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LASIODERMA SERRICORNE (COLEOPTERA: ANOBIIDAE): FIRST RECORD IN DEHYDRATED BEE POLLEN IN SERGIPE STATE, BRAZIL

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Coleopterans have global importance in grain storage and industrial food production and can cause damage to the appearance of products as well as weight loss and reduced nutrient levels, rendering products unfit for human consumption (Nansen et al. 2004). *Lasioderma serricorne* (Fabricius, 1792) (Coleoptera: Anobiidae), variously known as the cigarette beetle or the tobacco beetle, is cosmopolitan and occurs frequently in tropical and subtropical areas. This insect is usually found in perishable food products such as dry fruit, grain, crumbles, cereal flour and animal food (Papadopoulou & Buchelos 2002).

Pollen, which adheres to honey bees (*Apis mellifera* L.) as they collect nectar from flowers and which they agglutinate into balls with nectar and bee saliva is important for survival of these insects. Beekeepers remove pollen for processing, commercialization and human consumption as a protein source (Mattila et al. 2007; Bastos et al. 2000).

Damage to bee pollen stored at 10% RH was found in samples collected in Sergipe State, Brazil. The purpose of this study was to characterize the damaged pollen and to ascertain its cause.

Pollen samples were obtained from the producers of the municipalities of Pacatuba, Brejo Grande, Neópolis, Estância and Tobias Barreto in Sergipe State, Brazil in Feb (summer) and Jun (winter) 2007. A bee returning to the hive after collecting nectar from flowers passes through a retention grill at the entrance that allows her passage but removes the pollen ball, which then falls into a box. This material is collected by the beekeeper, stored at 4 °C for 48 h and is air-dried at 40 °C for 48 h. Any visible impurities such as insect fragments, fibers, propolis, balls, etc., are removed from the dry material.

The pollen samples were supplied by producers in commercial packaging of plastic or polyethylene terephthalate (PET) bags. The pollen was stored in 50 mL plastic packages at an average temperature of 28 °C and 80% RH in the Agricultural and Forest Pests Laboratory of the Department of Forest Engineering of the Federal University of Sergipe.

The beetles were removed from contaminated samples and stored in 70% (v/v) alcohol. Adults were pinned in the laboratory and sent to the Taxonomy Laboratory of the Entomology and Acarology Department of ESALQ, University of São Paulo, for identification.

Palynological analysis was done in the Agricultural and Forest Pests Laboratory of the Federal University of Sergipe. This analysis compared pollen grains with those of an image bank to identify the botanic plant families that bees have visited to collect nectar, i.e., the images of the pollen grains were compared to those of known plant families. Microscope slides of the pollen samples were made with the acetolysis method (Erdtman 1960; Barth & Luz 1998; Terrab et al. 2003) and photomicrographed by a digital system of photodocumentation connected to an optical microscope with objectives of 40' and 100', and a quantitative assessment was made with 300 pollen grains per slide. The occurrence of each type of pollen (botanical family to which it belonged) was classified as: dominant (≥ 45%), accessorial (16-45%), or occasional (≤ 15%). The water content of 2 g samples of pollen was measured gravimetrically with an infrared drying system (Mettler LP16).

Insects found in pollen samples were identified as the tobacco beetle *Lasioderma serricorne* (Fabricius, 1792) (Coleoptera: Anobiidae) (Fig. 1). The hard plastic packages containing the pollen samples were undamaged (Fig. 2), so their infestation must have occurred in the field or during processing and sample handling. However, this beetle can cut into plastic bags and cause problems for the food industry (Arbogast et al. 2005; Begum et al. 2007). This beetle reproduces and the larvae grow and develop into adults when feeding on stored bee pollen.

Damage to pollen balls was similar to that observed in grains, with the consumption of the internal part, leaving only a thin husk. *Lasioderma serricorne* larvae also feed on pollen with galleries inside the packages of these products in which they leave excretions and feces. As a result, the pollen grains become lumpy and unfit for human or animal consumption (Fig. 1).

