First record of the occurrence of parasitoids of genus *Eurytoma* and *Eupelmus* (Hymenoptera: Calcidoidea) associated to the seeds of *Cassia leptophylla* in Brazil

Primeiro registro da ocorrência de parasitoides do gênero *eurytoma* e *eupelmus* (Hymenoptera: Calcidoidea) associados às sementes de *Cassia leptophylla* no Brasil

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**Dane Block Araldi**
Doctor in Forestry Engineering
Institution: Universidade Federal de Santa Maria (UFSM)
Address: Av. Roraima, 1000, Cidade Universitária, Camobi, Santa Maria - RS, CEP: 97105-900
E-mail: danearaldi@gmail.com

**Jerson Carús Guedes**
Doctor in Entomology
Institution: Universidade Federal de Santa Maria (UFSM)
Address: Av. Roraima, 1000, Cidade Universitária, Camobi, Santa Maria - RS, CEP: 97105-900
E-mail: jguedes@gmail.com

**Luís Eduardo Panozzo**
Doctor in Phytotechnics
Institution: Universidade Federal de Pelotas (UFPEL)
Address: R. Cel. Alberto Rosa, 154, Centro, Pelotas - RS, CEP: 96010-770
E-mail: lepanozzo@gmail.com

**Victor Mouzinho Spinelli**
Doctor in Plant Physiology
Institution: Universidade Federal de Rondônia (UNIR)
Address: BR-364, 9, Cidade Jardim, Porto Velho - RO
E-mail: spinellivm@gmail.com
ABSTRACT
The presence of parasitoids, predators, and pathogens that utilize the biological control of pest is important to agriculture and forestry is imperative as a dynamic equilibrium factor in agroecosystems. The insects of the order Hymenoptera possess a great diversity of habitats and are a species of insectivores predominate in population, frequencies, and effectiveness, in which they attack pest. The knowledge of the species that forms an ecosystem is one of the basic assumptions within a program of integrated pest management. This study objective identifies the parasitoid species of *Cydia tonosticha* and *Pygiopachymerus lineola* obtained from fruits of *Cassia leptophylla* (Fabaceae: Caesalpinoideae) collected from trees in an urban area of the municipal of Santa Maria, Rio Grande do Sul, and sent to the Entomology Laboratory of the Department of Plant Defense at the Federal University of Santa Maria (UFSM). The species found were identified as genus *Eurytoma* (Eurytomidae) and *Eupelmus* (Eupelmidae), and found as the first record of these parasitoids associated with the gold medallion tree (*C. leptophylla*).

**Keywords:** Cassia, parasitism, *Cydia tonosticha*, *Pygiopachymerus lineola*, IPM.
RESUMO
A presença de parasitoides, predadores e patógenos que utilizam o controle biológico de pragas é importante para a agricultura e a silvicultura é imperativa como um fator de equilíbrio dinâmico em agroecossistemas. Os insetos da ordem Hymenoptera possuem uma grande diversidade de habitats e são uma espécie de insetos predominantes em população, frequências e eficácia, na qual atacam pragas. O conhecimento das espécies que formam um ecossistema é um dos pressupostos básicos dentro de um programa de gestão integrada de pragas. Este objetivo de estudo identifica as espécies parasitoides de Cydia tonosticha e Pygiopachymerus lineola obtidas de frutos de Cassia leptophylla (Fabaceae: Caesalpinioideae) coletadas de árvores de uma área urbana do município de Santa Maria, Rio Grande do Sul, e enviadas para o Laboratório de Entomologia do Departamento de Defesa Vegetal da Universidade Federal de Santa Maria (UFSM). As espécies encontradas foram identificadas como gênero Eurytoma (Eurytomidae) e Eupelmus (Eupelmidae), e encontradas como o primeiro registro desses parasitoides associados com a árvore medalhão-de-ouro (C. leptophylla).

Palavras-chave: Cassia, parasitismo, Cydia tonosticha, Pygiopachymerus lineola, IPM.

1 INTRODUCTION

*Cassia leptophylla* Vogel (*C. Leptophylla*), is a arboreal specie of the family Fabaceae, sub-family Caesalpinioideae, native of Brazil, that grows in sandy-clayey soil with well drainage and great fertility. The specie is used for works of lightweight structures, crate structures, layered structures, and others (LORENZI, 2002); besides the use of urban landscaping, gardens, and also for the recovery of degraded areas (IBF, 2013).

The gold medallion tree, its common name, is a hermaphrodite specie that has pollination promoted essentially by honeybees from various species and florescent from November to January, in the state of Rio Grande do Sul, Brazil. This tree shows a typical macroscopic bloom towards the apex, opening up the primary basic first flowers and, then, the extremity of florescence. The fruits and seeds are dispersed by barochory (a form of autochory by gravity), and zoochory, with the seeds measuring 1.2 mm in length with a light brown stain. They are to be disposed by numerous transverse compartments, and in the period of maturation, it exudes a strong characteristic odor (EMBRAPA...
FLORESTAL, 2008). All of this occurs in the state of Rio Grande do Sul (RS) during the months of May through August (CARVALHO, 2008).

