DISTRIBUTION OF *BRACHYPNOEA* (COLEOPTERA: CHRYSMOMELIDAE) IN AN ALTITUDINAL GRADIENT IN A BRAZILIAN SAVANNA VEGETATION.

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**ABSTRACT**

The distribution of *Brachypnoea* spp. along an altitudinal gradient was studied. We tested the hypothesis that *Brachypnoea* spp. abundance would be positively correlated with altitude. Samples were taken from 800 to 1500 m. *Brachypnoea* species richness and abundance increased with increasing altitude. Species were more abundant at higher altitudes in both rainy and dry season, but abundance did not change between the rainy and dry season.

*Brachypnoea* species predominated at sites with higher abundance of their host plants. Inflorescences of Eriocaulaceae and Xyridaceae were the most abundant and rich food resource for the beetles.

**Key words**: Altitudinal gradients, *Brachypnoea*, savanna, insect distribution, insect herbivory.

**INTRODUCTION**

Patterns of insect distribution along altitudinal gradients have been described in several tropical mountains. Insect species richness decreases with increasing altitude in many studies (e.g., Young, 1982; Krysan et al., 1984; Wolda, 1987; Fernandes and Price, 1988, 1991). Nevertheless, richness peaks at intermediate altitudes have also been reported (e.g., Janzen, 1973; Janzen et al., 1976 but see McCoy, 1990). There are few studies on insect distribution in the southeastern altitudinal fields of Brazil (e.g., Fernandes and Price, 1988; Ribeiro, 1992).

The old mountains of Brazil have peculiar conditions if compared with other geologically younger tropical mountains (see Freitas, 1951; Janzen, 1973; Janzen et al., 1976; Wolda, 1987). Plants are generally sclerophyllous and originated in the Tertiary (Rizzini, 1979; Giulietti and Pirani, 1988). Savanna vegetation (cerrado) is found primarily between 800 and 1000 meters, while the altitudinal fields are found at higher altitudes. Nevertheless, sclerophyllous species predominate in both vegetation types (Giulietti and Pirani, 1988). Despite of altitudinal differences, Quartenary Paleo-Climatic events resulted in high habitat and vegetation complexity (Ab'Sáber, 1990).

We report on the distribution of *Brachypnoea* spp. (Coleoptera: Chrysomelidae, Eumolpinae) along an altitudinal gradient in the Serra do Cipó, MG. *Brachypnoea* beetles are small, black, and feed externally on flowers of their host plants. Both adults...
and larvae feed on inflorescences of several species of Eriocaulaceae and Xyridaceae. These plant families are extremely abundant at higher altitudes in the Serra do Cipó (Giulietti and Pirani, 1988). We attempted to verify whether beetle species richness and abundance were positively correlated with altitude and distribution of their host plants. If so, they would have an opposite distributional pattern to that reported in the literature of species distribution along altitudinal gradients (e.g., McCoy 1990). We were also interested to know whether richness and abundance of Brachypnoea changed between the rainy and the dry season, as the study area is remarkably seasonal (Galvão and Nimer, 1965).

MATERIALS AND METHODS

Samples were taken from 800 to 1500 meters above sea level along an altitudinal gradient in the Serra do Cipó. Six sampling sites were established at each 100 meters (see Ribeiro, 1992). Xyris spp. (Xiridaceae) and several species of Eriocaulaceae (such as Paepalanthus spp. and Syngonanthus spp.) predominate above 1200 meters. Insects were sampled with a sweep net (38 cm diameter). Five replicates of 30 sweeps were done in each sampling site along a transect, thus resulting in 150 sweeps per site. Cerrado vegetation predominated from 800 to 1000 m, while rupestrian and altitudinal fields predominated from 1100 to 1500 m (details in Ribeiro, 1992). Beetles were collected in February (rainy season) and in July (dry season) of 1991. All samples were taken near midday, in sunny days. The rainy and dry season were compared by the Wilcoxon's signed rank test (Zar, 1984). Herbivores could not be identified to the species level because of the complexity of the widespread tropical genus Brachypnoea and because it is in need of revision (R.W. Flowers, pers. comm.). Nevertheless, species were deposited at the insect collection of the Universidade Federal de Minas Gerais for future identification.

RESULTS

Based on morphological characteristics, three species of Brachypnoea were distinguished (R.W. Flowers, pers. comm.). All three species were abundant at higher elevations, but only one was found at lower elevations. Due to the small number of species found in this study we will report on the general abundance trend in the altitudinal gradient.

Brachypnoea abundance increased with increasing altitude in both seasons. Beetle abundance in the rainy season was higher at 1400 and 1500 meters compared to any other altitude (Kruskal-Wallis: \( H = 11.957, \ gl = 7, \ p < 0.05 \)). For instance, the mean number of total individuals was 20 times higher above 1400 meters (Fig. 1a). Beetles were only found above 1000 meters in the dry season (Fig. 1b). Ninety-eight percent of the sampled individuals were found between 1300 and 1500 meters in this season (a mean of 60.2 individuals above 1300 meters against a mean of 1.2 individual below 1200 meters).

Variation in beetle abundance was only observed at higher elevations (see Fig. 1). Nevertheless, sites at these three altitudes had the higher abundance of their host plants. The sites at 1300 and 1400 meters presented large clusters of Paepalanthus.
spp., especially *P. bromeliodes* and *P. speciosus* (Fernandes and Ribeiro, 1990). A dense population of *Xyris* spp. covers the sites at 1400 and 1500 meters. The flowering peak of *Xyris* spp. was in the rainy season. Beetles were seen feeding primarily on the inflorescences of these plants. *Brachypnoea* abundance was not different between the rainy and the dry season ($\text{Wilcoxon} = 1.028, n = 24, p > 0.05$).
DISCUSSION

We found a positive correlation between Brachypnoea abundance and altitude. The trends in the distribution of Brachypnoea species is different for that found for several insect herbivores (e.g., Fernandes and Price, 1988, 1991; McCoy, 1990). The most relevant factor influencing the abundance of beetles was the distribution and concentration of their food plants (see Miskimen, 1972; Janzen et al. 1976; Clark and Martins, 1987). Despite flowering peaks in the rainy season (Joly, 1983), inflorescences of Eriocaulaceae are found throughout the year due to the assinochronous flowering phenology of the populations. In addition, fire is a common phenomenon in the area, which influence the flowering phenology of these plants. Furthermore, fire is more frequent in the dry season and patchy, thus favouring flowering both in space and time (J.E.C. Figueira and G.W. Fernandes, in preparation).

We identified an interesting preference of Brachypnoea spp. for few host plants. In addition, food resource availability and concentration may drive the organization of this beetle community. Nevertheless, interesting questions on the extent of the relationships involving beetles and host plants must be studied in detail. The geographical distribution of the relationship between these generalist herbivores as and their host plants may shed light on many aspects of high altitude tropical insects. For instance, detailed studies may unravel interesting idiosyncratic patterns in host utilization, as well as the dynamics of the interactions in space and time.

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REFERENCES


Altitudinal distribution of Brachypnoea


