

SIREX WOODWASP: BIOLOGY, ECOLOGY AND MANAGEMENT

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ABSTRACT

Sirex woodwasp (*Sirex noctilio* F.) is an aggressive nonnative woodwasp that kills pine trees. In the southern hemisphere, it has caused up to 80 percent mortality in unthinned, overstocked pine plantations. In its native range of Europe, northern Asia, and the northern tip of Africa, sirex attacks mainly pines (e.g., *Pinus sylvestris*, *P. nigra*, *P. pinaster*), but it is rarely a pest (Spradbery and Kirk 1978). In the Southern Hemisphere, it has attacked many of the pines that are native to North America (e.g., *P. radiata*, *P. taeda*, *P. elliottii*, *P. banksiana*, *P. ponderosa*, *P. contorta*).

Sirex is expected to have one generation per year over most of North America, with adult emergence from July through September. Females lay eggs into the wood (up to 400 eggs per female) and also inject a fungus (*Amylostereum areolatum*) and toxic mucus during oviposition. Together, the fungus and mucus kill the tree, and sirex larvae feed on the fungus as they develop. Early symptoms of attacked trees include resin beads or dribbles at the oviposition sites, brown cambial staining, and green needles that reflex. Later symptoms include foliage that turns light green to yellow to red, larval galleries with tightly packed fine frass, and round exit holes that range from 3-11 mm in diameter.

Seven native sirex species occur in North America (*S. areolatus*, *S. behrensii*, *S. cyaneus*, *S. edwardii*, *S. juvencus*, *S. longicauda*, and *S. nigricornis*). However, there are some uncertainties with *S. juvencus* (may be Palearctic in origin) and *S.*

cyaneus (may be introduced to Europe). All of these species have conifers as hosts, with varying ranges of pine, spruce, fir, larch, and other conifers (Krombein et al. 1979). However, these North American species use a different species of fungus (*A. chailletii*) than *S. noctilio* (Bedding and Akhurst 1978).

Management of sirex can be accomplished through survey, silviculture, and biological control. Early detection is critical for successful sirex management. The National Strategy for Australia states that sirex should be detected before any compartment reaches 0.1 percent tree mortality (Haugen et al. 1990). Trap trees are a very efficient and effective monitoring tool in the southern hemisphere. Its application in North America will need to be tested due to the native bark beetles and woodborers that may compete for these trap trees. A detection trap may be feasible, but more research is needed on lures (i.e., host volatiles) and trap design. Silvicultural control by on-time thinning will need to be considered in pine plantations and dense fire-regenerated stands.

Another key to sirex management is a parasitic nematode (*Deladenus siricidicola*). It is highly density dependent and specific to woodwasps with the fungus *A. areolatum*. The use of this nematode for sirex control will be presented by Dr. Robin Bedding (See page 21). However, it is important to note that the North American sirex species also have parasitic nematodes (*Deladenus canii*, *D. nevexii*, *D. proximus*, and *D. wilsoni*), and these nematodes require the fungus *A. chailletii*

(Bedding and Akhurst 1978). Also for biological control, parasitoids have been introduced into sirex woodwasp populations in the southern hemisphere, and most are native to North America (e.g., *Megarhyssa nortoni*, *Rhyssa persuasoria*, *Rhyssa hoferi*, *Schlettererius cinctipes*, and *Ibalia leucospoides*), so parasitoid introductions for sirex management should not be needed in North America (Haugen and Hoebeke 2005). For the USDA Forest Service Pest Alert on sirex woodwasp, go to: www.na.fs.fed.us/fhp/sww/

Literature Cited

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