

Plant Pathology Fact Sheet

Poor Fruit Set in Brambles

by John R. Hartman

Poor fruit set and sterility commonly occur on bramble fruits (red raspberries, black raspberries, and blackberries) both in commercial and home plantings. Typically the fruit fails to develop or small misshapen berries form. When an insufficient number of drupelets fully develop, they tend to separate so that the fruit “crumbles” when picked. This symptom, referred to as “crumbly berry,” is another common result of poor fruit set (FIGURE 1).

POTENTIAL CAUSES

There is no single cause for poor fruit set; it may be due to fungi, viruses, abiotic problems, lack of bees, and/or insect injury.

Fungal Diseases

Anthracnose fruit infections result in dry, seedy fruit; failure of the fruit to fully develop; or no fruit set at all. This disease, caused by the fungus *Elsinoe veneta*, is most striking on newly emerging canes where lesions and cankers develop. However, when there is high disease pressure, flowers and immature drupelets can also become infected. Anthracnose can cause serious damage to black raspberry, red raspberry, and some

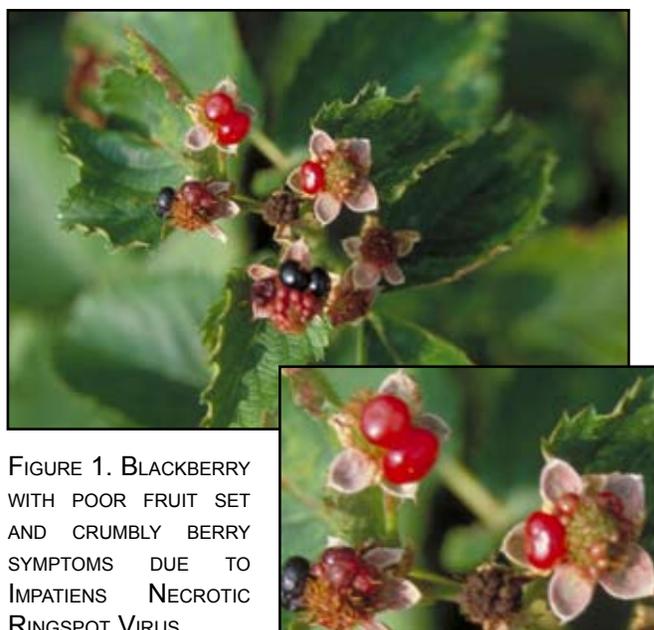


FIGURE 1. BLACKBERRY WITH POOR FRUIT SET AND CRUMBLY BERRY SYMPTOMS DUE TO IMPATIENS NECROTIC RINGSPOT VIRUS

raspberry hybrids. It is occasionally a problem on blackberry.

Other fungal diseases, such as **orange rust** and **rosette**, can affect fruit development in blackberry. Orange rust, caused by *Gymnoconia nitens* and *Arthuriomyces peckianus*, can be recognized by the highly visible, bright orange pustules that form on the underside of infected leaves. This disease stunts and weakens plants so much that they

produce little or no fruit. Blackberry rosette (also called double blossom) is caused by the fungus *Cercospora rubi*. Flowers with distorted petals, as well as shoots with leafy proliferations or witches brooms, are typical rosette symptoms. Berries do not develop on infected canes and the uninfected parts of some canes may produce only small, poor quality fruit.

Viral Diseases

A number of viruses that affect raspberry and blackberry fruit production can result in sterility problems. Virus diseases not only reduce fruit quality and quantity, they also reduce plant vigor. The first two viruses listed below have been diagnosed in Kentucky in recent years; the other three could also occur here.

Tomato Ringspot and **Tobacco Ringspot** are related viruses that may cause similar symptoms on brambles. Tomato ringspot is known to only affect red raspberry; tobacco ringspot has also been reported on blackberry. Both viruses can be transmitted by the dagger nematode; however, thrips and aphids have been identified as potential vectors of tobacco ringspot virus on some hosts. Infected plants are stunted, yield poorly, and show reduced vigor. As is



FIGURE 2. BLACKBERRY LEAVES WITH SYMPTOMS OF A VIRUS IN THE TOBACCO/TOMATO RING SPOT VIRUS GROUP

common with the other virus diseases, fruit is small and crumbly. Foliar symptoms include pale yellow rings and veinal chlorosis (FIGURE 2).

Impatiens Necrotic Ringspot Virus has more recently been identified as a problem in brambles. It causes foliar symptoms similar to other bramble viruses: ring spots, mottling, and mosaic (FIGURE 3). Leaves may also become distorted. Affected fruit is small, poorly developed, and crumbly (FIGURE 1). Diseased plants are stunted and show a general loss of vigor. This virus is spread from plant to plant by thrips.



