PP-1024 (Revised)

Blackleg of Canola
Biology and Management

Arthur Lamey
Extension Plant Pathologist

Two strains of the blackleg fungus, *Leptosphaeria maculans*, occur in North Dakota and western Canada. The mild or weakly virulent strain is widespread throughout western Canada and North Dakota, but infects plants late in the season and seldom causes yield loss. A virulent or aggressive strain was first identified in Saskatchewan in 1975. It was observed in Alberta in 1983, Manitoba in 1984 and North Dakota in 1991.

Blackleg has increased in economic importance in Manitoba over the past decade. The virulent strain was present in 70% of the fields in western Manitoba in 1990 and in 10% of the eastern fields. Yield losses as high as 50% were noted in individual fields.

Figure 1. Stem girdled (top) by blackleg. Sunken gray lesion (bottom) containing pycnidia (tiny black fruiting bodies). Photo by A. Lamey, NDSU.

In 1991 blackleg was observed in all 23 North Dakota fields examined with an average of 28% infected plants in these fields. The highly susceptible variety Westar was the most commonly grown variety in that year. Blackleg was observed in 30% of the 40 fields examined in 1993, 7% of 64 fields examined in 1994 and 33% of 75 fields observed in 1995. Average percent infected plants across all fields ranged from 3% to 28% in the survey years.

During the past several years a few fields in North Dakota had a high percentage of infected plants and the rest had little or no blackleg. In the years subsequent to 1991, Westar was no longer grown because of its high susceptibility.

NDSU EXTENSION SERVICE
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NOVEMBER 1996

The majority of varieties grown in subsequent years were moderately susceptible rather than highly susceptible. Some of the fields with high levels of blackleg in 1993-1995 were *Brassica rapa* (Polish) varieties, all of which are susceptible, or else were planted to a susceptible *Brassica napus (*Argentine) variety.

Signs and Symptoms

Symptoms of the mild strain usually do not appear until mid season, when superficial white to gray lesions develop on the stem. Infections from the mild strain usually occur much later than those from the virulent strain, and they cause shallow stem lesions with little or no girdling of the stem. Only a few of the tiny black fruiting bodies called *pycnidia* are formed by the mild strain. This is in contrast to the signs and symptoms produced by the virulent strain.

The virulent or aggressive strain may infect early, causing leaf spots any time from the seedling stage to crop maturity. The leaf spots are a tan or buff color and round to irregular in shape; by summer the leaf spots are filled with many tiny black pycnidia.

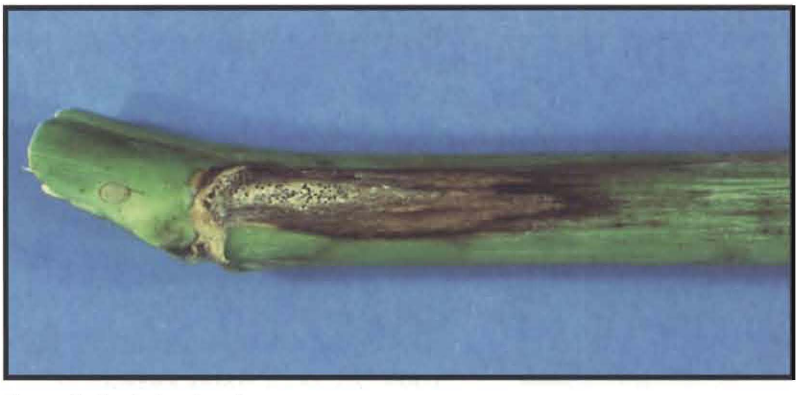

Figure 2. Dark bordered gray stem lesion with numerous pycnidia.
Photo by A. Lamey, NDSU.

Stem lesions produced by the virulent strain are gray and dark bordered, later turning dark gray to black. Stem lesions become sunken and may girdle the stem (Figure 1). Pycnidia form in the stem lesions, often at the stem base where a leaf was attached (Figure 2). Early infection causes premature dying of the plant and may also result in lodging (Figure 3).

Pods and seeds also may be infected. Infected pods split open resulting in seed loss. Seed produced in infected pods may be shriveled and gray in color.

Biology (Survival and Spread)

Blackleg survives for several years on infected crop residue and also is seed borne.

Most severe infections come from airborne sexual spores called *ascospores* that are discharged from fruiting bodies on previous canola crop residue. Maximum ascospore discharge occurs in the second year following crop growth. Little disease spread occurs more than one to three miles from infected crop residue.

Following infections from ascospores, masses of tiny black pycnidia form in the resulting leaf and stem lesions. During wet weather these pycnidia release masses of pink spores that are spread by splashing rain. The spores produced by pycnidia are responsible for localized spread of the blackleg fungus.

Research in Canada has shown that early infections cause the greatest damage, with infections before the six-leaf stage causing severe yield loss in susceptible varieties. In fact, stems are most susceptible to infection when the plant is in the cotyledon or one- to two-leaf stage. Some of the less susceptible varieties have a longer period of latent infection, *i.e.* the period from infection to symptom expression; this may help minimize injury. Temperatures in the 70s (Fahrenheit) and extended periods of plant canopy wetness favor infection. Disease development is inhibited by temp-eratures of 86 F or higher, or by temperatures around 50 F or lower. Plant injury from insects, hail or herbicides increases incidence and severity of blackleg.

Figure 3. Premature ripening and lodging due to blackleg.
Photo by G. Platford, Manitoba Agriculture.

Disease Management

Do not introduce blackleg into new canola production areas. In areas where blackleg is already established, canola crop residue is the primary source of inoculum. Management of crop residue and crop rotation are essential to blackleg management in these areas.

- *Crop Rotation.* Avoid planting in or next to severely infested fields. This is especially important in the first and second years following a canola crop. The airborne ascospores may blow in from distances from one to three

miles, and rarely up to five miles. Keep records on crop rotations and cooperate with your neighbors to avoid planting near a field that was recently planted to canola. Use a four year crop rotation with canola only once in the rotation.

- *Control Weed Hosts.* Both wild mustard and volunteer canola are hosts to blackleg and should be controlled in crops rotated with canola.
- *Sanitation.* Bury canola residue by moldboard plowing or by deep tillage. This speeds the decomposition of canola residue and prevents the release of ascospores. Decomposition of crop residue is more rapid in wet years than in dry ones.
- *Use Disease-Free Seed.* This is especially important when planting in new areas. Treat seed with Benlate fungicide. This treatment is highly effective against seed-borne blackleg, and is especially important for seed being planted in new areas. When planting in new areas, use treated seed even if the seed was tested for blackleg and found to be free. Treatment lessens the danger of inadvertently introducing blackleg into new areas.
- *Use Disease Resistant Varieties.* Many canola varieties now available have moderate to good blackleg resistance. Use Argentine (*Brassica napus*) varieties that have no greater than a moderately susceptible reaction and preferably a resistant reaction. Currently available Polish (*Brassica rapa*) varieties do not have any resistance to blackleg. Consult the current year's variety recommendations for information on the blackleg reaction of canola varieties.
- After a four year rotation, plant certified blackleg-free fungicide-treated seed of a variety that has at least a moderately susceptible blackleg reaction.
- No fungicide is currently registered for blackleg control in the US. However, trials with fungicides are in progress and some fungicides may be registered in the future.

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