**1 Sclerotinia Disease Cycle**

What are sclerotia? Sclerotia are hard black fungal resting bodies up to 2 cm (0.8”) long. They can remain dormant in soil for up to 3 years or more.

What are apothecia? Apothecia are small fruiting structures that look like tiny mushrooms or fruiting bodies. Accurate identification of apothecia is critical to improve yield.

Early flowering is the best time for risk assessment. Fungicides must be applied between early and full bloom, prior to petal drop.

Sclerotinia overwinters in soil and on canola residue. Sclerotia germinate to produce apothecia during subsequent growing seasons (see section 3). Ascospores are released from apothecia and dispersed by the wind.

Infection leads to premature ripening and stems become bleached, brittle and will easily shred to reveal sclerotia forming in stem cavities.

Lessons progress up and down stems.

Early infection appears as a soft grayish white rot, and affected leaves wilt. Infection penetrates into stems.

Infected petals collect in high moisture areas (e.g. on leaves or in leaf axils).

Sclerotinia Stem Rot Checklist

For each risk factor, circle the risk points that apply to your field.

**RISK FACTOR** | **POSSIBLE ANSWERS** | **RISK POINTS**
--- | --- | ---
**NUMBER OF YEARS SINCE LAST CANOLA CROP** | More than six years | 0 | Three to six years | 5 | One to two years | 10 |
**DISEASE INCIDENCE IN LAST HOST CROP** | None | 0 | Low (1 to 10%) | 5 | Moderate (11 to 30%) | 10 | High (31 to 100%) | 15 |
**CROP DENSITY** | Low | 0 | Normal | 5 | High | 10 |
**RAIN IN THE LAST TWO WEEKS** | Less than 10 mm (0.4”) | 0 | 10 to 30 mm (0.4 to 1.2”) | 5 | More than 30 mm (1.2”) | 10 | High pressure | 0 | Variable | 10 | Low pressure | 15 | None found | 0 | Low numbers | 10 | High numbers | 15 |
**WEATHER FORECAST** | Low numbers | 10 | High numbers | 15 | **TOTAL RISK POINTS FOR ALL RISK FACTORS** = 0

Sclerotinia disease management can vary greatly among fields and years, making scheduled spraying of fungicides unreliable. However, when sclerotinia risk is high, preventative fungicide applications can effectively lower disease severity and improve yield. Assessment of disease risk within each field is essential to improve the odds that fungicides are only applied when it is economical to do so.

This checklist developed in Sweden can be useful in helping to assess disease risk in fields. Growers should fill out the checklist for each field shortly after first flowering (when 75% of the canola plants have at least 3 open flowers). The greater the risk score for a field the higher the probability of a positive economic return. Results in Sweden have suggested that fields scoring 40 or higher will likely benefit from a fungicide, but this may vary a bit depending on fungicide cost and commodity price. Using this checklist effectively requires scouting for apothecia, usually in nearby cereal crops following canola or other host crops (e.g. beans, sunflowers) in the rotation. The same moist soil conditions conducive to apothecia production can also favor the development of many other types of mushrooms or fruiting bodies. Accurate identification of apothecia is critical to effectively determine the risk of stem rot (see sections 3 and 4).

**2 Assessing the Risk for Sclerotinia Stem Rot in Canola**

Sclerotinia incidence can vary greatly among fields and years, making scheduled spraying of fungicides unreliable. However, when sclerotinia risk is high, preventative fungicide applications can effectively lower disease severity and improve yield. Assessment of disease risk within each field is essential to improve the odds that fungicides are only applied when it is economical to do so.

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**What are apothecia?** Apothecia are small fruiting structures that look like tiny mushrooms germinating from sclerotia. They are slightly cupped (similar to the top of a golf tee) with a diameter of between 5 and 15 mm (0.2” to 0.6”), with a stalk no more than 50 mm (2”) long that is mostly below ground. The apothecia release mushrooms or fruiting bodies up to 2 cm (0.8”) long. They can remain dormant in soil for up to 3 years or more.

