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# Diseases of Raspberries in Idaho

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Raspberries are grown by many market gardeners and home gardeners in Idaho. They are second to strawberries in importance as small fruit in home gardens. Raspberries are subject to a variety of fungal and bacterial diseases. The most common of these are discussed in this publication.

## Major Fungal Diseases

### Spur Blight

Spur blight is one of the most damaging diseases occurring on red raspberries in Idaho. It reduces yield and affects the quality of marketable berries. It is occasionally seen on black and purple raspberries. Spur blight is most prevalent during periods of heavy, intermittent rain in spring and early summer. The disease can be extremely serious where overhead sprinklers are used. The spur blight fungus reduces yields in several ways. It can kill the fruit-bearing canes, cause premature leaf drop and kill buds that later would develop into fruit-bearing side branches. Berries produced on diseased canes are dry, small and seedy.

**Symptoms** — Spur blight symptoms first appear on young canes in late spring or early summer. Reddish-brown to purple spots develop just below leaves or buds, usually on the lower side of the stem (Fig. 1). These spots expand, sometimes covering all of the area between adjacent leaves.

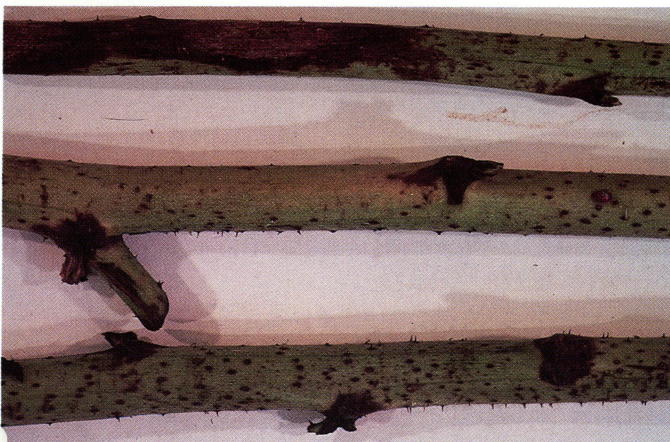


Fig. 1. Reddish-brown to purple spots on young canes are symptoms of spur blight.

In late summer or early fall, bark in the affected area splits lengthwise, and small, black specks appear. These are fungal spore structures. Later, many slightly larger, black, raised spore structures are formed. Leaflets sometimes become infected and develop brown, wedge-shaped spots. Infected leaflets may fall off, leaving only the leaf stems. When diseased canes become fruiting canes during the next growing season, the side branches growing from diseased buds often are weak and withered, resulting in reduced fruit production.

**Causes** — Spur blight is caused by the fungus *Didymella applanata*. It survives the winter in diseased canes. The following spring and summer, during wet and rainy periods, spores are released and are carried by splashing rain and wind to nearby new growth. There they germinate and produce new infections.

### Cane Blight

Cane blight is often confused with spur blight. Cane blight is most common on black raspberries but also occurs on red and purple varieties. The disease occasionally occurs on blackberries and dewberries.

Cane blight can result in wilt and death of lateral shoots, a general weakening of the cane and reduced yield. It is most severe during wet seasons. The cane blight fungus infects its host tissue through wounds, especially pruning



Fig. 2. Cane blight symptoms are brown-to-purplish or brown-to-black cankers that develop near wound sites on canes.

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wounds above ground, whereas the spur blight fungus invades the tissue by direct penetration. Cane blight damage in Idaho is not as severe as spur blight damage, but both can cause extreme damage to raspberries.

**Symptoms** — Lesions develop at wound sites, particularly on canes that have been tipped or pruned back to force lateral growth. Brown-to-purplish or brown-to-black cankers develop that may extend down one side or engulf a cane for several inches below a wound (Fig. 2). Lateral shoots in the immediate area wilt and eventually die.