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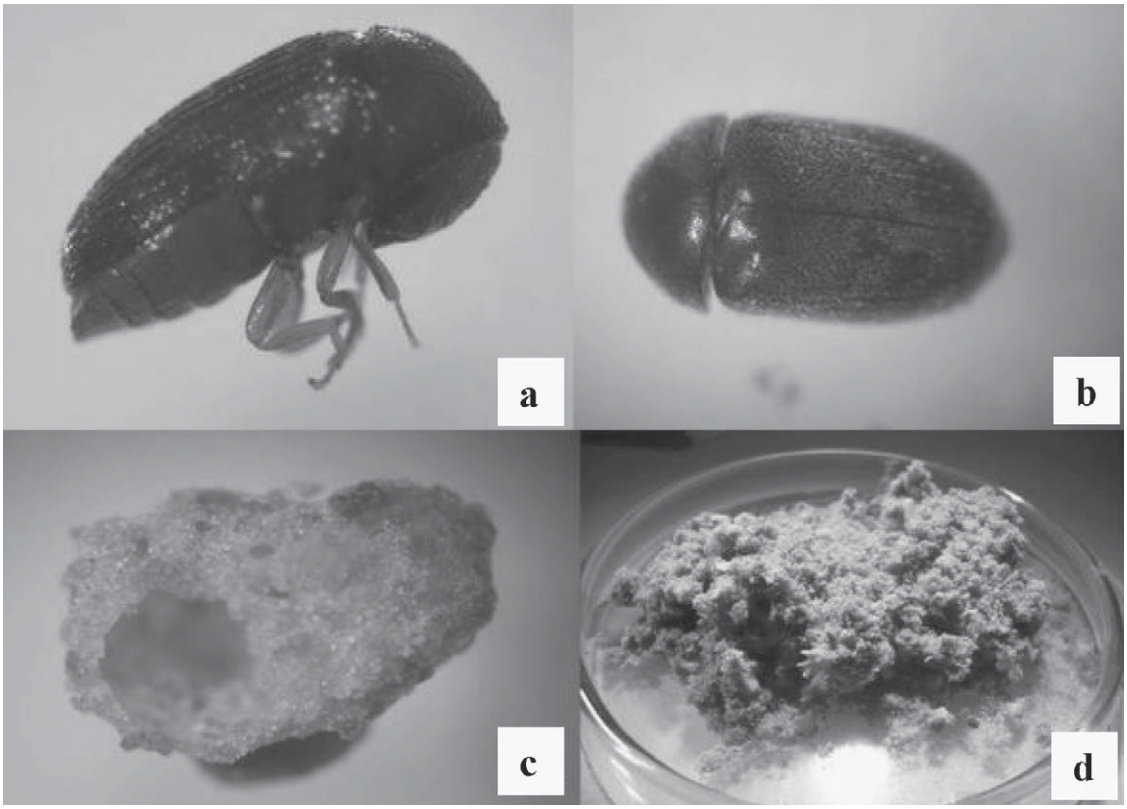


Fig. 1. *Lasioderma serricorne* (Coleoptera: Anobiidae), the cigarette beetle, found in dehydrated pollen. a. side view of the insect; b. dorsal view; c. damage by the cigarette beetle, *Lasioderma serricorne* (Coleoptera: Anobiidae) in dehydrated pollen; d. appearance of the infested product.

Insect contamination was observed in dehydrated bee pollen from Neópolis, Pacatuba, Brejo Grande and Estância municipalities which had a water content > 8% (Table 1).



Fig. 2. Container with dehydrated pollen with a heavy infestation by the cigarette beetle, *Lasioderma sericorne* (Coleoptera: Anobiidae).

Table 1. Results of the percentage of moisture in dehydrated samples of pollen during the summer (Feb) and winter (Jun) 2007 produced in various municipalities of Sergipe, Brazil.

Municipalities	February/2007	June/2007
Brejo Grande	10.6	9.9
Estância	10.5	12.5
Neópolis	10.3	10.93
Pacatuba	9.83	8.96
Tobias Barreto	11.66	11.16

The dehydrated bee pollen from Tobias Barreto was the only product not infested with *L. serricorne* beetles. Bee pollen from this municipality had a moisture level > 8%. Pollen from Areaceae species was < 10% of the total in bee pollen from Tobias Barreto, whereas Areaceae pollen occurred more frequently in samples from the other 4 municipalities, suggesting that *L. serricorne* might have a preference for this type of pollen (Table 2).

