

**A preliminary note on the evaluation of garlic as a mosquito repellent**

Keith Snow and Ronald Cutler

School of Health and Bioscience, University of East London, London E15 4LZ, UK. Email: k.r.snow@uel.ac.uk

In an attempt to discover new mosquito repellents, to augment established chemicals such as diethyl toluamide (deet) and permethrin, a number of extracts from plants including neem, basil, clove and thyme together with essential oils such as citronella, mentha piperita, eucalyptus and vanillin have been investigated and subsequently reported to have mosquito repellent properties (Yang & Ma, 2005). A number of commercial products are currently available based mainly on citronella and eucalyptus. These repellents have been evaluated with regard to the prevention of mosquito landing and feeding on humans and mice under laboratory and field conditions. Garlic has been shown to have larvicidal properties (Amonkar & Reeves (1969), so its effect on adult mosquitoes is of interest.

A different approach was used in the present study where either 1 ml of garlic extract or 1 ml of citronella oil (for comparison) was placed on each of two cotton bands (1 cm wide) above and below the entrance of a carbon dioxide suction trap to investigate any repellent activity. Three carbon dioxide traps were used at each of two locations, one with garlic extract, one with citronella oil and one with neither as a control. Over eighty years ago Rudolphs reported that carbon dioxide was an attractant for mosquitoes and it is now generally accepted that carbon dioxide together with other olfactory cues, is an attractant to virtually all haematophagous flies (Service, 1993).

The traps were suspended from metal poles at a height of 2m above the ground and 3m apart in open areas in an urban park in Chingford, London, UK and a woodland location in Epping Forest, Essex, UK, the former frequented by *Anopheles plumbeus*, *Culex pipiens* and *Ochlerotatus geniculatus* and the latter by *An. plumbeus*, *Oc. cantans*, *Oc. punctor* and *Oc. geniculatus*. The traps were run for 10 hour periods from 8 pm until 6 am, one night per week each for the ten week period from early June 2005 until mid October 2005. The location of the traps was rotated regularly to compensate for local conditions. The nets containing the captured mosquitoes were removed at the end of the trapping period and placed in a freezer to kill the mosquitoes, thus allowing them to be counted and identified. All were found to belong to one of the above named species.

Over the trapping period the control traps captured 701 mosquitoes, the traps with garlic extract caught 289 mosquitoes and the traps with citronella oil captured 94 mosquitoes. This represents a reduction in attracted mosquitoes of 59% in the traps with garlic extract and 86% in the traps with citronella oil. All species of mosquito were more or less equally affected by the garlic and citronella.

Clearly, both the garlic extract and the citronella oil were exhibiting a negative effect on mosquito attraction, the latter greater than the former. Carbon dioxide is a mosquito attractant and the garlic extract and citronella oil appear to have counteracted this to varying extents.

More detailed studies have been devised to investigate this phenomenon further and will be reported at a future date. Further studies will involve other possible natural repellents and compare the results with deet and permethrin.

**References**

- Amonkar, S.V. & Reeves, E.L. (1969) Mosquito control with active principle of garlic, *Allium sativum*. WHO/VBC/69.174  
Service, M.W. (1993) Mosquito Ecology. Field Sampling Methods. Elsevier Applied Science. London and New York. xiii+988pp.  
Yang, P. & Ma, Y. (2005) Repellent effect of plant essential oils against *Aedes albopictus*. *Journal of Vector Ecology* 30, 231-234.