

ROSETTE (DOUBLE BLOSSOM) OF BLACKBERRY

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Rosette is a severe disease of blackberries in the southeastern United States which often limits commercial production if it is not controlled. Caused by the fungus, *Cercospora rubi*, rosette has a biennial disease cycle that matches the growth pattern of blackberries. Primocanes are infected in the spring or early summer, but disease symptoms are not evident until the following year when new growth begins on the fruiting canes. Most thorny, erect blackberry cultivars adapted to the area are very susceptible to rosette; however, many growers do not recognize this disease until it is wide-spread in their planting. Symptoms of rosette often go unnoticed in a new planting until about the fourth year when a large percentage of the plants suddenly display signs of infection as new growth emerges in the spring. Yield is drastically reduced on severely infected plants.

The rosette fungus produces spores on infected flowers at the same time pollen is being produced. These spores are dispersed by wind and insects, and subsequently, infect the young buds of primocanes. Infected primocanes grow normally the first year showing no external symptoms until the following spring. As the infected buds begin to develop, several to many branches may grow from each infected node instead of the single branch per node that is characteristic of healthy stems. Nodes or inflorescences are closer together than normal giving the plant a bunched appearance. Young foliage of infected stems is a light green and later becomes yellowish-brown to bronze compared to the dark green foliage on healthy stems. Infected flowers have more pink, purple or red color compared to healthy flowers of the same variety and may have a ruffled or distorted appearance (hence the name “double blossom”) (Fig 1.) . Little or no fruit is produced from infected flowers.

Rosette can be controlled through a combination of cultural practices and chemical treatments. **1) Plant resistant cultivars.** Most erect, thorny cultivars are very susceptible to rosette, but most thornless cultivars from the Arkansas breeding program are tolerant or resistant. Navaho and Arapaho develop little or no rosette at most locations. Where these cultivars have been infected, it took longer for symptoms to occur and disease severity was much less than that of other cultivars.

2) Eradicate wild blackberries. Wild blackberry plants in the southeast often are infected with rosette and are the initial source of infection in most fields. Wild blackberries should be removed from the immediate vicinity of cultivated blackberry fields. This eradication of the native wild host reduces the amount of natural inoculum in the area. Since the rosette fungus does not occur in the roots of blackberry plants, fields established from root cuttings should not become infected with rosette if there are no other blackberries with the disease nearby.

3) Prune out infected rosettes. Effective disease control can often be accomplished in new plantings by rigorously pruning out any stems with rosette symptoms in early spring before the infected buds open. In areas of low disease pressure, this may be the only control practice necessary. The fungus is not systemic within the blackberry plant so only the side stems showing disease symptoms have to be removed.

4) Apply fungicides. Spread of the rosette fungus from infected flowers to primocanes can be dramatically reduced if fungicide applications are correctly timed. Fungicide applications should begin when primocanes are about one foot tall and rosette infected flowers are blooming. For best control applications must continue through harvest. Infected flowers will continue to bloom during and after harvest, so it is important to continue fungicide applications as long as rosette infected flowers continue to bloom. Among the fungicides registered for use on blackberries, Abound®, Switch®, and Pristine®, are the most effective for rosette control. Since these fungicides have a zero -day pre-harvest interval, they can be applied during harvest. Abound and Pristine are both strobilurin class fungicides and no more than two applications of any fungicide in this class should be applied in sequence before alternating to a different class of compound, such as Switch, Elevate or Nova. The number of applications of each fungicide per season is limited. It is important to remember that fungicides will not stop symptom development on current year’s fruiting canes. The goal of fungicide treatments is to prevent infection from occurring on primocanes. There is about a nine-month delay between fungicide application and any evidence of control. By maintaining a rigorous fungicide spray program, as outlined on Table 1, rosette infection should be minimal to none.

