

Identification of novel bio-insecticidal metabolite from soil borne bacterium *Bacillus megaterium* against dengue and filariasis vector

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Mosquitoes transmit dreadful diseases, causing millions of deaths every year. Dengue (mosquito borne tropical disease, caused by dengue virus) and Lymphatic filariasis (infected with the filarial worms, *Wuchereria bancrofti*, *Brugia malayi* or *B. timori*) diseases are transmitted by mosquito vectors *Aedes aegypti* and *Culex quinquefasciatus*, respectively; vector control strategies include chemical, non-chemical and biological control agents. Repetitive use of man-made insecticides for mosquito control disrupts natural biological control systems and lead to the reappearance of mosquito populations. It also resulted in the development of resistance, harmful effects on non-target organisms and human health problems and subsequent searching for an alternative control measures. Microbial products are effective against mosquitoes at very low dosages with minimum effect on other biological control agents. Therefore, screening for larvicidal activity of microbial extract attributes could lead to the development of new and improved mosquito control methods is economical and safe for non-target organisms. The purpose of the present study is to explore the larvicidal activity of soil borne microbial isolate of *Bacillus megaterium*, against the targeted mosquito vectors. The bacterium was isolated from soil using standard microbiological methods (serial dilution) and identified as based on colony morphology i.e., white, round, smooth and shiny. Gram staining results found to be Gram positive rods and the presence of endospores. The biochemical tests were performed and the results show catalase positive, oxidase, indole, Vogues-Proskauer negative and citrate positive. Molecular identification (based on 16S rRNA analysis and Genbank database) of the potential strain (OS1) showed 99% similarity with *Bacillus megaterium*. The results of partial sequenced 16S rRNA gene (with 915 bp in length) were submitted in NCBI Genbank (GenBank Accession number KR061332.1). The supernatant of *B. megaterium* with equal volume of ethyl acetate: methanol (1:1) was mixed and the upper layer was separated using a rotary evaporator. The separated metabolite has been used to perform the larvicidal potential of *Ae. aegypti* and *Cx. quinquefasciatus* larvae. The mortality rate was observed at dose-dependent activity for different stages of larval instars (second, third and fourth) of both mosquitoes. Log Probit analysis (95% confidence level) revealed an LC₅₀ value of 113.256, 168.210, 289.597; LC₉₀ 166.735, 224.943, 289.597 and LC50 232.197, 197.659, 70.728; LC90 305.076, 283.773, 133.997 ppm/ml respectively. In the biolarvicidal assay, about 1000 ppm/ml concentration of the isolate (OS1) showed 100% mortality after 48 hours of incubation. This is the first hand information on larvicidal efficiency of ethyl acetate: Methanolic extract from an entomopathogenic bacterium *B. megaterium* extract and could be suitable for the control of vector borne diseases in humans, especially dengue and filariasis.

Biography

D. Natarajan is currently working as an Assistant Professor in the Department of Biotechnology, Periyar University, Salem, Tamilnadu since October, 2008. He obtained his post-graduation and Doctoral degree (Botany) from Bharathidasan University, Trichy, Tamilnadu in 2003. His research interest includes Herbal and Microbial Biotechnology, Plant tissue culture, Bio/phytoremediation and Bio-nanomedicine. He has published more than 100 research articles both National and International journals and 63 conference attended/presented papers and 4 book chapters for his research credentials. He has operated four major projects funded by Indian Government agencies like UGC, DST, ICMR & TNSCST (worth of Rs. 45 lakhs) during his career at Periyar University. He was the recipient of the Young Scientist award for 2013 by SERB, New Delhi and he has awarded at the prestigious author award by OMICS International 2011. So far, he has guided 10 Ph.D and 20 M. Phil scholars.

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