



USE OF *Elaeis guineensis* (ARECALES: ARECACEAE) AS SHELTER AND FOOD RESOURCE BY *Coendou spinosus* (RODENTIA: ERETHIZONTIDAE) IN A MANGROVE SWAMP

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Abstract: *Coendou spinosus* (Rodentia: Erethizontidae) is a nocturnal and arboreal rodent capable of living in fragments of forest with different conservation status, feeding on different plant parts. Little is known about this species and plants it uses. The purpose of this article is to describe the use of palm oil, *Elaeis guineensis* (Arecales: Arecaceae), as food source and shelter by *C. spinosus*. The study was carried out in a mangrove swamp of the Guapi-Mirim Environmental Protection Area, municipality of Itaboraí, Rio de Janeiro State, Brazil. During the period from May 2013 to April 2014, 24 fortnightly expeditions were carried out with six visual records of *C. spinosus*, during night, between 19:00 and 23:00 h. In six occasions, we recorded individuals consuming fruit pulp and using this tree as shelter. These observations add important information about the occurrence, feeding and behavior of *C. spinosus* in a mangrove, contributing to the knowledge of its natural history, which is still scarce.

Keywords: coastal ecosystems; oil palm; palm fruit; Spiny Tree Porcupine.

The Erethizontidae family (Rodentia) is composed of mammals known in Brazil as “ouriços-cacheiros” (Caldara-Junior & Leite 2012, Pontes *et al.* 2013). Also called porcupines, they are organized in three genera in the family - *Erethizon*, *Chaetomys* and *Coendou* -, highlighting that there is still a great discussion about the taxonomy of this group (Voss 2011). Today, we have little information about the phylogenetic relationships of Erethizontidae species, even less about the evolution of their most striking features (Caldara-Junior 2013). These Neotropical rodents are known for their main features, such as the presence of modified hairs in spines distributed throughout the body, absence of

the first digits of the posterior and anterior limbs (halux and plex, respectively), which are replaced by a bone callousness that exerts the function of the same ones in each member (Faria *et al.* 2010). They are mainly nocturnal, but can also be occasionally diurnal, and usually feed on different parts of plants, such as seeds, fruits, stem ends, barks, flowers and leaves (Emmons & Feer 1997, Pontes *et al.* 2013, Oliveira *et al.* 2015). In this way, they can play an important role, regulating vegetal diversity (Prado 2009). Porcupines can eat abundant and common plant species in forests of different successional stages, allowing them to survive in forest fragments with different conservation status (Faria *et al.* 2010).

Knowledge about the natural history of species of the genus *Coendou* is still scarce, considering their cryptic habits, as nocturnal activity and long rest time in dense lianas or tree forks above the ground (Patton *et al.* 2015, Abreu *et al.* 2016). *Coendou spinosus* (F. Cuvier, 1823) occurs in humid tropical and subtropical of forests of Mata Atlântica of southeastern Brazil (from Espírito Santo State southward to Rio Grande do Sul State) and in similar contiguous habitats of northeastern Argentina, eastern Paraguay, and northern Uruguay (Patton *et al.* 2015). It is an arboreal rodent species capable of living in forest remnants with different conservation status and its feeding is reported as mainly composed of leaves (Passamani 2010) and flowers (Abreu *et al.* 2016). Although the species feeds mainly on trees, there are reports of these mammals also feeding at ground level also (Abreu *et al.* 2016). Little is known about the species of plants used as food by this species, as well as the parts used as food (Passamani 2010, Abreu *et al.* 2016). The scarcity of studies on this species and other species of porcupines is aggravated because of their difficult capture, due to their arboreal habits, which also leads to the ignorance of the status of conservation of the majority of species of this family in nature (Chiarello *et al.* 2008, ICMBIO 2016).

The mangrove swamp is a coastal ecosystem of the Atlantic Forest that shelter a big variety of mammals (Cerqueira 2010). Its muddy soil consists mainly of decaying plants and animals. This ecosystem of high primary productivity provides a fundamental ecological role in the maintenance of the trophic webs of the coastal environments (Emin-Lima *et al.* 2010). However, mammals correspond to approximately 7.5% of the total of vertebrates that occur in this environment (Lourenço *et al.* 2010). One of the factors that may influence the low number of species of mammals in mangroves is the low diversity of plant species that could offer food resources to frugivorous species (Lourenço *et al.* 2010). Within the mangroves swamps it is possible to find the oil palm, *Elaeis guineensis* (Arecaceae), which is a native plant from Africa, widely distributed throughout Latin America and Asia, among other regions, and is usually associated with water availability (Bakoumé *et al.* 2013). Its fleshy fruit is appreciated by many animals (Batista-da-Silva & Souza 2014).

