THE SPREAD AND ESTABLISHMENT OF *SIREX NOCTILIO* AND *AMYLOSTEREUM AREOLATUM* IN NEW ENVIRONMENTS

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Siricids are frequently intercepted in packaging material and other forms of unprocessed wood. They are well suited to this mode of long range anthropogenic dispersal, because they are attracted to fresh wounds, are common at sites where wood is being harvested and subsequently occur in low grade timber often used for packaging. Their accidental movement is also enhanced by the fact that their larvae are cryptic and well protected deep inside infested wood. Their predisposition to spread in wood, coupled with the often weakly implemented quarantine regulations and the large volume of trade between the Northern and Southern Hemisphere, makes it surprising that only two Siricids, *Sirex noctilio* and *Urocerus gigas*, have spread to the latter region. Furthermore, our research into the population diversity of *S. noctilio* and its fungal symbiont, *Amylostereum areolatum*, indicates that these organisms were most likely introduced only once or a limited number of times from the same origin, after which they spread between countries in the Southern Hemisphere. These findings suggest that, while Siricids might be easily introduced to new environments, they do not establish as easily as might be supposed. Results of our research also illustrate the threat of invasive pests moving between countries of similar latitude, compared to that between the Northern and Southern hemisphere. As for other invasive organisms, barriers to establishment could include the presence of host plants in a given area, extreme seasonal or other environmental differences, barriers to the establishment of the symbiont or the presence of Allee effects due to small initial population sizes. An already established population of a pest such as *Sirex* in a new environment would, however, increase the chances of future establishments, as it might alleviate Allee effects and because a successful fungal genotype would already be present. Such additional introductions could seriously threaten biocontrol programs due to incompatibility between host-parasite genotypes and because it adds a layer of complexity to the control programs. In order to reduce the threat of new introductions and slow the outward spread from already established populations, renewed attention should be given to monitoring and eradication as an artificial measure to induce Allee effects, as has recently been shown for other invasive insects. This should be especially considered around potential points of introduction and around range margins of already established *Sirex* populations.

Bernard has a PhD in Plant Pathology from the University of Pretoria. He specializes in plant protection, mycology and insect-microbe interactions. A special interest is the ecology and evolution of pests and pathogens influenced by humans, i.e. when these organisms are introduced into new environments, or when pathogens and pests adapt to environmental changes caused by humans as in agriculture and forestry. Bernard first worked on the *Sirex-Amylostereum* symbiosis during his M.Sc. (completed in 1998), and subsequently returned to the topic during a postdoc at the Swedish University of Agricultural Research in 2003. Bernard is a senior lecturer in the Department of Genetics at the University of Pretoria, where he works within the Tree Protection Co-operative Programme (TPCP) in FABI. The *Sirex* research program, including research on the wasp, fungus and natural enemies, are among his main responsibilities. In this capacity he also serves on the South African National *Sirex* Steering Committee.

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