

Economic impact of sclerotinia stem rot

Sclerotinia is a true hidden yield robber. One of the greatest problems with the disease is that once you see symptoms in your field, it's too late to apply any control measures.

Derwyn Hammond agrees the economic impact of sclerotinia can certainly be detrimental to growers. He notes the rule of thumb is that on average you get half the yield out of infected plants, which means for every one per cent incidence (one per cent of plants affected), the yield loss for a field will be about half a percent. "But it all depends on how early the infection comes in – earlier incidence allows more time for the disease to spread throughout plants and kill them prematurely, typically leading to higher losses," he says.

According to Kristin Hacault, Pioneer agronomy research manager, in 2010, sclerotinia caused Western Canadian canola growers hundreds of millions of dollars in lost revenue.

"In 2010 sclerotinia cost western Canadian growers an estimated \$600 million in lost revenue," says Hacault. By planting a Pioneer® brand hybrid with the Pioneer Protector sclerotinia resistance trait you reduce disease incidence levels by over 50 per cent, thereby reducing yield loss. In addition you get the benefits of season long protection against sclerotinia.

Yield Loss (%) = 0.5 x Disease Incidence (%)

With sclerotinia on the radar for the last couple of seasons due to an increase in moisture conditions and widespread incidence and severity in some areas, it's very clear that genetics can play a key role in combatting this costly disease.

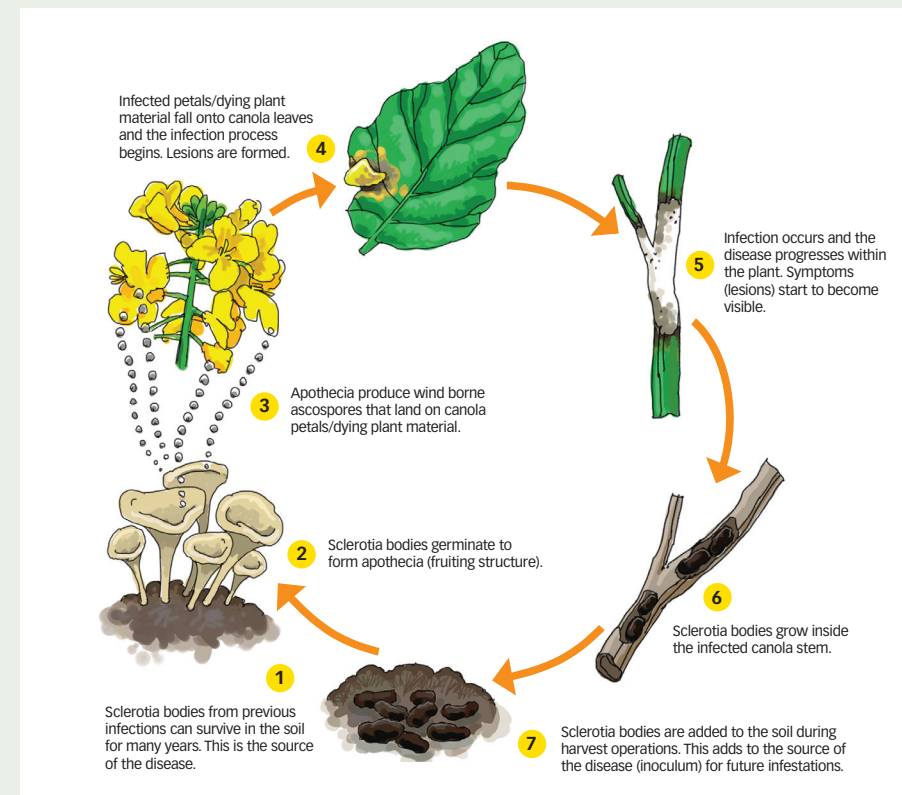
Sclerotinia disease cycle

One of the greatest challenges facing growers is the difficulty in diagnosing the threat of sclerotinia before it appears. With wide distribution, multiple hosts, long term survival and billions of spores, getting a jump on the disease is crucial.

Sclerotinia can survive in the soil for five years or more as irregular shaped fungal bodies called sclerotia. These sclerotia germinate in the summer and produce apothecia which are mushroom shaped structures that produce and release ascospores. These spores travel by wind, land on canola petals which are the food necessary for the spores to germinate, grow and infect the canola plant. The infection spreads from the petal to the canola plant at the leaf axil. The infected branch may then die or ripen prematurely and shatter before the healthy crop is mature. There can also be plant-to-plant infection following lodging as infected plants contact healthy plants thereby spreading the disease.

