

Isolation and characterization of multifunction beneficial bacteria from dairy farm effluent compost

ABSTRACT

Compost is a good biomass reservoir of a broad range of microbial communities, with bacteria, fungi, and actinomycetes being the main microorganisms groups reported in the literature. Some bacteria assigned as plant growth-promoting agents are capable of enhancing plant growth and improving soil fertility. In this study, bacteria with multiple beneficial traits for potential use in agriculture were screened and characterized from the dairy farm effluent (DFE) compost. A total of 160 bacterial colonies originally picked from 11 selective media were purified and used in this study. The variations among the isolates in plant growth beneficial traits were studied by agar plate and spectrophotometric assays. Results revealed 38 isolates exhibited multiple plant growth beneficial traits and there were nitrogen fixation, solubilization of potassium, zinc silicate, and organic and inorganic phosphorus, as well as production of iron-chelating siderophore, chitinase, protease, 1-aminocyclopropane-1-carboxylate (ACC)-deaminase, indole-3-acetic acid (IAA), and hydrogen cyanide (HCN). From the 160 isolates, 34.38% were label as high IAA production isolates, 33.75% were able to metabolize ACC, 8.13% were able to produce high HCN, and the remaining 23.82% isolates showed moderately low or absence of activities. These data suggested that DFE compost contains multifunction beneficial traits bacteria and its utilization on agricultural crops has the potentials to influence plant health and productivity in various ways. These include fixation of nitrogen, enhance mobilizing of insoluble soil minerals such as P and K, as well as provide basal protection against plant pathogens through HCN production and chitinase activity. As a summary, this study showed DFE compost is a potent plant growth booster with multiple effective microorganisms and has the potential application in novel bio-fertilizer formulations for the Malaysian agriculture sector.