



Helping nematode challenge through varieties

WORK IS UNDERWAY TO BETTER UNDERSTAND HOW DIFFERENT VARIETIES RESPOND TO THE COSTLY PROBLEM OF NEMATODES.

Plant parasitic nematodes (PPN) have been estimated to cost the Australian cane industry at least \$80 million per year, and could cause yield loss of 10 percent in plant cane and 7 percent in ratoons.

One of the biggest culprits for restricting cane production is root-knot nematode, especially in sandy soil. This nematode attacks the growing root tips by developing galls that shorten the roots, which reduces the capacity of the plant to uptake water and nutrients.

Nematodes are also very difficult to control.

Extensive research over decades has refined management strategies that can help growers minimise the effects of nematodes, especially regarding improved soil health (see breakout box). Unlike some other sugarcane diseases, there is no varietal resistance to root-knot nematodes.

In addition to refining management strategies, SRA researchers Dr George Piperidis, Mr Roy Parfitt, Dr Fengduo Hu and Dr Shamsul Bhuiyan have looked at the nematode challenge from a different angle. They have examined sugarcane introgression clones, which are produced by hybridising wild relatives of sugarcane and commercial varieties, and assessed how these clones respond to nematode pressure, and if there are opportunities to assist with the problem through plant breeding.

Previous research overseas, and now for the first time in Australia, has confirmed the potential for wild relatives of sugarcane to offer resistance to nematodes says Dr Piperidis, Principal Scientist, SRA.

Breeders use introgression breeding techniques to bring in the good traits from the 'tougher' wild relatives into commercial varieties. In this case, the

trait is resistance to the costly industry problem of plant parasitic nematodes.

However, in order to harness and understand this potential, the industry requires a screening technique for nematode resistance.

According to Dr Shamsul Bhuiyan, Principal Researcher, Disease Management, a screening technique is important for providing useful information on nematode resistance with new and existing varieties. It also needs to be efficient and affordable for the industry.

The research started at SRA Woodford with glasshouse screening to assess introgression clones for nematode resistance. It then moved to verify the glasshouse results with field experiments.

The field trials ran for three seasons at Wallville with the help of Isis Productivity Limited and they showed introgression clones substantially reduced nematode in plant and ratoon crops (see graph).

"The results suggested that introgression clones are a novel source of nematode resistance and the glasshouse-screening trials can predict the field resistance of clones for root knot nematode," Dr Bhuiyan said.

"We also saw that the introgression clones are a valuable source of resistance to other important diseases of sugarcane such as smut and Pachymetra root rot."

This offers the potential to have a tool that will allow the industry to better understand the nematode resistance of new varieties that may make their way through the system as a result of introgression breeding.

He said the work also made interesting observations about existing varieties, some of which may have nematode resistance, although more work was needed to verify the results and to identify others that may offer resistance.

Better understanding of varietal response to nematodes offers potential for another management option for sugarcane growers.

This is especially important given the speed at which nematode numbers can increase, as they have a life-cycle of four to five weeks in warm conditions. ■

This research will be presented at the Australian Society of Sugarcane Technologists (ASST) conference in Toowoomba in May.

(Over page) Sugarcane roots affected by root-knot nematodes.

NEMATODE MANAGEMENT

- Monitor crops: a soil test which can confirm the species of nematode present can be arranged through your local productivity services group. Nematode counts are conducted at the SRA Tully assay laboratory.
- Avoid plough-out/replant where possible.
- Harvest plough-out blocks early to give a maximum break before planting legume crops.
- Include a legume rotation in your crop cycle. Soybean and peanut crops can reduce PPN numbers by 80-90 per cent.
- Ensure fallow crops are kept free of weeds and volunteer cane.
- Green cane trash blanket (GCTB). High populations of root lesion and root-knot nematodes re-establish if a trash cover is not maintained. GCTB provides a better environment for beneficial organisms such as free living nematodes and predators of PPN.
- Minimum tillage systems which preserve the trash blanket between crops to help minimise populations of PPNs. Tillage operations kill beneficial nematodes, allowing PPNs to quickly re-establish.
- A number of chemicals are registered for nematode control in sugarcane. These nematicides also kill natural nematode enemies, and only reduce nematode populations for a short period of time.