Disease cycle detail:

- 1 Sclerotia are overwintering fungal bodies that can survive for many years in the soil
- 2 Sclerotia germinate to produce apothecia under prolonged moist soil conditions
- 3 Apothecia release airborne ascospores
- 3 Ascospores infect petals or other connecting tissue
- 4 A fallen petal is used as a nutrient source for the fungus and enables it to colonize on healthy leaves or stems
- 5 Sclerotinia lesions are initially accompanied by a white mould growth and will show premature ripening above the point of infection
- 6/7 Advanced lesions become bleached and shredded; sclerotia develop within the infected tissue and eventually drop to the soil or are harvested with the seed



What you need to know!

Sclerotinia stem rot, also known as white mould, is one of the most devastating diseases in canola production. With much of the prairies having above average to excessive moisture the past two years, sclerotinia is one disease that requires attention.

Sclerotinia is usually most severe in the higher moisture areas of the prairies. But with the right combination of adequate moisture and susceptible host, heavy infections can develop almost anywhere. Disease severity and the resulting effect on yield will vary according to temperature, rainfall (environment), and especially the stage of crop growth at the time of infection.

According to Derwyn Hammond, resource manager with the Canola Council of Canada at Brandon, Manitoba, environmental conditions are drivers of the disease in terms of severity. "So it really varies, depending on geography. For instance, southern Alberta and southern Saskatchewan, which tend to see moisture deficits more frequently, have traditionally had less of an issue, but here in Manitoba it's much more common."

The 2010 Provincial Disease Surveys (Manitoba, Saskatchewan, Alberta) found that 82 per cent of canola crops across the prairies were affected by sclerotinia, with an average incidence of 21 per cent.

Faye Dokken-Bouchard, plant disease specialist with Saskatchewan Agriculture, says that based on reports and observations from the field, it seemed like many crops in 2011 that had a good stand – a thick stand and therefore more likely moist under the canopy – had some sclerotinia, whereas the thinner crops with more airflow were not as bad. "We received many questions about spraying fungicides this year, so it is likely that some farmers sprayed as well, which helped keep the incidence down."

2010 Provincial Disease Surveys

- **Saskatchewan:**
91 per cent
of canola crops surveyed had sclerotinia, with an average disease incidence of 20 per cent
- **Manitoba:**
88 per cent
of canola crops surveyed had sclerotinia, with an average disease incidence of 31 per cent
- **Alberta:**
64 per cent
of canola crops surveyed had sclerotinia, with an average disease incidence of 15 per cent

(NOTE: Incidence is defined as the number of plants out of 100 that show visible signs of sclerotinia infection in a field. For example, 20 plants infected out of 100 equates to 20 per cent incidence.)



The future of genetics



Genetics

Resistant genetics greatly reduce the risk of sclerotinia infection and provide season long protection against the disease.

"Genetic resistance can really help manage this disease," says Derwyn Hammond, resource manager with the Canola Council of Canada. Even if it doesn't completely eliminate sclerotinia and you need to intervene occasionally with a fungicide, having a background level of resistance can really help alleviate some of the risk associated with choosing not to spray and having the weather change to favour the disease. "It also provides some reduction in the disease if you miss the opportunity to spray at the

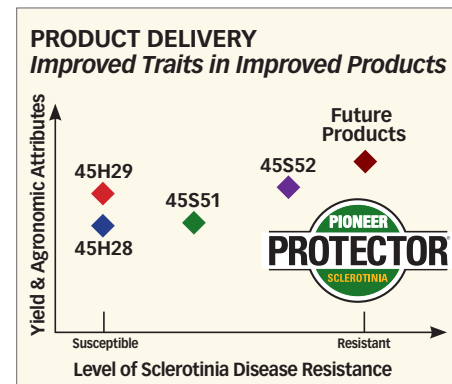
ideal bloom stage due to weather or equipment issues, adds Hammond."

Eradicating sclerotinia is likely impossible, according to both Hammond and Dokken-Bouchard. Indeed, sclerotinia is a bigger challenge in that it has a wide host range. Lentil, pea, chickpea, soybean and sunflower, and to a lesser degree flax, are all host crops.

"So even if canola genetics are quite effective, you have other host crops that don't have those genetics," notes Hammond. "Therefore, you still maintain that inoculum load in your farming system as a whole. That means ongoing pressure when conditions are conducive."

