

Sclerotinia brokkies van Canola webstudie 2014

1. Moisture Raises Sclerotinia Stem Rot Risk

The farm's location and a field's crop rotation history don't matter so much anymore. Sclerotinia stem rot can strike anywhere. To scout, growers and agronomists could look for tiny mushroom-like apothecia in fields that were seeded to canola last year, and have petals tested for sclerotinia ascospores. But the more important scouting steps are to look at the yield potential of the crop and check the current moisture situation for each field. A crop with a dense canopy and good yield potential, good soil moisture and lots of morning dew will likely provide a return from a fungicide application — as long as conditions stay moist.

If conditions turn hot and dry after flowering, sclerotinia infection may not be as severe as it would be if conditions stay humid and moist inside the canopy. Unfortunately, rainfall over the two weeks after flowering is hard to predict, so the decision has to be based on current conditions.

Fungicide application timing for sclerotinia stem rot management is between 20% and 50% bloom. This timing is important. For fungicide to be effective, it has to land on petals before they fall into the canopy. Sclerotinia ascospores cannot infect plants directly. They need dead tissue, such as fallen petals adhering to leaves and stems, to continue their cycle. Decaying petals give ascospores the energy to infect the plant. Once inside the plant, the fungus grows up and down the stem, eventually cutting off moisture and nutrient flow and killing the plant.

Remember that fungicides will reduce the severity of infection but will not eliminate sclerotinia completely, especially if conditions are favorable all through flowering,

<http://www.canolacouncil.org/news/moisture-raises-sclerotinia-stem-rot-risk/>

2. New fungicides for 2014

2.1 Bayer CropScience launched Serenade CPB (which) leans on microbes to control disease. Lipopeptides, which are molecules produced by bacteria, punch thousands of holes in the cell membranes. This destroys the fungus. Serenade will control Sclerotinia stem rot in canola . One thousand litres of Serenade covers 625 acres.

<http://news.agropages.com/News/NewsDetail---11349.htm>

2.2 DuPont Vertisan is the new, next generation SDHI fungicide (Group 7 fungicide) that provides powerful disease control in canola, sunflowers, pulse crops and potatoes. Vertisan® is registered for use on these crops and diseases:

Canola: sclerotinia stem rot

Sunflowers: sclerotinia head rot

Pulse crops: achochyta blight, botrytis

Potatoes: rhizoctonia, early blight

<http://www.phoenixtestdomain2.net/en/products-and-services/crop-protection/oilseed-crop-protection/products/vertisan.html>

2.3 Prosaro® 420 SC Foliar Fungicide targeted disease prevention and control.

Prosaro is a protective and curative fungicide that can give you high-level control of rust diseases, especially stripe rust in wheat, and hard to control foliar diseases such as barley net blotch (both net form & spot form) and leaf scald in barley. Prosaro is also the first foliar fungicide registered in Australia for the management of blackleg and sclerotinia in canola. Its application timing is flexible, so you can target Prosaro applications to effectively manage specific diseases at the most appropriate development stage.

Active Ingredient(s): prothioconazole 210 g/L
tebuconazole 210 g/L

<http://www.bayercropscience.com.au/cs/products/productdetails.asp?id=540>

3. *New varieties*

3.1 Bayer CropScience Canada launched four new InVigor canola hybrids

The year 2014 marks the official launch of the first ever InVigor hybrid with built-in Sclerotinia tolerance.

InVigor L160S combines valuable sclerotinia tolerance with all the benefits of the LibertyLink system plus the yield potential of an InVigor

<http://news.agropages.com/News/NewsDetail---9836.htm>

3.2 Top performing hybrids from Pioneer are redefining canola performance

New 3154 S contains the Pioneer Protector Sclerotinia for built-in sclerotinia protection

- Pioneer Protector® Sclerotinia resistance trait built-in
- Strong performance package
- Medium maturity
- Rated Resistant (R) to Blackleg
- Rated Resistant (R) to Fusarium Wilt. "

<http://www.dseriescanola.ca/cms/en/HybridDetails/HybridDetails.aspx?menuid=53>

4. *List of topics in Canola watch*

Sclerotinia Stem Rot Management (January 9, 2013 – Issue 1)

<http://www.canolawatch.org/>



Canola Watch – Free, Unbiased, Timely and Research Focused - Timely canola production tips and information

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Sclerotinia stem rot management

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Key points:

