

available at www.sciencedirect.comjournal homepage: www.elsevier.com/locate/actoec

Original article

Seed dispersal and spatial distribution of *Attalea geraensis* (Arecaceae) in two remnants of Cerrado in Southeastern Brazil

Lilian Bonjorne de Almeida^{a,*}, Mauro Galetti^b^aUniversidade Federal de São Carlos (UFSCar), São Carlos, SP, Brazil^bLaboratório de Biologia da Conservação, Grupo de Fenologia e Dispersão de Sementes, Departamento de Ecologia, Universidade Estadual Paulista (UNESP), C.P. 199, 13506-900, Rio Claro, SP, Brazil

ARTICLE INFO

Article history:

Received 18 May 2005

Accepted 6 April 2007

Published online 1 June 2007

Keywords:

Attalea

Arecaceae

Scatter-hoarding rodents

Seed dispersal

Seed predation

Spatial distribution

ABSTRACT

The seed dispersal system of *Attalea geraensis* (Arecaceae), an acaulescent palm, was investigated during one year in two Cerrado fragments in the state of São Paulo, southeastern Brazil. *A. geraensis* had inflorescences and infructescences throughout the year. Two scatter-hoarding rodents (the spiny rat, *Clyomys bishopi* and agoutis, *Dasyprocta azarae*) were identified as seed predators/dispersers, able to move seeds up to 30 m from the palms, although most of the fruits (57.5%) were dispersed less than 2 m. The removal rates were high and after 20 days, 97.2% of the fruits were removed. Fruit fate was not related to fruit mass, length and diameter. The application of Morisita's index showed a more clumped distribution of adults in the smaller fragment, probably because of the absence of agoutis. Higher seed removal by rodents in the large Cerrado remnant may decrease seed predation by beetles.

© 2007 Elsevier Masson SAS. All rights reserved.

1. Introduction

Seed dispersal is a central demographic process to plant populations (Harper, 1977; Jordano, 2000; Levine and Murrell, 2003). Seed dispersal curve can set if seedlings will be more or less aggregated and whether they will reach or not favourable patches (Janzen, 1970; Barot et al., 1999a). Therefore, seed dispersal is related to demographic parameters, such as seed or seedling survival (Barot et al., 1999b). In tropical regions, animals are the main seed dispersers of most plants and their foraging behavior may have strong effects on plant distribution (Jordano, 2000). In Cerrado, a savanna-like vegetation,

the most common dispersal mode is zoochory, which can involve up to 68% of all woody species (Gottsberger and Silberbauer-Gottsberger, 1983; Vieira et al., 2002). One of the most common plant families in the Cerrado, in terms of individuals, is the Arecaceae. The seed dispersal system of the Arecaceae is chiefly zoochoric (Zona and Henderson, 1989), with the seeds representing a very important component of the diets of mammals, especially in periods of fruit scarcity (Terborgh, 1986; Peres, 2000; Silviu, 2002). The importance of palms may be even higher in highly seasonal ecosystems, such as savannas. In the Cerrado, peak fruit production has been recorded between November and February, the most

* Corresponding author. Laboratório de Fisiologia Vegetal, Departamento de Botânica, Universidade Federal de Minas Gerais (UFMG), Avenida Antônio Carlos, 6627, Pampulha, 31270-901 Belo Horizonte, MG, Brazil.

E-mail address: bonjorne@gmail.com (L. Bonjorne de Almeida).

1146-609X/\$ – see front matter © 2007 Elsevier Masson SAS. All rights reserved.

doi:10.1016/j.actao.2007.04.001

humid months of the year, when fruits can remain attractive for a longer time (Batalha and Mantovani, 2000).

The genus *Attalea* contains at least 29 species that occur in the Neotropics, in tropical forests and savanna-like vegetation that corresponds to Cerrado (Henderson et al., 1995; but see Lorenzi et al., 2004). Twenty of these species are found in Brazil (Henderson et al., 1995), but studies related to seed dispersal in this genus have dealt with only six species. These studies have shown that most species of *Attalea* are dispersed by mammals, some of them exclusively by scatter-hoarding rodents (Forget et al., 1994; Peres, 1994; Kays, 1999; Fragoso and Huffman, 2000; Wright et al., 2000; Wright and Duber, 2001; Vieira, 2002; Fragoso et al., 2003; Pimentel and Tabarelli, 2004).

The fruits of *Attalea geraensis*, which have a smooth mesocarp that is appreciated by rodents (Lorenzi et al., 1996, 2004), are commonly found in galleries of the spiny rat *Clyomys bishopi* (Vieira, 2002). The hard dry fruit is apparently not attractive to other frugivores of the Cerrado except for peccaries, which are seed predators (Neri, 2004).

