

ENHANCING LARVICIDAL EFFICIENCY OF SODIUM- ENCAPSULATED ESSENTIAL OILS AGAINST *Aedes aegypti* AND *Culex quinquefasciatus*

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Abstract Mosquito borne diseases such as dengue fever are an important health issue. Vector control is a crucial way to prevent the spread of mosquito-borne diseases and mainly relies on synthetic insecticides which always result in resistance, affecting non-target organisms and environmental pollution. Plant essential oils (EOs) are considered as an eco-friendly alternative for vector control, however a major limitation to the widespread use of EOs is their high volatility, which limits their persistence and effectiveness. To reduce volatility, three main components of Indian mint (*Plectranthus amboinicus*) essential oil (carvacrol, p-cymene and β -caryophyllene) were thoroughly mixed with sodium alginate under the emulsion of Tween-80. The emulsified EOs were then dropped into calcium chloride solution by peristaltic pump to form small droplets for larvicidal testing. The results showed that sodium alginate encapsulation significantly increased the larvicidal activity of EOs against both *Aedes aegypti* and *Culex quinquefasciatus*. The experiment demonstrated EOs embedded in 0.5% SA exhibited the best effect on improving the larvicidal activities against both species of mosquito, mainly due to the larger swelling index of 0.5% SA which allows it to encapsulate more EOs. In addition, the 0.5% SA-encapsulated EOs have relatively larger surface area to facilitate EOs release, as evidenced by HPLC analysis. Sodium alginate is a naturally occurring polymer that has been increasingly studied in controlled-release of pharmaceutical due to its low cost, low toxicity, biocompatibility, biodegradability. The current studies suggested that sodium alginate is applicable for EOs encapsulation, making EOs an effective larvicidal agent.

Key words Essential oil, mosquito control, encapsulation, sodium alginate