Avoid Sclerotinia by managing your cultivation practices

By Wessel van Wyk, contractor at the Protein Research Foundation

Aside from drought, *Sclerotinia sclerotiorum* is currently the leading cause of low yields in certain seasons in large parts of South Africa where soya beans are cultivated. Unfortunately, it is viewed as a 'good producer disease' as the soya beans of good producers are usually planted under ideal cultivation practices, which leads to abundant vegetation. These so-called optimal growth conditions are one of the main reasons why *Sclerotinia* occurs – the microclimate that forms under the dense foliage is ideal for the development of the disease.

In seasons with good rainfall, the disease is especially prevalent in soil where it was previously spotted. It catches producers off guard as it can suddenly reduce yields of 3 tons/ha in February/March on dryland to yields of less than 1,5 tons/ha. Another factor to consider is that during a good season, rain may fall daily. Overcast conditions and lower temperatures are ideal for the development of the disease.

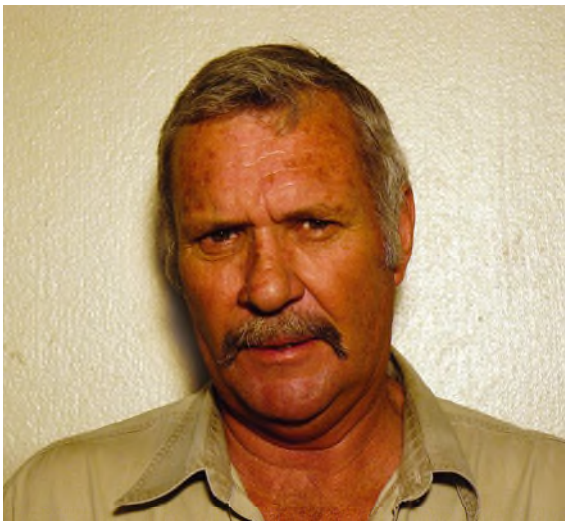
As soon as the symptoms of *Sclerotinia* are evident in a field, it is too late to do anything about it as the disease will have already spread inside the plants, where fungicides will be unable to reach it. Pro-active measures are essential in an effort to control the disease.

Multiple challenges

Much of the *Sclerotinia* research has focused on developing fungicides that control the disease, breeding resistant cultivars, and using cultivation aspects such as lower plant populations, wider row widths, later planting dates and less susceptible cultivars.

The problem with all these efforts is that fungicides (however good) cannot be applied where the disease occurs because the dense foliage prevents the fungicides from being applied to the location of contamination, which is usually on the first two nodes from the ground.

Breeding resistant cultivars is also tricky due to the multiple genes involved. Suggested cultivation practices mostly do not contribute to higher yields, which means that yields will be low even in seasons when the disease was not present as a result of less-than-optimal cultivation practices.



Wessel van Wyk.

Severe Sclerotinia contamination in a field.

Sclerotinia contamination on soya bean plants on the left, versus a healthy, fast-growing soya bean plant on the right.

A cultivar trial at Gerrit Roos close to Wonderfontein. The only cultivar that wasn't contaminated by Sclerotinia is the one indicated by the arrow. It is clear that most of the other cultivars are almost black from Sclerotinia contamination. The cultivar that evaded Sclerotinia is a short grower.

Sclerotinia symptoms on the stem of the plant.

Nowadays, much effort is put into testing existing cultivars for their susceptibility to *Sclerotinia*, but even that is not always useful because this research is done in greenhouses and cannot be compared to conditions in the field. Some of the research shows that certain cultivars are less susceptible than others. Unfortunately, researchers know that specific cultivars that were shown to be either susceptible or less susceptible in the greenhouse do not necessarily behave accordingly in the field. These observations are the result of artificial contamination in greenhouses, which does not consider the cultivar's behaviour in the field.

Planting date and maturity

Avoidance of *Sclerotinia* is based on the growth stage of a particular cultivar when conditions for disease development are optimal. Ascospores need a 'wound' on the plant to germinate. Such vulnerable areas are formed when petals dry, pods form or where flowers fall off. Dry petals serve as 'food' for the spores to germinate. If there are already pods and no flowers, it is unlikely that the plants will be contaminated.

