JUNE 2018

SCLEROTINIA ROT OF GREEN BEANS

Source: The Ohio State University.

Sclerotinia rot, also known as white mould, is one of the major diseases of green beans in Australia. It is caused by the fungus *Sclerotinia sclerotiorum*. Sclerotinia rot can cause significant yield losses during the cropping season as well as post-harvest damage.

Sclerotinia can survive in the soil for more than five years and has a wide host range (e.g. beans, lettuce, carrots, potatoes), which makes control of the disease a challenge.

IDENTIFYING SCLEROTINIA

Sclerotinia can induce a variety of distinctive symptoms including yellowing, water-soaked lesions and collapse of bean pods, followed by the appearance of fluffy white fungal threads studded with black resting bodies of the fungus, called sclerotia (figure 1). Sclerotia are irregular in shape, up to 1–1.5cm long and resemble rat faeces[1].

Sclerotia can also form inside stems, flowers and fruit of affected plants.

Figure 1. (a) Fluffy white fungal growth and (b) black resting bodies (sclerotia) on bean pods infected with sclerotinia. **Source:** John Duff, Qld Primary Industries and Fisheries Primary Industry and Fisheries

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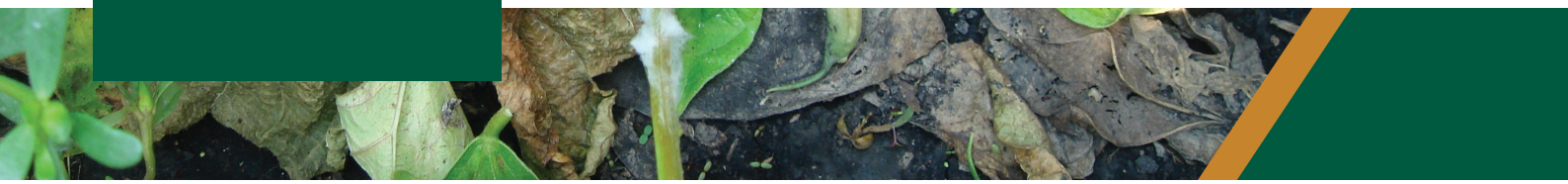

MANAGEMENT OPTIONS

There are a variety of options for Sclerotinia management in green beans including conventional disease control, such as application of fungicide, or cultural control practices – such as crop rotations, that aim to reduce favourable conditions for the disease.

Best practice guidelines for green beans, recommend that a combination of these strategies be used, i.e. integrated pest management approach[1]. When deciding which management strategies to use, consideration should be given to cost, sustainability, e.g. risk of chemical resistance developing, and any adverse effects to the user environment or other crop management systems.

Current options available for Sclerotinia control in green beans include:

Chemical control

- Only fungicides that are registered or have a current permit for use can be used to control Sclerotinia in green beans
- Currently there are limited products available. At the time of printing (April, 2018) Switch™ (cyprodinil + fludioxinil) and Filan™ (boscalid) were registered for Sclerotinia control in green beans, however APVMA (www.apvma.gov.au) should be consulted for the most up-to-date information. Product labels should always be carefully read and followed
- Application timing is critical (see figure 3). Switch™ and Filan™ at flowering have been shown to reduce Sclerotinia by more than 80%[2]
- Relying on the one chemical group can increase the risk of resistance, therefore rotating products that are from different chemical groups is encouraged. Further information on fungicide activity group tables see Crop Life Australia (www.croplife.org.au)
- In situations of extreme disease pressure, application of soil fumigants may be used although consideration should be given to user safety and the negative impacts of soil fumigants, e.g. death of beneficial soil microorganisms.

Cultural control options:

- Increasing plant spacing or selecting varieties with less dense canopies to promote good air circulation around plants and reduce humidity will reduce Sclerotinia risk[2].
- Ensure a break of around four years between susceptible crop species, particularly in paddocks where crops were previously affected by Sclerotinia rot.
- Control broadleaf weeds such as shepherd purse (*Capsella bursa-pastoris*) and variegated thistle (*Silybum marianum*) as they are hosts for *Sclerotinia* and help it survive during fallow periods or crop rotations
- Plant biofumigant cover crops, e.g. mustard species, which release compounds into the soil that inhibit Sclerotinia growth
- Ploughing in cover crops ("green manuring") can increase organic matter which acts as a food source for good soil microbes. Large populations of good soil microbes can outcompete soil pathogens such as Sclerotinia and reduce their numbers in the soil[2]
- Research is continuing into biological products such as *Coniothyrium minitans* (Contans™) or plant derived produces (e.g. ECO-V), which may
- not provide complete control alone but are beneficial when used in integration with conventional control options[2]
- Avoid overirrigating, which can increase disease pressure, while still meeting the crop's water needs (see below for further details)

