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Seasonal variation of *Lutzomyia longipalpis* (Lutz & Neiva, 1912) (Diptera: Psychodidae: Phlebotominae) in endemic area of visceral leishmaniasis, Campo Grande, state of Mato Grosso do Sul, Brazil

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Abstract

The seasonal distribution of *Lutzomyia longipalpis* was studied in two forested and five domiciliary areas of the urban area of Campo Grande; MS, from December 2003 to November 2005. Weekly captures were carried out with CDC light traps positioned on ground and in the canopy inside a residual forest and on the edge (ground) of a woodland and in at least one of the following ecotopes in peridomiciles—a cultivated area, a chicken coop, a pigsty, a kennel, a goat and sheep shelter and an intradomicile. A total of 9519 sand flies were collected, 2666 during the first year and 6853 during the second. *L. longipalpis* was found throughout the 2-year period, presenting smaller peaks at intervals of 2–3 months and two greater peaks, the first in February and the second in April 2005, soon after periods of heavy rain. Only In one of the woodlands was a significant negative correlation ($p < 0.05$) between the number of insects and temperature during the first year and the climatic factors (temperature, RHA and rain) was observed. In the domiciliary areas in four domiciles some positive correlations ($p \leq 0.05$) occurred in relation to one or more climatic factors; however, the species shows a clear tendency to greater frequency (72%) in the rainy season than in the dry (28%). Thus, we recommend an intensification of the VL control measures applied in Campo Grande, MS, during the rainy season with a view to reducing the risk of the transmission of the disease.

Keywords: Phlebotominae; *Lutzomyia longipalpis*; Seasonal variation; Mato Grosso do Sul; Brazil

1. Introduction

In Campo Grande, MS, visceral leishmaniasis (VL) is a serious public health problem. Data supplied by the Epidemiological Surveillance Department of the Municipal Health Secretariat, shows that there has been an increase in the number of cases reported since 2002, when the first human autochthonous cases of VL (total of 19) were diagnosed. In subsequent years, the disease has spread throughout the municipality with, a total of 490 registered cases, up to and including 2005 and thus confirming its endemic nature.

The presence of *Lutzomyia longipalpis*, the main vector of VL in Brazil, was reported in Campo Grande for the first time in 2000, when it was the most common species collected in the central area of the city. *L. longipalpis* was found to be present throughout the year, with the greatest density being recorded in the period following that of the heaviest rainfall, in peridomestic/domestic environments, suggesting its potential relevance to the transmission of VL in the municipality (Oliveira et al., 2000, 2003).

Given that VL and *L. longipalpis* are widely distributed in the Campo Grande urban area the purpose of this study was to determine if there was a relationship between climate and density of *L. longipalpis* in Campo Grande.

2. Material and methods

2.1. General characteristics of Campo Grande

The municipality of Campo Grande is located in the central part of Mato Grosso do Sul State. Covering 8118.4 km^2, it occupies 2.27% of the total area of the state and according to

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an estimate by the Brazilian Institute of Geography and Statistics for 2004, it has an urban population of 734,164 inhabitants (Instituto Municipal de Planejamento Urbano de Campo Grande (PLANURB), 2006). The center of the municipality is situated at 20°26′34″S and 54°38′47″W.

According to the classification of Köppen (1948), the predominant climate is of the tropical rainy type of Savanna, subtype AW, characterized by the irregular annual distribution of rain, with a well defined dry period from April to September and a rainy season from October to March. The average annual temperature is around 23 °C, December is the hottest month, at approximately 25 °C and June the coldest, with an average temperature of 18 °C.

2.2. Area of study

The captures were carried out in three regions of the city chosen because of the density and diversity of sand flies reported in a previous study (Oliveira et al., 2003) (Fig. 1). In total seven sites were sampled including two areas of residual forest and five domiciliary environments.

2.3. Sand fly captures

Simultaneously, in each of the seven selected sites, at least one automatic light trap (Natal et al., 1991) was positioned inside the forest (on the ground and in the canopy) on the edge of the woodland (on the ground) and in at least one of the following peridomiciliary environments—a cultivated area, a chicken coop, a pigsty, a kennel, a goat and sheep shelter and an intradomiciliary environment. The traps installed in the canopy were placed at a height of approximately 5 m and those on the ground at 1 m. The captures were made weekly dusk to dawn regardless of official summer time.

The sand flies captured were transported to the Laboratory of Parasitology of the Federal University of Mato Grosso do Sul (UFMS) for species identification. The nomenclature of the species adopted was that of Galati (2003).

The meteorological data was supplied by the Empresa Brasileira de Pesquisa Agropecuária, EMBRAPA (CNPGC-Centro Nacional de Pesquisa de Gado de Corte) in Campo Grande, Mato Grosso do Sul, Brazil.

Fig. 1. Area of study where the captures were carried out in three regions of the city of Campo Grande, Mato Grosso do Sul State, Brazil. A, Ze Pereira woodland and domiciles 1 and 2; B, domiciles 3 and 4; C, Chácara Wood and domicile 5.