Managing the planting date and type of maturity group to which the cultivar belongs, is critical in avoiding *Sclerotinia*. Research has shown that where an MG 4 to 4,5 cultivar is planted during 'normal' planting dates (mid-October to the end of November), it is already in the R5 (pod-filling) stage, which means that there are no flowers present.

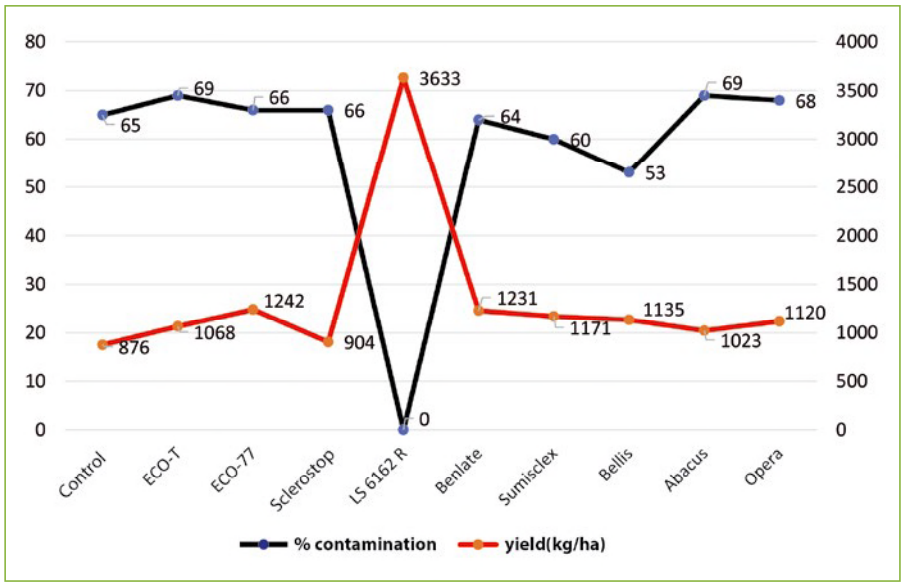
The fact that an MG cultivar blooms early (35 days in temperate to hot regions and 40 to 45 days in colder areas), causes the plant to be relatively smaller. Smaller plants do not close the canopy of leaves completely, which means that conditions are not yet optimal for the sclerotia to germinate and contaminate the plants.

Trials at Kinross

Extensive research was done between 2008 and 2013 at Kinross in Mpumalanga, where various chemical and biological agents, planting dates and cultivars were tested against a fast MG 4 cultivar (in this case LS 6162, which would later become LS 6444.) The results were astonishing and farmers who previously experienced problems with *Sclerotinia* planted early cultivars with great success.

The problem was and still is that only one cultivar cannot be planted because harvest time must be extended, which is usually not possible with a single cultivar, especially when planting dates are uninterrupted and the soya beans are all harvest-ready at the same time. Another problem is that it is not

Figure 1: Percentage *Sclerotinia* contamination and yield of soya bean trials at Kinross in 2008/09.



possible for a soya bean cultivar with such a short growth cycle to compete with the yields of longer growing plants. In years during which *Sclerotinia* was not a problem, long growers delivered larger yields than the short growers.

In 2008/09 three biological agents, namely Eco-77, Eco-T and Sclerostop, and five chemical agents, namely Benlate, Sumislex, Bellis, Abacus and Opera were applied to the long-season cultivar LS 6150 and compared with the short-season LS 6162/LS 6444 (*Figure 1*). The agents were all applied according to the instructions on the label.

The trial was planted on 19 November 2008 and the faster cultivar started blossoming (R1) on 29 December 2008, 41 days after planting. On 22 January 2009 the LS 6162 was in the R5 stage and the LS 6150 in the R2 stage. *Sclerotinia* contamination started showing even with all the chemical and biological agents applied. The first sprayings of these agents were at the R1 stage on 15 January 2009 and the second spraying was done four weeks later, on 11 February. At this stage, contamination was severe across the board, except on the fast cultivar, where no *Sclerotinia* was noted.