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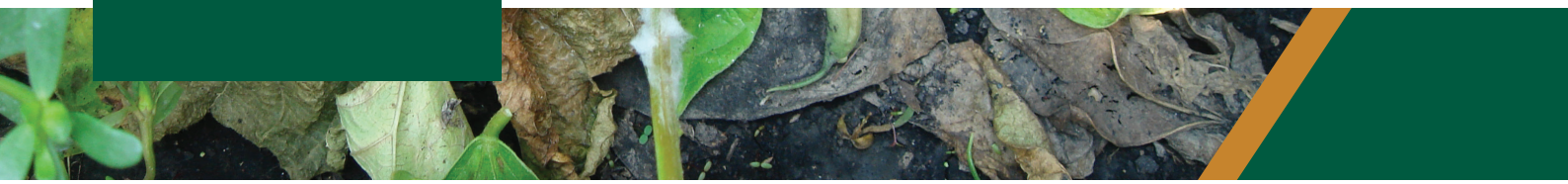
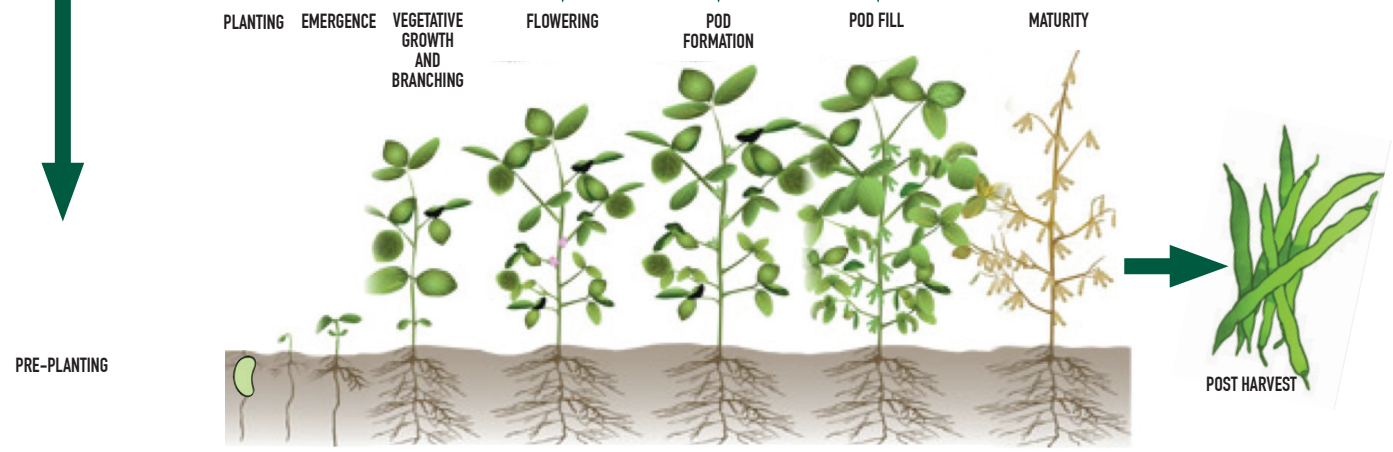


IMPORTANT IRRIGATION TIMINGS

Consider pre-plant irrigation to ensure adequate soil moisture in the profile. Monitor soil moisture at seedling emergence to ensure healthy even crop establishment. Avoid over-watering.

Water demands may be reduced in flowering and pod fill compared to the vegetative stage, but moisture stress at this time can severely limit yield. Over irrigation however, can increase risk of disease. Use soil moisture monitoring tools to help accurately schedule irrigation.



Soil fumigation pre-planting may be considered to reduce risk in extreme disease potential situations.[1]

HIGH RISK	1st Application	2nd Application	3rd Application
MEDIUM RISK		1st Application	2nd Application

Foliar fungicide applications from early flowering depending on risk of disease. Where multiple applications are required try to rotate the fungicide group used to minimise risk of resistance. Always follow label instructions for application details and withholding periods.

Soil fumigation maybe considered post harvest of a highly diseased crop.[1]

CHEMICAL CONTROL OPTIONS

Figure 2. In-crop management options for control of Sclerotinia in Green Beans

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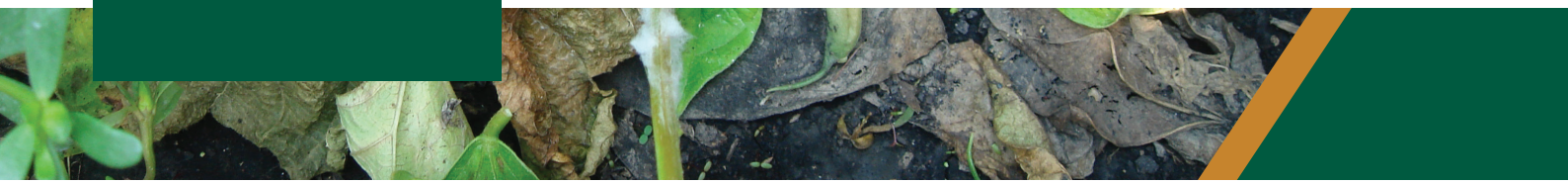

STRATEGIC IRRIGATION FOR SCLEROTINIA CONTROL IN GREEN BEANS

To maximise yield it is critical to ensure the water requirements of a green bean crop are met, particularly when environmental and crop demands (see figure 2) are high. Environmental conditions such as sunshine (length and strength), wind, humidity and temperature will all influence how much water is lost to the air from soil and plants - known as evapotranspiration (ET_o). Useful seven-day forecasts of ET_o are also provided by IrriSAT and The Yield.

ET_o however changes between crops and seasons and information that is relevant to your block– known as ET_c – can be obtained from satellite images which can also be sourced through IrriSAT.

Monitoring soil moisture can also help keep an eye on what is happening in your crop at peak water demand and to allow you to adjust irrigation following in-crop rainfall. Big technological advancements have taken place in this area such as real-time soil moisture data being sent directly to your smartphones or computers e.g. Wildeye.

By taking into consideration crop growth stage, ET_c and soil moisture more informed decision on when to irrigate and exactly how much to deliver can be made. This will ensure adequate water is available to the crop at critical development stages without heightening the risk of Sclerotinia through overirrigation.

Overirrigation may create conditions that increase incidence of Sclerotinia. Extended periods of water droplets on a plant increase the likelihood of infection and consequently the incidence of Sclerotinia is significantly increased when green beans are heavily irrigated[3].

Maintaining adequate plant available water in the top 30cm is particularly important for green beans as 80% of water requirements are extracted from this depth.

REFERENCES

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