



Detection of pine woodwasp in *Pinus taeda* in São Paulo State, Brazil

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ABSTRACT: The woodwasp *Sirex noctilio* (Fabricius) (Hymenoptera: Siricidae) is one of the main pests of *Pinus* plantations in South America. The aim of this study is to report the occurrence of *S. noctilio* in *Pinus taeda* in Botucatu, São Paulo, Brazil. The surveys were carried out in the arboretum of Faculdade de Ciências Agronômicas (FCA) da Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), campus Botucatu, SP where six species of *Pinus* are distributed in blocks of 100 trees. Resin beads were observed on the trunks and stems of *Pinus* species. In post-flight evaluation it was reported that 8.77% of *P. taeda* trees showed symptoms of oviposition by *S. noctilio*. A female *S. noctilio* was found performing oviposition. *Sirex noctilio* is present in Botucatu, increasing the geographical distribution of the pest in São Paulo State.

Key words: *Sirex noctilio*, exotic pest, forest pest, occurrence, pine.

Detecção da vespa-da-madeira em *Pinus taeda* no estado de São Paulo, Brasil

RESUMO: A vespa-da-madeira, *Sirex noctilio* (Fabricius) (Hymenoptera: Siricidae) é uma das principais pragas de plantações de *Pinus* na América do Sul. O objetivo deste estudo foi relatar a ocorrência de *Sirex noctilio* (Hymenoptera: Siricidae) em *Pinus taeda* em Botucatu, São Paulo, Brasil. As pesquisas foram realizadas no arboreto da Faculdade de Ciências Agronômicas (FCA) da Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), campus Botucatu, SP, composto por seis espécies de *Pinus* distribuídas em blocos de 100 árvores. Respingos de resina foram visualizados nos troncos das espécies de *Pinus*. Na avaliação pós-revoada verificou-se que 8,77% das árvores de *P. taeda* apresentaram sintomas de oviposição por *S. noctilio*. Uma fêmea de *S. noctilio* foi encontrada realizando oviposição. *Sirex noctilio* está presente em Botucatu, ampliando a distribuição geográfica da praga no estado de São Paulo.

Palavras-chave: *Sirex noctilio*, praga exótica, praga florestal, ocorrência, pinheiro.

An important pine pest is the pine woodwasp, *Sirex noctilio* Fabricius, 1793 (Hymenoptera: Siricidae). This pest is native to Europe, Asia, and North Africa, and it has become a strong threat in the Southern hemisphere countries where it was introduced (IEDE et al., 2015). In South America, detections were recorded in Uruguay (1980), Argentina (1985), Brazil (1988), and Chile (2001), with records of high levels of pest population (ECHEVERRIA, 1986; MADERNI, 1998; CISTERNAS, 2007). In Brazil, the first record of *S. noctilio* was reported in Canela, Gramado, and São Francisco de Paula, in Rio Grande do Sul State in 1988 (IEDE et al.,

1988). This pest was reported in states of Santa Catarina, in 1989 (MENDES et al., 1993), Paraná, in 1994 (IEDE et al., 1998), and in São Paulo, in 2004, and most recently in Minas Gerais, in 2005 (IEDE & ZANETTI, 2007) (Figure 1). *Sirex noctilio* was reported in four municipalities as Itapeva, Itapirapuã Paulista, Capão Bonito, and Jundiá, in the state of São Paulo (IEDE; ZANETTI, 2007).

A female lays up to 226 eggs per female and the incubation period ranges from 14 to 28 days, and adult longevity varies between four to five days in Brazil (CARVALHO et al., 1993). After hatching, larvae begin feeding and they bore galleries close to the laying sites. The formation of pupae occurs inside