On the left is a soya plant (long grower) in the R2 to R3 growth stage, which makes it highly susceptible to Sclerotinia. On the right is a short-season grower, which is already in the R6 stage and no longer susceptible to Sclerotinia. These two pictures were taken on the same day.

Avoiding contamination

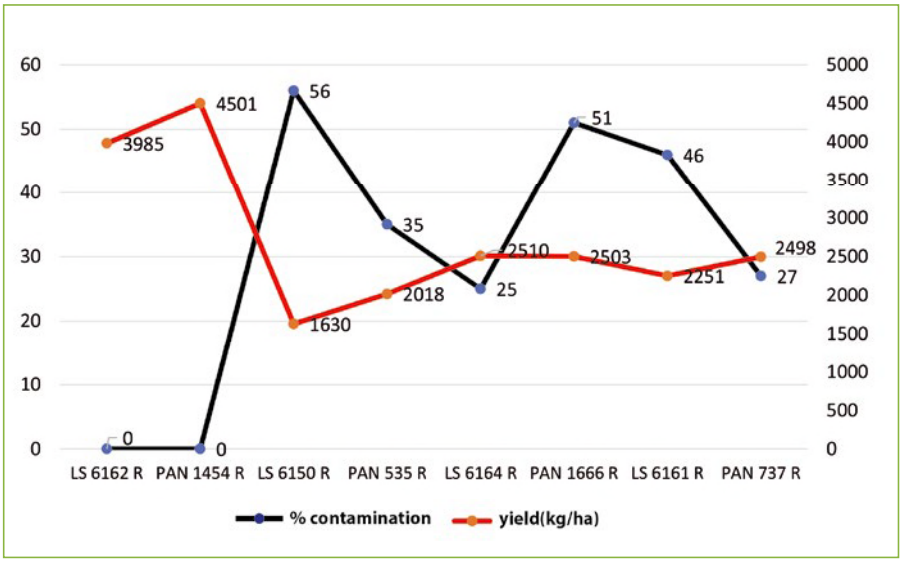
Not far from the trial, on a farmer's field that was also planted under LS 6162 on 10 December 2008, slight contamination was observed because the plants were in the R1 to R2 stages. This slight contamination could be attributed to the fact that the canopy of leaves was not completely closed yet, which means that the microclimate was not too favourable for the development of the disease. In the end, the farmer harvested 2,2 tons/ha here.

On the field across from the trial, the farmer planted the same cultivar on 21 December 2008 after harvesting wheat. No *Sclerotinia* was observed and he harvested 2,8 tons/ha on this field. These observations are invaluable because it shows that no cultivar is resistant to *Sclerotinia*, but that it can be avoided by planting a fast cultivar and changing the planting date. The research proved that a fast cultivar and the date on which it is planted plays a significant role in avoiding *Sclerotinia*.

During the season of 2009/10, cultivars that ranged from MG 4 to 7 were planted on 22 October 2009 and compared (*Figure 2*). All the treatments (except for the MG 4 treatments) were contaminated with *Sclerotinia* – as much as 53% contamination in some instances – and a yield of 1,55 tons/ha was recorded.

New research was done in 2018 after producers suffered major damage in the 2017/18 season. In cultivar trials that were planted at various producers, it was only the MG 4 cultivars that delivered high yields.

Figure 2: Percentage *Sclerotinia* contamination and yield of eight cultivars at Kinross in 2009/10.



Great yield potential is possible

New MG 4 cultivars are available with unbelievable yield potential if performing successive plantings. However, where there are a few weeks between plantings, one could perhaps get away with planting only this cultivar so that harvest time is not affected. The later plantings will have to be tested to see whether the yield decreases to such an extent that it is not profitable, and to determine whether these cultivars, which will flower in February/March, can still avoid *Sclerotinia*.

For references or more information, email the author at zenzele@netactive.co.za.