TYPE OF LIGHT IN SAND FLY CAPTURES (DIPTERA: PSYCHODIDAE)

Tipo de luz en la captura de flebotominos (Diptera: Psychodidae)

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ABSTRACT

The number of visceral leishmaniasis cases has been gradually increasing in Brazil. One of the strategies to reduce the disease transmission is based on vector control. It is therefore of great epidemiological importance to develop more refined methods for monitoring and controlling its vectors, which are the phlebotomine sand flies. The present study evaluates the performance of traps using UV light or conventional incandescent, or white, light in sand flies captures. Traps baited with UV light caught higher numbers of sand flies than traps baited with white light, indicating the potential use of UV light, especially in locations of low sand flies densities.

Keywords: *Lutzomyia longipalpis*, sand flies, UV light.

RESUMEN

El número de casos de leishmaniasis visceral en Brasil ha ido en aumento, y una de las estrategias para reducir la transmisión de esta enfermedad tiene como base el control

de sus vectores. Por tanto, es de gran importancia epidemiológica desarrollar métodos más refinados para monitorear y controlar sus vectores, que son los flebotominos. El presente estudio compara la atracción ejercida por la luz UV en comparación con luz incandescente convencional, o luz blanca, en la captura de flebotominos. Las trampas adaptadas con luz UV capturaron un mayor número de mosquitos que las trampas adaptadas con luz blanca, lo que indica el uso potencial de la luz ultravioleta, especialmente en las localidades de baja densidad de flebotominos.

Palabras clave: flebotominos, luz UV, *Lutzomyia longipalpis.*

INTRODUCTION

Visceral leishmaniasis has been spreading in Brazil both in the number of cases and in areas of occurrence, having moved from a rural to an urban pattern. Measures for controlling its transmission are complex, and structured primarily on the treatment of patients, the reduction of the vectors, and the elimination of reservoirs (Ministério da Saúde, 2006). *Lutzomyia longipalpis* (Lutz and Neiva) is the main vector of *Leishmania infantum chagasi* (Cunha and Chagas, 1937), the etiological agent of American visceral leishmaniasis in the new world (Dantas-Torres and Brandão-Filho, 2006). Strategies for catching sand flies in great numbers are important for entomological monitoring and control.

Among the various types of traps used to catch adult phlebotomine sand flies in the field, CDC-type light traps baited with incandescent light and their adaptations are the most widely used (Alexander, 2000). Studies on the geographic, environmental, monthly and seasonal distribution of different species of phlebotomine sand flies have been made possible with the use of this type of trap.

The increased efficiency of CDC traps associated with UV (or black) light, evidenced by an increase in the number of male and female caught, was shown for *Phlebotomus* and *Sergentomyia* species in Iraq (Burkett *et al.*, 2007). Observations made in several municipalities of the State of São Paulo, Brazil, especially in areas of low abundance of phlebotomine sand flies, also indicate that UV light is more efficient than white light. The present study was carried out to compare CDC-type traps baited with incandescent light with those using UV light in terms of the numbers of phlebotomine sand flies caught. Geographically, the research was held in an area of urban expansion in the relatively large city of Aracaju, in the northeastern state of Sergipe, Brazil, a region considered endemic to visceral human and canine leishmaniasis.

MATERIALS AND METHODS

The study was carried out in Areia Branca (11°03' S 37°08' W) urban expansion zone in the Aracaju city, State of Sergipe, Brazil with population of 16,857 inhabitants in 2010 (IBGE, 2012). The mean annual rainfall is 1,400 mm, and the average annual temperature is 26 °C. Collections of sand flies were made from 6:00 p.m. till 7:00 a.m. on two consecutive nights for three weeks. The potential appeal of CDC-type light traps (12 V) coupled with 4W UV fluorescent black light, as compared with incandescent 2W white light, was evaluated.

The traps were arranged in pairs, each with one of the types of light, and installed between three and five m one from the other. The pairs of traps were exchanged in the following way: the trap that used UV light on the first day of collection was used with white light on the second day, and vice-versa. Twelve traps were set every evening, for a total of 72 traps during the entire collecting period. The Mann-Whitney Statistical Test was applied to evaluate differences between the numbers of sand flies collected using the white and the UV light.

