Comparative evaluation of the mosquito magnet® trap and the CDC light trap as sampling tools for outdoor mosquitoes in Kenya

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ABSTRACT

Sampling for surveillance of adult stages of mosquitoes is a necessary process in any disease control program. It provides important information for ecological, taxonomic as well as faunastic studies necessary in disease control attempt. There is, therefore, need for a continuous development as well as evaluation of new vector sampling systems for more accurate surveillance. Studies to evaluate the efficiency of a new trapping system known as the mosquito magnet trap® model liberty plus (MMLP) were undertaken in Jaribuni, a rural area in Kilifi district, coast province, Kenya. Its efficiency was compared with that of the standard centre for disease control light trap (CDC-LT). Two mosquito magnet traps and four CDC light traps were employed for this study. Mosquito sampling was done outdoors for a period of three months. All collected mosquitoes were morphologically identified to species level and counted. Members of the two principal malaria vectors in Kilifi namely, *Anopheles gambiae* and *An. funestus* were further identified to their sibling species by a polymerase chain reaction (PCR) assay. All mosquitoes belonging to the genus *Anopheles* were examined for infection with the human malaria parasite *Plasmodium falciparum* by an enzyme-linked immunosorbent (ELISA) assay. Bloodmeals from the fed mosquitoes were also analysed to determine the preferred hosts.

A total of 1192 mosquitoes belonging to 21 species were collected during the sampling period. Out of the total, 158 mosquitoes representing 13.3% were captured by the CDC-LT traps while 1,034 representing 86.7% were captured by the MMLP traps. The MMLP traps collected a significantly higher mean number of mosquitoes (12.93±2.51) compared to 0.99±0.18 in the CDC-LT traps (p=0.05). Each kind of trap captured mosquitoes belonging

to five genera. With a total of 18 species, the MMLP traps did not capture a significantly higher species diversity ($p < 0.05$) than the CDC-LT traps which had 15 species. Molecular identification of *An. funestus* using PCR assay yielded four sibling species namely *An. funestus s.s., An. leesoni, An. parensis* and *An. rivulorum*. PCR identifications of *An. gambiae* on the other hand yielded two species namely *An. arabiensis* and *An. merus.*

A single specimen belonging to *An. parensis* captured by MMLP trap tested positive *P. falciparum* circumsporozoites. The capture of this *P. falciparum* positive mosquito in a carbon dioxide baited trap was an indication that it was host seeking. This observation suggested that malaria transmission does occur outdoors.

In total, 13 blood-fed mosquitoes were captured. Sixty two percent (n=8) of the bloodmeals were identified, as bovine suggesting that majority of the outdoor captured mosquitoes were zoophagic. Human immunoglobulin G (IgG) was not detected in any of the mosquitoes.

This study demonstrated the superiority of the mosquito magnet traps over the CDC light traps for outdoor mosquito sampling. The large numbers of unfed host seeking mosquitoes suggested that carbon dioxide, heat and moisture baited traps can be considered as an ideal substitute for human bait catches which are increasingly raising ethical issues. These findings also suggest that mosquito control strategies targeting outdoor adult populations should be employed to reduce outdoor disease transmissions. A high potential of zoo prophylaxis is also demonstrated by this study.