PLANT AND SOIL NEMATODES

SOYBEAN CYST NEMATODE (*HETERODERA GLYCINES*), A PEST THAT IS NOT PRESENT IN AUSTRALIA BUT IS A SERIOUS THREAT TO SOYBEAN AND OTHER LEGUME CROPS

Soybean cyst nematode (*Heterodera glycines*) is found in most soybean-growing areas of the world but has not been detected in Australia. This nematode is a serious threat to Australia's soybean industry and can also attack several other cropped legumes.

Distribution and economic importance

Soybean cyst nematode (SCN) is believed to have originated in north-eastern China. It was reported in the North America in 1954 and has since spread to nearly all areas where soybean is grown in the United States and Canada. It is also found in most other soybean-producing countries around the world, including Argentina, Brazil, Chile, Columbia, Ecuador, Egypt, Indonesia, Iran, Japan, Korea, Taiwan, and Russia. SCN is considered the most damaging pest of soybean worldwide, causing annual losses of US$1.2 billion in the United States alone. Other crops that may be damaged by SCN are adzuki bean, common bean, cowpea, common vetch, field pea, hairy vetch, lupins, mung bean, and pigeon pea.

Symptoms

Stunting (i.e. reduced plant size) and chlorosis (i.e. leaf yellowing) are the main aboveground symptoms of SCN, but patchiness, poor canopy closure, plant dieback, early plant death and smaller seed size are other signs that the nematode may be present. However, significant yield loss sometimes occurs when no aboveground symptoms are apparent. Symptoms observed belowground include stunted, dark coloured roots and reduced formation of nitrogen-fixing nodules.

Life history

The life cycle of SCN commences when second-stage juveniles hatch from eggs and use root exudates from a host plant to locate a host. The juveniles penetrate a root, establish a feeding site, become sedentary, and then develop to the adult stage. Adult females become lemon shaped and protrude from the root. After fertilisation, the female produces 200 to 600 eggs, with the eggs that are laid in a gelatinous material outside the root hatching quickly to commence another life cycle. The female's body then becomes a tanned cyst and about two -thirds of the eggs are retained within the cyst. The cyst protects the eggs from desiccation, predators, and harsh environmental conditions, and enables the eggs to survive for many years in the absence of a host plant. A paper by Mahecha-Garnica et al. (2022) has some excellent photographs showing various stages in the life cycle of the nematode, and the symptoms produced by SCN.

Biosecurity measures

SCN is most likely to be introduced into Australia on infested soil and plant material. If you have visited overseas farms where SCN may be present, discard your footwear before returning to Australia. If you suspect SCN may be present at a particular location, contact biosecurity authorities in your state. If you are a soybean grower, ensure that all staff are aware of the threat imposed by SCN, establish an on-farm biosecurity program, monitor crops regularly, and purchase seed from reputable suppliers.

Further reading

Mahecha-Garnica S, Ye W, Schumacher LA, Gorny AM (2022) Soybean cyst nematode of soybean: A diagnostic guide. *Plant Health Progress* 23, 507-513.

Peng D (2022) Status of soybean cyst nematodes and integrated management in China. In Sikora RA, Desaeger J, Molendijk LPG (Eds.) Integrated Nematode Management. State-of-the-art and visions for the future, Chapter 16, 111-116

Sikora RA, Claudius-Cole B, Sikora EJ (2018) Nematode parasites of food legumes. In Sikora RA, Coyne D, Hallmann J, Timper P (Eds.) Plant parasitic nematodes in subtropical and tropical agriculture. Chapter 9, 290-345

Tylka GL (2022) The soybean cyst nematode: Pervasive and destructive to soybean production in the mid-western United States. In Sikora RA, Desaeger J, Molendijk LPG (Eds.) Integrated Nematode Management. State-of-the-art and visions for the future. Chapter 17, 117-124.

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