- All areas of the Prairies are at risk. Geography does not provide immunity to this disease.
- Prevalence of sclerotinia stem rot has a direct correlation to above-average moisture. If a field has regular rains or high humidity or both from two weeks before flowering and through flowering, then infection will occur. If these conditions continue after flower, severity of the disease will be high and yield loss will be significant.
- If these conditions are present and canola has yield potential of 30 bu./ac. or greater, then a fungicide application at 20-30% flower is warranted. Fungicide may also pay for yield potential below that level.
- Assess disease levels before choosing a swathing date. Swath based on the best time for the healthy plants, not the diseased plants. Swathing sclerotinia infected canola too early can reduce yield further and increase the potential green seed count, adding unnecessarily to the losses on the crop.



(<http://www.canolawatch.org/wp-content/uploads/2013/01/Sclerotia-on-severely-infected-stem-Turkington.jpg>)

Sclerotia resting body, the small black orb, on a severely infected stem. With moisture and warm weather, these sclerotia germinate the following summer to each form up to 15 apothecia.

Source: Kelly Turkington, AAFC

Sclerotinia stem rot: What is it?

Sclerotinia stem rot is caused by the fungus *Sclerotinia sclerotiorum*. The fungus overwinters as sclerotia, either in the soil or in stubble at the soil surface. With moisture and warm weather, these sclerotia germinate to each form up to 15 apothecia, tiny golf tee shaped mushrooms. After a rain it takes 10-12 days for apothecia to grow to a point where they release ascospores into the air.

Wind spreads ascospores all over the countryside, but only those that land on canola petals concern canola growers. Ascospores cannot infect plants directly. They need dead tissue, such as fallen petals adhering to leaves and stems, to continue their cycle. Decaying petals give ascospores the energy to produce hyphae that release oxalic acid and other infection agents, which the fungus needs to invade healthy plant tissue and infect the plant. Once inside the plant, the fungus grows up and down the stem, eventually cutting off moisture and nutrient flow and killing the plant.

The next generation of sclerotia are produced within the white mass of fungal hyphae growing inside and, in extreme cases, outside the stem. Because most fungicide sprays do not effectively penetrate the stem tissue to eradicate infection, living flowers are the best targets for fungicides to prevent sclerotinia infection.

Sclerotinia risk factors

With widespread sclerotinia infection in past years and with widespread canola production, all regions of the Prairies are at risk. The following factors will determine the level of risk based on field conditions this year.

1. Moisture



http://www.canolawatch.org/wp-content/uploads/2011/06/apothecia-2-Dokken-Bouchard_opt.jpg

Sclerotinia apothecia. Source: Faye Dokken-Bouchard, Saskatchewan Ministry of Agriculture. See more apothecia photos at the bottom of the article.

Moisture is the key factor in sclerotinia stem rot risk. Good soil moisture and a few rains in the period starting two weeks before flowering and carrying through to infection after flowering will greatly increase the sclerotinia stem rot risk. (Alternatively, low rainfall and low humidity through these stages will greatly reduce the disease risk, and fungicide applications rarely provide a benefit in these conditions.)

Moisture can come from rain, relative humidity in the high 80s, or morning dew. High humidity and dew are often enough for the disease to form. Keep in mind that humidity is often higher in the canola canopy than at the local weather station or in the farm yard, so consider this when estimating disease risk. Interestingly, heavy rain can actually reduce the risk if the timing is right. Heavy and frequent rains can inhibit ascospore release by covering up apothecia, and heavy rains can wash petals off the plants.

One big rain. If a region had been dry for a couple weeks leading up to flowering, had one large rain, then turned dry again, this one big rain event will not increase the sclerotinia risk much. However if that one big rain is followed with high humidity, lots of dew (wet legs every morning you walk through the field) this may be enough to sustain the fungus. Note that if conditions stay wet after a few weeks of dry, it will take about two weeks before the release of spores from apothecia germinated by this rain will infect petals. If flowering is close to wrapping up within that time, a fungicide spray may not benefit the crop.

2. Temperature

Moisture has a much larger influence than temperature, however temperature can influence severity. Night and morning lows of 15 C are ideal for sclerotinia, especially with heavy dew. Infection may not advance during the heat of the day, but it will grow at night.

Infection can be high in hot weather as long as the moisture is there. Hot days can reduce sclerotinia stem rot infection rates if heat causes infected petals to dry up and blow off the plant. Heat may also cause canola plants to drop lower leaves at an accelerated pace. If infected leaves drop before infection spreads to the stem, the heat will have indirectly stopped the infection.