Sclerotinia Stayrot in soil and on canola residue. Sclerotia germinate to produce apothecia during subsequent growing seasons (see section 3). Ascospores are released from apothecia and dispersed by the wind. Infection leads to premature ripening and stems become bleached, brittle and will easily shred to reveal sclerotia forming in stem cavities. Lessons progress up and down stems. Early infection appears as a soft grayish white rot, and affected leaves wilt. Infection penetrates into stems. Infected petals collect in high moisture areas (e.g. on leaves or in leaf axils). Scouting & Risk Assessment Card

Effective and economical management of diseases like sclerotinia stem rot in canola often requires decisive action prior to symptom development, making accurate assessments of potential disease risk in each field very important. The goal of this card is to help improve the accuracy of these risk assessments through better understanding of risk factors and improved identification of spore producing structures and late season infections. Better risk assessment will help ensure that fungicides are applied only when the likelihood of a positive economic return is high. Accurate identification and records of diseases present, including the percent infection and severity of symptoms, will help growers better prioritize their disease management based on the prevalence in their fields.
Examples of Apothecia of the Sclerotinia Fungus

Only apothecia produced from sclerotia of the stem rot fungus (Sclerotinia sclerotiorum) produce the ascospores that can infect the canola petals, increasing sclerotinia risk and the potential need for fungicide application.

Typical apothecia of Sclerotinia sclerotiorum

The cups or top parts of apothecia seldom protrude much above the soil surface.

Apothecia of sclerotinia stem rot will always germinate from sclerotia. If mushrooms are growing from canola residue, check for sclerotia inside infected plant tissue or gently dig apothecia from the soil to try to find the sclerotia.

Apothecia do not always appear perfectly round, particularly if they are growing close together or against crop debris. Apothecia tend to be honey-coloured, ranging from light tan to dark brown depending on their age.

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Apothecium beginning to expand after emerging from the soil

Late Season Scouting

Late season field scouting enables growers to record the percentage of canola plants infected and the severity of disease symptoms. This data can then be used to assess the success of past management decisions as well as potential future benefits of various IPM techniques (e.g. varietal resistance, crop rotation), provided the diseases are accurately identified. These are some diseases other than sclerotinia that can cause premature ripening.

Other Diseases That Cause Premature Ripening

Blackleg lesions can occur on leaves, but it is the basal stem cankers that can girdle the stems. This can lead to premature ripening and plant death, followed by bleaching of the plant in the sun. Look for small black pycnidia (slightly raised spots) embedded in the lesions to confirm the problem is blackleg. Rising levels of blackleg in fields over time may indicate the need for selection of varieties with greater genetic resistance and/or lengthened crop rotations.

Fusarium wilt is another fungal disease that can cause premature wilting and death of plants. The fungus attacks the vascular tissue of stems causing yellow or reddish-brown streaking followed by chlorosis and necrosis, resulting in premature desiccation and poor seed set. This often occurs on only one half of affected stems, or on individual branches.

Alternaria black spot causes small black lesions on canola pods, stems and leaves. It does not typically cause premature plant death. However, it can cause desiccation of pods, predisposing them to shattering. As a result, crops with significant alternaria are not good candidates for delayed swathing or straight cutting.

Clubroot is a disease characterized by the creation of galls on the canola roots that severely hinder the ability of plants to take up moisture and nutrients, causing wilting and premature plant death. Bleaching of stems and deterioration of the galls then follows (picture at right). For more information regarding prevention and management of clubroot check out the website at www.clubroot.ca.

Other fungal structures or mushrooms are often produced by saprophytic fungi, meaning that they survive on decaying crop residue. The tiny mushrooms on this wheat stalk (picture at left) are only 1 to 2 mm in diameter, while apothecia are typically 5 to 15 mm across.

Mushrooms of bird’s nest fungus are often abundant in wet conditions, but differ considerably from apothecia (circled here).

Photos and assistance supplied by - Dr. Kelly Turkington and Dr. Randy Kutcher, Agriculture and Agri-Food Canada; Murray Hartman, Alberta Agriculture and Rural Development; Canola Council of Canada Agronomists; David Kaminski, Manitoba Agriculture, Food and Rural Initiatives; Penny Pearse, Saskatchewan Ministry of Agriculture.