Forest Threats

Sirex Woodwasp / Sirex noctilio

Tree Protection Co-operative Programme

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Insect pests

Sirex Woodwasp / Sirex noctilio

Sirex noctilio

SYMPTOMS

Pine needles wilt, turn yellow and then brown within a month after attack. Small resin droplets are visible on the bark of stems where the ovipositor penetrated. Larval tunnels can be observed in the sapwood – circular in cross section and tightly packed with a fine wood frass. When the adults emerge they leave perfectly circular emergence holes (3-10mm in diameter), which go through the bark and into the sapwood.

BIOLOGY

Research into the visual and olfactory cues involved with *Sirex noctilio* mating and host location has confirmed the strong phototactic response of emerging wasps and identified putative pheromones, both of which might contribute to the mating swarms observed above the tree canopy. This understanding, together with optimization of plant volatile (kairomone) lures, will enable researchers to develop more effective monitoring tools.

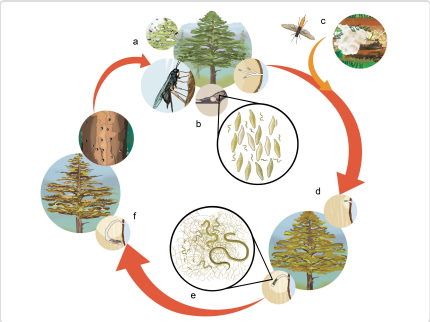
On finding a host, the female wasp drills into the wood with her ovipositer and inserts a toxic mucous and its symbiotic fungus *Amylostereum areolatum*; it is a combination of the mucous and fungus that kills the tree. If the tree is suitable for infestation, the female will also deposit eggs into the wood. The fungus *Amylostereum areolatum* decays lignin and cellulose in wood, releasing carbohydrates that are pressed as a liquid from the wood and ingested by developing larvae. Bacteria could contribute to cellulose digestion and most likely fix nitrogen for the larvae. Nitrogen is also limiting for the fungus but could be obtained from bacteria or through parasitism of the nematode. Such parasitism can potentially affect nematode population levels in the tree. The larvae leave the fungal colonized area during pupation, possibly to avoid parasitism (Slippers et al. 2015).

In South Africa, *S. noctilio* has a one-year life cycle. The adult flight season is from summer to early autumn, depending on the region.

MANAGEMENT

Silvicultural practices to increase vigour of trees, including thinning to remove the stressed and sub-dominant trees which are the primary host of *S. noctilio*. Biological control agents, namely the parasitic nematode *Deladenus siricidicola* and the parasitic wasp *Ibalia leucospoides*, have been released and can obtain high levels of parasitism.

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Stressed pine tree
Stress factors include physical damage, pests / diseases, competition and climate
Increased tissue permeability, and increased rate of monoterpenes and water lost through the bark
Attracts female wasp
Female wasp probes sapwood with ovipositor
Conditions suitable for oviposition (includes suitable moisture content and oleoresin pressure)
Mating and dispersal
Haplodiploid sex determination system; unfertilized eggs develop into males
Female Sirex carry mucus (in mucus gland) and asexual arthrospores of the fungus (in mycangia)
Male and unmated female search for stressed trees
Predisposes the tree to further attack
Conditions not suitable for oviposition
Multiple drill hole
With mucus, fungus and eggs
Single drill hole
With mucus and fungus
Symptoms
Foliar chlorosis and eventual tree death
Resin droplets and occasionally dead female wasps
Emergence of Sirex and sexual fruiting structures of fungus
Fruiting structures of fungus only observed in native range
Development of Sirex larvae and spread of fungus
Female larvae have external mycangia with fungal arthrospores