CONTROLLING *SIREX NOCTILIO* IN NORTH AMERICA: A NEW PARADIGM

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ABSTRACT

The *Sirex noctilio* woodwasp, a major pest of North American pines in southern hemisphere countries, recently has entered North America, and become established in the northeast. The spread of *Sirex noctilio* is expected to be rapid. If unchecked it will likely cause significant economic damage to paper and timber industries especially in the southeastern United States. Over the past 50 years, Australian researchers have developed a successful program to control *Sirex noctilio* in *Pinus radiata* plantations utilizing a European nematode, *Beddingia* (=Deladenus) *siricidicola*. We plan to adapt their program to control *Sirex noctilio* in North America, but there are significant differences in ecosystem complexity between North American coniferous forests and southern hemisphere exotic pine monocultures that necessitate further study before this exotic biocontrol agent can be released.

We summarize the differences between southern hemisphere pine ecosystems and North American coniferous forests in Table 1. In the southern hemisphere, there is a single exotic pine species, a single exotic woodwasp, and a single exotic fungal symbiont that helps the woodwasp larvae to feed. In North America, there are at least a dozen native genera of conifers, at least 35 native species of pines, approximately 20 species of native woodwasps, many native wood decay fungi that are associated with conifers, many species of parasitoid wasps and nematodes that attack woodwasps and probably hundreds of native and exotic insects that attack pines. Although, it is clear that the nematode is effective and host specific in simple Australian ecosystems, it is unclear what its nontarget effects might be in North America.

We propose several areas of research including taxonomy, host range testing for the woodwasp, fungus and nematode, interactive effects and fine-tuning different components of the control program such as detection traps, lures and nematode releasing systems (trap trees). Taxonomically, we face problems the Australians do not have to consider. They only have a single exotic woodwasp, whereas we have to differentiate the pest from 20 similar native species. We are in the process of developing a field guide to adult woodwasps and a DNA barcode key to identify larvae. Host range testing is also more complicated than in Australia because of our native diversity. Currently, we are studying the ability of the fungal symbiont to decay different conifer species, and the ability of the nematode to survive on native wood decay fungi. We are also testing interactions between host trees, fungal symbionts, nontarget insects and the nematode. We believe a control program utilizing the nematode is our best chance of successfully controlling *Sirex noctilio* in North America. Our goal is to ensure that it is also the safest.

Table 1.–Comparison of diversity in southern hemisphere pine plantations and North American coniferous habitats.

Southern Hemisphere countries	***North America***
Monoculture of exotic NA pine	Mixed coniferous forests
Single exotic pest, *Sirex noctilio*	20 native siricid species
Few, if any, pine-feeding insects?	Many native conifer-feeding insects
A few exotic parasitoids	Many native parasitoids
One exotic nematode	A few native nematodes
One exotic fungal symbiont	A few native fungal symbionts
Few native wood-decay fungi on pine	Many native wood-decay fungi on pine