Section 2. Bacterial diseases

Chapter 5. Stem disease

Stem necrosis is the only bacterial stem disease reported in the literature. However, this disease is not limited to the main culm but causes damage on the upper portions of the culm including rachis and panicle axis also. The destructive effects of the disease, however, are on the stem or culm.

1. Stem necrosis (StN)

StN was reported in New South Wales, Australia, in 2003 (Cother et al 2004). The causal bacterium, *Pantoea ananas*, was previously suspected to occur in Australia although its presence was not confirmed until Cother et al (2004) provided a comprehensive report of the disease. StN has not been considered a serious disease of rice in Australia but is of interest for plant quarantine purposes.

1.1. Symptoms

According to Cother et al (2004), the symptoms, in the form of necrotic lesions, initially appear on the neck region of the panicle (**StN Figure 1**). The discoloration extends from the rachis and stem or culm, the flag leaf sheath, and stops at the second node. Some of the affected stems, the flag leaves, show a light brown to yellowish lesion on the collar along one side of the leaf blade. The lesion is usually darker at the panicle base where the first primary branch of the panicle arises. In most affected plants, the lesion usually reaches half way of the panicle axis. In severely affected stems, the top node was black with uniformly brown tissue on either side (Cother et al 2004).

On infected stem, fine "mottling" of brown and green tissue below the top node is also observed.

Infected stems are weaker and easily break at the second top node when the panicles are pulled. In many infected plants, dark brown to black lesions are observed on the entire leaf sheath. The infection normally affects the entire panicle of a tiller, but neighboring tillers may not show any symptom.

1.2. Causal organism

Stem necrosis is caused exclusively, thus far, by *Pantoea (formerly Erwinsia) ananas* Serrano (Cother et al 2004). However, it appears to be a common epiphyte and is commonly isolated from the rice plant and even from the brown plant hopper (Watanabe et al 1996). The same organism is responsible for the disease, panicle palea browning (dealt in Section 2, Chapter 4) wherein the bacteriological characters of the bacterium is presented in detail.

The colonies of *P. ananas* on King's medium B are off-white to yellow and the fatty acid similarity index is 0.88-0.95. The bacterial cells are positive for indole but negative for phenylalanine deaminase.

Although the bacterium has been isolated from rice seeds in the tropics (Cottyn et al 2001), the stem necrosis syndrome has not been observed or reported in other countries.

StN Fig. 1. Symptoms on rice caused by *Pantoea ananas*: (a) necrotic stems (arrow); (b) light brown, moist lesions not observed to extend below the second node; (c) necrotic rice stems showing (i) blackened top nodes, (ii) lesion on flag sheath leaf; (d) area of affected rice, cv. Amaroo at Whitton NSW prior to harvest; (e) stem lesions on cv. Amaroo (Cother et al 2004).

References

Cother, E. J., Reinke, R., McKenzie, C., Lanoiselet, V. M., Noble, D. H. 2004. An unusual stem necrosis of rice caused by *Pantoea ananas* and the first record of this pathogen on rice in Australia. Australasian Plant Path. 33:495-503.

Cottyn, B., Regalado, E., Lanoot, B., DeCleene, M., Mew, T. W., Swings, J. 2001. Bacterial populations associated with rice seed in the tropical environment. Phytopathology 91:282-292.

Watanabe, K., Kawakita, H., Sato, M. 1996. Epiphytic bacterium, *Erwinia ananas*, commonly isolated from rice plants and brown planthoppers (*Nilaparvata lugens*) in hopperburn patches. Appl. Entom. and Zoo. 31:459-561.