Palms are considered to be a very important resource to the vertebrate fauna, as there are many species which produce fruits during the period of fruit scarcity (Terborgh, 1986). Therefore, the aim of this work was to study the interaction between the frugivorous mammal fauna and *A. geraensis* in Cerrado vegetation. We were particularly interested in (i) determining the availability of *A. geraensis* fruits throughout the year, (ii) verifying the influence of fruit mass, length and diameter on the number of seeds and on the distances that fruits were removed by mammals from parent plants, (iii) comparing the spatial distribution of *A. geraensis* adult palms, and (iv) the proportion of seeds preyed upon by insects and mammals in two fragments of Cerrado with different degrees of defaunation.

2. Material and methods

2.1. Study sites

This study was done at two sites located in the central part of São Paulo state, southeastern Brazil, where the predominant vegetation is Cerrado (Fig. 1). The largest fragment (about 9010 ha) was the Estação Ecológica de Jataí (hereafter referred to as the "large fragment"), which was located in the municipality of Luiz Antônio (21°33'S, 47°45'W). This site has a wide variety of habitats, from aquatic (rivers and lagoons) to vegetation completely free of inundation, such as cerrado *sensu lato* (which accounts for most of the area) and parts of semideciduous forest (Santos et al., 2000). The climate is Aw, according to the Köppen classification, and is characterized by two distinct seasons: one humid, with high temperatures and abundant rainfall (from November to April) and the other dry, which has lower temperatures and less frequent rainfall (from May to October). The frugivorous mammal fauna of this fragment consists of manned wolves (*Chrysocyon brachyurus*), crab-eating foxes (*Cerdocyon thous*), collared peccaries (*Tayassu tajacu*), agoutis (*Dasyprocta azarae*) and spiny rats (*Clyomys bishopi*; Talamoni, 1996).

The second study site is a 528 ha Cerrado reserve on the campus of the Universidade Federal de São Carlos (hereafter referred to as the "small fragment"), located in São Carlos (21°58'S and 47°52'W), about 90 km from the large fragment.

About 124.7 ha of this site corresponds to Cerrado *sensu lato*, 3.6 ha to gallery forests, 93.8 ha to *Eucalyptus* forest and 83.7 ha to ponds, trails and modified fields (Santos et al., 1999). The climate is Cwa (tropical of altitude) – warm with a dry winter, in which the average temperature of the coldest month is <18° C and of the hottest is >22° C. Rainfall in the driest month is <30 mm, but is ≥10 times higher in the moistest month. This site is characterized by habitat fragmentation and anthropogenic interference (Motta-Junior et al., 1996) and lacks large ungulates and large carnivores. Although endangered species of frugivores, such as the manned wolf (*C. brachyurus*) occur at this site, their abundance in this area is very low, as is that of agoutis (*D. azarae*) and collared peccaries (*T. tajacu*; Motta-Junior et al., 1996).

2.2. Study species

A. geraensis Barb. Rodr. is a monoecious acaulescent palm, rarely more than 1 m tall that occurs in Cerrado or dry forests of the Brazilian states of São Paulo, Minas Gerais, Rio de Janeiro, Goiás and Bahia, and also in Paraguay (Henderson et al., 1995). *A. geraensis* has 2–11 leaves with leaflets regularly arranged in the same plane and brown scales on the lower surface. The palms start to bear fruit when 3–5 years old (Lorenzi et al., 1996, 2004). *A. geraensis* endocarps can have from 1 to 3 seeds (Fig. 2).

Many species of *Attalea* can thrive in disturbed areas, such as cleared pastures (Henderson et al., 1995; Lorenzi et al., 1996, 2004; Souza et al., 2000), and in areas with intense use of fire. Indeed, when fires are not very frequent, *Attalea* species show increased fecundity, growth under open canopies and larger nutrient availability after burning (see Souza and Martins, 2004, for *Attalea humilis*).

2.3. Phenology

We conducted a phenological study in both study areas from April 2003 to March 2004. In each fragment, we monitored 12 adult palms in the first week of each month. The characteristics recorded every month included the number of leaves, inflorescences, infrutescences and fruits per infrutescence. The Mann-Whitney U-test was used to compare the number of inflorescences, infrutescences and fruits at both sites, whereas the number of leaves was compared using Student's t-test for independence. Student's t-tests and regression analysis were performed for the variables which were normally distributed. These analyses were done using the software JMP, version 5.0.1 (SAS Institute, 2002).

2.4. Morphological description of *A. geraensis* fruits

To determine the number of seeds per fruit, we collected 62 mature fruits from six palms from the large fragment in October 2003. We opened the fruits with a hammer and the number of seeds was recorded. Linear regression tests were used to determine whether fruit mass, length and diameter were related to the number of seeds.

2.5. Endocarp census

We did an endocarp census at both study sites in November 2003 in order to assess the relationship between endocarp

Download English Version:

<https://daneshyari.com/en/article/4381537>

Download Persian Version:

<https://daneshyari.com/article/4381537>

[Daneshyari.com](https://daneshyari.com)