IDENTIFICATION AND MANAGEMENT A OF FUNGAL DISEASE COMPLEX IN MELONS

PROJECT VM22001

WHAT IS GUMMY STEM BLIGHT

Gummy stem blight (GSB) disease affects melon crops and can result in significant yield impacts. The disease is caused by three different foliar-infecting fungal pathogens. These are *Stagonosporopsis citrulli*, *S. cucurbitacearum*, and *S. caricae* [1]. These three species were previously all known as *Didymella bryoniae*. In the USA, the predominant species causing disease is *S. citrulli* and *S. caricae* was reported as less aggressive in melons [1]. All three species are known to occur in Australia, and their relative importance to cause disease in melons is under investigation within this project.

What does it look like?

Typical symptoms of GSB are necrotic lesions on leaves, petioles, stems and the crown (Figure 1). Some lesions will produce a gummy exudate. Not all these symptoms occur in all disease outbreaks, and they can also occur with other diseases. For example, charcoal rot, caused by *Macrophomina phaseolina* and anthracnose caused by *Colletotrichum orbiculare*.

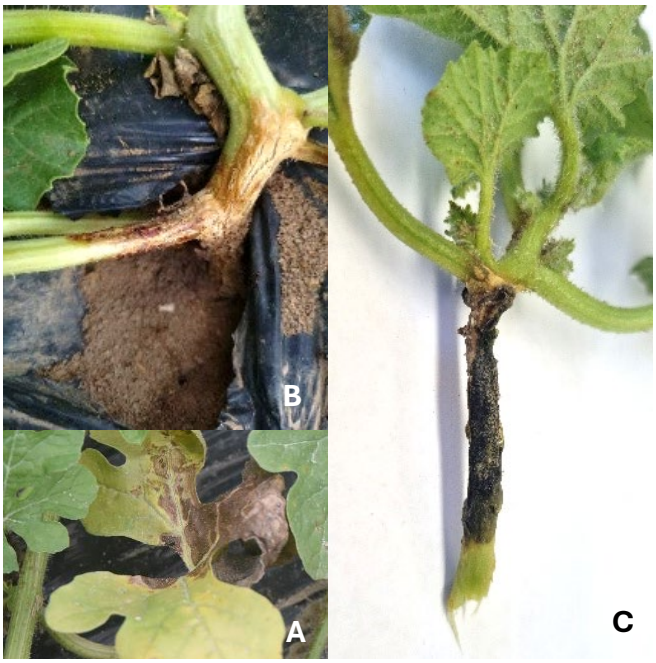


Figure 1. Typical symptoms of gummy stem blight disease in melon. (A) necrotic lesions are often seen on leaves, (B) stems and petioles which can have a gummy exudate, (C) early, severe infections of seedlings lead to plant loss.

Fungal fruiting bodies can be seen within the GSB lesions in some infections; however, these can be confused with microsclerotia produced by *M. phaseolina* (Figure 2a). A distinctive feature of the *Stagonosporopsis* spp. fruiting bodies (pycnidia) is the opening at the top of the fruiting body and the release of spores when water is applied (Figure 2b).

The pathogen also produces pseudothecia fruiting bodies which are almost identical to pycnidia in appearance but release spores into the air, not with water. Fruiting bodies of *C. orbiculare* are very distinctively different (Figure 2c).

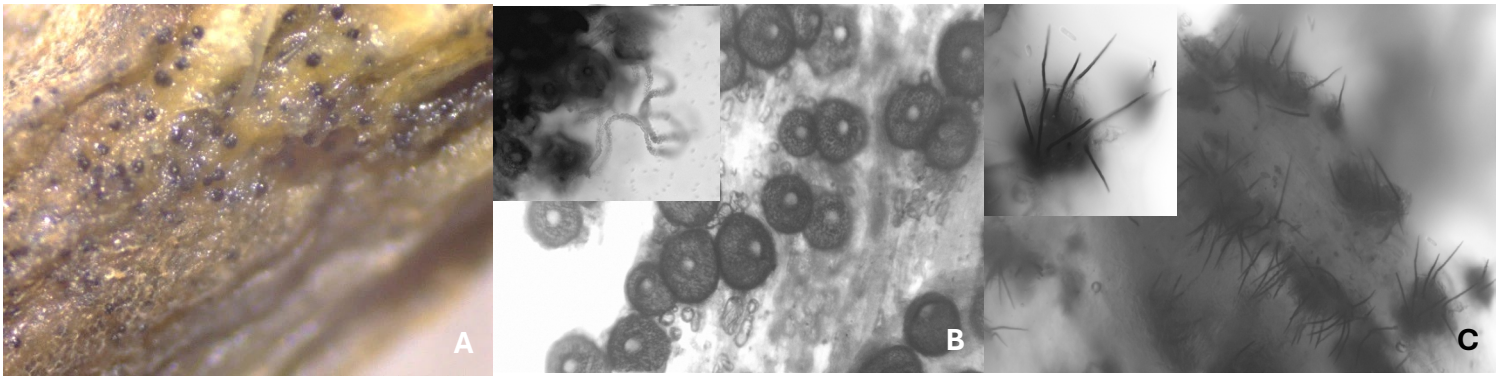


Figure 2. Photographs of fungal fruiting bodies (A) microsclerotia of *Macrophomina phaseolina*. (charcoal rot), (B) pycnidia of *Stagonosporopsis* spp. (gummy stem blight) showing the opening in the top and a chain of oozing spores and (C) the very distinctively different fruiting bodies of *Colletotrichum orbiculare*. (anthracnose)

Where does it come from?

