

Certified seed – your first defence against *Sclerotinia* in soya beans

By Hanlie du Plessis

Sclerotinia, a sporadic fungal disease affecting a wide range of host plants, had a substantial impact on soya bean production the previous season. This fungus can potentially reduce soya bean yields by up to 50%, should conducive environmental conditions for the infection and rapid development of the disease prevail during the growth period.

Unfortunately, by the time the first *Sclerotinia* symptoms are observed, very little can be done to control the fungus. Preventative management practices should therefore be implemented and applied to minimise the level of infection and further spread of the disease.

One of the early symptoms of *Sclerotinia* disease is the sudden wilting of soya bean plants. Leaves will turn greyish-green before turning brown, curling up

and eventually dying off. The fact that the leaves do not drop immediately makes it easier to distinguish infected plants from healthy ones. Symptoms will normally be visible within two to three weeks after flowering has commenced in the crop, if the right conditions persisted and infection has occurred.

Sclerotinia can easily be distinguished from most other soya bean diseases by the presence of a white, cottony, mouldy growth and hard, black sclerotia on the inside and outside of infected stems and pods. The black sclerotia are the survival structures of *Sclerotinia* and can easily be spread during harvesting.

The fact that sclerotia can survive in the soil for a period of between four to seven years, while awaiting favourable conditions, makes it even more difficult to contain this disease. The most favourable conditions for the fungi to develop are during the flowering stages, with high rainfall and cool temperatures of below 28°C.

The development of the disease occurs primarily after the closing of the leaf canopy, which promotes cool temperatures and creates a humid microclimate around the stems of the plants. High soil moisture because of rain or irrigation contributes significantly in creating the favourable microclimate underneath the closed canopy.

Farm-saved seed

Sclerotinia spores and sclerotia are widely found across South Africa. Some management practices conducted by farmers may, however, contribute towards the build-up of these bodies in the soil. The biggest culprit is farm-saved seed.

Chances are that the seed of the grain harvested the previous season have not been subjected to testing for quality properties. If the commercial production was infected with *Sclerotinia*, the sclerotia harvested together with the grain will be planted along with the farm-saved soya bean 'seed'.

There are different opinions on the reasons for the sudden increase in *Sclerotinia* occurrence. Whitey van Pletzen, production manager at Agricol and chairperson of the



Good management practices against *Sclerotinia* infection used by seed production companies include:

- **Cultivar selection:** A number of cultivars have proven to be either more tolerant or more susceptible to *Sclerotinia* infection than others. This information, obtained through internal product research, can usually be obtained from the seed companies marketing those cultivars.
There is currently no soya bean cultivar known to be completely resistant to *Sclerotinia*. The use of more tolerant cultivars is an effective tool in managing the disease. Avoid planting highly susceptible cultivars in fields with a history of *Sclerotinia* infection.
- **Plant population and general planting direction:** Unfortunately, producers follow production practices that can often create the ideal microclimate and environment for diseases to develop. Some of the following practices are associated with high infection rates: narrow row spacing, high seeding rates, late planting dates, and over-application of nitrogen.
Cultivation practices used should discourage the formation of a cool and humid microclimate where *Sclerotinia* can thrive. Wider rows and planting from north to south will allow sunlight into and the movement of air between the rows, especially after irrigation or spells of rain.
Soya bean plants are very adaptable and known to compensate in cases where lower seeding rates are observed.
- **Crop rotation:** *Sclerotinia* has a wide host range including soya bean, dry bean, potatoes, peas, cucumbers and some common weeds, to name a few. Crop rotation towards non-susceptible crops such as maize and sorghum can help to reduce the level of sclerotia occurrence in the soil. Rotation crops need to be planted for at least three consecutive planting seasons before soya beans can be reconsidered on the same field.
- **Weed control:** Several broadleaf weeds are known to be *Sclerotinia* hosts and aid in the spread of the disease. A well-planned spray programme should be followed as recommended by chemical sales agents.
- **Fertility and plant nutrition:** High soil fertility, especially the use of nitrogen-rich manure and fertilisers, favours *Sclerotinia* development by promoting lush plant growth and early canopy closure. Having soil fertility tests conducted on a regular basis will help avoid over-fertilising fields that are prone to *Sclerotinia* infection.
- **Irrigation management:** Excessive irrigation, above what is needed to maintain yield potential, should be avoided during flowering to minimise moisture in the soil surface and below the crop canopy. Low moisture levels within the soya bean canopy are critical for reducing the potential for infection. Occasional, heavy watering is better than frequent, light watering. Avoiding excessive irrigation is especially important during the critical periods of infection, such as the early flowering to early pod development stages.
- **Chemical control:** Chemical applications can be a component of an integrated management system for *Sclerotinia*. Some foliar-applied fungicides and herbicides are effective against *Sclerotinia*, although none of them offer complete control.
- **Harvesting:** As previously mentioned, sclerotia are often distributed by combine harvesters. It is therefore imperative to leave the fields where the fungus has been observed to be harvested last.

South African National Seed Organization's (Sansor) Seed Certification Standing Committee, is of the opinion that the only effective way to manage *Sclerotinia* is by following an integrated process of best farming practices.

Insist on certified seed

Start by planting healthy, good quality certified seed. The fields on which seed companies produce certified seed are subject to regular inspections throughout the planting, production, harvesting, cleaning and packaging process.

Seed samples of registered seed lots are taken by authorised seed samplers for various tests to be conducted. Field inspections, sampling and quality testing must be done according to internationally accepted, validated methods and procedures. Seed testing is important to assess the quality of seed marketed to producers.

Kobus van Huyssteen, technical officer at Sansor, explains the thorough and lengthy process of seed certification: "Certified seed must meet additional and stricter requirements than other seed. The process, with more than 90 control points, exercises control over breeder seed through pre-basic, basic and finally certified seed multiplications and aims specifically to guarantee cultivar purity and cultivar identity, as well as seed of good physical quality."

Sansor will only certify seed lots that have been produced on fields registered with Sansor and produced according to the specifications and requirements of the SA Seed Certification Scheme. During the registration process the origin of the seed is verified to ensure that it is acceptable for certification.

Inspected by trained inspectors

Field inspections – during which several aspects such as varietal purity and isolation distances are controlled – are conducted by trained and authorised seed inspectors. After harvesting, processing and packaging, the seed is sampled and tested by registered seed testing laboratories to assess the germination potential and physical purity of the seed lots.

Post-control grow-outs are planted by the Department of Agriculture, Forestry and Fisheries (DAFF) to verify the varietal purity and identity of the production unit.

BP Greyling, a mega farmer and Agricultural Writers SA's Farmer of the Year 2011, farms on Langfontein near Wakkerstroom in Mpumalanga. His opinion on the use of certified seed is: "I have planted soya beans for the past 32 years. I cannot say that I've never had *Sclerotinia* on my farm, but I can say that in 32 years I've never had *Sclerotinia* on any field where I've planted certified seed."

He is convinced that buying certified seed is the first and most important step towards keeping soya bean fields free of *Sclerotinia*.

Going forward

More research is needed to effectively manage this dreaded disease, with a special focus on the breeding of more resistant cultivars, biological control agents and integrated disease management systems. 🌱