On second-year canes, the side branches may suddenly wilt and die, usually between blossoming and fruit ripening. Upon close examination, dark brown or purplish cankers can be observed on the main cane or branches below the wilted area. The spore-producing bodies of the fungus are small, black specks that develop on killed areas of the canes. An infected area often extends over several nodes. This is in contrast with spur blight, which is located at and limited to individual nodes. Infected canes commonly become cracked and brittle, and they snap off easily.

**Causes** — Cane blight is caused by the fungus *Leptosphaeria coniothyrium*. The pathogen survives over winter in infected or dead canes. The following spring, spores of the fungus ooze out during wet periods and are blown,

splashed by rain or carried by insects to nearby canes. Under moist conditions, the spores germinate and enter the cane tissue through pruning wounds, insect punctures, fruit stem breaks and other wounds. After entry, the fungus spreads rapidly, killing bark and other cane tissue. Dead canes can remain a source of infection for several years.

### Spur and Cane Blight Control

1. Whenever possible, start with disease-free, certified stock.
2. Plant raspberries in sunny, open areas where water and air drainage are good. This allows plants to dry more quickly following wet periods and reduces the chance of infection.
3. When setting out new plants in early spring, cut off the old cane stubs at ground level. New shoots will appear from the crown. Pruning out old canes is the best control of cane blight.
4. Healthy, rapidly growing plants that have been properly fertilized and watered are damaged less by spur and cane blight.
5. After harvest, remove and destroy all fruiting canes and obviously infected new canes.
6. Keep plantings free of insects, since they may cause wounds that serve as entry points for the fungus.
7. Follow the fungicide spray program outlined in the *PNW Plant Disease Control Handbook*.
8. Spray with fungicide after pruning.

## Minor Fungal Diseases

### Anthracnose

Anthracnose causes severe damage to raspberries, blackberries and other brambles or cane fruits in the United States. Other common names for this disease are "cane spot" and "gray bark." Although common on red raspberries, anthracnose does not seriously affect the red raspberries in Idaho.

Anthracnose is caused by the fungus *Elsinoe veneta*. The fungus survives the winter in diseased canes. Spores are released the following spring and summer, during wet and rainy periods. The spores are carried by splashing rain or sprinklers to healthy canes, where they may then germinate and infect the plant.

**Symptoms** — Anthracnose first appears in the spring on young shoots as small, grayish, slightly raised or sunken spots. As the disease progresses, the spots enlarge and become ash-gray in the center with slightly raised purple margins. The spots are often so close together on black and purple raspberries that they form large, irregular cankers. Badly infected canes may be girdled or cracked. The bark in badly cankered areas often splits (Fig. 3).

Late season infections result in superficial gray, oval spots. The spots have definite margins, but are sunken. They may become so numerous that the spots blend together, covering large portions of the cane. This characteristic "gray bark" symptom is common on red raspberries. Dark specks of fungal fruiting bodies develop in circles on the gray bark. Anthracnose sometimes attacks the leaves, but it rarely defoliates the plants. Small spots (about 1/16 inch in diameter) with light gray centers

and purple margins develop on the leaves. The centers later fall out, leaving a shot-hole effect.

### Anthracnose Control

1. Plant raspberries in sunny, open areas that permit good air movement. This will speed up drying-off of plants.
2. Remove all wild brambles growing in the area because they may harbor the disease and produce fungus spores that can blow or splash onto the cultivated crop.
3. Buy and plant only anthracnose-free raspberries. After planting black or purple raspberries, cut off the old cane stubs. Where anthracnose is known to be a problem, plant resistant cultivars, if available.
4. After harvest, remove and destroy all fruiting canes and new canes that are badly infected.
5. Follow the fungicide program outlined in the current *PNW Plant Disease Control Handbook*.

### Verticillium Wilt

Verticillium wilt is one of the most serious diseases of raspberries. It is a soil-borne fungus that can reduce raspberry yields by wilting, stunting and eventually killing the fruiting canes or the entire plant. It is usually more severe in black raspberries than in red raspberries.

