

# SIREX RESEARCH AND MANAGEMENT IN SOUTH AMERICA

Edson Tadeu Iede<sup>1</sup>, Susete Rocio C. Penteado<sup>1</sup>, and Wilson Reis Filho<sup>2</sup>

<sup>1</sup>Embrapa Florestas, Estrada da Ribeira,  
km 111, 83411-000 - Colombo, Paraná, Brasil

<sup>2</sup>EPAGRI, Estrada da Ribeira,  
km 111, 83411-000 - Colombo, Paraná, Brasil

## ABSTRACT

The European woodwasp, *Sirex noctilio* Fabricius, 1793 (Hymenoptera: Siricidae) is being monitoring and/or controlled on about 4.1 million hectares *Pinus* spp. plantations in South America's Southern Cone. Most of these stands consist of a small number of species that were planted at high density and have not received adequate forest management. These areas serve to enhance the natural spread potential of the pest, mainly in the Southern Cone where 75 percent of the species of *Pinus* (*P. taeda*, *P. radiata*, and *P. elliottii*) are susceptible to attack by *Sirex*. The other 25 percent are tropical pine species, which are also susceptible to attack by *S. noctilio*. When tropical species such as *P. kesiya*, *P. caribaea caribaea*, *P. caribaea hondurensis*, *P. caribaea bahamensis*, *P. oocarpa*, and *P. strobus chiapensis* were artificially exposed to attack by *S. noctilio* in Brazil, the insect demonstrated that it was able to attack successfully and complete its development in these hosts (DURAFLOA 1993).

In South America the insect was first recorded in *Pinus taeda* and *P. elliottii* stands at the Department of Cerro Largo in Uruguay in 1980. In 1985, it was detected in *P. taeda* stands in the Province of Entre Rios, Argentina and eventually dispersed to Corrientes (1993), Jujuy (1994), Misiones (1995), and Cordoba (1995) Provinces. In 1991, it was first detected in the Argentinian Patagonian Andes threatening stands of little economic significance but of strategic ecological importance. In Brazil, it was introduced in Rio Grande do Sul (1988), Santa Catarina (1989), Paraná (1996), São Paulo and Minas Gerais States (2005), and currently infests around 450,000 ha, most of it consisting of *P. taeda*. In Chile, the insect was first recorded in 2001.

In Brazil, *Sirex* life cycle is usually about 1 year in duration, but there is a short period or summer cycle that is completed in 3 to 4 months. This occurred in about 2 to 3 percent of the *Sirex* population (Reis Filho et al. 1998). The pattern of adult emergence varies considerably under different climatic conditions. In Brazil, adults emerge and attack trees between mid spring (October) and early autumn (April). The peak of emergence occurs between November and December, and the short life cycle between March and April (Carvalho et al. 1993, Iede et al. 1998). Longevity rate of adults varies from 5 to 12 days for males and from 4 to 5 days for females in the summer (Iede et al. 1988, Carvalho et al. 1993). Females lay around 212 eggs (Carvalho et al. 1993). The woodwasp population is found between 30 and 80 percent of stem length, in the medium third and in the lower half of the upper third of the stem (Penteado et al. 2000)

Monitoring and early detection are among the main preventive measures that have been adopted by all countries including Paraguay, where the pest is not present. Monitoring is conducted by using trap trees that have been stressed with herbicides and increase their attractiveness to the pest.

In the countries where *S. noctilio* is present, control measures are similar but enforced with different intensity. These measures include monitoring for early detection and dispersal of the pest, using trap trees; adopting preventive strategies such as silvicultural practices, i.e., thinning of overstocked stands, to improve their phytosanitary condition; adopting quarantine strategies to control and slow down dispersal; and introducing nematodes and parasitoids to increase the range of natural enemies.

Applications of the nematode *Deladenus siricidicola* have been conducted in 1988 in Uruguay, in 1989 in Brazil, in 1995 in Argentina (Iede et al. 2000a), and in 2001 in Chile. The nematode was obtained from the Forest Research Institute, New Zealand, in October 1987 for the introduction in Uruguay. The release was conducted in a 3,000-ha *Sirex*-infested pine plantation in Paysandu Department (State), and the parasitism level reached 35 percent in the first year. Another evaluation was conducted in 1994/95, in Soriano and Tacuarembó Departments, where the nematode had not been previously released; the parasitism level reached 67 percent in the Soriano Department and 53 percent in Tacuarembó. *Ibalia leucospoides* parasitism was 20 percent at Soriano and 18 percent at Tacuarembó (COSAVE 2001). In Brazil the first introduction of the nematode occurred in 1989-1990, using material obtained from CSIRO, Australia, but the strain that was introduced became defective. Two strategies were used to solve the problem: (1) buying and importing the Kamona strain re-isolated in Tasmania from CSIRO, Australia and released in 1995; (2) new strains re-isolated from the field in Brazil, where the nematode demonstrated good efficiency (mainly the Encruzilhada strain), probably due to adaptation to local conditions. New strains were re-isolated and released every year beginning in 1995. Every year the level of nematode parasitism is being evaluated and during 1999-2000, this occurred in seven monitoring localities. Parasitism varied from 17 to 65 percent, in four of the sites and parasitism levels were more than 92 percent in another three localities. In 2000-2001 in nine localities, the level of parasitism recorded varied from 65 to 80.5 percent in three locations and exceeded 91 percent at the other six sites. During this same period, at 68 company-owned farms, the average parasitism was 77 percent; 3,036 insects were evaluated in this study. In Argentina, the monitoring and control program started in 1993 when the insect was detected in San Carlos de Bariloche, Patagonian

Region. Initially, attempts were made to eradicate the pest, with trap trees and burning of *Sirex* attacked trees, but this was not successful. After the pest was detected in pine plantations from the Provinces (States) of Entre Ríos, Corrientes, Misiones, Córdoba, and Jujuy, the nematode *Encruzilhada* strain was imported from Brazil and released in 1995-1996. The nematode mass rearing laboratory is located in INTA (Instituto Nacional de Tecnología Agrícola) Montecarlo, Province of Misiones (COSAVE 2001).