Stagonosporopsis spp. are known to be seed transmitted in cucurbits [2,3]. As a result, GSB diseased seedlings are a high-risk source of the pathogen for disease outbreaks in new plantings. Several studies have identified crop debris as another important source and that infected crowns are a higher risk source than vines or leaves.[4,5]. *Stagonosporopsis* spp. can remain viable for at least 6 months in crop debris on top of plastic mulch. The effectiveness in removing previous crop debris will dictate how soon the block can be replanted with melons and how safe it will be to do so.

Agreco Australia field trials in Bundaberg, QLD, support these findings and provide further insight for replanting melon blocks [6] (Figure 3). Significant seedling mortality was observed when plastic beds were reused with no removal of the previous crop debris which was infected with both GSB and anthracnose. Within 3 weeks of planting 97.5-100% of the seedlings in the trial were infected and almost all were dead. By contrast, infection of seedlings in beds with new plastic and no surface crop debris was delayed, the plants survived well and were harvested. A separate trial showed a delay to planting of at least 2 months was effective to reduce seedling mortality and infection rates substantially when reusing plastic. After 2 months seedling mortality was down from about 100% to zero and infection rates were 50%. Allowing the crop debris to degrade naturally for a further month reduced the seedling infection rate further to only 9%. It is important to note that the high seedling mortality rate in these trials was a combination of gummy stem blight and anthracnose diseases.

Other sources of gummy stem blight and anthracnose in the field include volunteer cucurbit seedlings from previous crops and cucurbit weeds.

Figure 3. (A) gummy stem blight infection in reused plastic with crop debris, (B) healthy seedling in fresh plastic with no crop debris

How is it spread?

GSB is favoured by wet conditions which is needed for both initial infections and spread [7,8]. Periods of vine wetness of at least one hour will result in infections, with ongoing wetness resulting in more severe infections and spread. Although the optimum temperature for infection is reported to be 20 to 25 °C [9,10], the window for infection and disease development is much larger. Disease outbreaks are reported from 12 to 28 °C [8]. This means the high-risk conditions for GSB development and spread are periods of rainfall or heavy dews, particularly if combined with high humidity (i.e at least 85%). High humidity prolongs vine wetness thus increasing rates of infection and spread. Conversely, if the weather becomes dry and windy, GSB impacts will be lessened, especially if this is early in the crop life.

Spread of the pathogen between plants and production blocks can be via dispersal of spores in water or air. This spread only occurs after the formation of the fungal fruiting bodies on the outside of vine tissues (e.g leaves, stem or crown). New plantings near to older infected blocks are at risk of infection via this type of disease spread.

These weather patterns are also highly conducive to the development and spread of anthracnose disease in melons.

How do I manage GSB disease?

Management of GSB disease starts with minimising pathogen sources prior to planting to limit or prevent introduction into newly planted crops. The three key cornerstones to manage GSB are;

1. Use quality, disease free seedlings,
2. Manage crop debris prior to planting and
3. Strategic use of fungicides.

Integrated disease management in melons is essential given the overlap in conditions and disease sources between multiple pathogens including GSB and anthracnose.

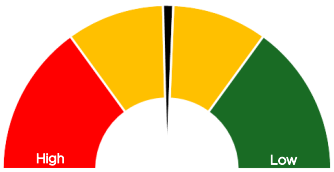
In Agreco Australia field trials there was no resistance or tolerance for GSB, or anthracnose observed between commercially available watermelon varieties.

Figure 4 illustrates the two major sources of GSB for new plantings. For example, where there are extended periods of vine wetness and infected seedlings or infected melons near to new plantings, disease development risk is high.

CUCURBIT CROP RESIDUES

Extended periods of vine wetness

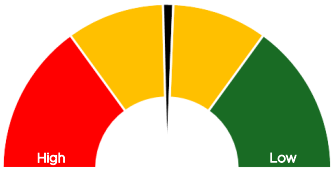
Intermittent periods of vine wetness



Extended periods of vine dryness

INFECTED SEEDLINGS

Extended periods of vine wetness



Intermittent periods of vine wetness

Extended periods of vine dryness

Figure 4. Gummy stem blight infection risk guide

References

1. Stewart, et al (2015). *Fungal Biology* **119**, 370–382
2. Sudisha, et al (2006). *Biological Control* **37**, 196–205
3. Lee, et al (1984). *Journal of Phytopathology* **109**, 301–308
4. Keinath, (2002). *Plant Disease* **86**, 32–38
5. Keinath, (2008). *Plant Disease* **92**, 1223–1228
6. Themsen, (2024). *Hort Innovation: **VM22001** Milestone report 105*
7. Arny, & Rowe, (1991). *Phytopathology* **81**, 206–209
8. Keinath, & Anco, (2025). *Plant Disease* doi:10.1094/PDIS-05-24-1083-RE.
9. Van Steekelenburg, (1983). *Netherlands Journal of Plant Pathology* **89**, 75–86
10. Sitterly, & Keinath, (2000). *Gummy Stem Blight*. https://www.apsnet.org/edcenter/apsnetfeatures/Pages/GummyStemBlight.aspx

Hort Innovation Strategic levy investment | MELON FUND

This project has been funded by Hort Innovation using the melon research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

agreco AUSTRALIA