The purpose of this work is to report the first occurrence of *C. spinosus* in a mangrove swamp, as well as the use of the *E. guineensis* tree, also known as *dendê* in Brazil, as shelter and food resource.

Coendou spinosus occurrence was registered in the mangrove swamp of Guapi-Mirim Environmental Protection Area (APA de Guapi-Mirim), geographically located at the coordinates 22°39'30"-22°46'50" S, 42°57'00"-43°06'40" W, in Itambi, municipality of Itaboraí, Rio de Janeiro, Brazil. In an area of 500 m², inside the mangrove swamp, along 24 fortnightly expeditions from May 2013 to April 2014 for ectoparasite study on small mammals, porcupines were sighted and photographed. The photographs were taken using a Kodak® 7.1 camera with 3x zoom. The nocturnal visualizations were made between 19:00 and 23:00 h with the aid of a flashlight and for the unique capture made, 45 cm diameter nylon net, with a mesh of 2 cm, was used. The objective of the capture was to do the species taxonomic identification, through the collection of hairs and needle-like quills samples.

The single individual of porcupine captured for identification was subsequently released (Figure 1). Based on morphological characters of the hairs and geographic distribution, the specimen captured was classified as *C. spinosus* (Caldara-Junior & Leite 2012). During the 24 expeditions, we did six visual records of *C. spinosus* feeding on palm fruits *E. guineensis*. At different days we made four observations of solitary individuals in the same tree, while one observation was done when two individuals were together using another tree distant 15 m from the first. As individuals were not marked, it is not possible to say whether the solitary specimens observed were the same or not. In all observation, the individuals of *C. spinosus* were feeding on the mature fruits of the palm fallen on the ground and on the tree. During feeding events, the animals manipulated the fruits with the fore limbs, consuming an average of 12 fruits per each sighting. Only the pulp of the fruit was ingested and the seed was discarded in the soil. Besides the consumption of fruits, we also observed the use of palm tree as shelter, when the animal was not feeding, but stopped inactive in a protected place, indicating that it was using that for resting.

Knowledge about the natural history of porcupines has large gaps and is surrounded by



Figure 1. *Coendou spinosus* (Rodentia: Erethizontidae) captured in Guapi-Mirim Environmental Protection Area, municipality of Itaboraí, Rio de Janeiro State, Brazil, resting on a tree of *Elaeis guineensis* (Arecales: Arecaceae).

creeds, which stimulate their hunting by people living near forests. Many people believe, for example, that *Coendou insidiosus* (Lichtenstein, 1818) is able to shed its quills on its predators. This fact is due to the ease with which their quills are released and, when being threatened, the animal will turn its back to the source of the threat, exposing the back covered with quills that are released when they are touched (Santori 1990). In this study, when observed during rest, it was noted that the porcupines slept in a sitting position on the hind limbs. This position is probably a strategy to make a defensive barrier with its quills against predators. In this posture, the animal protects the belly by bending forward and leaves the back with its spines facing outwards. However, there is no information to prove that this behavior is standard for the species, or if it is an individual habit. Individuals were observed to be more often solitary, although in one of the sightings a pair of individuals of approximately the same size

was seen together. However, it was not possible to say whether it was a couple or an adult and his cub.

The occurrence of *C. spinosus* in mangrove swamp described in this report extends the record of occurrence of the species in this type of environment. Consumption behavior on *E. guineensis* fruits, an exotic species, as observed for *C. spinosus* was already described for another species of porcupine, *Coendou speratus* (Pontes *et al.* 2013). Fruits and seeds of *E. guineensis* are rich in oil. Thus, consumption of the oil palm fruits pulp in mangrove swamps may be an important alternative energy supplement in their diet, since the availability of fruits in this environment is low. Santori (1990) studied the food preference and nutrient consumption by *C. spinosus* in captivity (at that time classified as *Sphiggurus insidiosus*), carbohydrates were consumed in a ratio just over five times more than that of proteins and fats, and preference was recorded for tubers, leaves, fruits,

roots and grains of commercially grown plants. Taking into account that few of the foods offered to the animals tested in that study were high in fat, the observations made in the present study suggest that fruit rich in oils, like the palm “*dendê*”, is important for the energetic supply of this species in nature, especially in mangrove swamps, where the variety of food supply of resources for an frugivore/ herbivore mammal is restricted. Thus, *E. guineenses* seems to have an important role for the species maintenance in the mangrove swamp habitat, as for other species of mammals and birds (Batista-da-Silva & Souza 2014).

Plasticity to survive in different types of environments, such as mangroves swamps, is a key factor to understand distribution of mammals. The results found in this work add important information on the occurrence, feeding and behavior of *C. spinosus*, which may contribute to increase knowledge about its natural history, and reinforce the importance of palm oil as a food resource for the fauna of small mammals in mangrove swamps.

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