



Figure 1. Sugarbeet leaf showing symptoms of powdery mildew (left) vs. a healthy leaf (right).

(Photo by R. Nelson)

Sugarbeet Powdery Mildew

Carl A. Bradley, Extension Plant Pathologist
North Dakota State University

Mohamed F. R. Khan, Extension Sugarbeet Specialist
North Dakota State University and University of Minnesota

Powdery mildew is a sporadic fungal leaf disease of sugarbeet in the Red River Valley and southern Minnesota sugarbeet production areas. It was first found in Minnesota and North Dakota in 1975. In recent years, the use of triazole and strobilurin fungicides for *Cercospora* leaf spot control has limited powdery mildew development. Recent discoveries of the sexual stage of the powdery mildew fungus in Colorado, Idaho, Nebraska and Wyoming could lead to potential biological changes in the fungus, making it more difficult to control.

Symptoms

Powdery mildew first shows up on the lower leaves. The first symptoms are a wispy growth of white to light gray threadlike filaments, often radiating from a central point (Figures 1 and 2). Early symptoms of powdery mildew are not detected easily. Symptoms may be detected more readily under full sunlight, with the sun to your back. Once the early symptoms appear, the disease may progress very rapidly in favorable weather. A powdery white or gray-white growth may cover a leaf within a week, and the mildew may begin to appear on the middle leaves. Mildew may even appear on the upper leaves that have not completely expanded when the disease is severe. A characteristic odor similar to that of a musty basement may be noted in fields with severe powdery mildew.

Powdery mildew may be more severe where nitrogen levels are low. When inspecting a field for powdery mildew, look in the areas of the field that are beginning to turn light green or yellow green in color due to depletion of available



Figure 2. Closeup view of a sugarbeet leaf infected by the powdery mildew fungus.

(Photo by C. Bradley)

nitrogen. Powdery mildew is not likely to be found in the rest of the field if it cannot be found in the yellowing areas.

Severely mildewed leaves may begin to turn yellow within a month of initial symptoms. Observations made near harvest time in North Dakota indicate that mildewed leaves are killed by light freezes that do not kill healthy leaves.

The powdery mildew fungus' sexual stage has not been observed

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North Dakota State University
Fargo, North Dakota 58105

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in North Dakota or Minnesota; however, it has been observed in Colorado, Idaho, Nebraska and Wyoming. Structures known as ascomata will be present in the sexual stage of the powdery mildew fungus. With the naked eye, ascomata will appear as small, dark, round spots that are mixed with the threadlike filaments of the fungus (Figure 3). With a hand lens, immature ascomata are yellow to orange in color, while mature ascomata are dark brown to black (Figure 4). The ascomata are circular in shape.



Figure 3. Sugarbeet leaf with powdery mildew ascomata (sexual structures – dark spots). (Photo by L. Hanson)



Figure 4. Ascomata on sugarbeet leaf as seen through a hand lens. Yellow and orange ascomata are immature; dark brown to black ascomata are mature. (Photo by L. Hanson)

Biology

Powdery mildew is caused by the fungus, *Erysiphe polygoni* (formerly *Erysiphe betae*). The fungus is an obligate parasite, which means that it must have a living host for growth and reproduction. The disease is favored by long periods of dry weather, warm days, cool nights and a wide fluctuation in day-night temperatures. The most favorable temperatures for production of conidia (fungal asexual spores) are day/night temperatures of 81/54 degrees, but infection also has been observed under day/night temperatures of 86/50 and 90/45 degrees.

The conidia are formed in the morning and usually are released about noon. Germination of conidia occurs in the afternoon and early evening, depending on temperature, and the formation of appresoria (infection cushions) occurs in the evening. Conidia germinate best in the light at 86 degrees. Appresoria form best at 59-68 degrees. Once infection occurs, the incubation period (the period from infection to development of a spore-producing lesion) can be as little as five days if temperatures are around 77 degrees.

It is not known what role the sexual stage is playing in the epidemiology of the disease in the western U.S.

Management

Varieties resistant to powdery mildew are available in the western U.S. sugarbeet production areas, but may not be available in North Dakota and Minnesota.

When powdery mildew occurs in late July or early August, some yield reduction may occur. Fungicides are available to manage powdery mildew. Fungicides in the strobilurin chemistry class labeled for sugarbeet, such as Amistar, Gem, Headline and Quadris, can be used to manage powdery mildew. Sulfur fungicides such as Microthiol Disperss, Micro Sulf and Thiolux can also be used for powdery mildew management. Eminent, a triazole fungicide, has been available for North Dakota and Minnesota growers for a few seasons as a section 18 emergency exemption approved by the U.S. Environmental Protection Agency (EPA) for management of *Cercospora* leaf spot. At the time this publication was written, a full section 3 label had not been granted for use of Eminent on sugarbeet, but may be available in the future. If Eminent is approved for use on sugarbeet, it also has good efficacy against powdery mildew.

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