Lasioderma serricorne has been found in packaged foods destined for birds, cats and dogs in the

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Table 2. Botanical families found in samples of pollen dehydrated in Sergipe. D: dominant pollen grain, ≥ 45% of representativeness; A: accessorial, 16 -45%; o: occasional, ≤ 15

	Botanical Family	
Cities	February	June
Brejo Grande	Compositae (D); Arecaceae (A); Fabaceae, Mimosaceae and Rubiaceae (O)	Arecaceae (D); Compositae(A); Mimosaceae, Rubiaceae and Myrtaceae (O)
Estância	Arecaceae, Amaranthaceae, Compositae (A); Mimosaceae, Fabaceae and Labiatae (O)	Arecaceae, Compositae (A); Mimosaceae, Myrtaceae, Fabaceae and Rubiaceae (O)
Neópolis	Mimosaceae (D); Arecaceae (A); Compositae, Anarcadiaceae and Myrtaceae (O)	Mimosaceae, Arecaceae, Compositae (A); Rubiaceae (O)
Pacatuba	Arecaceae (D); Compositae (A)	Arecaceae (D); Mimosaceae (A); Compositae (O)
Tobias Barreto	Myrtaceae, Solanaceae (A), Arecaceae, Compositae and Mimosaceae (O)	Compositae, Labiatae (A); Amaranthaceae, Fabaceae, Mimosaceae and Arecaceae (O)

USA (Roesli et al. 2003) and in wheat flour, maize and oat in Portugal, and it is common in factories using these cereals as raw material (Carvalho et al. 2006). This beetle infested tobacco and processed foods in Greece (Papadopoulou & Buchelos 2002). Despite its wide range of damaged products, *L. serricorne* has not been reported previously to infest stored pollen.

The water content of the dehydrated bee pollen samples was > 8%, which might be important for *L. serricorne* reproduction; however, this beetle was not found in pollen collected from Tobias Barreto. Dehydrated bee pollen is supposed to have a maximum water content of 4% but it can change during storage (Almeida-Muradian et al. 2005).

Dehydrated bee pollen contains high levels of proteins, amino acids, lipids and secondary nutrients such as vitamins, which makes it a desirable food source for *L. serricorne* (Shinoda & Fujiasaki 2001; Patt et al. 2003; Lundgren & Wiedenmann 2004); however, its nutrient content varies among main botanic families and species of the same family (Richards & Schmidt 1996). The pollen from Tobias Barreto without *L. serricorne* had lower percentage from species of the botanic family Arecaceae compared to all other samples.

This is the first report of *L. serricorne* in dehydrated bee pollen. This beetle damages the dehydrated pollen balls, making them unfit for human or animal consumption.

Summary

Bee pollen, which is the material that adheres to honeybees as they collect nectar from flowers, is agglutinated into balls with nectar and bee saliva substances and is important to the survival of colonies of these insects. Damage to bee pollen stored at 10% RH was found in samples collected in Sergipe State, Brazil. Insects found in the pollen were identified as *Lasioderma sericorne* (Fabricius, 1792) (Coleoptera: Anobiidae), a cosmopolitan insect and one of the main insects infesting tobacco and many stored food products. This is the first record of damage by this insect in dehydrated pollen balls, which makes this product unfit for human consumption.

Key Words: apiarian products, stored products, tobacco beetle

Resumo

O pólen de abelha, o material levado por abelhas quando coletam o néctar das flores, é aglutinado em bolas com substâncias da saliva e importante para a sobrevivência das colônias desses insetos. Danos ao pólen de abelha armazenado a 10% de umidade foram encontrados em amostras coletadas no Estado de Sergipe, Brasil. Insetos encontrados no pólen foram identificados como *Lasioderma serricorne* (Fabricius, 1792) (Coleoptera: Anobiidae), um inseto cosmopolita e um dos principais insetos que infestam tabaco, assim como muitos outros produtos alimentares armazenados. Este é o primeiro registro de danos causados por este inseto e tornando o pólen desidratado impróprio para consumo humano.

Palavras Chave: Besouro do tabaco, Produtos Apícolas, produtos armazenados

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