UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

PPFS-FR-T-13

Plant Pathology Fact Sheet

Apple Scab

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Introduction

Apple scab is the most consistently serious disease of apple and flowering crabapple in Kentucky. This disease also occurs on hawthorn and mountain ash; a similar disease affects pear and pyracantha (firethorn). The most noticeable losses on apple result from reduced fruit quality and from premature drop of infected fruit. Scab also causes a general weakening of the host when leaves are shed prematurely. Summer defoliation of flowering crabapple due to scab invariably results in fewer flowers the next spring.

Figure 1. Apple Scab

Symptoms

Leaves

Olive-green to brown spots (lesions) with indefinite, feathery margins (Figure 2) appear on upper and/or lower surfaces of infected leaves, although those on upper leaf surfaces may seem more obvious. Spots range from the size of a pinhead to slightly smaller than a dime. As disease progresses, lesion margins become more distinct, and a greenish-black, velvety growth covers lesions. Eventually, lesions thicken and bulge upward (Figure 3). If heavily infected, leaves may become disfigured and/or turn yellow. Diseased leaves drop prematurely.

Fruit

Symptoms on fruit are similar to those on leaves, although fruit spots may be more distinctly outlined (Figure 4). Older lesions turn dark brown to black, develop a corky ("scabby") appearance, and frequently become cracked as fruit enlarge (Figure 5). If infections occur on young fruit, uneven growth near "scabs" may cause fruit to become severely deformed. Heavily infected fruit may drop prematurely.

Disease Development

The apple scab fungus (*Venturia inaequalis*) overwinters in fallen leaves. During spring rains, fungal spores (ascospores), which are released from fruiting bodies, are carried by wind currents to newly-emerged leaves, flower sepals, and young fruit. Ascospores initiate primary infections during periods of continuous leaf wetness from either rain or dew and can continue to cause primary infections from bud break until 2 to 4 weeks after petal fall. Later in the spring, a secondary spore type (conidia) is produced.

Figure 2. Scab lesions initially have indefinite, feathery margins. **Figure 3**. Older foliar lesions thicken and bulge up. **Figure 4**. Scab lesions on young fruit. **Figure 5**. Scab can result in fruit distortion; older fruit lesions crack.

Conidia develop within primary infection lesions and are washed or splashed onto adjacent fruit and leaves. These conidia produce secondary infections throughout the season. Thus, a few initial primary infections can produce hundreds or thousands of secondary infections as the year progresses.

The time required for primary and secondary infections depends upon air temperature and duration of the wetting period. Refer to the *Midwest Tree Fruit Pest Management Handbook* (ID-93) for details on the relationship between leaf wetness, temperature, and infection periods.

Disease Management

Resistant cultivars

The most effective scab management begins with scab-immune cultivars. Refer to Table 1 for a brief summary of the relative resistance of some apple cultivars. Information on resistant apple cultivars recommended for Kentucky can be found in *Disease and Insect Control Programs for Homegrown Fruit in Kentucky* (ID-21). A number of crabapple varieties are also highly resistant or immune to apple scab; refer to *The Flowering Crabapple* (ID-68).

Cultural practices

A critical step in prevention and management of apple scab includes reduction of fungal inoculum and alteration of the environmental conditions that are favored by the pathogen. Without implementation of these practices, fungicide efficacy is reduced.

- Prune trees to improve air circulation, thereby promoting rapid drying of fruit and leaves and reducing leaf wetness periods. Canopy thinning also allows for more effective spray coverage.
- If defoliation occurs early in the year, provide water and mulch to reduce additional stress. Fertilize in fall according to soil test recommendations.
- Destroy fallen leaves and fruit to reduce the amount of inoculum present the following spring.
- Commercial orchards may mow fallen leaves and apply nitrogen to promote the breakdown of leaf tissues.

Table 1. Relative resistance of apple cultivars

Immune	Moderately Resistant
Enterprise	Jonathan
Freedom	
Gold Rush	
Jonafree	**Moderately Susceptible**
Liberty	Golden Delicious
Macfree	
Nova Easy	
Prima	**Very Susceptible**
Priscilla	Cortland
Redfree	McIntosh
Sir Prize	Red Delicious
Williams Pride	Rome Beauty

Fungicides

A good spray program is the principle means for control of scab on susceptible varieties. The key is to prevent primary infections. Fungicides for management of primary infections are recommended from bud break until 2 to 4 weeks after petal fall. Thus, disease management during primary infection periods aids in control of disease development throughout the rest of the growing season. Refer to *Midwest Tree Fruit Spray Guide* (ID-92) and *Midwest Tree Fruit Pest Management Handbook* (ID-93) for specific spray recommendations.

Disease Forecasting

Disease prediction models analyze local weather data to determine when an infection period may have occurred. Because sprays are applied only during periods of high risk, the number of fungicide applications are reduced when compared to calendar-based spray programs. Most universities have predictive systems in place; Kentucky growers should refer to the UK Ag Weather Center site for risk evaluations.

Additional Resources

- Ag Weather Center Disease Prediction Models (University of Kentucky) http://wwwagwx.ca.uky.edu/plant_disease.html
- Backyard Apple IPM Manual, IPM-9 (University of Kentucky, 1994) http://www.uky.edu/Ag/IPM/manuals/ipm9hmap.pdf
- Disease and Insect Control Programs for Homegrown Fruit in Kentucky, ID-21 (University of Kentucky, 2012) http://www.ca.uky.edu/agc/pubs/id/id21/id21.pdf
- Flowering Crabapple, ID-68 (University of Kentucky, 1999) http://www.ca.uky.edu/agc/pubs/id/id68/id68.pdf
- Homeowner's Guide to Fungicides (University of Kentucky, 2011) http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-MISC-7.pdf
- Fungicides for Management of Landscape Woody Ornamental Diseases (University of Kentucky, 2011) http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-OR-W-14.pdf
- Fungicides for Tree Fruits (University of Kentucky, 2012) http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-FR-T-11.pdf
- IPM for Select Deciduous Trees in Southeastern US Nursery Production (Southern Nursery IPM Working Group, 2012) http://wiki.bugwood.org/IPM_book
- Midwest Tree Fruit Spray Guide, ID-92 (University of Kentucky et al.) *2 MB file* http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/MwTreeFruitSprayGuideID92.pdf
- Midwest Tree Fruit Pest Management Handbook, ID-93 (University of Kentucky, 2012) http://www.ca.uky.edu/agc/pubs/id/id93/id93.htm
- Woody Plant Disease Management Guide for Nurseries and Landscapes, ID-88 (University of Kentucky, 2012) http://www.ca.uky.edu/agc/pubs/id/id88/id88.pdf

Photos by John Hartman, University of Kentucky (Fig. 1) and Alan Biggs, West Virginia University (Figs. 2 to 5)
Revised from the original fact sheet (PPA-25) written by John R. Hartman ***August 2012***