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Mosquito vector management with botanicals—the most effective weapons in controlling mosquito–borne diseases

Shyamapada Mandal

Department of Zoology, Gurudas College, Narkeldanga, Kolkata–700 054, India

Dear editor,

Mosquito–borne diseases, *viz.*, malaria, filariasis, dengue hemorrhagic fever, chikungunya, Japanese encephalitis *etc.*, created huge impact on humans over the world, and the chemical insecticides remain the mainstay of effective control. But, indiscriminate and rampant use of the chemical insecticides in controlling mosquito vectors, in order to prevent diseases vectored by them, has resulted problems related to the adverse environmental effects for their (insecticides) potential toxicity, high operational cost, community acceptance, and the development of insecticide resistance among the vectors. The factors mentioned above prompted the search for new means of control strategies. Currently, the botanicals (*viz.*, plant extracts, essential oils and phytochemicals) with mosquitocidal potential are recognized as potent alternatives to replace the synthetic insecticides in mosquito control programs due to their larvicidal, pupicidal and adulticidal properties; these also have excellent oviposition inhibiting, repellent or insect growth regulatory effects, and are found environmentally safe, degradable and target specific. Several authors, from different parts of India, timely reported the potential role of various plants extracts^[1–4], since these contain multiple active ingredients with different modes of action, and thus lessening the chance of resistance development in mosquito populations.

Govindarajan *et al*^[1], from Tamilnadu (India), reported the ovicidal and repellent activity of *Ervatamia coronaria* (*E. coronaria*) and *Caesalpinia pulcherrima* (*C. pulcherrima*) leaf extract against *Culex quinquefasciatus* (*Cx. quinquefasciatus*), *Aedes aegypti* (*Ae. aegypti*) and *Anopheles stephensi* (*An. stephensi*), the eggs of which lost 100% hatchability due to *E. coronaria*, at concentrations of 250, 200 and 150 ppm, respectively, while *C. pulcherrima* exerted zero hatchability (100% mortality) at 375, 300 and 225 ppm, respectively against the mosquitoes. *E. coronaria*, which was found to have greater repellency than *C. pulcherrima*, provided 100% protection for 150, 180 and 210 min at 5 mg/cm².

Prabhu *et al*^[2], from Coimbatore (India), studied the larvicidal activity of *Moringa oleifera* extract against larvae

and pupa of *An. stephensi*, and recorded LC₅₀ (57.79–78.93 ppm) and LC₉₀ (125.93–143.20 ppm) values for larvae; the LC₅₀ and LC₉₀ for the pupae were 67.77 ppm and 141.00 ppm, respectively.

Kumar *et al*^[3], from New Delhi (India), nicely documented the larvicidal and repellent potential of *Mentha piperita* essential oil against *Ae. Aegypti*; the 24 h LC₅₀ and LC₉₀ values against the larvae were 111.90 and 295.18 ppm, respectively, and against the adults the agent showed 100% protection for 150 min.

The repellent activity of *Eucalyptus* and *Azadirachta indica* (*A. indica*) seed oil has been evaluated against *Cx. quinquefasciatus*, and it has been recorded that there was zero bite for 120 and 180 min, respectively due to *Eucalyptus* and *A. indica* seed oil, and thus 100% protection from *Cx. quinquefasciatus* bite was achieved^[4].

The botanicals might be used as an alternative to other insecticides for the control of mosquito and thus mosquito–borne diseases, and hence, such studies would be helpful in developing plant–based anti–mosquito agents. However, further investigation is required in order to quantify and determine contribution of the active ingredients, because this may lead to the discovery of novel compounds having desired mosquitocidal activities.

References

- [1] Govindarajan M, Mathivanan T, Elumalai K, Krishnappa K, Anandan A. Ovicidal and repellent activities of botanical extracts against *Culex quinquefasciatus*, *Aedes aegypti* and *Anopheles stephensi* (Diptera: Culicidae). *Asian Pac J Trop Biomed* 2011; **1**: 43–48.
- [2] Prabhu K, Murugan K, Nareshkumar A, Ramasubramanian N, Bragadeeswaran S. Larvicidal and repellent potential of *Moringa oleifera* against dengue vector, *Anopheles stephensi* Liston (Insecta: Diptera: Culicidae). *Asian Pac J Trop Biomed* 2011; **1**: 127–132.
- [3] Kumar S, Wahab N, Warikoo R. Bioefficacy of *Mentha piperita* essential oil against dengue fever mosquito, *Aedes aegypti* L. *Asian Pac J Trop Biomed* 2011; **1**: 90–93.
- [4] Mandal S. Repellent activity of *Eucalyptus* and *Azadirachta indica* seed oil against the filarial mosquito *Culex quinquefasciatus* Say (Diptera: Culicidae) in India. *Asian Pac J Trop Biomed* 2011; **1**: 181–184.

*Corresponding author: Dr. Shyamapada Mandal, Department of Zoology, Gurudas College, Narkeldanga, Kolkata–700 054, India.
E-mail: samtropmed@gmail.com