Extraction, partial purification and detection of antimicrobial metabolites produced by the Rhizobacterial Strain UPMP3 of Pseudomonas aeruginosa and UPMB3 of Burkholderia cepacia and their antagonistic activity against Ganoderma boninense in vitro

ABSTRACT

Antimicrobial metabolites are produced as secondary metabolites by microorganism as well as the plant growth promoting rhizobacteria. These compounds are widely distributed in nature, where they play an important role in regulating the microbial population of soil, water, sewage and compost. In the present investigation, some antimicrobial metabolites such as antibiotics, siderophores, and HCN were detected in vitro by TLC, CAS agar universal test plates and filter paper with alkaline picrate solution method respectively from the two rhizobacterial strains Pseudomonas aeruginosa UPMP3 and Burkholderia cepacia UPMB3. In vitro bioassay was carried out through antagonistic activity test against G. boninense based on the percentage inhibition of radial growth (PIRG). The strains showed antifungal activity against Ganoderma boninense that is responsible for the disease of basal stem rot in oil palm. The crude extracts obtained from ethyl acetate solvent extraction and analyzed by thin layer chromatography (TLC). Six different antibiotics were detected with different retention factors (Rf) on TLC plates. The Rf values were calculated as 0.88, 0.77, 0.63, 0.53,0.47, 0.28 and 0.23 for 2-4 DAPG, pyoluteorin, phenazine, pyocyanin, phenazine-1-carboxamide (PCN) and pyrrolnitrin successively developed with different solvent systems. Among the different solvent systems ethyl acetate: chloroform was most effective in separating the active bands from the extracts. Siderophores were detected through colour change into blue to orange and HCN was in dark brown to red colour. The antagonistic activity of Pseudomonas aeruginosa UPMP3 and Burkholderia cepacia UPMB3 was evaluated. In case of bacterial antibiotics and volatile and non-volatile effects, the strain P. aeruginosa UPMP3 showed the highest 94.21% and 51.16% inhibitory on the mycelial growth of G. boninense than B. cepacia UPMB3 (21.27% and 8.89%) compared to control treatment after 7 days of incubation respectively. The findings of this study indicate that these two rhizo-bacterial strains are capable to control Ganoderma boninense through producing antimicrobial metabolites.

Keyword: Purification; Detection; Antifungal metabolites; Pseudomonas aeruginosa UPMP3; Burkholderia cepacia UPMB3; Antagonistic activity; Ganoderma boninense; In Vitro