<http://www.canolawatch.org/wp-content/uploads/2013/01/Petals-falling-on-leaves-small.jpg>

With ample moisture evident in this canopy, these petals fallen near the main stem will likely lead to sclerotinia infection unless they've been sprayed.

3. Canopy conditions

Sclerotinia disease level is highly dependent on the microclimate within the field. Factors that result in moisture-laden canopies include:

Variety selection – Higher disease levels will occur in varieties that have more leaf area (which usually means high yield potential, more area for falling petals to land on, and greater canopy closure which tends to trap moisture in the canopy), tall stature, and/or poor standability.

High fertility levels – Higher nitrogen rates or the addition of manure results in heavier, more dense and thick canopies, which tend to increase humidity in the canopy.

Degree of lodging — Lodged crops tend not to dry out quickly, and increased direct plant-to-plant contact will increase disease spread from infected to healthy tissue.

Seeding date – Neighbouring canola fields with different seeding dates and maturities may have different levels of sclerotinia damage depending on how their flowering stages coincided with weather conditions conducive to disease infection and development.

High plant populations – Dense stands are good for competition with weeds and earlier, more uniform maturity, but they tend to result in moist canopies. In addition, higher plant populations usually result in plants with smaller, weaker stems that are more prone to lodging. However, thin stands are not immune either. Conventional wisdom would be that with fewer plants per square foot, the canopy would be more open, less humid and at lower risk of infection. This might be true for a thin canopy with low yield potential, but if a canopy of 2-3 plants per square foot fills in, it will have very large plants with lots of leaf material, lots of branches, and a longer flowering period. This could actually increase the risk of yield loss from sclerotinia because the crop is flowering longer and dropping petals into the canopy over a longer period. With larger leaves and more branches, these plants have more surface areas for petals to land.

In general, growers can't bank on wider row spacing and low seeding rates to reduce risk. Any risk reduction from these strategies requires the weather conditions to cooperate. If winds move dry air through the canopy and keep the crop dry for much of the day, then a more open canopy may be beneficial. But if wet conditions predominate throughout flowering, then any risk reduction will be minimal. And once plants are infected, a few hours of hot and dry each afternoon may stop the pathogen for a short part of the day, but it will restart again in evening with cool humid conditions.

4. Rotation

Because environment is such a large factor in sclerotinia infection rates, and with so many acres of host crops (e.g. canola, beans, lentils, sunflowers) across the Prairies, rotation on any one field does little to reduce the sclerotinia risk.

The risk assessment score card. The score card (see below), developed in Sweden, outlines the risk factors that can increase the incidence and severity of sclerotinia stem rot in canola. Fill out the checklist for each field shortly after first flower — 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 from a fungicide application. Results in Sweden have suggested that fields scoring 40 or higher will likely benefit from a fungicide, but canola prices are higher and fungicide prices are lower than when the score card was developed, so a score of 30 to 35 might be a better starting point. When filling in the card, score at least a 5 for rotation risk no matter the rotation on a particular field. Even if one field has a one year in 4 canola rotation, odds are some fields close by are in a tighter rotation.

Sclerotinia Stem Rot Checklist		
<i>(For each risk factor, circle the risk points that apply to your field).</i>		
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
WEATHER FORECAST	High pressure	0
	Variable	10
	Low pressure	15
REGIONAL RISK FOR APOTHECIA DEVELOPMENT	None found	0
	Low numbers	10
	High numbers	15
TOTAL RISK POINTS FOR ALL RISK FACTORS =		

<http://www.canolawatch.org/wp-content/uploads/2011/06/Sclerotinia-check-list1.png>

The checklist, developed in Sweden, can help determine if it will pay to spray for sclerotinia stem rot.

The hail factor. Hail cannot cause sclerotinia stem rot and there is no evidence that this pathogen will enter plants directly through a hail wound. However, hail can move petals and stripped leaves — the food source for the germinating sclerotinia spores — down into the canopy which may increase the level of infection. Alternatively, hail could move those petals off the leaves onto the ground, reducing infection. Hail at flowering can extend the flowering period, which extends the susceptible period for sclerotinia.

Will it pay to spray?

If the above risk factors are present, then yes, spray will quite likely pay, and may pay very well. Payback is not guaranteed, however, so growers who are unsure could leave a few check strips and compare yields for treated versus untreated parts of the field.

