Jan 19 Pathogen of the month – Jan 2019

Pratylenchus zeae (Graham, 1951)

Fig. 1. (a) Juveniles and adults of *P. zeae* b) Eggs of *P. zeae* and adults (c) Reddish- purple lesions caused by *P. zeae* on sugarcane roots (white arrows).The nematodes in (a) and (b) were suspended in sterile water.

Common Name: Root lesion nematode (RLN)
Disease: Root lesion
Classification: K: Animalia P: Nematoda C: Secernentea O: Tylenchida F: Pratylenchidae

Pratylenchus zeae is one of the most important nematode pests of sugarcane (*Saccharum officinarum* L.) worldwide. It is one of the factors contributing to the yield decline syndrome of sugarcane and one of the reasons many Australian growers have changed from continuous monoculture to crop rotation. In 2016-17, Australia's estimated production was 4804 Kt of the total world production of 178 Mt of sugar. *P. zeae* probably caused yield losses of 5-10% in Australia and similar losses in most other cane-growing regions of the world.

Biology and Ecology:

With a body length ranging between 0.36-0.58 mm, *P. zeae* reproduces by parthenogenesis where adult females lay eggs within roots of a host plant. The nematode reproduces within a temperature range of 20-35ºC. All stages from J2s to adults are vermiform and motile, can leave and enter roots, and feed from host cells using their mouth stylet (approx. 15-17 µm in length). Below ground symptoms are the characteristic reddish-purple lesions on young roots which later turn brown to black. Necrosis and destruction of fine roots contribute to the reduced root mass. Above-ground symptoms can be hard to distinguish, but are premature leaf yellowing and stunting leading to reduced stalk mass. In addition, root cell damage caused by *P. zeae* aids the entry of bacteria and fungi that exacerbate other root diseases.

Impact:

About 440 000 ha of sugarcane is grown between Mossman (Qld) and Grafton (NSW). In fields where infestation levels are greater than 2,000 *P. zeae*/g root, root biomass and length of the sett root system are significantly reduced and primary shoot growth is affected.

Distribution:

P. zeae has been found in many tropical and sub-tropical graminaceous crops worldwide. It is widespread in Australasia e.g. on sugarcane in Pacific Islands and Australia and maize in Papua New Guinea.

Host Range:

P. zeae has a wide host range but grasses such as sugarcane, maize, rice and forage sorghum are the best hosts. Grassy weeds such as *Brachiaria decumbens* (Signal grass), *B. brizantha, Digitaria insularis, D. horizontalis and Rhynchelytrum repens* are also good hosts. They aid in its survival and increase populations in soil.

Management options:

Currently, most commercial varieties of sugarcane are susceptible to *P. zeae.* Non-volatile nematicides have been used as control measures in the past but are relatively ineffective. Rotation with crops that are poor hosts (e.g. legumes such as soybean and peanut), reduce nematode numbers in soil for 6-12 months. In addition to crop rotation, controlling traffic, retaining crop residues and reducing tillage improve soil health and help reduce losses from root-lesion nematode. Soil fumigation is effective but is too expensive to use on sugarcane. Some *Erianthus arundinaceus* clones, generated from crosses between *Erianthus* (a genus within the *Saccharum* complex) and sugarcane, are moderately resistant to *P. zeae* and could be useful in future sugarcane breeding programs.

Further Reading: Australian Sugarcane August-September (2015) 19 (4): pp14; Bellé et al. (2017). Planta Daninha, 35, e017158528; Blair and Stirling (2007) Aust J Exp Agric, 47, 620–634; Stirling (2008) Australasian Plant Pathol 37: 1-18; Stirling (2017) http://dx.doi.org/10.19103/AS.2017.0035.24; Stirling and Blair (2001) Proc. Int. Soc. Sugar Cane Technol., 24: 430-433; Stirling et al. (2011) Proc Aust Soc Sugar Cane Technol 33: 1-8; Stirling et al (2010) Proc. Aust. Soc. Sugar Cane Technol. 32: 62-70; Stirling et al. (2012) Int Sugar J, 114 (1357): 30 -36;

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