Verticillium wilt is usually a cool weather disease and is most severe in poorly drained soils and following cold, wet springs. The appearance of symptoms on new canes frequently coincides with water stress caused by hot, dry mid-summer weather.



The disease is caused by the fungus *Verticillium albo-atrum*. It is a common soil-borne fungus that causes wilt on more than 160 different kinds of plants including strawberries, eggplant, tomatoes, potatoes, stone fruits and peppers. The fungus overwinters in the soil and in plant debris. It can survive in the soil for many years. When the fungus germinates, it produces thread-like filaments that invade the roots of plants. The fungus can penetrate the root directly, but invasion is aided if the roots are injured by cultivation. Once inside the root, the fungus plugs water-conducting tissues, and this prevents the movement of water from the roots to the rest of the plant. The plant eventually dies.

**Symptoms** — *Verticillium* wilt symptoms usually appear on black raspberries in June or in early July and on red raspberries about a month later. The lower leaves of diseased plants may at first appear to have a dull green cast in comparison with the bright green of normal leaves. Starting at the base of the cane and progressing upward, leaves wilt, turn yellow and drop. Eventually the cane may be defoliated except for a few leaves at the top. Black raspberry canes may exhibit blue or purple streaking from the soil line upward. This streaking often is not present or difficult to detect in red raspberries.

By the following spring, many of the diseased canes will be dead. Others will be poorly developed and have shriveled buds. New leaves are unusually yellow and stunted. Infected canes may die before the fruits mature, resulting in withered, small and tasteless berries.

### Verticillium Wilt Control

1. Plant raspberries in fertile, well-drained soil. Avoid low, wet areas.
2. Whenever possible, start with disease-free, certified stock. Do not plant raspberries in the same area where the disease has been a problem unless soil is fumigated. Rotate raspberries with wilt-resistant crops.
3. Wait at least 3 years before planting raspberries in soils that have grown potatoes, tomatoes, peppers or eggplant.
4. Once the disease invades the planting, remove and destroy infected plants (burn if possible) as soon as they are detected. Remove the entire plant including the roots. Fumigate the soil to control the fungus.

## Rust

Two types of rust disease have been found in Idaho. Orange rust (*Kunkelia nitens*) attacks black and purple raspberries, and late leaf rust (*Pucciniastrum americanum*) causes disease in red raspberries. These rusts usually are of minor importance, but they can defoliate certain varieties.

**Symptoms** — Orange rust is often referred to as black and purple raspberry rust. Leaf symptoms develop toward the end of June. Infected leaves are small and yellowish, with orange pustules composed of waxy rust spores on the underside of the leaves. The spores are shed and cause new infections over a 2- to 3-week period. Leaf symptoms disappear from the field by mid- to late summer. The fungus invades all parts of the plant, including the roots. Infected plants never recover.

Late leaf rust occurs on red raspberries, usually late in the growing season. Older leaves are covered with fine, light-yellow, powdery masses of spores in midsummer. The spore masses can appear on leaf petioles, shoots and fruits. The disease builds up on the leaves of fall-bearing varieties because of their long growing season.

### Rust Disease Control

1. Plant rust-free raspberries. Destroy nearby wild raspberry plants since they can be a source of infection.
2. Control weed growth in the planting, and thin out canes to allow good air movement.
3. Remove and burn any plants that show symptoms. Fungicides have not proven effective for control of rusts.

## Powdery Mildew

This foliar disease is of minor importance in Idaho. Most raspberries are resistant to the fungus; red raspberries are the least resistant. The disease has been observed along the Payette River and in northern Idaho.

Powdery mildew of raspberries is caused by the fungus *Sphaerotheca humuli*. It survives the winter in dormant terminal buds. The fungus produces great numbers of spores at temperatures between 65 and 80 F. Succulent shoots, leaves and berries are readily infected at those temperatures when the relative humidity is 97 to 99 percent.

