



## FLORAL VISITORS OF *PALIAVANA TENUIFLORA* IN MUCUGÊ - BAHIA - BRASIL

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### INTRODUCTION

The Gesneriaceae family includes 135 genera and approximately 3,000 species of flowering plants which are distributed predominantly in the tropics. Two hundred species from 23 genera are found in Brazil (Araújo *et al.* 2005). The family is represented mainly by grasses, sub-shrubs, terrestrial epiphytes, vines and shrubs (Araújo *et al.* 2005). In this family the Sinningieae tribe is composed of the genera *Sinningia*, *Vanhouttea*, and *Paliavana*. Bees and hummingbirds pollinate almost 93% of the species of the Sinningieae tribe. The *Sinningia* and *Vanhouttea* genera both present an ornithophilous syndrome whereas *Paliavana* are pollinated primarily by large bees and bats (Perret *et al.* 2001; Sanmartin-Gajardo & Sazima 2005). The *Paliavana* genus is mainly represented by shrubs, occasionally small trees, and includes six species which occur on rocky outcrops (Campos Rupestres) (Araújo *et al.* 2005).

*Paliavana tenuiflora* presents floral traits characteristic of chiropterophilous syndromes: shrubs with hermaphroditic flowers having tubular and zoomorphic corollas of a violet-purple color, with high production of pollen and nectar (Sanmartin-Gajardo & Sazima 2005). This species occurs mainly in humid forests on rocky outcrops in Pernambuco, Bahia, and Minas Gerais (Araújo *et al.* 2005). This species presents asynchronic bloom, over a period of two to four hours. The flower lasts between four and six days and the stigma is viable throughout the flower lifetime. There is little available information on the reproductive biology of this species. While the Sinningieae tribe originally evolved ornithophilous syndromes, *P. tenuiflora* displays chiropterophilous syndromes that are derived from its taxonomic lineage (Perret *et al.* 2001; Sanmartin-Gajardo & Sazima 2005).

This study attempts to identify the floral visitors of *Paliavana tenuiflora* and record their behaviors

over a 24-hour period in areas of rocky outcrops in Mucugê, Bahia, Brazil.

### MATERIAL AND METHODS

This study was carried out from April to May 2007, as part of the activities of III Pollination Course, organized by “REPOL, Rede Baiana de Polinizadores”. The work was completed in The Municipal Park of Mucugê, located four kilometers from the City of Mucugê in Bahia, Brazil. The park contains rocky outcrop vegetation at an elevation more than 800 meters and is home to a high numbers of endemic species. The area includes vegetation native to humid forests, savannas and caatinga. Flower samples were collected for identification and preservation as material certification, in Alexandre Leal Costa Herbarium (ALCB) - UFBA.

Observations were made on May 15<sup>th</sup> and 16<sup>th</sup> of 2007, on the Sandália Bordada trail in the park (tree hundred meters from the City of Mucugê). The flowers were bagged from May 14<sup>th</sup> to 15<sup>th</sup> and were subsequently unbagged on May 15<sup>th</sup> and 16<sup>th</sup>. Observations were made simultaneously at three different sites during the following periods: May 15<sup>th</sup>: 11h30-13h30, 17h30-19h30 and 23h30-01h30. May 16<sup>th</sup>: 05h30-07h30, 08h00-10h00 and 14h00-16h00. During these observation periods, the time, the number of visitors, the duration of visits and the behavior of visitors were recorded. Floral visitors were collected for identification.

### RESULTS AND DISCUSSION

In total, 117 visitors including bees, beetles, and hummingbirds were observed at *P. tenuiflora* flowers. Most of bees and beetles appeared to be resources thieves as they did not touch the reproductive parts of the flowers. The most frequent visitor species was *Frieseomelitta francoi* Moure (Meliponinae), of which we observed 83 visitors. These bees were observed collecting either

pollen or nectar from the flowers. Specifically, those bees which were observed flying into the flowers and collecting pollen from the anthers did so mostly in the beginning of the day, from 05h30 to 10h00. The bees spent between 30 seconds and 40 minutes collecting pollen. Other bees from the same species landed on the flowers and collected nectar from the petals. This behavior was observed mostly from 11h00 to 13h00. Bees collecting nectar stayed on the flowers between two and five minutes. Flower movement due to wind turbulence reduced the average visitation period of *F. francoi*. The bees would hover around flowers until they stopped moving in the wind and then would land.

A less frequent floral visitor was *Trigona spinipes* (Meliponinae). Sixteen bees were observed, each eating floral parts, including both reproductive tissue and petal tissue. Flower visits were brief, generally between three and ten seconds. Also these bees generally appeared in groups from two to five individuals.

Eighteen bumblebees (*Bombus* sp. or *Xylocopa* sp. and *Nigrita Eulaema* - Euglossinae) were observed visiting the flowers for one to five seconds each. These visits happened mostly between 05h30 and 10h00. The bumblebees crawled into the flowers up to the end of the corolla tubes, probably collecting nectar. These bees touch the reproductive parts of the flower with the top of their body, thus, transferring pollen from anther to stigma. It is therefore predicted that bumblebees are efficient pollinators of *P. tenuiflora*.

Based on earlier collections, *Bombus brevivillus* and *Trigona spinipes* are the most constant bee species in this region of the Chapada Diamantina. In terms of abundance of individuals, *T. spinipes*, *A. mellifera*, *F. francoi* and *B. brevivillus* are the predominant species in this region. These species represented 81% of the total number of insects sampled (Silva-Pereira & Santos 2006). These data are supported by our work, which showed *T. spinipes* and *F. francoi* most often visiting the flowers.

Two species of hummingbirds, *Chlorostilbon aureoventris* and *Phaethornis pretrei*, were observed visiting the flowers. Visitation time ranged from one to four seconds during which time the humming birds could touched the anthers and stigma with their head. They visited the flower most in the afternoon, from 14h00 to 16h00. According to the literature, hummingbirds are the primary pollinators of both *Vanhouttea* and *Sinningia*. While hummingbirds are collecting nectar, they touch the reproductive structures with

either the tops of their heads or with the bases of their jaws (Sanmartin-Gajardo & Sazima 2005a). Consequently, hummingbirds could also be efficient pollinators of *P. tenuiflora*.

During the observation period no bats were seen visiting *P. tenuiflora* flowers. This does not support the predictions of Sanmartin-Gajardo and Sazima (2005) who suggested bats as pollinators of *P. tenuiflora* based on the flower's syndrome (Faegri & Van der Pijl, 1979). During nighttime observation periods, bats were flying around the flowers but they did not make contact. The bats may not have been observed visiting the flowers, because of the late period of budding, the low availability of flowers, or because of our presence. To determine whether bats are in fact pollinators, future tests should use fluorescent powder in the anthers of the flower and subsequent collection of the bats to look for traces of this fluorescent powder.

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