



Scientific Note

Record of tritrophic relationship between *Syagrus coronata* (Martius) Beccari (Arecaceae), *Pachymerus nucleorum* Fabricius (Coleoptera: Chrysomelidae: Bruchinae) and *Heterospilus* sp. (Hymenoptera: Braconidae) in the State of Alagoas, northeastern Brazil

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Abstract. Some conservation units in Brazil border urban areas, like the Catolé and Fernão Velho Environmental Protection Area (EPA) in the State of Alagoas. In urban areas, there is the habit of cultivating plants for landscape purposes, and *Syagrus coronata* (Martius) Beccari (Arecaceae), “Licuri” or “Ouricuri”, is a palm tree commonly used in ornamentation; a native species from Caatinga and Atlantic Forest biomes widely explored through time. Some insects have part of their development associated with plants, and *Pachymerus nucleorum* Fabricius (Coleoptera: Chrysomelidae: Bruchinae) has a close connection with some Arecaceae. Females usually lay eggs on the surface of fallen fruits and the immatures feed on the seed under the drupe endocarp; the larvae, even protected by the hard surface could be preyed by skilled parasitoid wasps. Here, the record of a tritrophic relationship between *S. coronata*, *P. nucleorum*, and a wasp of the genus *Heterospilus* (Hymenoptera: Braconidae) in an urbanized region of Alagoas, close to a remnant of Atlantic Forest of the Catolé and Fernão Velho EPA is communicated. Fruits were collected from the soil surface under the canopy of Licuri palms in the “Universidade Federal de Alagoas” A. C. Simões Campus and transported for laboratory monitoring. Either adults of *Heterospilus* parasitoid wasps and *P. nucleorum* beetles from some fruits were recorded. The specimens of *S. coronata* had seeds preyed upon by *P. nucleorum* close to a remnant of the Atlantic Forest. The record of a tritrophic relationship involving *Heterospilus* seems to indicate the tenacity of natural biological control.

Keywords: Atlantic Forest; Biological control; Licuri palm; Ouricuri; Parasitoid wasps.

Some conservation units in Brazil border urban areas. One of these cases occurs in the State of Alagoas in northeastern Brazil. The Catolé and Fernão Velho Environmental Protection Area (EPA) is a State conservation unit for sustainable use created in 1992, covering part of five municipalities (Coqueiro Seco, Maceió, Rio Largo, Santa Luzia do Norte and Satuba). It is surrounded by urbanized areas and involves a discontinuous series of remaining fragments of the Atlantic Forest, the mouth of the Mundaú River and part of the Mundaú Lagoon. It is inserted in the Endemism Center called “Pernambuco”.

In urban areas, there is the habit of cultivating plant species for landscape purposes. A group of plants commonly used in these landscape projects is palm trees, such as *Syagrus coronata* (Martius) Beccari (Arecaceae), popularly known as “Licuri” or “Ouricuri”, which can be easily transplanted (DRUMMOND 2007). This palm can reach 10 m in height and has natural flowering from May to August, the fruits are drupes that are an important source of food for native fauna, and their seeds could take a long time to germinate, even in good conditions of humidity and light (DRUMMOND 2007). It is a native species of the Caatinga biome, a semiarid region in northeast Brazil, found also in the Atlantic Forest (SOUZA *et al.* 2018), widely explored due to the possibility of use in food, handicrafts and agriculture (NOBLICK 1986, 2017).

Phytophagous insects have part of their development associated with plant species, and predators, like parasitoids, take advantage of this primary relationship for their own interests, a complex trophic network stemming from evolutionary pressures on each of the parties involved. In this regard, *Pachymerus nucleorum* Fabricius (Coleoptera: Chrysomelidae: Bruchinae) has a close connection with some species of Arecaceae, adult beetles of this genus have nocturnal habits and feed on the pollen of palm flowers, being responsible for at least part of the pollination (DE MEDEIROS *et al.* 2019). *Pachymerus nucleorum* usually lay eggs on the surface of fallen fruits, and they prefer those with exposed endocarp; immatures hatch, search and make their way through the sap channels to feed on the seed, where they develop until reaching the adult stage (GARCIA 1979). The larvae, even protected under the hard endocarp, could be attacked by specialized predators, such as braconid wasps (FRAGOSO 2002).