*Ibalia leucospoides* (Hym.: Iballidae), a parasitoid of the woodwasp eggs and young larvae, was accidentally introduced together with the pest and is present throughout the infested area. It has an average parasitism of 23 percent (ranging from 4 to 45 percent) and a high capacity of establishment. In South America, *I. leucospoides* was first reported in Uruguay in 1984, attacking on average 24 percent of the *S. noctilio* population (Rebuffo 1988); according to Klasmer et al. (1998), in 1993-1994 the parasitism level reached 20 percent in Argentina. In Brazil, the parasitoid was detected in 1990, attacking up to 29.05 percent of the pest population (Carvalho 1993). *Ibalia leucospoides* was not released at any of these locations. However, in some cases, the companies did mass rear the parasitoid in the laboratory and later released them in the field with the objectives of introducing the parasitoid into areas where it was not yet present or enhancing parasitism rates.

In Brazil, the program is being complemented by the introduction of *Megarhyssa nortoni* and *Rhyssa persuasoria* (Hym.: Ichneumonidae), both imported from Tasmania, Australia. The introductions were made in 1996, 1997, and 2003, through a cooperative project of Embrapa Forestry, CSIRO, the International Institute of Biological Control (CABI-Bioscience), and the USDA Forest Service. At the moment the establishment of these species in the release areas has not been confirmed.

## Literature Cited

- Carvalho, A. G. 1993. **Aspectos biológicos de *Ibalia leucospoides* (Hockewarth), Hymenoptera, Ibalidae).** In: Conferencia Regional da vespa da madeira, *Sirex noctilio*, na America do sul. (1992: Florianópolis). Anais. Colombo: EMBRAPA/FAO/USA/FUNCEMA: 11-120.
- Carvalho, A.G.; Pedrosa-Macedo J.H.; SANTOS, H.R. 1993. **Bioecología de *Sirex noctilio* Fabricius, 1793 (Hymenoptera: Siricidae) em povoamentos de *Pinus taeda* L.** In: Conferência regional da vespa da madeira *Sirex noctilio* na América do sul (1992: Florianópolis). Anais. Colombo: EMBRAPA/FAO/USDA/FUNCEMA: 85-96.
- COSAVE. 2001. **Informe sobre a ocorrência de *Sirex noctilio* na região do COSAVE.** Comitê de Sanidade Vegetal do Cone Sul. Série Técnica. Relatório técnico 001/00. p.1-9.
- DURAFLOA. 1993. **Susceptibilidade de toras de pinheiros tropicais ao ataque da vespa-da-madeira, *Sirex noctilio* (Hymenoptera: Siricidae).** In: Conferência regional da vespa da madeira *Sirex noctilio* na América do sul (1992: Florianópolis). Anais. Colombo: EMBRAPA/FAO/USDA/FUNCEMA: 97-109.
- Iede, E.T.; Penteadó, S.R.C.; Bisol J.C. 1988. **Primeiro registro de ataque de *Sirex noctilio* em *Pinus taeda* no Brasil.** CNPF/Embrapa. Circular Técnica, 20: 1-12.
- Iede, E.T.; Penteadó, S.R.C.; Schaitza, E.G. 1998. ***Sirex noctilio* in Brazil: detection, evaluation, and control.** In: Proceedings of a conference: Training in the control of *Sirex noctilio* by the use of natural enemies, Colombo, Brazil: 45-52
- Iede, E.T.; Klasmer, P.; Penteadó, S.R.C. 2000a. ***Sirex noctilio* in South América:** distribution, monitoring and control. In: XXI International Congress of Entomology. Foz do Iguaçu, Pr. agosto 2000. . Embrapa Soja. Anais. Londrina-PR. 1: 474.
- Iede, E.T.; Penteadó, S.R.C.; Murphy, S.; Haugen, D.; Reis Filho, W. 2000b. **Introduction and release of rhyssines to control *Sirex noctilio* in Brazil.** In: XXI International Congress of Entomology. Foz do Iguaçu, Pr. agosto 2000. Embrapa Soja. Anais. Londrina-PR. 1: 460.
- Klasmer, P.; Fritz, G.; Corley, J.; Botto, E. 1998. **Current status of research on *Sirex noctilio* F. in the Andean-Patagonian region in Argentina.** In: Proceedings of a conference: Training in the control of *Sirex noctilio* by the use of natural enemies. Colombo, Brazil: 89-90.
- Penteadó, S.R.C.; Oliveira, E.B.; Iede, E.T. 2000. **Distribuição da vespa-da-madeira e de seus inimigos naturais ao longo do tronco de *Pinus*.** CNPF/Embrapa. Boletim-de-Pesquisa-Florestal. 40: 23-34.
- Rebuffo, S. 1988. La “Avispa de la Madera” *Sirex noctilio* F. en el Uruguay. Montevideo: Ministério e Ganaderia, Agricultura y Pesca, Dirección Forestal. 14 p. (Serie Protection Forestal)
- Reis Filho, W.; Iede, E.T.; Penteadó, S.R.C. 1998. **Biological aspects of *Sirex noctilio* F. (Hymenoptera: Siricidae) and its parasitoid *Ibalia leucospoides* (Hymenoptera: Ibalidae).** In: Proceedings of a conference: Training in the control of *Sirex noctilio* by the use of natural enemies. Colombo, Brazil. 61-65.