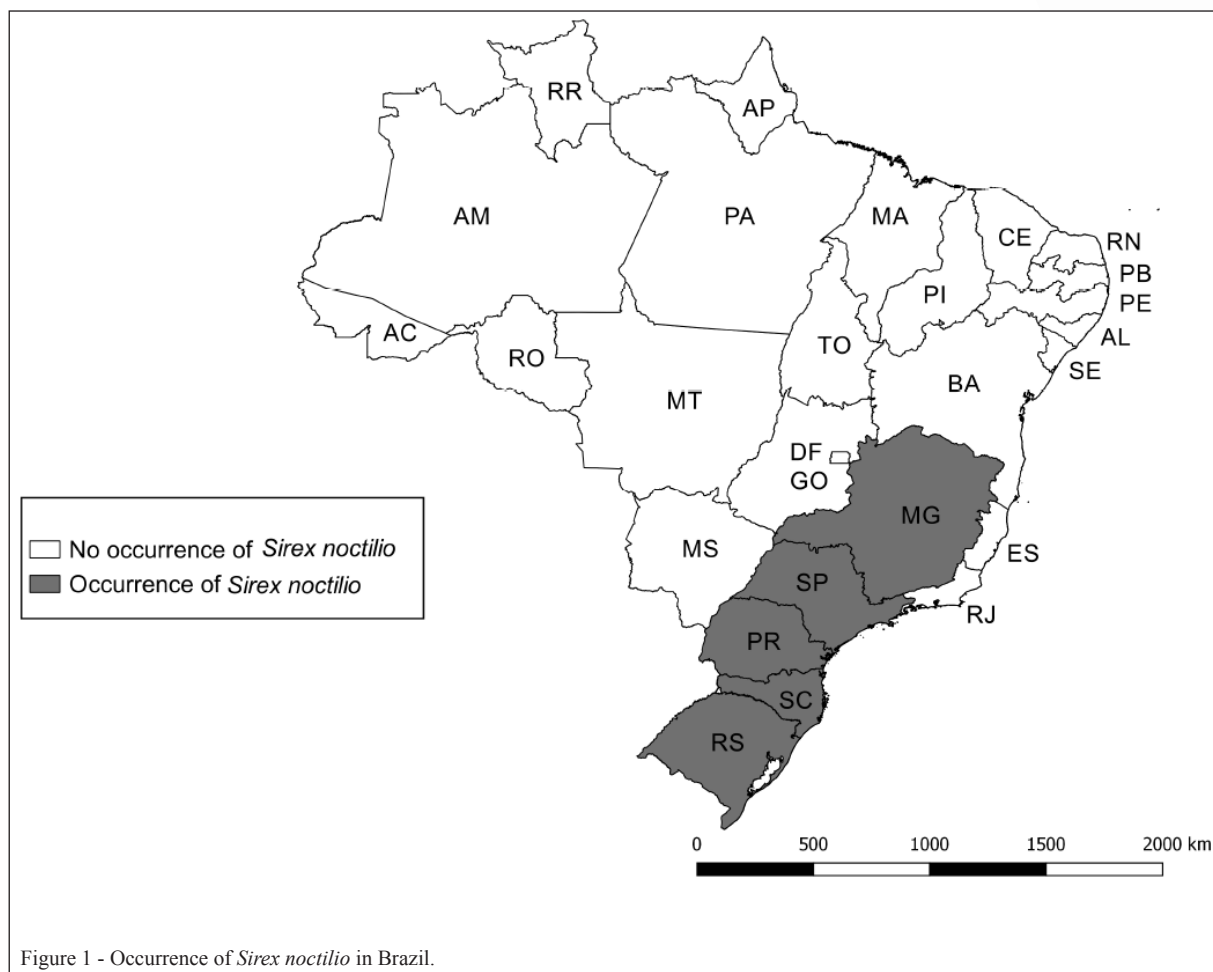


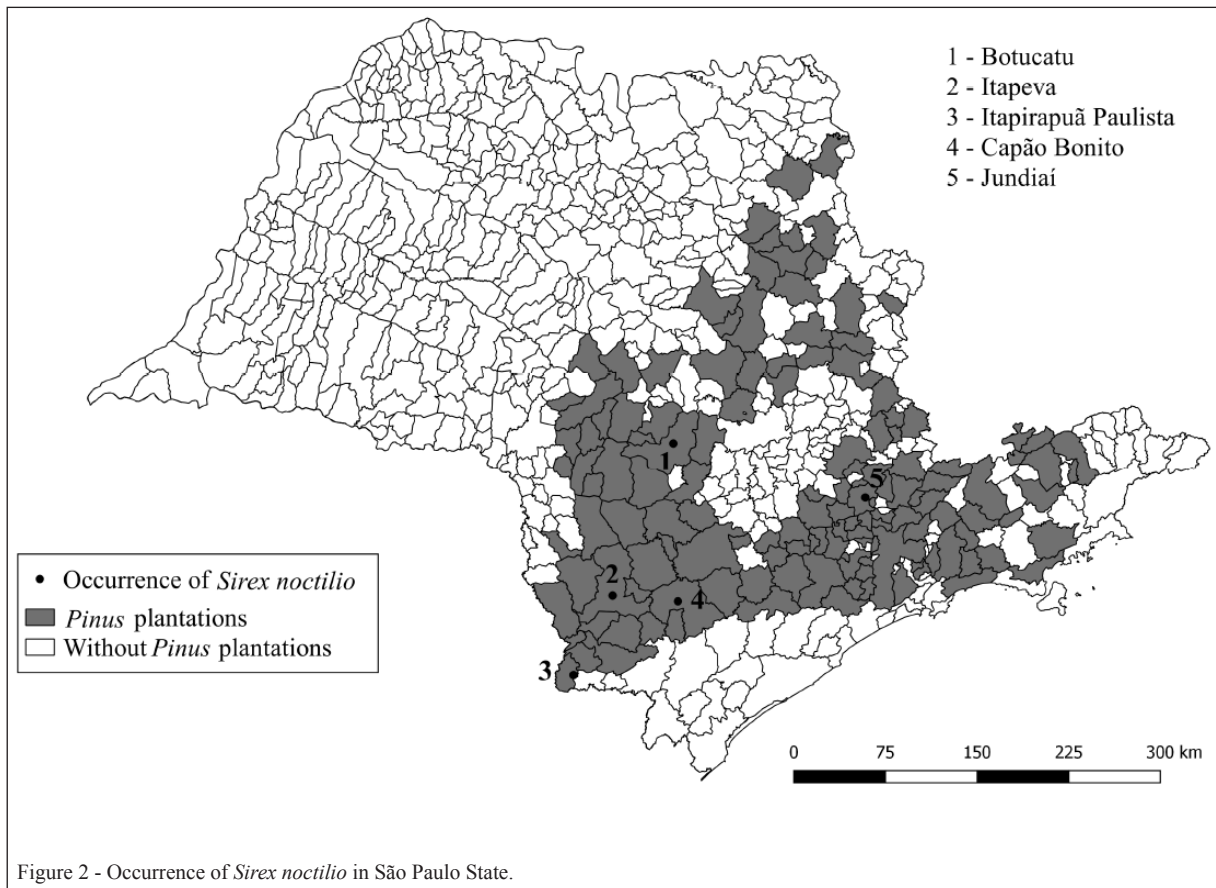
Figure 1 - Occurrence of *Sirex noctilio* in Brazil.

the trunk (IEDE et al., 2015). In general, the pine woodwasp prefers dominated trees, as these trees are stressed and smaller, with a thinner trunk diameter (IEDE et al., 2015), between 7cm and 26cm at breast height (DBH) (NEUMANN et al., 1987), more than eight years old, and these are under stress (IEDE et al., 2015). The adoption of appropriate silvicultural practices to maintain the health and vigor of *Pinus* plantations is the main principle to prevent severe attacks (IEDE et al., 1998).

The main damage caused by *S. noctilio* is boring the wood caused by larvae; tree death occurs due to combined action of phytotoxic mucus and pathogenic fungus *Amylostereum areolatum* (Chaillat ex Fr) Boidin (Russulales: Amylostereaceae) growth (IEDE et al., 1998; NAHRUNG et al., 2016). The most visible external signs are canopy chlorosis, drought, and fall of pine needles, resin beads, and adult emergence holes. These factors affected the

wood quality, limiting its use in the market (IEDE et al., 1998). The monitoring of areas infested by *S. noctilio* is performed by identification of trees with symptoms of external attack by adults, mainly resin beads along the trunk (PENTEADO, 2008). The main management strategy for the pine woodwasp is biological control using nematode *Deladenus* (= *Beddingia*) *siricidicola* Bedding, 1968 (Nematoda: Neothylenchidae), the egg parasitoid *Ibalia leucospoides* Hochenwarth, 1785 (Hymenoptera: Ibalidae), and the ectoparasitoids of mature larvae, *Megarhyssa nortoni* Cresson, 1864 and *Rhyssa persuasoria* Linnaeus, 1758 (Hymenoptera: Ichneumonidae) (HURLEY et al., 2007; CAMERON, 2012).

