FACTSHEET 19/15
Field Vegetables

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Management of sclerotinia in vining peas and green beans

Sclerotinia disease, caused by the fungus *Sclerotinia sclerotiorum*, is a recurring problem in the UK. The disease has a host range of more than 400 plant species, including many vegetable and arable crops such as carrots, lettuce, green beans, vining peas, potatoes and oilseed rape. Winter field beans are not infected by *S. sclerotiorum* (they are susceptible to *Sclerotinia trifoliorum*), so they can be used as a break crop in fields where there are problems with *S. sclerotiorum*. The risk of sclerotinia infection varies across regions and seasons, and major outbreaks may be difficult to predict. As well as plant loss, vining pea and green bean produce may be contaminated with sclerotia (long-lived resting bodies), which are difficult to remove during processing. Foliar fungicides can be very effective against sclerotinia, provided they are applied at the correct time, before infection occurs.

Plants can be affected either individually or in small patches in the field, usually noticed at early to mid-summer when conditions are suitable. Infected stems become covered in white mycelium and may collapse, often bleaching as they desiccate with upper plants wilting and dying (Figure 1). Stems and pods may also contain sclerotia that develop on or within diseased tissue (Figure 4). These are frequently found as contaminants in fresh and frozen produce following years when infection has been severe (Figure 6).

The broad range of crops that are susceptible to *S. sclerotiorum* lead to a build-up of the pathogen within the rotation and losses generally relate to the extent of infection. However, in green beans and vining peas there is zero tolerance for infection as the entire crop may be rejected if contamination with sclerotia is found.


Figure 1. Sclerotinia white mould on pea plant


Figure 2. Sclerotinia infection on pea pods


Figure 3. Sclerotinia infection on green bean pods


Figure 4. Sclerotia of *S. sclerotiorum* inside a stem

Action points

- Identification – look for white mycelial growth on vining pea and green bean stems and pods. Stems may collapse, often bleaching as they desiccate, with upper parts wilting and dying. Stems and pods may contain black resting bodies (sclerotia) that develop on or within plant tissue. Disease spreads rapidly in warm, wet conditions.
- Impact – infection may result in plant and yield loss, and losses are related to the extent of infection. In vining peas and green beans, there is the risk of contamination of fresh produce by sclerotia and rejection of crops at the factory. If susceptible crops, which include peas, green beans, Brassicas and other vegetables, are continuously grown in the rotation, the pathogen builds up to damaging levels in the soil.
- Cultural methods of control and best practice for disease reduction – include at least one non-host crop in the rotation in five years to reduce pathogen build-up in the soil. However, it is better to include more than one non-host crop in the rotation.
- Chemical control and best timing – apply fungicides when optimum conditions for sclerotial germination and infection are present (moist soil conditions and temperature 15–18°C) during flowering and up to first pod set. Select products that give good control of sclerotinia (Tables 1 and 2).

Description and life cycle

Sclerotinia has two key phases of the life cycle that influence crop infection levels: sclerotia in soil and airborne spores, produced when sclerotia germinate to produce mushroom-like fruiting bodies (apothecia) in spring (Figure 5). Most sclerotinia inoculum originates within the field and is generated from the sclerotia produced in infected plants, which can survive in soil for several years. Sclerotial germination occurs when soil conditions are moist and temperature is 15–18°C. At soil depths of up to 2cm, apothecia can extend from the sclerotia to reach the soil surface. One or more apothecia can emerge from a single sclerotium and apothecia produce ascospores over a period of several days, infecting the upper parts of plants including the petals. Conditions for ascospore infection are when relative humidity is at least 80% for 23 hours, and temperature at least 7°C. As petals fall during wet weather, they stick to pods and stems, initiating infection in these areas.

The airborne ascospores released by the apothecia from germinated sclerotia are small enough to be dispersed in air over long distances, but significant numbers of ascospores are rarely seen more than 150–200m from a source. It is likely that spore inoculum arrives mainly from adjacent fields and seldom from further afield. However, large numbers of sources may collectively result in an important regional background of spores in the air. It is likely that a reservoir of sclerotinia inoculum is also maintained on common wild plants eg giant hogweed (*Heracleum mantegazzianum*) and cow parsley (*Anthriscus sylvestris*).

S. sclerotiorum infection produces a white mould that forms cottony mycelium on the surface of infected plant tissue (Figure 1). The hyphae produce compounds that create water-soaked lesions. Symptoms such as wilting and bleaching may be observed on plant tissue as the lesions enlarge.

As the disease develops, the hyphae of the pathogen form small clumps of mycelium (Figures 2 and 3) which mature into the hardened black sclerotia. These may be found on the outer surface of the diseased tissue, or inside pods and stems (Figure 4). Plants may die due to infection and produce may be contaminated with sclerotia (Figure 6).

Figure 5. Apothecia of *S. sclerotiorum*

Figure 6. Sclerotia contamination in vining peas

Figure 7. Life cycle of sclerotinia

Management and control

The challenge for vining pea and green bean growers in the UK is to improve the timing of fungicide applications for sclerotinia disease and reduce unnecessary treatments.

Chemical control and best timing

Infection by sclerotinia is the result of key criteria, such as suitable weather and presence of inoculum, occurring at the same time. Vining peas and green beans have a relatively short flowering period compared to other susceptible crops, allowing for a single fungicide application during flowering. Sclerotial germination, crop growth stage, airborne spore levels and weather conditions conducive for infection are monitored during the season for oilseed rape, which is host to the same species of sclerotinia as vining peas and green beans. This provides useful information for decisions on spray timing, and guidance about the risk of sclerotial germination and infection events in other crops (cereals.ahdb.org.uk/monitoring/sclerotinia/sclerotinia-risk-report.aspx). Products that will control *S. sclerotiorum* in vining peas and green beans are listed in Tables 1 and 2.

Cultural and rotational control

Sclerotinia survives in the soil as sclerotia for up to 10 years, so a high level of inoculum built up in the soil in one crop can have a significant impact on subsequent susceptible crops in a rotation. Continuous cropping of susceptible host crop species in the long term will result in substantial financial losses and a build-up of sclerotia in land, with major losses to be expected after four or five years. Including one non-susceptible crop in the rotation will reduce build-up of sclerotia in soil and improve financial returns. For soils with moderate to high levels of sclerotinia sclerotia, the best strategy is to include more than one non-susceptible crop in the rotation. The combination of rotation with a non-susceptible crop and fungicide treatment will give the best effectiveness in minimising disease infection.

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Table 1. **Fungicides approved in vining peas that will control *Sclerotinia sclerotiorum***

Active ingredient	Product	Harvest interval
Azoxystrobin	Various (including Amistar)	14 days
Cyprodinil + fludioxonil	Button, Clayton Gear, Reversal, Switch	14 days

Table 2. **Fungicides approved in green beans that will control *Sclerotinia sclerotiorum***

Active ingredient	Product	Harvest interval
Azoxystrobin	Amistar, Life Scientific Azoxystrobin (Extensions of Authorisation for Minor Use)	7 days
Cyprodinil + fludioxonil	Button, Clayton Gear, Reversal, Switch	14 days (28 days if harvested dry)