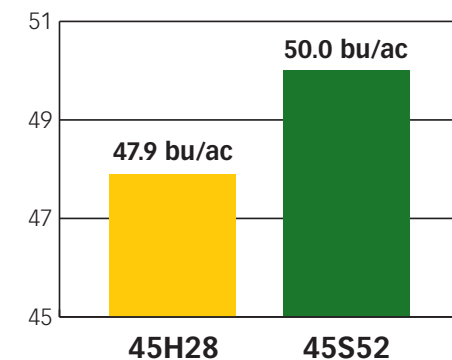
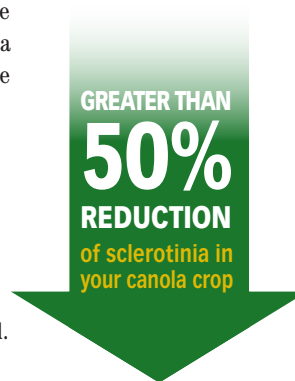
Dokken-Bouchard says that while incidence of sclerotinia can be based mainly on weather, management practices are crucial in handling the disease as best as you can. Because the pathogen can survive as sclerotia in the soil for several years and all the broadleaf crops in Saskatchewan crop rotations are susceptible, eradication is not possible.

Field scouting and agronomic practices are still vitally important in assessing and preventing sclerotinia infection. However, despite disease forecasting checklists which aid in fungicide spray decisions, control of sclerotinia continues to challenge canola producers prairie-wide.



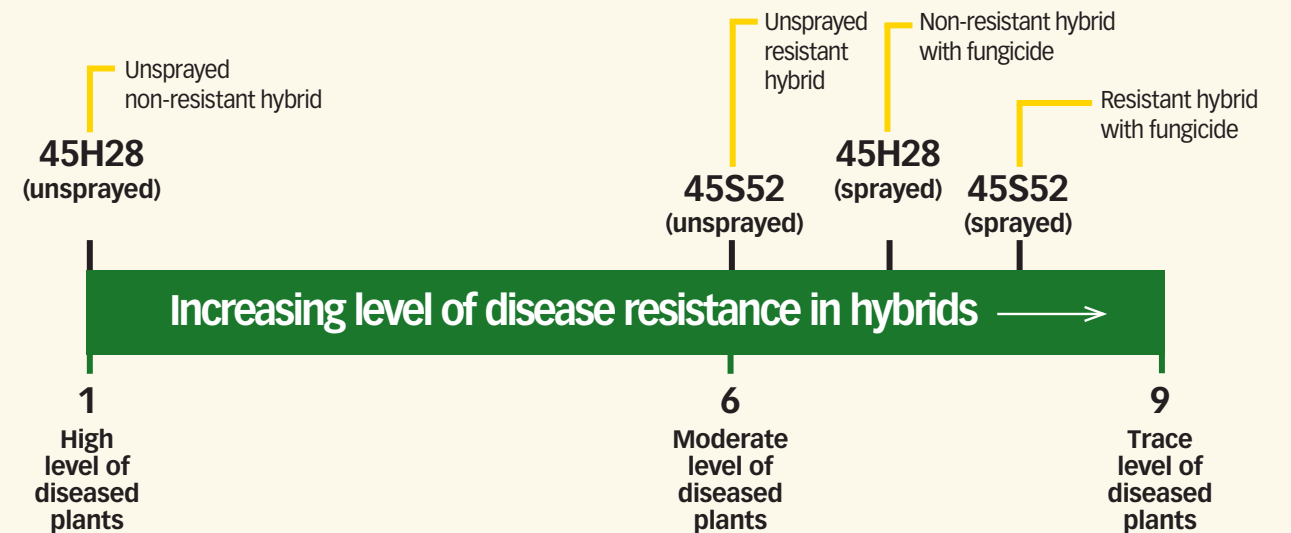
In the past four years Pioneer Hi-Bred has introduced four sclerotinia resistant canola hybrids – Pioneer® brand 45S51, 45S52, 46S53 as well as VR9557GS.

Pioneer large scale on-farm sclerotinia field trials indicate a greater than 50 per cent overall reduction in sclerotinia infection with a resistant hybrid vs. susceptible hybrid.



2010 On-Farm Sclerotinia Trials, 13 locations, Pioneer Agronomy Sciences.

Deciphering Sclerotinia Resistance in canola hybrids



Pioneer Protector® Canola hybrids

45S51 45S52 46S53



Exclusively available from your Pioneer Hi-Bred sales representative

- Reduction in incidence
- Peace of mind
- Convenience
- Season-long control

Pioneer Hi-Bred offers top performing Pioneer Protector® canola hybrids. The Pioneer Protector hybrids provide growers with leading seed genetics and insurance against one of canola's worst diseases.



Management options:

Integrated sclerotinia management tools:

1. Crop rotation
2. Sclerotinia resistant hybrids
3. Foliar fungicide

Effective and economical management of sclerotinia requires decisive action prior to symptom development.

Because sclerotinia incidence can vary greatly among fields and years, automatically scheduling fungicide spraying is not profitable. 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.