Valdensinia leaf spot of lowbush blueberry

Valdensinia leaf spot, caused by the fungus *Valdensinia heterodoxa*, has become a serious disease of lowbush blueberry in the last few years. It was first observed in 1997 and has since spread to numerous fields throughout Nova Scotia, New Brunswick, Prince Edward Island and with new observations occurring in Quebec and Maine in 2009.

**Symptoms**

The disease appears on leaves of sprout and fruiting stems as circular, brown lesions sometimes with a purple-red border and variable in size up to 1 cm in diameter (Figure 1). A single spore in the centre of a lesion may be visible on either side of the leaf with a hand lens. Infected leaves fall rapidly from the plant while still green. When the disease is serious, many fallen green leaves with lesions can be seen on the soil surface. Infections early in the season appear on leaves on lower portions of stems, but with time, symptoms appear progressively higher on stems eventually reaching the upper leaves. This leads to defoliated patches which become visible from a distance. Affected localized areas continue to expand and merge resulting in large defoliated areas in fields. Severely affected fruiting fields may have poor yields. Severely affected sprout fields may appear to recover a few weeks later, but this is due to vegetative re-growth from the leaf axils where fruit buds would normally form and so reduced yields may result in the following year.

The disease frequently appears in the shade of wooded areas, but in seasons with long wet periods, the disease can appear anywhere in the field. All blueberry clones are susceptible and all highbush cultivars tested so far are susceptible. The fungus can often be seen causing spots on many other plants in blueberry fields, but this is not important since the fungus does not easily produce spores or overwinter on these infected hosts. Such plants include sheep sorrel, bunchberry, birch, wild strawberry and raspberry.

*Figure 1. Large, circular brown lesions with a dark border.*
Life cycle
The fungus overwinters in infected blueberry leaves from the previous season and produces its first spores in early-mid June, but sometimes later in the season. About 3 days of continuous wetness are required for the first crop of spores to be produced and released. Once released, spore infection occurs rapidly within about 6-10 hours of continued leaf wetness. Relatively few spores are produced, but each spore is highly aggressive and will cause a large lesion. Lesions reach about 5-10 mm in diameter in 24-48 hours after which leaves begin to drop. At this point, a further 48 hours of wetness are required for new spores to be produced on the infected leaves. As a result, multiple spore production/infection cycles can occur during a week of wet weather. If the weather clears, spore production and infection stops, but will resume if wet weather returns. As the season progresses, the leaves tend to become more resistant. While infection still occurs, lesions tend to be smaller and leaves tend not to drop as quickly. However, any new re-growth on stems still remains highly susceptible.

Spore production occurs at 10-25 °C with an optimum at 15-20 °C. No spores are produced at 5 °C and 30 °C. Spores infect rapidly within 6-8 hours of wetness at temperatures of 15-25 °C with an optimum at 20 °C. Infection is moderate at 10 °C (12 hours of wetness), slow at 5 °C (24 hours of wetness), and does not occur at 30°C. After the leaves drop, the fungus will colonize the mid vein of leaves where it overwinters. The fungus can survive in infected leaves for at least two years.

The spores of the fungus are forcibly discharged from infected leaves. They can be propelled upward about 30 cm and then fall downward due to their very large size if they have not impacted a leaf on the upward trajectory. This type of discharge results in localized areas of disease which then expand as the spores continue to jump to healthy plants. The spores are not spread by wind or rain, and so the disease often remains confined to affected fields. However, under wet conditions, the infected leaves become very soft and stick to machinery, tires and footwear and so the fungus is easily spread from field to field or within fields by mechanical transmission.

Disease management
Growers should thoroughly inspect their fields for signs of disease when the canopy is dry. If a diseased patch is discovered, it is important to flag the area and then leave the
area ensuring that no leaves are sticking to footwear or pant legs (Figure 3). It is key not to spread the disease by human activity. Work activities in affected areas should be planned so that they are completed last or affected fields should not be entered at all until other healthy fields have been worked. After exiting affected fields, equipment should be power or steam washed to remove all leaves before entering healthy fields.

If disease is found on a small scale, an immediate, thorough burning with a hand held weed burner under dry conditions may be adequate to destroy infected foliage thereby eradicating the disease. If disease is found on a larger scale, a thorough field burn may reduce disease the following year. However, the burn must be intense and uniform enough to destroy the leaf litter and so must be done under ideal burning conditions. Despite these measures, the disease may return if infected blueberry plants in nearby wooded areas are harbouring the disease.

If the disease is widespread in a field, fungicide applications will reduce the effect of the disease, but will not eradicate it from fields. For optimum disease control, the first application must be made when disease symptoms first occur and wet weather is forecasted. A second application may be necessary 10-14 days later if wet weather persists or before the next forecasted period of extended wet weather. Good spray coverage is essential. Consult pest management guides for fungicide recommendations. Research is in progress to identify economically effective fungicides.

Currently, another unidentified leaf spot pathogen is causing symptoms which are similar to those caused by Valdensinia. However, this pathogen does not spread rapidly and does not cause extensive defoliation and so it is not considered a threat. However, because of its similarity to Valdensinia leaf spot, it is important to obtain an accurate diagnosis of the leaf spots to avoid needless and costly control measures.

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