Signs of *S. noctilio* were reported in an experimental area of *Pinus* in Botucatu, state of São Paulo, Brazil during the periodic monitoring of leaf-cutting ants in this area (Figure 2). Thus, the aim of



this study was to report a new area of occurrence of *S. noctilio* in São Paulo.

A female of *S. noctilio* was found ovipositing in the trunk of a *P. taeda* tree (Figure 3), and resin beads were observed in the tree during a control operation of cutting ants in the arboretum of Faculdade de Ciências Agronômicas, Universidade Estadual Paulista “Júlio de Mesquita Filho” (FCA/UNESP) - Campus of Botucatu. This female was collected, fixed, and incorporated in the collection of the Entomological Museum of the Department of Plant Protection in FCA/UNESP.

Later, evaluations to find *S. noctilio* were carried out in other pine species of the arboretum. The *Pinus* species evaluated were: *P. caribaea caribaea*, *P. caribaea hondurensis*, *P. caribaea bahamensis*, *P. oocarpa*, and *P. elliottii*, planted between 1992 and 1999, in blocks of 100 trees (Table 1). *Pinus taeda* was the only species in the arboretum which was attacked by *S. noctilio*. Pre-infested trees were evaluated looking for symptoms of canopy chlorosis

and dried pine needles, but no symptoms were observed, confirming no fungus colonization in trees.

Measurements of the diameter at breast height (DBH) were performed on all species of *Pinus* (Table 1). The average DBH of *P. taeda* was 20.9cm (Table 1), confirming the preference of the pine woodwasp to oviposit in trees between 8 cm to 26 cm in diameter (NEUMANN, 1987). A total of 57 *Pinus* trees present in the arboretum, 8.77 % (five trees) showed symptoms of *S. noctilio* oviposition. The other pine species in the arboretum have larger diameters compared to the *P. taeda* block (Table 1).

The dispersion of *S. noctilio* in Botucatu may have been through timber transport, due to the presence of the pest, *Pinus* spp., in the vicinity of the arboretum. The detection of one female *S. noctilio* in this municipality occurred in October. In Brazil, the occurrence of pine woodwasp adult pest vary from October to January (CARVALHO et al., 1993).

The detection of a *S. noctilio* female was recorded in Botucatu, SP, during the estimated period



Figure 3 - Resin beads in *Pinus taeda* caused by *S. noctilio* in Botucatu, SP, Brazil, October, 2016.

Table 1 - Diameter at breast height (DBH) of *Pinus* spp. in Botucatu, SP, Brazil (2016).

Species	-----Trees with DBH>7cm-----		-----Attacked trees by <i>S. noctilio</i> -----	
	Number of trees	Rate DBH (cm)	Number of trees	Rate DBH (cm)
<i>P. taeda</i>	57	20.9	5	19.48
<i>P. caribaea</i> var. <i>caribaea</i>	32	26.1	-	-
<i>P. caribaea</i> var. <i>hondurensis</i>	52	29.6	-	-
<i>P. caribaea</i> var. <i>bahamensis</i>	15	35.7	-	-
<i>P. elliotti</i>	30	23.4	-	-
<i>P. oocarpa</i>	27	35.7	-	-

of occurrence of this pest in Brazil. Evolution of the typical symptoms of a *S. noctilio* attack, such as, drying and death of *P. taeda* trees in this municipality was not observed. The surveys carried out on pine species of the arboretum will continue in the following years, considering that the establishment of this pest was not confirmed in Botucatu yet.

In this context, population surveys on *S. noctilio*, in areas with *Pinus* plantations, in municipalities of the central region of São Paulo (Figure 2) has become necessary, to confirm the possible establishment of this pest and to guide management procedures based on biological control, using natural enemies. In this region there are *Pinus* plantations for wood and resin production, and the presence of the *S. noctilio* will cause economic losses for the farmers and forest companies.

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