For organic growers Bordeaux mixture may be substituted for pre-harvest fungicide sprays; but it should not be applied when the temperature is above 75⁰ F because it may burn the foliage. Bordeaux mixture in the commercial pre-mixed formulations will have label restrictions that must be followed. A 4-4-50 Bordeaux mixture may be prepared on the farm as follows. (1) Dissolve 4 pounds hydrated lime (calcium hydroxide) in 5 gallons of water and stir to make a “milk of lime” suspension. (2) Dissolve 4 pounds of finely powdered bluestone (copper sulfate) in 30 gallons of water in spray tank. Keep tank agitator running, and (3) slowly add the “milk of lime” suspension to bluestone solution in the tank. (4) Fill the tank with water to 50 gallon mark. The Bordeaux mixture should be constantly agitated and should not remain in the tank for an extended period of time. It is very corrosive and may damage the spray nozzles.

5) Mow severely infected plantings. Heavily infected blackberry plants should be pruned to about a foot above the ground (usually by mowing) immediately after harvest. In fields where the disease is so severe that harvest is not feasible, the plants may be mowed before harvest. Remove all diseased plant material from the field, and fertilize with a complete fertilizer. Continue irrigation to ensure good re-growth, and begin a fungicide spray program. Mowing the entire planting to the ground is only necessary when the infection is wide-spread. Yield from mowed fields will be drastically reduced the following year. Most cultivars should not be mowed more than once every three or so years except along the Gulf Coast where the growing season is longest.

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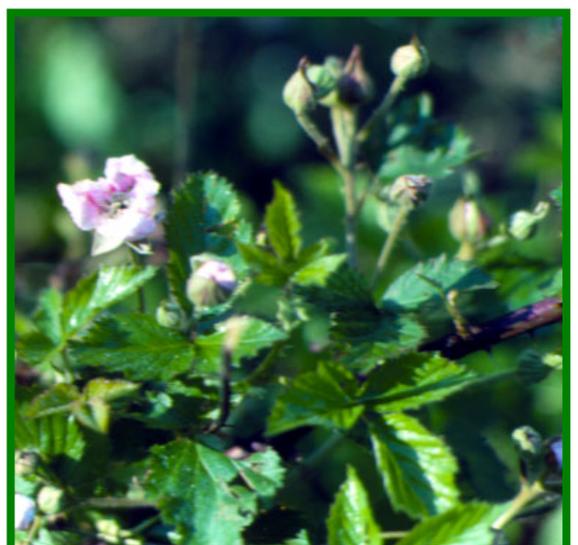
Table 1. Spray Program for Control of Rosette of Blackberry. Apply the first application when infected flowers are open and primocanes are about 6 inches tall. The number of applications will depend on severity of disease and bloom duration of blackberry cultivar.

Spray No.	Time of Application	Fungicide Recommended ¹
1	When infected flowers open	Abound (Strobilurin class)
2	10 to 14 days later	Switch
3	10 to 14 days later	Pristine (Strobilurin class)
4	10 to 14 days later	Abound (Strobilurin class)
6	10 to 14 days later	Switch
* * * * Harvest Begins * * * *		
7	10 to 14 days later	Pristine (Strobilurin class)
8	10 to 14 days later	Elevate (for gray mold control)
9	10 to 14 days later	Switch
* * * * Harvest Ends * * * *		
10	10 to 14 days later	Nova (for leaf and cane rust)
11	10 to 14 days later	Pristine ² (Strobilurin class)
12	10 to 14 days later	Nova (for leaf and cane rust)

¹All fungicides should be applied to the point of runoff.

²Fungicide applications can be discontinued when there are no more infected flowers blooming in the field.

Figure 1. Blackberry Rosette Symptoms. Rosettes continue to bloom throughout the summer, producing conidia on young blossoms and old dead flowers (left). Infected flower buds are elongated or “beaked”. Petals of infected flowers are pink and twisted, hence the name “double blossom” (right).



**ALWAYS READ AND FOLLOW LABEL DIRECTIONS.
PESTICIDE LABELS ARE CONSTANTLY BEING REVISED; THEREFORE,
BE SURE BLACKBERRIES ARE LISTED ON THE LABEL BEFORE USE.**