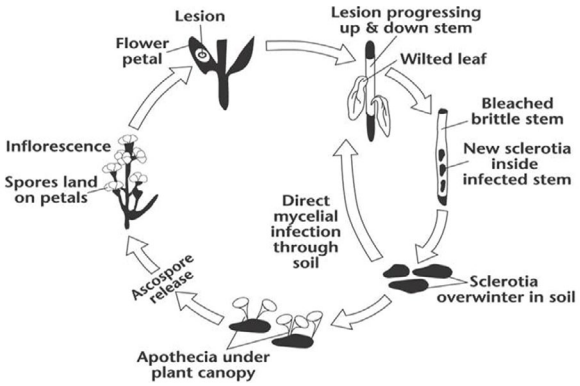
Sclerotinia Stem Rot of Canola

Sclerotinia stem rot is a disease that affects western Canadian canola on a yearly basis. Incidence and severity of the infection can be sporadic, but in high rainfall regions, it can often become severe. In addition, a host range of over 400 species of plants are known to be susceptible to sclerotinia, mostly broadleaf species. Sunflower, safflower and occasionally flax crops are quite susceptible to this disease. Mustard, field peas, beans, carrots, crambe, potatoes, lentils, soybeans, fababeans, clovers and alfalfa are also susceptible to some degree. Some weed species can also be hosts to sclerotinia stem rot and produce sclerotia after infection. Some of these common weeds include:

- chickweed
- false ragweed
- hemp-nettle
- narrow-leafed hawk's-beard
- shepherd's purse
- stinkweed
- thistles
- wild mustard

This alone emphasizes the importance of control of all weeds and also shows how sclerotinia can infest many fields through a variety of vectors.

Sclerotinia Disease Cycle



(From Canola Growers Manual, courtesy of Canola Council of Canada.)

Challenges to Successful Management

Each year can be a challenge for producers to determine whether to apply a fungicide for the disease, as well as when to spray to maximize protection. Although there are tools to help in the decision process, there is still some "guess work" needed as weather conditions prior to and during the flowering period contribute to the level of severity.

The percent of infected plants can vary due to many factors:

- plant genetics – sclerotinia tolerant canola hybrids
- differences in the quantity of infectious spores
- plant population
- crop height and vigor
- severity of lodging
- rainfall
- soil moisture
- temperature

Weather conditions prior to and during the flowering period contribute to the level of sclerotinia severity.

Heavy infections can develop with a combination of many of the above factors. Even after plants are infected, the severity of stem rot symptoms and the resulting effect on yield will vary according to temperature, rainfall, crop density and especially the stage of crop growth at the time of infection.

Heavier stands of canola tend to lodge, and infection can spread from plant to plant by direct contact, especially in wet weather. In swaths that are wet, heavy and are touching the ground, the infection can spread down the swath and can result in additional sclerotia bodies being returned to the soil at harvest, completing the disease cycle.

Originally, rotation was used to help control sclerotinia stem rot. However, with the 1-in-2 rotation of today, this is not a viable option. Sclerotia bodies can survive from 5 to 10 years in the soil, which defeats these type of rotations in managing the disease. In addition, spores may blow in from neighboring fields.

Two canola hybrids show differences in maturity. Fungicide application must be timely relative to flowering to help prevent sclerotinia infection but may still only achieve 70% protection.

Some have suggested that lower seeding rates of canola (resulting in lower plant populations and giving more air movement through the canopy) can serve to reduce the incidence as well as severity of sclerotinia development. Though this may be true in the right situation, research conducted at the Canola Council of Canada showed that lower plant populations (below five plants/ft^2) had sclerotinia incidence as high as higher plant

populations (greater than 10 plants/ft²). Much of this infection can be attributed to longer exposure to sclerotinia spores in the environment as a result of the extended days of flowering associated with the multi-branching that occurs with lower plant populations.

Forecasting systems have been developed for stem rot in canola that use either petal testing, a checklist, or environmental risk maps based on environmental conditions. While no forecast system is 100% accurate, they do provide practical direction in making a decision to control the disease.

Factors Involved in Sclerotinia Forecasting

Many factors influence a forecasting system and its relationship to the actual incidence of disease. Most predictive models evaluate several environmental and crop variables such as:

- field cropping history
- field disease history
- apothecia presence
- neighboring or nearby crop and disease histories
- rainfall through months of June and July
- soil moisture
- weather forecast
- canopy density

Other important variables affecting the relationship and incidence of the disease include:

- changing inoculum levels during flowering
- heat units
- daily and weather related inoculum fluctuations
- light penetration
- leaf area index
- crop height

Field and nearby field cropping and disease history are an indirect means of measuring the potential for presence of spores. While sclerotia within the field are considered the main source of spores, those produced in nearby fields and blown into the crop can also be important in disease development.

Management of Sclerotinia in Canola

Management options for sclerotinia stem rot in canola are often limited due to the nature of the disease and the practical alternatives available. The most common control options include use of a fungicide, crop rotation and selecting canola hybrids that have genetic resistance built into the seed.

Spraying a fungicide to control the disease requires proper timing, as well as the use of appropriate water volumes to ensure maximum petal coverage for disease prevention. However, in most cases, the fungicide provides only about 70% protection. The fungicide decision typically involves much second guessing about when conditions no longer favor the growth and development of the disease.

Use of genetic resistance reduces much of the guesswork in sclerotinia management as well as helps producers maximize yield while minimizing the disease. Canola hybrids with the Pioneer Protector® Sclerotinia resistance trait provide moderate genetic resistance that can act as part of a management plan to help control sclerotinia and increase flexibility and insurance when timing fungicide applications.

Pioneer Protector Sclerotinia resistant canola hybrids include 45S51, 45S52, 46S53, and 45S54. All the Pioneer Protector Sclerotinia resistant hybrids have shown a reduction in sclerotinia levels of more than 50% (through reduction of stem incidence and transfer into the stem). In years where weather conditions are not extreme and/or where conditions are good for the early development of sclerotinia but turn unfavorable in the later flowering stages, Pioneer Protector Sclerotinia resistant hybrids can offer a level of protection against the disease and reduce the necessity to spray with a fungicide.

Pioneer Protector® Sclerotinia hybrids have in-plant genetic resistance to help protect against sclerotinia.

With these resistant hybrids, sclerotinia protection is built right into the seed, potentially providing season-long control. This in-plant trait helps protect against the disease regardless of weather patterns throughout the growing season. However, when weather conditions are extreme in promoting disease development (wet conditions in June and July, warm weather, high humidity and a heavy canopy), even the Pioneer Protector Sclerotinia resistant hybrids may warrant a fungicide application to help control the disease.

To maximize both genetic yield potential and resistance, ensure proper seeding practices with Pioneer Protector Sclerotinia resistant canola hybrids. Primarily, check that seeding rates are set to achieve plant stands ranging from 6 to 10 plants/ft² at 21 days after emergence. Plant stands higher than this can result in higher incidence of disease due to the thicker canopy created and increased lodging potential which further increases the development and severity of the disease.

References

Sclerotinia disease cycle taken from Canola Growers Manual, page 1014c. Courtesy of Canola Council of Canada.