Fields sprayed with fungicide in the 20% to 50% flower window can still have sclerotinia. Fungicides reduce the severity of infection but will not eliminate sclerotinia completely, especially if conditions are favorable all through flowering. Spraying twice will help prolong the protection when the flowering period is extended, but even that will not completely eliminate the disease when pressure is high.

Sclerotinia tolerant varieties. Growing sclerotinia tolerant varieties may reduce infection level, but sclerotinia stem rot will still occur in these varieties. With extended moisture through the sclerotinia risk period, fungicide will often provide a return on investment even when these varieties are grown.

When to spray?



(<http://www.canolawatch.org/wp-content/uploads/2012/06/Photoquiz7.jpg>)

The photos on the left show canola at 10% bloom. Within a few days, the crop will be at 20% bloom, the earliest stage to spray for sclerotinia stem rot management. The photos on the right show 50% bloom. Source: BASF

Petals are the spray target. Spraying is not effective until the flowering stage. Fungicides do not cure infection, but are used to prevent spores from growing on petals after petals have fallen onto leaves and stems and started to decay. Since it is easier to spray petals at the top of the canopy rather than after they've fallen, this is why living flowers are the target.

Timing should be within the window from 20% to 50% bloom. (Some products are registered for only 20% to 30% bloom.) At 20% bloom, no petals have dropped and no pods are forming. At 30% bloom, petal drop has just begun and side branches are just starting to bloom. Canola can reach 20% flower 4 to 5 days after first flower, so prepare to assess the sclerotinia stem rot risk as soon as flowering starts.

Spraying at 20% to 30% bloom ensures that a large number of flowers have opened and the spray will cover petals before they drop. Split applications — two lower rate applications 7 to 14 days apart — can be worthwhile if conditions are good for fungal growth and the crop flowers for a long period. Split applications might also be best for crops with plants at multiple stages. The first application can be made when first plants reach recommended staging. If necessary, a second application can be made when the remaining plants are ready to be sprayed. Not all products are registered for a split application.

Late applications. If conditions are dry at early flower and then it rains at 40% to 50% flower, spraying at the end of the window may be effective — especially if branching or strong plant recovery from heat or drought stress extends the flowering period.

Applications after 50% flower are not on fungicide labels, and may be inside the [pre-harvest interval](http://www.canolawatch.org/2011/08/04/pay-attention-to-pre-harvest-intervals/) (<http://www.canolawatch.org/2011/08/04/pay-attention-to-pre-harvest-intervals/>) for some fungicides.

In general, late applications are not as effective as applications at 20% flower since the main stem flowers first, and these flowers are more likely to drop on main leaves and against the main stem. These main stem petals lead to infection that girdles the main stem. Also, earlier infections have more time to develop and cause more damage to the plant. At or after 50% flower, most of the flowering is on side branches. These petals tend to drop onto upper leaves and side branches, causing minimal damage to the main stem. However, if the crop lodges,

infection on side branches can spread to main stems. Using spray volume and pressure that drives fungicides down into the canopy may still provide some protection at these stages.

Remember that fungicide does not provide a curative benefit, so any infection present before application will not be stopped. A late application may stop subsequent infection, but infection that is already present can spread throughout the plant and from plant to plant in cases of extreme lodging, reducing the effectiveness of this late application.

Spraying hailed crop. Canola beat down by hail at early flowering can recover, and start to bolt and re-flower again. In that case, growers may see a benefit from spraying for sclerotinia again if yield potential is above 25-30 bushels per acre, and conditions are moist (rain, humidity and/or dew). Keep in mind that some fungicides are registered for only one application per year. If you already sprayed that product, switch to a different one.

What to spray?

There are many fungicide groups available, and growers are recommended to rotate fungicides.

