Department of Primary Industries
primefact

Stem rot of rice

February, 2018, Primefact 1593, First edition
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Stem rot is a fungal disease found in rice. It causes black lesions commonly located around water level on the stem of the plant and is often first noticed around panicle initiation (PI).

Stem rot appeared in the MIA in 1995. A large number of farms were affected, but no major yield losses were experienced. In 2017 there was a similar occurrence, with a number of properties reported to have stem rot in the Finley area.

What is stem rot?

The stem rot detailed in this fact sheet is caused by *Sclerotium oryzae*. It is one of a number of organisms that can damage rice leaf sheaths and/or stems. Others are listed in the “Rice field guide to pests, diseases and weeds”.

What does the fungus do?

The fungus infects the leaf sheath, leading to leaf death and rotting of the stem. Severe infection can cause plant lodging, yield loss and/or grain chalkiness.

How do you know if you have stem rot?

Stem rot appears as black lesions (spots) around the water level on infected plants. Spots on stems are seen at the earliest around PI and are commonly observed when sampling for PI plant tissue testing (Figure 1).

Why can stem rot become severe?

Stem rot infects rice through sclerotia which are tiny (0.1 to 0.2 mm) black round structures produced by the fungus (Figure 2). They float on the water surface and germinate when attached to rice stems, with the fungus subsequently growing into the plant tissue. The sclerotia are produced soon after infection on the inside and outside of stems. Mature rice plants are a major source of sclerotia for infecting crops the following season, especially if the stubble is not burnt, a critical part of breaking the disease cycle (Figure 3).

Figure 1 Black spots observed on rice stems.

Figure 2 Stem rot symptoms observed closer to harvest (left) and sclerotia within a rice stem (right).

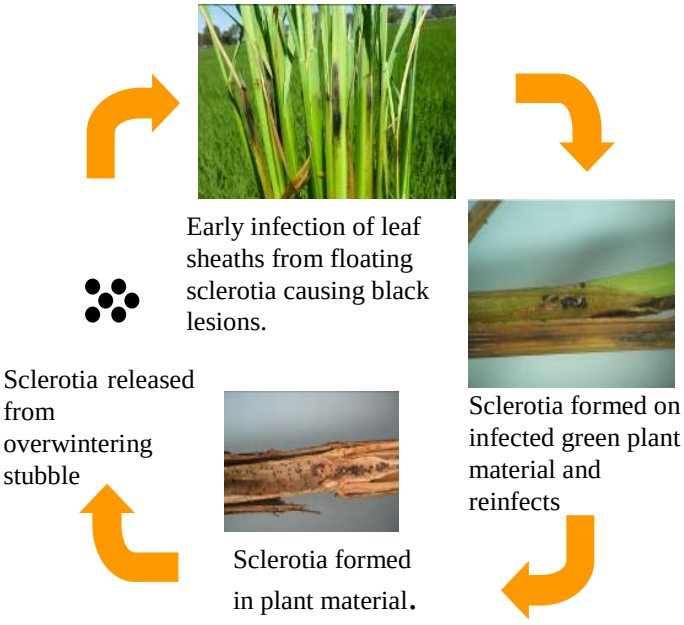

Figure 3 Cycle of infection of stem rot.

What needs to be done?

Careful surveillance of crops is important.

A combination of factors can make stem rot more serious.

1. Infected rice plants may go unnoticed in the earlier years of regularly cropped blocks i.e. the disease is not severe and not common through a block and is easily missed in normal surveillance.

2. Continuous rice cropping increases the chance of disease, especially if burning of stubble is poor between crops. Burning stubble may be difficult due to wet conditions and unburnt stubble can lead to lots of sclerotia being available for future crops.

3. If stubble is slashed before burning, sclerotia will be smashed out of the stems and onto the soil surface or into cracks in the soil. Burning is not hot enough to kill all sclerotia once they are on the ground.

4. Infected stubble that remains for a long period in a block that will be planted in the next year or two can act as a reservoir of sclerotia. A fallow where the rice remains the following season will still carry sclerotia. The sclerotia can fall out of the infected stems naturally or through the movement of stock and remain on the ground until the sowing of the next rice crop.

5. After harvest, if the fungus is present in the plant, it will continue to grow and produce more sclerotia.

6. Drainage water can carry sclerotia to new ground where rice may be grown in the future. Water collected from a bay with infected rice had approximately 15 sclerotia per litre of water. These sclerotia are not internal but are produced externally on stems. There are far more sclerotia produced internally.

7. Severity of the disease is simply related to the number of sclerotia present. The lower bays have more disease because of the water movement resulting in the presence of more sclerotia.

8. Greenhouse trials, although variable, indicate no differences between cultivars for tolerance to stem rot.

9. After cutting one metre square plots of rice with stem rot then removing and weighing grain from the panicles, found that yield losses were estimated to be 12%, but this was only in the worst affected areas. This is close to the 10% quoted as an estimate of yield loss previously.

10. Fungicides are commonly used to control fungal infections; however getting the fungicides through the canopy at a high water rate is difficult. In Australia there have been no trials to examine fungicide control of stem rot. This avenue of control of stem rot needs to be investigated in terms of efficacy and the potential cost benefit. Application at low volumes, e.g. by plane, would have minimal benefit on reaching the target site of infection at water level.

11. Low soil potassium levels increase disease incidence. Potassium levels need to be monitored and application considered. Overseas studies indicate application of

potassium is critical in reducing disease severity and increasing yield where potassium levels are low.

12. Stem rot doesn't infect crops other than rice. It is not the same as *Sclerotinia* species that cause stem rot in crops such as canola, beans, lettuce and cotton.

Other issues observed on rice stems in 2017.

There were other stem symptoms seen on rice in 2017. Two diseases causing sheath spots by the pathogens *Rhizoctonia* and *Waitea* were observed. More information on both of these diseases are in the "Rice Field Guide to Pests, Diseases and Weeds in Southern NSW" and are shown in Figure 4. All the diseases on rice leaf sheaths and stems are very similar and early observation of the diseases and their diagnosis needs to be confirmed in a laboratory.

Figure 4 Aggregate sheath spot (*Rhizoctonia*) (left) and early symptoms of sheath spot (*Waitea*) (right).

More information

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"Rice Field Guide to Pests, Diseases and Weeds in Southern NSW" (2014). Whitworth, R. and Lattimore, M. RIRDC, Canberra. http://www.dpi.nsw.gov.au/agriculture/broadacre-crops/summer-crops/rice-development-guides/field-guide

Acknowledgments

Part of this work has been funded by RIRDC.

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ISSN 1832 6668