

## ***Leptocybe invasa* (HYMENOPTERA: EULOPHIDAE) ON *Eucalyptus* SEEDLINGS IN SANTA CATARINA STATE, BRAZIL**

### *Leptocybe invasa* (HYMENOPTERA: EULOPHIDAE) EM MUDAS DE EUCALIPTO NO ESTADO DE SANTA CATARINA, BRASIL

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#### ABSTRACT

The blue gum chalcid, *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae), native from Australia, can severely damage eucalyptus (Myrtaceae) plants. This insect was found on *Eucalyptus grandis* seedlings in May 2015, in Treze de Maio municipality in Santa Catarina state, Brazil.

**Keywords:** blue gum chalcid; invasive species; nurseries; spread.

#### RESUMO

A vespa-da-galha, *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae), originária da Austrália, pode danificar severamente plantas de eucalipto (Myrtaceae). Este inseto foi registrado em mudas de *Eucalyptus grandis* em maio de 2015 no município de Treze de Maio, Estado de Santa Catarina, Brasil.

**Palavras-chave:** vespa-da-galha-do-eucalipto; espécies exóticas; mudas; dispersão.

#### INTRODUCTION

In 2016, Santa Catarina state had 116,240 ha of *Eucalyptus* plantations, occupying the 13<sup>th</sup> position of the eucalyptus production in Brazil (INDÚSTRIA BRASILEIRA DE ÁRVORES, 2017).

Insect pests have been reported damaging forest plantations, including *Eucalyptus* in several countries (DOOLEY; SIX; POWELL, 2015; FRANÇOIS; THIFFAULT, 2015). Gall-inducers of the Hymenoptera are pests for this plant (CARVALHO-FERNANDES et al., 2016). The feeding habits of gall-inducers change the anatomy of host plant tissues in response to damage (DIAS et al., 2013).

The blue gum chalcid, *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) is a gall wasp and important pest of *Eucalyptus* spp. (Myrtaceae) (MENDEL et al., 2004). This insect, native from Australia, was detected in the Mediterranean Basin and the Middle East in 2000 (MENDEL et al., 2004) and has spread to 29 countries (ZHENG et al., 2014).

In Brazil, *L. invasa* was found on eucalyptus seedlings in nurseries and on a *Eucalyptus camaldul-*

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*lensis* Dehnh x *Eucalyptus grandis* W. Hill ex Maiden hybrid in the northeast of Bahia state in 2008 (COSTA et al., 2008). It has spread to Rio Grande do Sul (GARLET et al., 2013), Minas Gerais (FERNANDES et al., 2014), Goiás (PEREIRA et al., 2014), Espírito Santo, Maranhão, Mato Grosso, Mato Grosso do Sul, Pará, Paraná, Pernambuco, São Paulo, Sergipe, and Tocantins states (WILCKEN et al., 2015).

*Leptocybe invasa* adults are between 1.1 to 1.4 mm long. Their body is dark brown, with a blue-green metallic shine, mainly on the head and mesosoma, with a yellowish color at the basal antenna joints and brown legs (MENDEL et al., 2004). The life cycle (egg to adult) of *L. invasa* lasted 132.6 days on *Eucalyptus camaldulensis* in a greenhouse in Israel (MENDEL et al., 2004). The insect development period was 59.5 days on *Eucalyptus tereticornis* Smith in India (KAVITHA-KUMARI et al., 2010) and 46 days on *E. camaldulensis* in Thailand (SANGTONGPRAOW; CHARERNSON; SIRIPATANADILOK, 2011).

*Leptocybe invasa* females oviposit on the epidermis of the leaf petiole midrib, causing leaf senescence and gall formation on growing branch parenchyma. These galls may stunt young plants growth causing deformations on stems and leaves (MENDEL et al., 2004; NYEKO; MUTITU; DAY, 2009). This may reduce productivity (COSTA et al., 2008) especially of susceptible genotypes. Thus, efficient strategies to manage *L. invasa* need to be developed (ZHENG et al., 2014) focusing on plant resistance and biological control.

