Control of *Aedes aegypti* with temephos in a Buenos Aires cemetery, Argentina

Controle de *Aedes aegypti* com temefós em cemitério de Buenos Aires, Argentina

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Keywords
Aedes. Temephos. Vector control. Mosquito control. Insect vectors. Insecticide resistance.

Abstract
The efficacy of a larvicide, temephos, for controlling *Ae. aegypti* was evaluated in a cemetery in Buenos Aires, Argentina. Breeding sites decreased from 18.4% in the first study period (Nov 1998 to May 1999, without temephos) to 2.2% in the second period (Nov 1999 to May 2000, two applications), and to 0.05% in the third one (Nov 2000 to May 2001, five applications). Ovitraps with eggs decreased from 17% in the first period to 5.8% in the second period, and to 2.9% in the third one. Results suggest that, in Buenos Aires, *Ae. aegypti* populations are highly susceptible to temephos. It is recommended to limit the use of temephos to prevent potential epidemics rather than for routine control.

Descritores
Aedes. *Temefós, Controle de vetores. Controle de mosquitos. Insetos vetores. Resistência a inseticidas.*

Resumo
Avaliou-se a eficácia de um larvicida, temefós, para controlar Ae. aegypti *em um cemitério de Buenos Aires, Argentina. Os criadouros reduziram de 18,4% no primeiro período de estudo (nov de 1998 a maio de 1999, sem temefós) para 2,2% no segundo (nov de 1999 a maio de 2000, duas aplicações), e para 0,05% no terceiro (nov de 2000 a maio de 2001, cinco aplicações). As ovitrampas com ovos diminuíram de 17% no primeiro período para 5,8% no segundo e para 2,9% no terceiro. Os resultados sugerem que, em Buenos Aires, as populações de* Ae. aegypti *são altamente susceptíveis ao temefós. É recomendável seu uso para prevenir eventuais epidemias e não para o controle rotineiro.*

INTRODUCTION

The cemeteries of Buenos Aires, Argentina, as in other Latin American countries, provide a high density of potential breeding sites of *Aedes aegypti*.[1,5] In these environments, traditional mourning habits are hard to change.[1] Slow-release larvicides as temephos can reduce the frequency and cost of insecticide application to control mosquito populations.[2] The present study evaluated the efficacy of temephos for controlling *Ae. aegypti* in an environment with the highest urban container density.

METHODS

The study area was Británico cemetery in Buenos Aires. This is a 5-hectare private cemetery with high vegetation cover (82%) and high availability of containers (1499/ha) that showed to have one of the highest *Ae. aegypti* infestation rates in the city (container index = 25%).[5]

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Financial support by Consejo Nacional de Investigaciones Científicas y Técnicas and Dirección General de Política y Control Ambiental (Secretaría de Planeamiento Urbano y Medio Ambiente del Gobierno de la Ciudad de Buenos Aires).
Received on 5/1/2004. Approved on 17/5/2004.

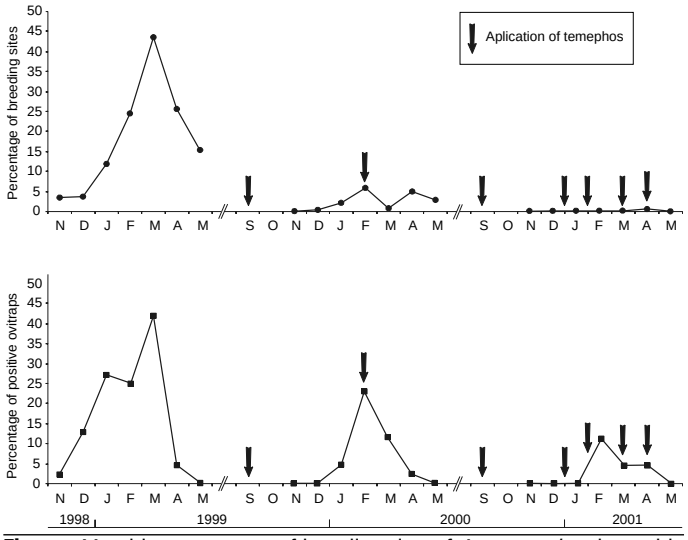

Figure - Monthly percentages of breeding sites of *Ae. aegypti* and monthly percentages of positive ovitraps in the cemetery Británico (Buenos Aires City, Argentina), from November 1998 to May 2001.

During three consecutive study periods (November 1998 to May 1999, Nov 1999 to May 2000, and Nov 2000 to May 2001), between 400 and 1400 containers were examined monthly for immature stages of *Ae. aegypti*, and 11 ovitraps were examined weekly to monitor oviposition activity.

The larvicide used for controlling *Ae. aegypti* population was 1% temephos (Abate®).No control measure was put in place during the first study period. In the second period temephos was applied to all containers available in mid-September, before the beginning of the mosquito reproductive season, and in mid-February. In the third period the larvicide was applied in mid-September, at the end of December, at the beginning of February and March, and in mid-April.

Ae. aegypti breeding sites and positive ovitraps proportions were compared between consecutive periods using the z-test for two independent proportions.

RESULTS

The proportion of breeding sites seen in the first study period (929 breeding sites/5,044 water-filled containers: 18.4%) was significantly higher ($z=22.06$, $p<0.001$) than that found in the second period (70/3,240: 2.2%), and the latter was significantly higher ($z=6.31$, $p<0.001$) than that in the third period (1/1,969: 0.05%).

The proportion of positive ovitraps seen in the first study period (56/330: 17%) was significantly higher ($z=4.29$, $p<0.001$) than that found in the second period (18/308: 5.8%) but the latter and the proportion of positive ovitraps in the third period (9/308: 2.9%) did not differ significantly ($z=1.57$, $p=0.12$).

The Figure shows monthly breeding sites and positive ovitraps proportions in the three study periods. *Ae. aegypti* was not seen in November and December in both periods in which temephos was applied during early spring (September). The highest monthly breeding site infestation rate decreased from 43.7% in the first study period to 0.4% in the third one. The highest monthly positive ovitraps decreased from 41.8% in the first study period to 0.4% in the third one.

DISCUSSION

The use of temephos in an environment with high availability of potential breeding sites was effective in reducing *Ae. aegypti* populations. With only two larvicide applications, one before and the other during the reproductive season, there was a eight-time decrease in breeding site infestation and three-time decrease in oviposition activity. Subsequently, in the third study period when there were five temephos applications, *Ae. aegypti* immature population was almost completely eliminated (remained only 1 breeding site). However, a 3% ovitraps with eggs were detected throughout this period, reaching a maximum of 11.4% in February. These eggs may come from oviposition of isolated females from the cemetery surroundings.

Considering that at the time of the study there were no records of periodical use of temephos in Buenos Aires, it is unlikely that mosquito populations had develop resistance against this insecticide. High and moderate resistance to temephos has been described in the Caribbean region[4] and Brazil[3] respectively. In Buenos Aires, where no local transmission of dengue virus has been demonstrated, it is recommended to save insecticides as an efficient tool for preventing potential epidemics only rather than for routine control.

ACKNOWLEDGEMENTS

To the Dirección General de Política y Control Ambiental (Secretaría de Planeamiento Urbano y Medio Ambiente del Gobierno de la Ciudad de Buenos Aires) and to the Departamento de Zoonosis, Reservorios y Vectores (Ministerio de Salud Pública y Acción Social de La Nación) for their help in applying temephos. To the authorities of Británico cemetery for allowing our work at the site.

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