BARLEY STRIPE MOSAIC VIRUS

Barley Stripe Mosaic virus (BSMV) is one of the relatively few plant viruses that is transmitted through the seed. In addition to being seed-transmitted, the virus may be transmitted to non-infected plants by the mechanical rubbing of infected plants with non-infected plants by wind action. This mode of transmission will permit the infection of several adjacent plants from a single infected plant during the growing season. In an infected plant about 60 per cent of the seed may become infected, depending upon the time of infection, the strain of the virus and the host variety.

Almost every field of barley in North Dakota was infested with BSMV until about 1960. Since that time new virus-free seed has replaced the infected seed and little or no virus is presently found. This is not to say, however, that varieties grown today are resistant. Presently grown varieties are susceptible to the virus and may become infected, so growers should be able to recognize the disease and utilize control measures available.

Symptoms

A chlorotic mosaic or spotting and streaking occurs on the seedling leaf of seedlings grown from infected seed. This may also be seen in the second and third leaves of the plant under some conditions. With some strains of the virus the seedling leaf may appear uniformly yellow. Seedborne infected plants may recover and later be almost symptomless except for a slightly lighter color than healthy plants. Infected plants may be slightly shorter and 2 to 4 days later in maturing, depending on the variety.

In plants that become infected from leaf rubbing, symptoms will appear in 5-10 days and show a mottled (mosaic) and yellowing (chlorosis), followed shortly by the appearance of small dead (necrotic) areas which eventually join and form long chocolate brown necrotic stripes (Fig. 1). These stripes may form “V”s and extend for several inches along the leaf. After this initial shock reaction, less severe chlorosis and necrosis may occur in all of the leaves. New leaves generally show milder chlorosis; although in some varieties severe chlorosis, necrosis, and stunting may persist, with little or no seed being produced.

Host Range

Barley Stripe Mosaic is restricted to members of the grass family. Some of the more important known hosts are: barley, wheat (winter, spring, and durum),
sorghum, corn, and green foxtail or pigeongrass. The virus is carried in the seed of wheat but is not important as a disease in nature.

There are some broadleaf plants, including lambs-quarter, that serve as indicator plants for the virus but have not been found infected in nature.

**Economic Importance**

Seed infection levels of 30 per cent may cause as much as 30 to 40 per cent reduction in yield. If 5 per cent of the seed is infected, significant losses in yield result.

The amount of yield reduction depends upon plant age when infected. The loss in yield may result directly from fewer tillers per plant, fewer kernels per head, thinner kernels, or any combination of these factors.

**Disease Control**

Using disease-free seed is the only disease control at present. To date, no known method of seed treatment will disinfect the seed. Very low levels of virus infection in the seed may build up to damaging proportions in a short time. A 0.1 per cent infection level in a lot of seed can build up to 50 per cent infection level in a period of five years. Therefore, disease-free seed is essential in controlling this disease.

Some varieties of barley presently grown are tolerant to some strains of the virus and seed transmission is low.

Varieties with immunity to most strains of the virus are in the developmental stage at the present time. A barley variety with good quality and agronomic characteristics with BSMV resistance should be forthcoming in the near future.

Certified seed, from virus-free seed lots, is highly recommended. Information on the availability of seed may be obtained from the State Seed Department, State University Station, Fargo.

**BACTERIAL BLIGHT**

This disease is a blight caused by a bacterium* that infects commercial varieties of barley and wheat. Wild barley and smooth brome are hosts. The disease has appeared sporadically because warm, wet weather is required for infection, development, and spread of the bacteria.

**Symptoms**

Leaf blade and sheath show water-soaked longitudinal blotches or streaks. These areas develop from infections that occurred during damp weather. Streaks usually are light-yellow or brown, translucent, with a glassy appearance due to the bacterial exudate (Fig. 2). Numerous infections result in eventual death of the leaf blade and sheath.

*Xanthomonas translucens*

**Host Range**

Bacterial blight affects barley principally, but also becomes serious on wheat and durum.

**Economic Importance**

Bacterial blight has only been of cursory importance, but in 1975 many barley and wheat fields became blighted. Farm operators not familiar with the disease confused it with Septoria leaf blotch. The actual dollar loss was not evaluated, but due to loss of foliage the impact was similar to loss caused by Septoria leaf blotch. In most years this is 10 to 30 per cent in heavily diseased high yielding fields of susceptible varieties.

**Disease Control**

Crop rotation is the principal control used. Crops such as corn, oats, flax, beets, potatoes, beans, and sunflowers are not affected. One to two years is sufficient to reduce bacteria in residue to economic levels.

Seed treatment chemicals used today are not effective against bacteria, however, the mercurial seed treatments were. This change of chemicals may have affected bacteria spread by contaminated seed.

All varieties of wheat and barley are susceptible, although some appear to be less so than others. Some seed lots of a variety may be contaminated, so the disease will be more severe in fields planted to this seed.