

*A non-sterilising strain of Deladenus siricidicola - R. Zondag*

In the Northern Hemisphere several strains of the nematode *Deladenus siricidicola* occur in association with siricid woodwasps. Some strains cause sterilisation of the host females whilst others do not. In recent years a non-sterilising strain has been found in *Sirex noctilio* from North Auckland. Previously the only strain known to be present in New Zealand was one in which the juveniles penetrate the woodwasp eggs so that, when laid, they do not hatch into *Sirex* larvae.

The complex life cycle of *D. siricidicola* can only be completed when trees

51

succumb after *Sirex* females have oviposited. During this act the woodwasps deposit eggs (which may or may not be infected), and sometimes nematodes, a symbiotic fungus, and a toxic mucus. Both infected and non-infected females usually attack the same tree in one season.

In the wood nematodes become free-living. They feed on the symbiotic fungus, mature, mate, lay eggs, and multiply rapidly. Many generations of this free-living stage may follow and these are capable of moving through the tree, but when in the neighbourhood of a *Sirex* larvae they may develop into the insect-infective stage, females of which stage penetrate the skin of the *Sirex* larvae. The nematode then grows considerably in size and during pupation of the insect produces juveniles which invade the reproductive organs of the developing *Sirex*. When the adult *Sirex* emerge, the testes of the male contain many thousands of juvenile nematodes but the insect is not sterilised; in the female the ovaries also contain many nematodes which, depending on the strain involved, may or may not have penetrated the eggs.

The sterilising strain, discovered in 1962, can be found throughout forests in the North Island and is considered to have been an important factor in the decline of woodwasp numbers. More than 90% infection of emerging *Sirex* females has been recorded on many occasions. The nematode was not present in the South Island before 1967 but since then successful introductions have been made in several forests.

The non-sterilising strain of nematode was first discovered in 1971 in *Sirex* emerging from logs collected the previous year from a woodlot near Dargaville, and in 1973 it was found in females from Waipoua forest. Although present in the ovaries, the nematode had not penetrated the eggs. To determine whether a particular strain of *D. siricidicola* was responsible or whether a less susceptible strain of *S. noctilio* occurred in North Auckland, nematodes from Waipoua were reared on cultures of the symbiotic fungus and injected into nematode-free logs from the South Island. The eggs of the emerging *Sirex* were not infected although nematodes were present in the ovaries. This demonstrated that the strain of nematode was responsible. Similar results were obtained in Tasmania where Dr R. A. Bedding was sent samples of the North Auckland strain of nematode.

In 1974, dissection of females emerging from logs taken from *Sirex*-killed trees showed that the non-sterilising strain occurred at Aupouri, Glenbervie, Waipoua, and Waitangi forests, and in a woodlot at Kerikeri. The sterilising strain, although also present, was least prevalent in the *Sirex* from Waipoua and Kerikeri. *Sirex* emerging from forests in other regions were dissected but only the sterilising strain of nematode was found.

To examine the course of infection of the non-sterilising strain, *Sirex* larvae taken from North Auckland logs were reared in the laboratory and dissected during their pupal stage. Although only a few could be so examined it appears that the non-sterilising strain does not produce juvenile nematodes until after the *Sirex* eggs are fully developed and beyond the stage of penetration, whereas the juveniles of the sterilising strain are released by the parent nematode early in the period of insect pupation when the eggs are being formed.

Since the strain in North Auckland does not sterilise its host, it is particularly suited for survival when the *Sirex* population is low, while the sterilising strain depends for transmission on healthy and infected *Sirex* ovipositing on the same tree, an occurrence most frequent when *Sirex* numbers are high. The non-sterilising strain has no value for biological control, so at Waipoua inoculum containing the sterilising strain has been injected into *Sirex*-killed trees. The competitive relationship of the two strains is also being examined.