Here, a tritrophic relationship between the *S. coronata* palm, the *P. nucleorum* beetle and a wasp of the genus *Heterospilus* (Hymenoptera: Braconidae) is recorded. In February 2019, a hundred fruits with endocarp exposed were collected from the soil surface under the canopy of Licuri palms from a garden in “Universidade Federal de Alagoas” A. C. Simões Campus (09°39'54" S 37°22'49" W) (Figure 1A), an urbanized

area that is close to a remnant of Atlantic Forest of the Catolé and Fernão Velho EPA. Each fruit was individualized and closed in transparent plastic bags and transported for laboratory monitoring (24,4 - 26,8 °C; 74,5 % relative humidity), with 12:12 (L:D) hours of photoperiod. Each fruit was opened, to check the internal content after each observed biological event; and at the end, when there were no events after 30 days.

Adults of *P. nucleorum* beetle (Figure 1B) came out from some fruits. From other fruits, adults of *Heterospilus* sp. parasitoid wasps (see images at CHILETTO & PENTEADO-DIAS 2016) escaped through a smaller circular orifice, leaving behind the dead parasitized immature within the fruit. No more insect species were found in or out the fruits. Both insects were identified with the help of studies available in the corresponding scientific literature (JOHNSON *et al.* 1995; COSTA-NETO 2004; RAMOS-ELORDUY *et al.* 2006; CORTINOZ 2011; ANDRADE *et al.* 2013; MAIA 2013; BENTON 2015; BARBOSA 2016; SILVA *et al.* 2019). Voucher specimens were deposited at the Insect Bioecology Laboratory's entomological collection in the "Universidade Federal de Alagoas" Biological and Health Sciences Institute.

Bruchinae larvae, like *P. nucleorum*, feed on the seed endosperm of plants (JOHNSON *et al.* 1995). In doing so, they end up making germination infeasible and can cause damage to propagation. Depending on the infestation level, they can be a problem in the conservation of threatened species, such as some native palm trees (FONSECA *et al.* 2019). *Pachymerus* species attack native and exotic palm trees in different types of vegetation (GRENHA *et al.* 2008; PINTO *et al.* 2012; ANDRADE

et al. 2013; ALVES *et al.* 2016; HERMÓGENES 2016; SANTOS 2016; FONSECA *et al.* 2019).

There are several records of *Pachymerus* feeding on seeds of *Syagrus* sp., but only *P. nucleorum* and *Pachymerus thoracicus* Prevett has reliable record preying seeds of *S. coronata* (ANDRADE *et al.* 2013; MAIA 2013; BENTON 2015; DE MEDEIROS *et al.* 2019; SILVA *et al.* 2019). These two species can be distinguished by the prothorax: *Pachymerus thoracicus* has a strongly transverse prothorax when compare with other species of *Pachymerus* (PREVETT 1966). *Pachymerus nucleorum* can prey on seeds of exotic species (SANTOS 2016; SANTOS *et al.* 2018) and native palm trees, such as *Syagrus* (PINTO *et al.* 2012; MAIA 2013; FONSECA *et al.* 2019) and other genera, including native species of the Atlantic Forest (HERMÓGENES 2016). Wasps of the genus *Heterospilus* have a reduced first radiomedial vein combined with a distally opened brachial cell (BELOKOBYSKIJ 2006), and have already been recorded in this biome (CHILETTO & PENTEADO-DIAS 2016). Many species of *Heterospilus* are parasitoids of borer beetle larvae such as those of *Pachymerus* sp. (CORTINOZ 2011; MAIA 2013; SILVA *et al.* 2019).

Even though they are in an urban area, the specimens of *S. coronata* had seeds preyed upon by *P. nucleorum*, which characterizes the first record of this association in the State of Alagoas. The proximity to a remnant of the Atlantic Forest of this Brazilian State is a sign that *P. nucleorum* may be present or break out in these places. However, the novelty of registering a tritrophic relationship in this locality involving parasitoids of the genus *Heterospilus* seems to indicate the resilience of natural biological control.



Figure 1. *Syagrus coronata* (Martius) Beccari (Arecaceae) plants in "Universidade Federal de Alagoas" A. C. Simões Campus (09°39'54"S 37°22'49"W), urban environment, Maceió, Alagoas (A); *Pachymerus nucleorum* Fabricius (Coleoptera: Chrysomelidae: Bruchinae) adult leaving the *S. coronata* fruit in laboratory (B).

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