FIGURE 3. FOLIAR SYMPTOMS OF IMPATIENS NECROTIC RINGSPOT VIRUS ON BLACKBERRY

Raspberry Mosaic Virus is actually a complex of viruses that are transmitted from diseased to healthy plants by the large raspberry aphid. This virus complex can also be spread via nursery plants and propagation stock. Affected fruit is small, seedy, and crumbly. Leaves may have mosaic symptoms consisting of light green to dark green or yellow to green mottling. Blistering and puckering of leaves may also occur. These symptoms are generally most evident in the spring and fall during cool weather. While symptoms may disappear temporarily during the heat of summer, plants remain infected. Diseased plants show a progressive stunting of growth, poor yield, and low vigor.

Raspberry Leaf Curl Virus results in reduced fruit production; fruit that does develop is usually small, crumbly, and seedy. Infected leaves are rounded, curl downward, and have a dark green greasy appearance. Fruiting lateral branches produce clusters of stunted shoots that become stiff and brittle. This extremely destructive disease progressively weakens plants, often killing them in 2 or 3 years. The small raspberry aphid carries the virus from diseased to healthy plants during feeding. Air currents can transport the vector several miles.

Raspberry Streak, which is caused by the Tobacco Streak Virus, only affects black raspberry. Infected canes develop small purplish streaks and produce small, seedy, and crumbly fruit. Leaves may become yellowed along the veins, mottled, and deformed.

Abiotic Problems

Crumbly berry and poor fruit set can also be caused by drought, low soil fertility, late spring frosts, winter damage, pesticide injury, hereditary abnormalities, variations in male and female sterility, and deep cultivation.

Lack of Bee Activity

Insufficient bee activity may result in a crumbly berry condition. Normally, bramble flowers have 100 to 125 pistils from which 75 to 85 drupelets will typically develop. When pollination is incomplete berries will often crumble or fall apart when picked. While most brambles are considered self-fruitful, bees are important in moving the pollen from the stamens to the pistils.

Insect Damage

Poor fruit development may result from the feeding of some insects. Mites, thrips, Japanese beetles, leafhoppers, and other insect pests may feed on flower buds or flower parts, resulting in fruit deformity.

MANAGING STERILITY IN BRAMBLES

Identify the Problem

The first step in managing sterility-related troubles is to determine the cause and extent of the problem. It is especially important to be able to differentiate between a virus disease and other causes since viruses pose such a serious threat to the planting.

For example, if a bramble planting blooms and sets fruit well one season, but is followed by a generally poor crop the next season, suspect poor pollination or abiotic factors as the most likely cause. Fungal diseases, as well as insect injury to the cluster stems, occur randomly and are less likely to be responsible for poor fruit set throughout the entire planting. Virus problems, on the other hand, show up initially on only a few plants and can spread gradually through the entire planting, but only over a period of years. Virus-infected plants may also show tell-tale leaf symptoms that can aid in diagnosis.

Managing Virus Diseases

When a virus disease is suspected as the cause of sterility, drastic action will be required. Virus infections, if left unchecked, can destroy an entire planting. Growers will not want to take the chance of continued spread or further loss of their crop.

- Remove and burn plants that fail to set fruit. Roots should be dug up to prevent new shoots from appearing. Avoid replanting in the same spot for several years afterward.
- When starting a new planting, purchase only high quality plants from a reputable nursery. Additionally, make sure the plants were obtained from fruitful stock, and that they are state-certified disease-free and virus-indexed.
- Inspect plantings frequently, removing and destroying diseased plants promptly.

- Eliminate nearby wild or neglected brambles. These may harbor virus diseases (as well as anthracnose and other pest problems) that could spread to the cultivated plants. For prevention of virus disease transmission, maintaining a distance of 500 feet is considered a minimum, however, the farther the better.

General Good Management Practices

Following good cultural practices is an essential aspect of any disease management program. Providing brambles with good growing conditions helps to promote the health and vigor of the planting.

- Provide a sunny, fertile site with good soil drainage.
- Plant blackberries and raspberries in an open environment with good air circulation.

- Control anthracnose through sanitation and the application of approved fungicides.

- Keep insects under control. While insecticides may also reduce the number of insect vectors, this is generally not an effective method of managing virus diseases.

- Avoid excessive fertilization and water brambles during dry periods.

- Practice good weed control. Weeds not only harbor viruses and their vectors, but weedy growth provides an environment conducive to the development of various other diseases.

*Photos: John Hartman (Figures 1 and 3)
& Paul Bachi (Figure 2), University of Kentucky
(Issued September 2008, cak)*