

Sirex woodwasp now in South Africa

By Dr. G. Tribe

Plant Protection Research Institute, Rosebank, Johannesburg

The *Sirex noctilio* woodwasp which is one of the most destructive pests of pine trees was discovered in Tokai plantation in April 1994. Originally a Eurasian and North African insect, it now also is to be found in Australasia and North and South America. Although 76 percent of the wasps are found in the winter rainfall regions surrounding the Mediterranean Basin, the rest occur in the temperate and cold axeric regions of Europe. The *Sirex* wasp shows a penchant for *Pinus radiata* which is a valuable timber and is the most widely planted of the pine species in the winter rainfall region of the Cape.

Just under 5,000 *Sirex* exit holes were counted in discarded logs in a clearfelled compartment of 44 year old *P. radiata* trees at Tokai. This figure could be doubled because several standing trees adjacent to this compartment were also riddled with *Sirex* exit holes. *Sirex* has most likely been present in South Africa a year or two before its discovery for such large numbers to be present from an insect which takes a year to complete its life cycle. The adult wasp lives only for about 5 days and immediately lays eggs, which means that there must be many infested trees in the area surrounding Tokai. That *Sirex* is well established has been confirmed recently by felling dying trees in that area and extracting live *Sirex* larvae. The wasp is expected to begin emerging in large numbers in December through to April with peak performance between January and March.

Follow-up surveys in the pine plantations of the south-western Cape have now revealed that *Sirex* is established outside the Cape Peninsular. Live *Sirex* larvae were extracted from 40 year old *P. radiata* trees which were felled in Jonkershoek, La Motte, Grabouw and Nuweberg plantations. *Sirex* exit holes were found in dead trees at Grabouw which indicates that the wasp had arrived there over a year ago. It is only now that these living trees have begun to show symptoms of *Sirex* attack, that they can be distinguished from the surrounding uninfested trees.

The *Sirex* woodwasp is an attractive steel-blue colour with four amber-coloured membranous wings and a pointed projection at the rear of her body which covers her egg-laying tube. The adult male is similar to the female but has a wide orange band on his abdomen. The wasps can vary considerably in size with a body length of 10 to 40 mm. They are strong fliers. *Sirex* larvae are creamy white with a distinctive dark spine at the rear of the abdomen and are found mainly in the sapwood.

The complicated life history of *Sirex* is most interesting. Wasps are attracted to the odour emanating from stressed pine trees 10 years or older. Once at a suitable tree the female wasp inserts her ovipositor through the bark into the wood and lays an egg. She then drills up to four more holes into the wood diverging from the original hole through the bark. Each hole usually contains an egg except for the final hole which is packed with mucus and fungal spores.

The mucus causes the pine foliage to wilt and creates ideal conditions for the spread of the fungus within the tree which stops the translocation of water and nutrients, causing the death of the tree. The fungus reduces the moisture content of the wood and supplies essential nutrients to the *Sirex* larvae. The *Sirex* larvae damage the wood but they do not kill the tree.

Two weeks after the *Sirex* egg is laid it hatches into a larva which begins tunnelling into the tree towards the heartwood before turning back to the outer layers of sapwood where it pupates. The adult wasp bores its way out of the tree leaving a characteristic round exit-hole which may vary in diameter according to the size of the wasp. Normally the life-cycle is one year but may sometimes be two years.

Control measures used successfully in Australia have involved the concurrent use of biological control agents and forest management (i.e. maximising the growth of healthy trees). Four parasitic wasp species were able to achieve a combined parasitism rate of 43 percent but the most important biological control agent was a parasitic nematode. This nematode occurs in two forms: a free-living form within the pine tree and a parasitic form which enters the *Sirex* larva and develops in the ovaries of the female wasp. *Sirex* females parasitised by the nematode become infertile and when attracted to a stressed tree that lay eggs full of nematodes. The nematodes also cannot survive without the presence of the symbiont fungus. The free-living nematode produces the parasitic form when *Sirex* larvae are encountered in the wood, and entering the larvae ensures that they become dispersed from one tree to another. Because numerous *Sirex* females may be attracted to a tree where they oviposit, the nematodes are able to infect healthy larvae which allows the nematode population to increase rapidly and become widely disseminated within the plantation.

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