

ABSTRACT

Background

Mosquitoes are the dominant vectors of pathogens that cause infectious diseases such as malaria, dengue, yellow fever and filariasis. Current vector control strategies often rely on the use of pyrethroids against which mosquitoes are increasingly developing resistance. Here, a push-pull system is presented, that operates by the simultaneous use of repellent and attractive volatile odorants.

Method/Results

Experiments were carried out in a semi-field set-up: a traditional house which was constructed inside a screenhouse. The release of different repellent compounds, para-menthane-3,8-diol (PMD), catnip oil e.o. and delta-undecalactone, from the four corners of the house resulted in significant reductions of 45% to 81.5% in house entry of host-seeking malaria mosquitoes. The highest reductions in house entry (up to 95.5%), were achieved by simultaneously repelling mosquitoes from the house (push) and removing them from the experimental set-up using attractant-baited traps (pull).

Conclusions

The outcome of this study suggests that a push-pull system based on attractive and repellent volatiles may successfully be employed to target mosquito vectors of human disease. Reductions in house entry of malaria vectors, of the magnitude that was achieved in these experiments, would likely affect malaria transmission. The repellents used are non-toxic and can be used safely in a human environment. Delta-undecalactone is a novel repellent that showed higher effectiveness than the established repellent PMD. These results encourage further development of the system for practical implementation in the field.