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Occurrence of *Lasioderma serricorne* (Coleoptera: Anobiidae) in rice grains from the city of Rio Branco, state of Acre, Brazil

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ABSTRACT

Lasioderma serricorne (Coleoptera: Anobiidae) is an important pest in the food and tobacco industry in many regions of the world. A species of polyphagic behavior, despite being a pest capable of successfully breeding and developing in a complex variety of products based on grains, spices and animal by-products, there are few occurrences of this species in the northern region of Brazil. This study was carried out to report the occurrence of *L. serricorne* in rice grains in the city of Rio Branco, in the state of Acre. In June 2020, the presence of developing *L. serricorne* was observed in rice grain mass. Identification was performed at the species level using available dichotomous keys. As it is the first record of *L. serricorne* in rice grains in the city of Rio Branco, the monitoring of insects in the mass of rice grains is necessary for investigation in the search for methods for the management of stored grain pests.

Keywords: cigarette beetle; stored-product insect; *Oryza sativa*.

Brazil is one of the largest grain producers in the world. The 2020/21 harvest reached a record level estimated at 264.8 million tons, which represents a growth of 3.1% compared to the 2019/20 harvest (CONAB, 2021). Despite the agricultural potential, the attack of insect pests on stored products is responsible for significant economic losses in the storage industry (FARONI; SOUSA, 2006; HAGSTRUM et al., 2013). Several species of orders, such as Coleoptera and Lepidoptera, are widely distributed in regions located in the tropics, and can infest products in the field before harvest, during transport and storage, or after industrial processing (FARONI; SOUSA, 2006; MOURA et al., 2017).

In this statement, the occurrence of *Lasioderma serricorne* Fabricius (Coleoptera: Anobiidae) was recorded for the first time in a mass of rice grains from the city of Rio Branco, in the state of Acre, Brazil. In general, the attack of *L. serricorne* damages food packaged in warehouses, stores, and retail, causing reduction in the quantity and quality of the product, making it unfit for human consumption (HAGSTRUM et al., 2013; ZANUNCIO et al., 2014; LÜ; MA, 2015).

Also popularly known as the tobacco beetle, *L. serricorne* is an important pest of stored products (ASHWORTH, 1993). This species frequently occurs in tropical and subtropical areas, and it is now distributed throughout the world. As it is a destructive cosmopolitan pest, due to its high reproductive rate, adaptability, and food habits, it consumes a wide range of stored products. In addition to destroying tobacco, it also attacks stored grains, spices, and other raw materials of animal and vegetable origin (HOWE, 1957; ASHWORTH, 1993; ZANUNCIO et al., 2014; CAO et al., 2019).

Adults are short-lived, females oviposit in small crevices in bales of tobacco and food products. After hatching, the larvae feed on stored products by opening the galleries, reducing or destroying the quality of the product (LORINI et al., 2015). Adults of *L. serricone* are oval-shaped insects that measure 2–3 mm in length, have a small head, dark brown color (Fig. 1), non-striated (smooth) elytra, long entirely serrated antennae, and the body is covered with fine pubescence (GAUTAM et al., 2014).

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Figure 1. Dorsal view of *Lasioderma serricorne*.
Source: Elaborated by the authors.

In June 2020, a large infestation of *L. serricorne* was observed in a mass of rice grains stored in the warehouse of the university restaurant of the Universidade Federal do Acre, on the main campus in Rio Branco, Acre. Three samples were collected and placed in 1.5-L jars, and kept under controlled conditions (27 ± 2°C) and relative humidity (70 ± 5%) and a scotophase of 24 h.

After multiplication and observation, the insects were mounted with entomological pins on 2 × 6-mm white paper triangles (double mounting). Three triangles were placed on a pin, containing a specimen of the insect in the ventral, dorsal and lateral positions. Identification was made using the available dichotomous keys, with information about the date and place of collection and the name of the collector. They were placed in an entomological MDF box with a glass lid and Styrofoam-coated bottom, treated with mothballs. The material went through the entire curatorial process (CAMARGO et al., 2015) and deposited in the Entomological Collection of the Entomology Laboratory of the Universidade Federal do Acre.

There are numerous published studies on the insect life cycle under environmental conditions (HOWE, 1957; ASHWORTH, 1993; MAHROOF; PHILLIPS, 2008; EDDE, 2019). Favorable conditions for the rapid development of *L. serricorne* larvae include high temperatures and constant humidity, minimum amounts of light and compact or concentrated food sources (EDDE, 2019). *L. serricorne* insects are sensitive to temperature fluctuations and low humidity, as these insects do not have the ability to regulate body temperature (ASHWORTH, 1993; EDDE, 2019). Relative humidity (RH) in the range of 65 to 75% does not prevent insect development, unless the substrate is destroyed by fungal growth (EDDE, 2019).

FERRI et al. (2018), studying the development of *L. serricorne* in soy-based products at a temperature of 27°C and RH at 60%, found that the duration of the egg to adult phases had the highest peak at 49 days after infestation of insects. MAHROOF; PHILLIPS (2008), studying the development parameters of *L. serricorne* in seven food sources at a temperature of 28°C and 60% RH, observed that the development duration was 46 days. These authors emphasize that *L. serricorne* adults emerged in all food sources, with the highest survival rate (91%) in wheat flour.

Although tobacco is described as the suitable host for *L. serricorne*, some studies indicate that wheat flour is the ideal host as it contains nutritional sources of valuable proteins and carbohydrates (ASHWORTH, 1993; MAHROOF; PHILLIPS, 2008), in addition to being the raw material that offers favorable temperature and humidity conditions for many species of stored grain insects (LÜ; MA, 2015).

Therefore, knowledge of the insect's biology and behavior in different hosts is the first important step towards solving any agricultural pest problems and defining strategies for their management in the storage of grains and their derivatives (FERRI et al., 2018). The phosphine fumigation method is the most effective and widely used, at the same time as it allows residue-free treatment of the grains. However, its dependence highlights levels of genetically inherited resistance to phosphine in both *L. serricorne* and other storage pests (SAĞLAM et al., 2015), consequently facilitating the dissemination of resistant gene flow in commodity trade (COELHO-BORTOLO et al., 2016).

As this is the first of *L. serricorne* in mass of rice grains in Rio Branco, monitoring this pest in stored grains is recommended to mitigate risks of development of large colonies and avoid economic damage. To this end, in addition to preventive measures such as cleaning the facilities of storage units and applying insecticides by thermofogging and/or spraying, the moisture content of clean and dry grains must be observed, preferably 12 to 13% moisture (base humid), which also helps prevent the presence of fungal colonies and infestation of *L. serricorne* and other associated pests.

AUTHORS' CONTRIBUTIONS

Conceptualization: Oliveira, R.V.; Sousa, A.H. **Investigation:** Oliveira, R.V.; Lopes, L.M.; Sousa, A.H. **Validation:** Oliveira, R.V.; Lopes, L.M.; Sousa, A.H. **Writing – original draft:** Sousa, A.H.; Oliveira, R.V.; Lopes, L.M. **Writing – review & editing:** Oliveira, R.V.; Lopes, L.M.; Sousa, A.H.

AVAILABILITY OF DATA AND MATERIAL

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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CONFLICTS OF INTEREST

All authors declare that they have no conflict of interest.

ETHICAL APPROVAL

Not applicable.

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