Antibacterial activity of entomopathogenic fungi isolated from a beetle (*Harmonia* sp.) in Sri Lanka

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Majority of human pathogenic bacteria has become resistant to the exsisting antibiotics causing a human health crisis in the world. Thus discovering novel antibacterial drug leads has become an urgent concern. Entomopathogenic fungi (EPF) infect insects and kill or disable them. Previous research have shown entomopathogenic fungi exhibit various bioactivities. Thus, the objective of the current study was to isolate entomopathogenic fungi from a beetle, a *Harmonia* sp. in Sri Lanka and evaluvate their potential of producing antibacterial compounds. EPF were isolated from surface sterilized insect cadavers collected from Balangoda area in Sri Lanka. Isolated fungi were grown in potato dextrose agar and broth media, incubated close to sporulation, harvested and extracted into ethyl aceate. The obtained weights of the crude extracts of solid and liquid cultures were compared using ANOVA. Antibacterial activity of the crude extracts were evaluated using agar disc diffusion bioassays at 400 µg/disc, against two Gram-positive bacteria, *Staphylococcus aureus* (ATCC 25923), *Bacillus cereus* (ATTC 11778) and two Gram-negative, *Escherichia coli* (ATCC 35218) and *Pseudomonas aeruginosa* (ATCC 9027). The positive control used was Gentamycin and the negative control was methanol. Seven morphologically different EPF were isolated from *Harmonia* sp. The crude weights of the solid cultures were significantly higher than the crude weights of the liquid cultures (ANOVA, $p < 0.05$). This result showed fungi have preferred to synthesize more metabolites under solid culture conditions than liquid. Six out of the seven fungi showed antibacterial acitivities against at least one bacterium tested. EPF cultures BET 06, 08 and 10 showed high inhibition zones against the *S. aureus* and *B. cereus*. According to ANOVA there was a significant difference between the antibacterial activities of the crude extracts ($p < 0.05$). None of the fungal extracts showed activity against *P. aeruginosa* while BET 05, 06 and 08 showed mild activity against *E. coli*. According to the microscopic characteristics the fungi were tentatively identified as belong to *Penicillium* and *Aspergillus* species. A bioautography study reveled the presence of several bioactive compounds in BET 05, 06, 08 and 10 extracts. The results of this study showed that entomopathogenic fungi are potential sources for isolating antibacterial compounds.

***Keywords*:** Antibacterial; Entomopathogenic fungi; *Harmonia* sp.; *Penicillium*; *Aspergillus*