**Symptoms** — Powdery mildew is an external parasite that coats foliage, young growing tips and fruits with a whitish-gray powdery coating. Shoot tips may be covered with the mealy growth, become long and spindly (rattails) and bear dwarf leaves. Severe mildew retards, dwarfs and distorts plant parts. If the fruits of red raspberries are attacked when green, they will wither and die.

### Powdery Mildew Control

1. Remove mildewed canes in the fall. Prune fruiting canes to a desirable height in the spring. This will reduce the overwintering fungus and spring inoculum.
2. Control weeds and space plants to provide good air circulation. Fungicide programs are outlined in the *PNW Plant Disease Control Handbook*.

## Phytophthora Root Rot

Phytophthora root rot (*Phytophthora erythroseptica* or *P. cactorum*) is of minor importance in Idaho. The fungi live in the soil and may infect raspberry roots in low-lying, poorly drained portions of fields. Symptoms appear in the summer and consist of wilting of a few terminals or occasionally wilting of entire canes.

### Phytophthora Root Rot Control

1. Control should start with planting disease-free plants with good root systems.
2. Plant in well-drained soils. Install drainage tile or dig drainage ditches where soil is poorly drained.
3. No registered chemical treatment program is available.



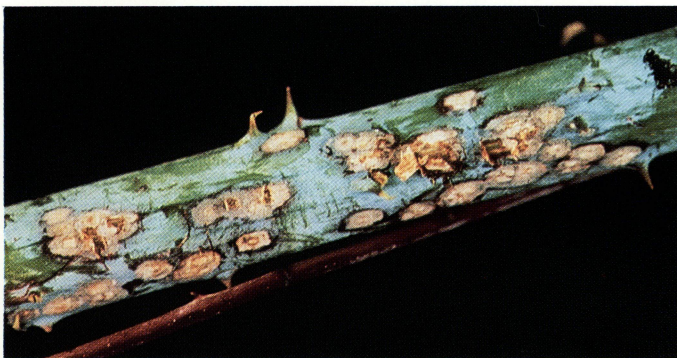


Fig. 3. Anthracnose fungus symptoms include ash-gray spots on canes.

## Bacterial Diseases

Crown gall and cane gall are two common bacterial diseases that cause economic damage in raspberries. They affect blackberries as well.

These diseases are caused by two species of bacteria, *Agrobacterium tumefaciens* and *Agrobacterium rubi*. Once introduced into a planting by infected plants, these bacteria can survive in the soil for many years. Crown gall bacteria can infect a wide range of annual and perennial broadleafed plants. They damage woody perennial plants most seriously. The cane gall bacteria have a limited host range.

### Crown Gall

Crown gall is identified by rough swelling or tumor-like overgrowths on the crown and underground parts of the plant. Galls are white at first but soon become brown and rough. The galls stunt plant growth, weaken the plants, lower production and eventually cause the plant to die.

#### Crown Gall Control

1. The most effective way to control crown gall is to plant disease-free planting stock in clean soil. Once bacteria are introduced into the soil, they are difficult to eliminate. If the raspberry plot is infected, all infected plants should be removed and destroyed.



Fig. 4. Wort-like growths are symptoms of cane gall disease.

### Cane Gall

The first signs of cane gall infection are tiny wort-like growths that appear on canes (Fig. 4). As the galls enlarge, the diseased canes crack and dry out. Infected plants produce small and seedy berries and are more susceptible to winter kill.

#### Cane Gall Control

1. To avoid cane gall problems, plant gall-free stock in clean soil.
2. Be careful not to injure plants during cultivation.
3. If a plot does become infected, diseased canes can be cut out and destroyed individually in the early stages. Between each cut, dip the pruning equipment into a reliable disinfectant. This will help prevent disease spread. If infection is more extensive, dig up and destroy infected plants and fumigate the hole before replanting. Wait 2 to 3 years before planting raspberries in an infected location.

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