

Screening Metabolites of Selected Soil Fungi and Their Potential Bioactivities

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Fungal metabolites possess a broad range of functions, ranging from antibiotics to mycotoxins. These metabolites are either retained within the cell, secreted into the surrounding environment, or exuded via guttation. This study screened metabolites produced by seven different soil fungal strains isolated from a grassland near the University of Peradeniya, Sri Lanka, for potential industrial applications. Two *Penicillium* spp. (PEN1 and PEN2), one *Aspergillus* sp. (ASP1), one *Gongronella*-like sp. (GON1), and three unknown spp. (UNK1, UNK2 and UNK3) were among the isolates. Of them, five isolates demonstrated guttation. Both guttation droplets and ethylacetate broth extracts of fungal metabolites were screened using Thin Layer Chromatography (TLC), Fourier Transform Infrared spectroscopy (FTIR), and qualitative chemical tests. Metabolites were also evaluated for their antibacterial activities against *Staphylococcus aureus* and *Escherichia coli*, as well as for antifungal, and toxin production, with appropriate positive and negative controls. All fungal isolates produced varying metabolites, with ASP1 and PEN2 producing a higher number of metabolites. FTIR results suggest the presence of nitriles in both *Penicillium* spp. (PEN1 & PEN2), with amides and esters specific to PEN2. Guttation droplets of UNK1 demonstrated a significant antibacterial activity against *S. aureus* (with an inhibition zone diameter of 17.37 ± 0.85 mm), while ethylacetate extract of ASP1 exhibited potent antibacterial activity against *E. coli* (17.67 ± 0.18 mm). Ethylacetate broth extract of GON1 displayed notable antibacterial (11.33 ± 0.36 mm) and antifungal (10.00 ± 0.20 mm) activity against *E. coli* and *Cladosporium* sp., respectively. The highest antifungal activity against *Cladosporium* (13.70 ± 0.20 mm) was reported with PEN2, whereas UNK2 and PEN1 showed no effect. Furthermore, ethylacetate extracts from ASP1, PEN1, and PEN2 inhibited *Brassica juncea* seed germination, indicating potential herbicidal effects. The study concludes that soil fungi have the potential to produce bioactive metabolites that can be utilized in various industrial applications.

Keywords: Antibacterial, Antifungal, Chemical screening, Metabolites