

ABSTRACT

Mosquitoes have a substantial role in ecosystem as they are a source of biomass in the food chain both in adult and larval form. However they are a primary vector of different diseases like dengue fever, chikungunya, zika virus and yellow fever. Control of mosquitoes at larval stage is important as it stops the emergence of the disease causing adults. Essential oils are the natural alternatives of synthetic larvicides having multiple components resulting in no way of resistance development in mosquitoes. The volatile nature, poor solubility and lower stability of essential oils due to environmental factors including temperature and humidity lowers its larvicidal activity. To enhance the pharmacokinetic profile of EOs, we have encapsulated the *Curcuma longa* (Turmeric) Essential Oil and *Cymbopogon citratus* (Lemon Grass) Essential oils in hydrogel nurdles. Essential oils were extracted by hydro-distillation method and their components were analyzed by using GC-MS analysis. Hydrogel nurdles were characterized using Dynamic light scattering (DLS), Zeta Sizer, and UV spectrophotometry, FT-IR, Swelling degree, floatability and Scanning electron microscopy. These plant EOs have significant mortality ($F_{1,28} = 68$; $P < 0.001$) against *Aedes aegypti* larvae with LC_{50} / LC_{90} value 47.70ppm/ 90.51ppm for *Curcuma longa* Essential Oil and LC_{50} / LC_{90} values 95.69ppm / 160.94ppm for *Cymbopogon citratus* Essential Oil. Mortality rate was dose dependent and differ significantly ($F_{6,28} = 319$; $P < 0.001$) among various dose concentrations of each plant EO. The Essential Oil filled hydrogel nurdles showed larvicidal effects with LC_{50} / LC_{90} values 146.86 ppm/290.50ppm for Turmeric essential oil filled nurdles and 246.17ppm/516.36ppm for Lemon Grass essential oil filled nurdles. We conclude that EO filled hydrogel nurdles offers promising and effective larvicides against *Aedes aegypti* larvae.

Keywords: *Aedes aegypti*, nurdles, Turmeric essential oil, Lemon grass essential oil, Essential oil filled nurdles, Larval mortality