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MARSSONINA BLOTCH OF APPLE

Marssonina blotch of apple was first reported in Japan in 1907 and has since been a serious disease problem in East Asia, Europe, South America, and North America. The disease was first detected in Connecticut in late summer 2016. Severe epidemics of the disease can cause extensive early defoliation before harvests (Figure 1), which affects fruit size, color, and yield as well as tree vigor and fruit bearing capacity in following years.

SYMPTOMS AND DIAGNOSTICS

Marssonina blotch can affect leaves and fruits. The initial symptom on leaves appears dark green circular patches, and then leaf tissue necrosis results in dark brown spots (Figure 2). Many lesions coalesce to form large brown blotches on leaves. Yellowing of leaf tissues surrounding brown lesions and along veins is a characteristic symptom of this disease (Figures 2 and 3). The fungus forms acervuli (fungal fruiting bodies) on the upper surface of leaves (Figure 3). In wet and highly humid weather conditions, fungal spores ooze out of acervuli on infected leaves (Figures 4 and 5) and serve as secondary inoculum for epidemics of the disease in fields during a season. On fruits, symptoms appear as brown to black sunken circular spots where black acervuli may be noticed, which affects fruit quality.

DISEASE DEVELOPMENT

The fungal pathogen, *Marssonina coronaria* (syn. *M. mali*), overwinters on fallen leaves and fruits. In the spring or early summer, when weather conditions are warm and wet, fungal spores that are released from acervuli

Figure 1. Significant early defoliation in late summer on an apple tree

Figure 2. Brown leaf spots and yellowing of leaves on an affected apple tree

Figure 3. Close-up black fungal fruiting bodies (arrows) on brown spots/patches and yellowing of the leaf

Figure 4. Fungal spores (arrow) oozing out of fungal fruiting bodies

on diseased debris are dispersed by wind and rain splash and infect leaves (primary infection). The latent period (the time from infection to showing symptoms) of the disease is normally more than a month on naturally infected leaves. Repeated secondary infections result in epidemics of the disease in fields during a season, which makes the disease more noticeable in late summer. Frequent rains and wet weather conditions in the spring and summer are favorable to the disease development. The optimum temperature of spore germination is 70 °F.

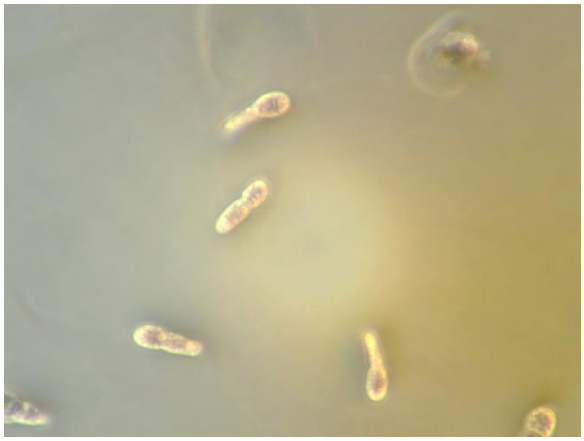

Figure 5. Conidia spores of *Marssonina coronaria* under a compound microscope

DISEASE MANAGEMENT

Resistance: Differences in resistance to Marssonina blotch were reported among apple varieties. Almost all commercial cultivars of apple are susceptible to the disease. Developing and planting resistant cultivars is an economic, reliable, and effective way to control the disease.

Cultural practice: Collect and disperse fallen leaves and fruits by burning or burying them. Prune trees properly to improve air circulation in the canopies.

Fungicide application: There are no fungicides labelled for control of Marssonina blotch of apple in the United States. Some fungicides, such as trifloxystrobin, kresoxim-methyl, difenoconazole plus cyprodinil, myclobutanil, thiophanate-methyl, and mancozeb, have been used to control Marssonina blotch of apple in other countries. Fungicide applications may protect leaves from the disease and suppress spore production on infected leaves. However, fungicide resistance has been reported for several single-site mode-of-action fungicides, so a proper fungicide rotation is suggested to prevent fungicide resistance.

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