College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-FR-S-06**

Rust Diseases of Brambles

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Importance

The three most important rust diseases occurring on brambles in Kentucky are cane and leaf rust, late rust, and orange rust. The most destructive of these diseases is orange rust, which is ultimately lethal to plants. Once infected, entire plants must be removed and destroyed. In contrast, cane and leaf rust, along with late rust, are not lethal to plants and can be managed using cultural practices and fungicides. Distinguishing between these rust diseases is critical for proper management.

Cane & Leaf Rust

Symptoms & Signs

The first evidence of cane and leaf rust is the presence of elongated, bright yellow pustules appearing on infected floricanes (year-old canes that will produce fruit) in spring (Figure 1). Pustules rupture through the bark and result in brittle canes that break easily. Small yellow pustules may also appear on undersides of leaves (Figure 2) and less frequently on fruit (Figure 3). Fungal signs (pustules of powdery yellow rust spores) may be evident in mid-April and extend through summer. Premature defoliation, which results in stress and loss of plant vigor, can occur if leaf infections are severe.

Hosts

Blackberry is susceptible; raspberry infections are rare.

Figure 1. (A) Cane and leaf rust pustules erupt through the bark of floricanes in spring. **(B)** Close-up of cane and leaf rust pustule containing abundant powdery yellow spores.

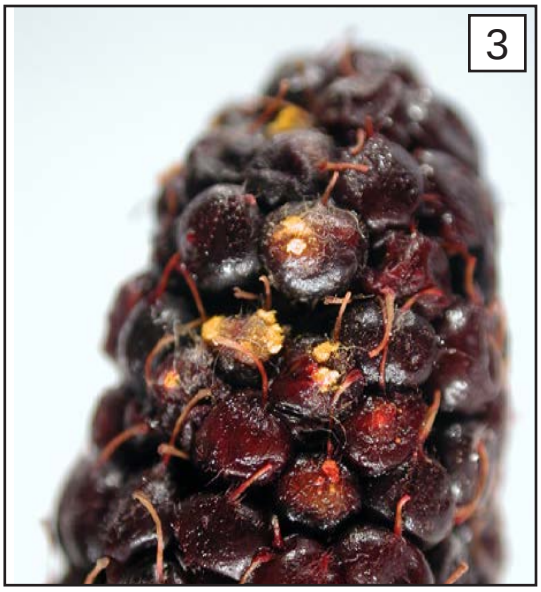

Figure 2. Cane and leaf rust infections on leaves become visible as yellow pustules on undersides of blackberry leaves.

Figure 3. Cane and leaf rust can affect blackberry fruit if disease becomes severe.

Cause & Disease Development

Cane and leaf rust is caused by *Kuehneola uredinis,* a fungal pathogen that produces multiple spore types on bramble hosts. The pathogen overwinters on infected canes. In spring, bright yellow pustules (uredinia) on infected floricane bark release spores (urediniospores), which infect floricane leaves. Light, yellow-colored pustules develop on undersides of leaves from summer through autumn. Urediniospores develop in large numbers and are the source for new infections throughout the growing season. Urediniospore production is highest when conditions are wet. Disease spreads when rust spores are carried by air currents. Another pustule type (telia) also develops on leaves during summer; telia sometimes appear on fruit. Primocanes (current year canes) are susceptible to infections by teliospores originating from floricanes or leaves; primocane infections are the source for overwintering.

Late Leaf Rust

Symptoms & Signs

Late leaf rust symptoms begin in July as chlorotic (yellow) spots on upper sides of mature leaves while yellow-orange, powdery spores develop on leaf undersides (Figure 4). By late summer, leaf spots turn brown; leaves curl and eventually drop. Yellow-orange, powdery rust spores also form on canes and petioles. Individual drupelets of fall fruit may become covered with these yellow-orange spore masses (Figure 5), making fruit unmarketable. Premature defoliation results in yield losses and reduces winter hardiness.

Figure 4. Late leaf rust develops as yellow to orange pustules on undersides of raspberry leaves in summer.

Hosts

Some cultivars of red raspberry, especially those with wild-type parentage, are susceptible. Blackberry and black raspberry are not affected.

Cause & Disease Development

Late rust is caused by *Pucciniastrum americanum,* a fungus with two possible life cycles and several spore types. Generally, the fungus overwinters in infected canes. Infective spores (urediniospores) are released in spring and throughout the growing season. Spore production is highest when conditions are wet. Disease spreads when fungal spores are carried by air currents. Leaves, fruit, and primocanes (current year canes) become infected in summer and autumn. An alternate host, white spruce, can play a role in the disease cycle by producing different spore types (aeciospores, basidiospores); however, it is unlikely that white spruce is part of the disease cycle in Kentucky.

Figure 5. Late rust can affect drupelets of fall fruiting raspberry.