*Eucalyptus* genotypes resistant to *L. invasa* were identified in Laos, Thailand, Vietnam (OATES et al., 2012), Kenya, South Africa and Uganda (NYEKO et al., 2010). Tolerance and/or resistance of *Eucalyptus* clones and species make them potentially suitable for planting in areas with different *L. invasa* infestation levels (NYEKO; MUTITU; DAY, 2009; DITTRICH-SCHRÖDER et al., 2012). *Eucalyptus camaldulensis*, *Eucalyptus grandis* and *Eucalyptus tereticornis* were more susceptible to this pest in Vietnam (THU; DELL; BURGESS, 2009). *Eucalyptus dunnii* Maiden, *Eucalyptus nitens* (Deane & Maiden) Maiden, *Eucalyptus saligna* Smith x *Eucalyptus urophylla*, *Eucalyptus smithii* (R.T. Baker) and *Eucalyptus urophylla* S.T. Blake (DITTRICH-SCHRÖDER et al., 2012) and *Eucalyptus benthamii* Maiden & Cambridge and *Corymbia citriodora* (Hook.) K.D. Hill and L.A.S. Johnson (WILCKEN et al., 2015) had low or no infestation by *L. invasa*.

Biological control is an effective strategy to manage insect pests such a *L. invasa* (KIM et al., 2008; KULKARNI et al., 2010). Eulophidae parasitoids are natural enemies of eucalyptus pests (PEREIRA et al. 2008a; 2008b), including *Selitrichodes neseri* Kelly & La Salle in South Africa (KELLY et al., 2012) and Brazil (SOUZA, 2016; MASSON et al., 2017; DE SOUZA et al., 2018) and *Quadrastichus mendeli* Kim & La Salle and *Selitrichodes kryceri* Kim & La Salle were introduced in Israel, for the biological control of *L. invasa* (KIM et al., 2008). The search for natural *L. invasa* enemies identified the Hymenoptera parasitoids *Aprostocetus* sp. and *Megastigmus* sp. (Torymidae), *Parallelaptera* sp. (Mymaridae) and *Telenomus* sp. (Scelionidae) (GUPTA; POORANI, 2009). In Brazil, the native species *Megastigmus brasiliensis* Doğanlar, Zaché & Wilcken (Hymenoptera: Torymidae) is associated with *L. invasa* (DOĞANLAR; ZACHÉ; WILCKEN, 2013).

The aim of this study was to report the occurrence of *L. invasa* in Santa Catarina state, expanding the distribution of this pest in Brazil.

## MATERIALS AND METHODS

The presence of *L. invasa* on *Eucalyptus grandis* seedlings was confirmed based on the characteristic gall symptoms normally found on the central leaf veins, the petioles and green stems. This assessment was made during May 2015 in a forest nursery in Treze de Maio municipality in Santa Catarina state, Brazil (28° 35' S latitude × 49° 10' W longitude and 169 m above sea level). The average minimum and maximum temperatures in Santa Catarina state during the autumn season were 15.36 °C and 24.93 °C, respectively, with 1,444 mm average annual rainfall (WREGGE et al., 2011).

*Eucalyptus* seedlings were screened for symptoms of this insect in Araranguá, Iporã do Oeste, Jacinto Machado, Palma Sola, São João do Oeste, São José do Cedro, São Miguel do Oeste, and Urussanga municipalities in the Santa Catarina state.

## RESULTS AND DISCUSSION

The blue gum chalcid was recorded on *Eucalyptus grandis* seedlings in Treze de Maio, Santa Catarina state, Brazil. *Eucalyptus grandis* seedlings in full sun were more infested by *L. invasa* than those predominantly in the shade. Galls induced by the pest occurred mostly on the central leaf veins, the petioles and the green stems of these plants (Figure 1). Approximately 10% of nursery seedlings were infested and subsequently eliminated. The rest of the seedlings were treated with chemicals registered for this pest in Brazil.



