

Larvicidal effects of Chinaberry (*Melia azederach*) powder on *Anopheles arabiensis* in Ethiopia.

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Abstract

Background Chinaberry (*Melia azederach*) extracts have been shown to be effective growth-inhibiting larvicides against several insects, and seeds from the closely related Neem tree have been used to suppress *Anopheles gambiae* populations, a major malaria vector in Ethiopia and the world. Because several active chemicals in the trees' seeds have insecticidal properties, the emergence of resistance is unlikely. Here, we investigate the feasibility of Chinaberry as a locally available, low-cost sustainable insecticide that can aid in controlling malaria.

Methods Chinaberry fruits were collected from Asendabo, Ethiopia. The seeds were removed from the fruits, dried and crushed into a powder. From developmental habitats in the same village, *Anopheles arabiensis* larvae were collected and placed into laboratory breeders. Chinaberry seed powder was added at 3 treatment levels, with a control. The breeders were monitored daily and larvae; pupae and adult mosquitoes were counted. This experimental procedure was replicated three times.

Results Chinaberry seed powder caused an inhibition of emergence of 93% at the 4.4g m⁻² treatment level, and 100% inhibition of emergence at the two higher treatment levels. The Chinaberry had a highly statistically significant larvicidal effect at all treatment levels ($\chi^2=184, 184, \text{ and } 155$ for 4.4 g m⁻², 8.8 g m⁻² and 17.6 g m⁻², respectively; $p < 0.0001$ in all cases). In addition, estimates suggest that sufficient Chinaberry seed exists in Asendabo to treat developmental habitat for the duration of the rainy season and support a field trial.

Conclusion Chinaberry seed is a very potent growth-inhibiting larvicide against the major African malaria vector *An. arabiensis*. The seed promises to provide a sustainable additional malaria vector control tool that can be used where the tree is abundant and where *An. arabiensis* is a dominant vector. Based on these results, a future village-scale field trial using the technique is warranted.

