UNIVERSITY OF KENTUCKY College of Agriculture, Food and Environment

COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Plant Pathology Fact Sheet PPFS-FR-T-03

Frogeye Leaf Spot & Black Rot of Apple

Nicole Ward Gauthier, *Extension Plant Pathologist*
Paul Andrew Rideout, *County Extension Agent*

Introduction

Black rot and frogeye are common names of an apple disease that occurs in three phases: (1) leaf infections result in frogeye leaf spot, while (2) fruit rot and (3) branch infections are referred to as black rot. All three phases can cause significant damage in Kentucky home and commercial orchards.

Symptoms

Frogeye Leaf Spot

Tiny, purplish specks appearing on foliage are the first indications of frogeye leaf spot. Enlarging spots are circular and 1/8 to 1/4 inch in diameter. Spot centers become tan with dark brown to purplish margins, giving spots a frogeye appearance (Figure 1). Fungal reproductive structures (pycnidia) may develop in spot centers; they are visible as tiny black specks, but may best be seen with a hand lens. Pycnidia are filled with spores that are the source of continued infections. As leaf spots become more numerous and coalesce, leaves yellow and fall prematurely.

Figure 1. Frogeye leaf spot results in circilar lesions that have tan centers and darkder margins.

Black Rot Fruit Rot

Fruit infections, which may follow frogeye leaf spot, usually begin in the blossom (calyx) end of developing fruit (Figure 2). As decay expands, it is often characterized by a series of concentric rings alternating from black to brown; pycnidia appear as black dots scattered over decayed fruit surfaces. Eventually, rotted fruits dry up, shrivel, and mummify, sometimes hanging on trees until the following season (Figure 3).

Figure 2. Fruit infections result in decay that often begins at the blossom end.

Figure 3. The pathogen overwinters in diseased fruit that has shriveled and developed into mummies.

Black Rot Canker

Branch cankers initially appear as slightly sunken reddish-brown areas on bark. Old fire blight strikes, pruning wounds, and winter-injured tissue are frequently sites for black rot infections (Figure 4). Cankers may expand to several feet in length and girdle limbs, weakening and eventually killing branches.

Figure 4. Black rot canker; the black rot fungus can infect old pruning wounds and fire blight cankers.

Cause & Disease Development

Frogeye leaf spot and black rot are caused by *Botryosphaeria obtusa*. This fungus is capable of infecting over 100 different species of trees and shrubs in Kentucky, so inoculum (spores, which start new infections) is quite widespread. The pathogen overwinters in cankers and fruit mummies. Two spore types (conidia and ascospores) are released in spring and spread via splashing rain, wind, and insects. Secondary infections occur throughout the growing season when conidia are produced within pycnidia on infected tissues. The fungus requires natural openings (e.g. leaf stomata) or wounds for infection.

Disease Management

Sanitation

- Prune diseased/dead twigs and branches from trees during dormancy (late fall to early spring) since they can serve as sources of inoculum once colonized by the black rot fungus. Use proper pruning techniques (e.g.,

do not leave pruning stubs; see FIGURE 5) and cut well below diseased tissues. Dispose of prunings by removing them from the orchard and/or burning.

- Remove and dispose of mummified fruit, which also serve as sources of inoculum.

Promote Healthy Tree Growth

- Practices which promote optimum, healthy tree growth will aid in preventing black rot canker development; stressed, weakened trees are more susceptible.

- Protect trees and fruit from injury. Insect feeding and mechanical damage can injure fruit and provide infection sites for the pathogen. Extreme weather, such as hail, can also injure fruit.

Fungicides

- For management of fruit rots, fungicides may be used as preventatives. Once infection occurs, there is no cure. Commercial growers and homeowners should consult one of the University of Kentucky spray guides listed in Additional Resources (ID-232 or ID-21) or contact their county Extension agent for information for current recommended fungicides.

- Fungicides are not effective in managing black rot cankers; cultural practices listed above are important for management of cankers and reduction of inoculum.

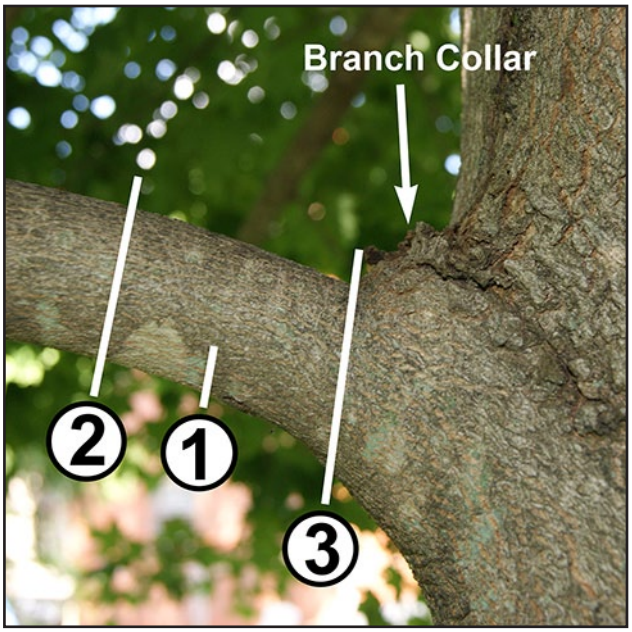

FIGURE 5.USE PROPER PRUNING TECHNIQUES WHEN REMOVING DISEASED LIMBS. THE STEPS TO THE THREE-CUT PRUNING TECHNIQUE ARE: (1) UNDERCUT (2) CUT BRANCH, AND (3) FINAL CUT. DO NOT CUT INTO BRANCH BRANCH COLLAR.

ADDITIONAL RESOURCES

- Commercial Fruit Pest Management Guide (ID-232)
http://www2.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/ID-232.pdf

- DIsease and Insect Control Program for Homegrown Fruit in Kentucky, including Organic Alternatives (ID-21)
http://www.ca.uky.edu/agc/pubs/id/id21/id21.pdf

February 2016

Acknowledgement
The authors thank Paul Vincelli, UK Extension Specialist, for his review of this publication.

Photos—Nicole Ward Gauthier, University of Kentucky