Among the principal insects that cause damage to seed of the gold medallion tree are the Bruchid Pygiopachymerus lineola, Chevrolat, 1871 (Coleoptera: Chrysomelidae, Bruchinae) and the microlepidoptera Cydia tonosticha, Meyrick, 1922 (Lepidoptera: Tortricidae, Olethreutinae) that are found in RS. The high frequencies of pests in forest species reduce the quantity and quality of the viable seeds, causing a reduction of seedlings (FENNER, 1985), becoming a serious problem for reforestation-based businesses. Damages to forest seeds are casually identified by orifices in the outer part of the fruit (RIBEIRO-COSTA and COSTA 2002). In this sense, the biological control is becoming an important tool the management of pest in forestry systems.

The order Hymenoptera is the most common natural enemy group of class Hexapoda, which makes it one of the orders of great importance for utilization of biological control (PARRA et al., 2002). The insects in this order possess the greatest diversity of habitat and are considered as Entomophagus that are predominate in number, frequency, and efficiency in attacking pest (BOORROR et al., 1992).

The objective of this study was to identify and report the first occurrence of the parasitoids of genera Eurytoma (Eurytomidae) and Eupelmus (Eupelmidae) associated to the seeds of C. leptophylla in RS, Brazil.

2 METHOD AND MATERIALS

The study was conducted in the municipal of Santa Maria, RS, Brazil, situated in the southern half of the state in a region surrounded by hills formed by the final basalt spill that occurred in the Pleistocene age. Its geographical position is 29°41′02″ S 53°48′25″ W in an urban area, near the Autonomic Department of Highways (DAER), with a minimal altitude of 41 meters and an average altitude of 113 meters above sea level (Figure 1). The climate is humid subtropical (Cfa) (MORENO, 1961), according to classification of Köppen, with an average annual temperature of 19.5°C and with an average annual precipitation of 1800 millimeters.
Figure 1. Location of collection area, proximately to DAER in the municipal of Santa Maria, Rio Grande do Sul, Brazil.

For the samples collected, we selected four trees of the gold medallion (*C. leptophylla*), derived from the urban area of Santa Maria, RS, in the period from June to September of 2012. The evaluation has a total of 45 fruits of various sizes, health, and insect damaged. Afterwards, the samples were packaged, labeled, and transported to the Entomology Laboratory of the Department of Plant Defense at the Federal University of Santa Maria.

From the total number of fruits collected, 22 of the fruits were individualized in full and packed clear glass receptacles, 40x25 centimeters in diameter, lined with a cheesecloth screen to allow gas exchange and prevent the insects, especially the adult insects, from escaping. The remaining fruit samples had their seeds removed; stored in receptacles, with the same specifications as the other samples; and kept in the laboratory under climatic conditions of 22±5°C and a relative humidity of 70±10%.

The determination of the emergence period of insects was conducted through daily reviews. After concluding its cycle of development and reaching adulthood, five specimens were mounted and sequentially referred for determination by Dr. Valmir
Antonio Costa of the Central Experimental Center of the Biological Institute – São Paulo (CEIB).

3 RESULTS AND DISCUSSION

The hymenopteran found associated to the seeds of *C. leptophylla* were identified as microhymenoptera belonging to the genres of *Eurytoma* sp. indet. (Eurytomidae) (Figure 2) and *Eupelmus* sp. indet. (Eupelmidae) (Figure 3), which were confirmed from the analysis by Dr. Valmir Antonio Costa of CEIB.
A study conducted by Digiulio (1997) and Gibson (1997) already determined the two genres as microhymenoptera parasitoids: *Eurytoma* (Eurytomidae) and *Eupelmus* (Eupelmidae), respectively. These specimens are to be deposited in the Entomophagus Collection of insects “Oscar Montes”, based in Campinas, São Paulo, in the Biological Control Institute. According to Costa (2013), the determination of the species of both genres is rather complex, as there is no fundamental principal to identify *Eurytoma* and *Eupelmus* to the neotropics region and, also, there a tens of thousands of species to be discovered. When looking at the Universal Chalcidoidea Database (NOYES, 2012), none of the genres of microhymenoptera were found associated to *Cassia* spp., in addition, records of occurrences were not found of the species *Eurytoma* and *Eupelmus* associated to the seeds of *C. leptophylla*. Therefore, this is the first occurrence of these genres ever to be reported in the country of Brazil.

4 CONCLUSION

These parasitoids are organisms that show potential to be utilized in biological control programs, exerting a negative effect on the forest pests, and, in the future, may prove to be adopted in integrated forestry pest management programs. The study was not possible to identify at the species level, however, it is essential to determine these species so that they can develop more detailed studies about this bioecology and especially verify the parasitoids endemism.

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