RESULTS AND DISCUSSION

During the period of study, 256 specimens of sand flies were caught, 227 (88.7 %) in the CDC-type traps with UV light and 29 (11.3 %) in conventional traps using white light. The species of sand flies caught were one male specimen of *Lutzomyia intermedia* caught with UV light, nine specimens of *Lutzomyia lenti* (Mangabeira) (three with white light and nine with UV light) and 246 specimens of *L. longipalpis* (26 with white light and 220 with UV light). Statistical analyses were carried out on *L. longipalpis*, which showed the highest number of specimens caught.

Only 16 (44.4 %) of the 36 traps set with white light caught *L. longipalpis* specimens, seven (19.4 %) of which included females. Twenty-eight (77.7 %) of the traps with UV light caught *L. longipalpis*, 19 (52.8 %) of the traps having caught female specimens. Interestingly, only the trap with UV light caught females with eggs (13 specimens).

More males than females of *L. longipalpis* were caught by both white-light and the UV-light traps, with male/female proportions of 1.6/1 and 3.2/1, respectively, for the two types of light.

The numbers of both males and females caught was significantly higher in CDC traps equipped with UV light ($U = 318.00$, $p = 0.0002$ for males and $U = 404.50$, $p = 0.006$ for females). Williams means were calculated for males and females of *L. longipalpis* by type of light used in the traps (Fig. 1).

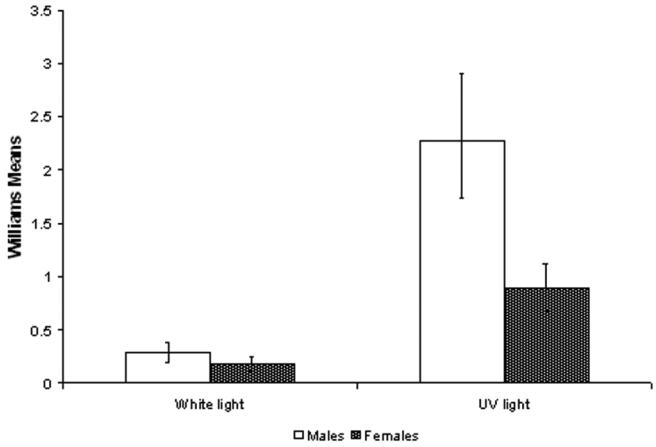

Figure 1. Williams means for males and females of *L. longipalpis* collected in CDC-type traps with white and UV light, in an urban expansion zone of Aracaju/SE, Brazil.

The difficulty of locating precisely where these insects grow to maturity, has led researchers to seek adult specimens, which are most active in the evening and at nighttime. Depending on the objective for catching flies, traps with animal bait, carbon dioxide, or light are the equipment most often employed (Alexander, 2000; Pinto *et al.*, 2001), and light traps are the devices most often used when the objective is to monitor the species. CDC light traps are indicated by the Brazilian Health Ministry for monitoring *L. longipalpis* in urban areas in Brazil (Brasil, 2006).

There is limited knowledge of the role of vision in the ecology of phlebotomine sand flies, and information concerning the potentiality of attraction of other types of light traps would require knowledge of the ability of these insects to perceive color. This question was answered in the laboratory, where the effect of different wavelengths of light for males and females of *L. longipalpis* was evaluated in behavioral experiments. The results showed that both sexes of *L. longipalpis* are attracted to UV light (350 nm) with a secondary peak in the blue-green-yellow region (490 to 546 nm) (Mellor and Hamilton, 2003). These data indicate that *L. longipalpis* is able to distinguish colors and discriminate wavelengths of different intensities. There have been few field studies to verify these laboratory data. Field experiments on species of the genus *Phlebotomus* and *Sergentomyia* in Iraq evaluated the appeal of UV light and indicated its use in capturing these species (Alexander, 2000).

The findings of the present study also indicate that researchers can adequately use CDC-type light traps baited with UV light to monitor populations of *L. longipalpis*. Efficiency will be greater in situations of low population density of this species.

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