FIGURE 1: *Eucalyptus grandis* seedlings infested by *Leptocybe invasa* (Hymenoptera: Eulophidae) in Treze de Maio municipality, Santa Catarina state, Brazil.

FIGURA 1: Mudanças de *Eucalyptus grandis* infestadas por *Leptocybe invasa* (Hymenoptera: Eulophidae) no município de Treze de Maio, no Estado de Santa Catarina, Brasil.

*Eucalyptus grandis* seedlings with galls from Treze de Maio were sent to the Embrapa Forests in Colombo, Paraná state, Brazil. The insects that emerged were identified as *L. invasa* based on its antenna, forewing, gaster, head and mesosoma (MENDEL et al., 2004).

In addition to detecting *L. invasa* in Treze de Maio, this insect was also found in eight other municipalities of Santa Catarina state, Brazil, which shows the presence of this insect on opposite sides of the state (Figure 2). This demonstrates that this insect may be present throughout the State.

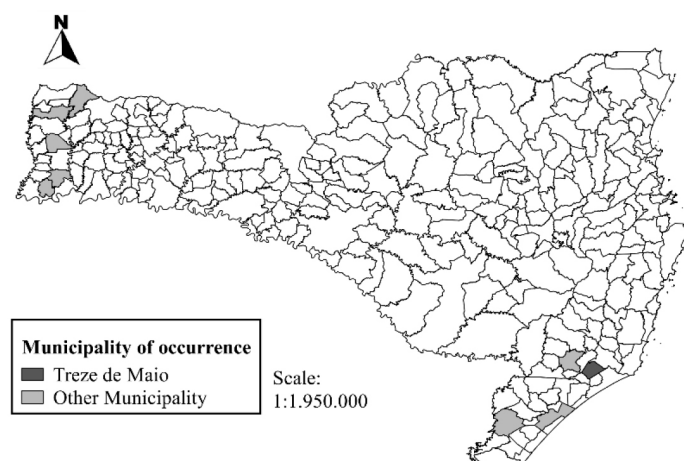


FIGURE 2: The blue gum chalcid, *Leptocybe invasa* (Hymenoptera: Eulophidae), distribution in Santa Catarina State, Brazil.

FIGURA 2: Distribuição da vespa-da-galha, *Leptocybe invasa* (Hymenoptera: Eulophidae) no Estado de Santa Catarina, Brasil.

Damage by *L. invasa* reduces plant growth and may cause plant death in severe cases. The presence of galls may be a diagnostic indicator for *L. invasa* presence (WILCKEN et al., 2015). Forest nurseries growing eucalyptus seedlings need periodic monitoring by direct visual or indirect assessment through yellow sticky traps. Chemical control with the systemic and contact insecticides such as Imidacloprid, Thiamethoxam and Fipronil are recommended for application on eucalyptus seedlings in forest nurseries and it is currently the most used *Leptocybe invasa* management strategy (WILCKEN et al., 2015).

Biological control is the major strategy in integrated management programs for this pest with importing and rearing of the parasitoid *Selitrichodes neseri* in Brazil and South Africa. In Thailand, the native parasitoid *Megastigmus thitipornae* Doğanlar & Hassan (Hymenoptera: Torymidae) is being studied (SANGTONGPRAOW; CHARERNSOM, 2013). In Israel, *Selitrichodes kryceri* and *Quadrastichus mendeli* are successfully used to manage *L. invasa* (KIM et al., 2008). Finding a suitable host to mass rear its natural enemies is the major question in developing biological control programs for *L. invasa* (FAVERO et al., 2013).

## CONCLUSION

The rapid spread and damage caused by *L. invasa* in various Brazilian states shows the need to develop efficient strategies to manage this insect pest.

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