Orange Rust

Symptoms & Signs

Symptoms become apparent as new growth emerges in spring; newly forming primocane shoots (current year canes) appear noticeably weak and spindly compared to healthy shoots. Leaves on symptomatic shoots turn pale green to yellow and are narrow and twisted (Figure 6); leaf edges may be bronze-colored. By late April through May, blister-like rust pustules are visible on lower leaf surfaces. Pustules are waxy and erupt with bright orange, rusty, powdery spores (Figure 7). By June, leaves wither and drop. In late summer or autumn, pustules darken to brown or black. Orange rust does not normally kill plants outright, but after the first year, plants become stunted, misshapen, and weakened; little to no fruit is produced.

Hosts

Blackberry (thorny) are susceptible; most cultivars of thornless blackberry are susceptible, but some resistant cultivars are available. Black raspberry and purple raspberry are susceptible; red raspberry are not hosts. Wild brambles are susceptible.

Figure 6. Orange rust (right) causes stunting, yellowing, and weak, spindly growth (healthy plant shown on left)

Figure 7. Orange rust pustules emerge from blackberry leaf undersides in spring.

Cause & Disease Development

Orange rust is caused by one of two very similar fungi, *Gymnoconia nitens* in the Southeast, and *Arthuriomyces peckianus* in the Midwest; both fungi cause similar symptoms and may be active in Kentucky.

Orange rust fungi overwinter as systemic infections in bramble crowns and bases of shoots. Spores (aeciospores) are released in spring and spread to other plants via air currents, equipment, or humans. Infections occur during cool, moist weather. In late summer and autumn, if conditions are wet, a second type of spore (teliospore) is produced, causing additional infections of shoot tips and buds on rooting cane tips. The disease cycle resumes in spring with the emergence of new, infected shoots. The pathogen may also spread from plant to plant via root contact that results in root grafts.

Orange rust is systemic (spreads internally) throughout roots, crown, and shoots of infected plants. Once a plant is infected, it remains infected for life and will become a source of inoculum (infection) for further diseases spread.

Table 1. A comparison of three common rust diseases in Kentucky.

	Cane & Leaf Rust	Late Rust	Orange Rust
Hosts	Blackberry Rare on raspberry	Red raspberry Purple raspberry	Blackberry Black raspberry Purple raspberry
Plant parts affected	Leaves, canes, fruit	Fruit (fall), leaves, petioles	Leaves, buds, shoots
Infection type	Surface	Surface	Systemic, internal
Symptoms & signs first evident	In early spring just before growth resumes (early April to May)	July	As new growth emerges in spring (mid-April to May)
Pustule color	Yellow	Yellow to yellow-orange	Bright orange

Disease Management

Cane & Leaf Rust, Late Rust

Management of these diseases is primarily through cultural practices. Fungicides can be applied to protect healthy plants; however, cultural practices should be the focus of any management strategy.

Cultural Practices

- Promote good air circulation to encourage drying of plant tissues. Proper spacing, pruning, thinning, and managing weeds can improve air movement through plantings.
- Remove fruiting canes and all diseased canes after harvest. Do not leave cuttings in the field; discard or destroy them away from plantings.

Fungicides

- Fungicides can be applied when brambles are dormant in winter, with additional applications at green tip and just prior to bloom.
- Contact a local county Extension office for current fungicide recommendations.

Disease Management
Orange Rust

Orange rust is best managed by integrating eradication, sanitation, and chemical control strategies. Fungicides alone do not adequately control orange rust.

Planting Material

- Begin with disease-free stock to prevent the introduction of orange rust into a planting.
- When propagating plants, verify that rooted shoot tips are not derived from infected mother plants.
- Consider planting immune species or tolerant cultivars.
- Avoid planting in the proximity of wild brambles or old bramble plantings.

Cultural Practices

- Promote good air circulation to encourage drying of plant tissues. Proper spacing, pruning, thinning, and managing weeds can improve air movement through plantings.
- Remove and destroy all wild blackberries or black raspberries from fence rows or other areas in the vicinity of the berry planting; wild brambles often harbor this disease.
- Once a plant becomes infected, it should be removed (including roots) and destroyed. Plant removal should be done in early spring when infected plants are easy to recognize and before fungal pustules release masses of spores that can cause new infections.

Fungicides

- Fungicides will not cure infected plants. Use fungicides to protect healthy plants, especially when risk for infection is high (e.g. orange rust diagnosed in nearby plants).
- Apply protectant fungicides to healthy plants at 10- to 14-day intervals from late April through June and again from early September through mid-October.
- To prevent development of fungicide resistance, limit the number of consecutive applications of the same fungicide by alternating between two types of fungicides (different FRAC codes) for each application.

Additional Resources

- Plant Pathology Extension fact sheets on Small Fruit
  https://plantpathology.ca.uky.edu/extension/publications#SMALLFRUIT

- IPM Scouting Guide for Common Problems of Brambles in Kentucky (ID-251)
  http://www2.ca.uky.edu/agcomm/pubs/ID/ID251/ID251.pdf

- IPM Scouting Guide for Common Problems of Brambles mobile website
  https://bramblescout.ca.uky.edu/

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