Fungicides registered for in-crop sclerotinia stem rot control				
Product	Application window	Split application	Pre-harvest interval (PHI)	Fungicide Group
Astound	20-50% flowering	No	35 days	9 and 12
Lance	20-50% flowering	Yes, 7-14 days apart	21 days	7
Proline	20-50% flowering	No	36 days	3
Quadris	Prior to 30% flowering	No	30 days	11
Quash	20-50% flowering	No	45 days	3
Rovral	20-50% flowering	Yes	38 days	2
Serenade	20-30% bloom	Yes, 7-10 days apart, if necessary	None	44
Vertisan	20-50% bloom	Yes, 7-14 days apart (DuPont recommends one app)	21 days	7

(<http://www.canolawatch.org/wp-content/uploads/2013/01/Fungicides-for-sclerotinia.png>)

Adding insecticide. Tank mixing insecticide with sclerotinia fungicide can work when insects are also at thresholds. If the insect threat to crop yield is low, this insecticide treatment can actually have a detrimental effect on yield. That's because pollinators are especially active during the flowering stage — the sclerotinia fungicide stage. Some studies have shown pollinators can contribute 13-16% to canola yield. Taking out pollinators with insecticide will reduce this yield benefit, and the spray may also eliminate many beneficial insects that could prevent future outbreaks.

Sclerotinia and swath timing

In fields badly infected with sclerotinia stem rot, swath when the healthiest plants are ready. These plants will provide most of the yield. Swathing early will not preserve seeds in badly infected plants — those seeds are unlikely to mature no matter when you swath — and swathing healthy plants before 30% seed colour change, for example, may not allow those healthy seeds to mature and fill fully.

Swathing in a little rain or in the evening dew will limit shattering of mildly infected plants that may have some yield but have dried down prematurely. Fields with a large percentage of diseased plants may be poor candidates for straight cutting due to the increased shattering risk.

Pre-harvest disease assessment

Pre-harvest is a good time to scout canola fields for disease severity. Identifying diseases at this stage is part of next year's disease management planning.



http://www.canolawatch.org/wp-content/uploads/2013/01/sclerotinia3_300-copy.jpg

Sclerotinia on stem at harvest time.

When looking for sclerotinia stem rot, look for areas in the field with lodged or prematurely ripened plants. Examine the basal (bottom) to middle of the stem. Sclerotinia leaves a bleached or tan lesion on the stem. In serious cases, white, downy growth appears on green stems, and as the stem dries, it will be bleached or brown (like a bone) and shredded typically around the entire stem. Hard, black sclerotia bodies (typically similar in appearance to mouse droppings but larger) can be found inside the stem or on the ground near the stem. ([Click here \(http://www.canolawatch.org/2012/08/29/diseases-to-look-for-while-harvest-scouting/\)](http://www.canolawatch.org/2012/08/29/diseases-to-look-for-while-harvest-scouting/) for more on how to identify various diseases, including blackleg, that may be present and visible at this stage.)

Planning for next year: For infested fields, think back to the risk profile in the field when you were making the fungicide decision. If you didn't spray, what made you decide not to spray? If you did spray and sclerotinia infection rates are still high, at what stage did you spray? At what rate? What were the conditions (some fungicides lose efficacy if sprayed above 25 C)? Answers to these questions will help with the spray decision next year.

More photos:



<http://www.canolawatch.org/wp-content/uploads/2013/01/cw2-image-diseases-sclerotinia-sclerotia-bodies-stem-1-hoarb-copy.jpg>

Sclerotia inside the stem. Source: Beth Hoar



<http://www.canolawatch.org/wp-content/uploads/2013/01/sclerotinia-stem-rot-early-infection-on-stem.jpg>

Sclerotinia infection on stem. With humidity in the canopy, this will continue to grow until the whole stem is dead.



http://www.canolawatch.org/wp-content/uploads/2011/06/apothecia-3-penny-Dokken-Bouchard_opt.jpg

Sclerotinia apothecia are quite small. Source: Faye Dokken-Bouchard, Saskatchewan Ministry of Agriculture



<http://www.canolawatch.org/wp-content/uploads/2012/07/petals-sclerotinia-small.jpg>

A late application may stop subsequent infection, but infection that is already present can spread from plant to plant within the canopy, likely making this late application ineffective.



<http://www.canolawatch.org/wp-content/uploads/2012/08/base-sclerotinia-small-Kubinec.jpg>

Sclerotinia stem rot at the base of a canola stem. Source: Anastasia Kubinec, MAFRI



<http://www.canolawatch.org/wp->

<content/uploads/2012/08/Sclerotinia-from-direct-contact-small.jpg>

Sclerotinia stem rot can spread from stem to stem when infected stems touch healthy stems. That is why the disease can be worse in lodged crop.

ASK A FOLLOW-UP QUESTION

[_mailto:whetterj@canolacouncil.org?Subject=Canola%20Watch%20follow-up](mailto:whetterj@canolacouncil.org?Subject=Canola%20Watch%20follow-up)

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