on the basis of race, color, national origin, genetic information, sex, age, sexual orientation, gender identity, religion, disability, or status as a veteran, in any of its policies, practices or procedures. This provision includes, but is not limited to admissions, employment, financial aid, and educational services. The Director of Equal Opportunity, 408 Whitehurst, OSU, Stillwater, OK 74078-1035; Phone 405-744-5371; email: eeo@okstate.edu has been designated to handle inquiries regarding non-discrimination policies: Director of Equal Opportunity. Any person (student, faculty, or staff) who believes that discriminatory practices ha

ve been engaged in based on gender may discuss his or her concerns and file informal or formal complaints of possible violations of Title IX with OSU's Title IX Coordinator 405-744-9154. Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, the Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 42 cents per copy. Revised 0515 GH.