Thesis Title: Phenotypic and Genotypic Characterization of Endophytic Actinomycetes Isolated from Tangerines and Their Potential for Plant Growth Promotion

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Abstract

Endophytic actinomycetes were isolated from surface sterilized leaves, branches and roots of the healthy tangerines (Citrus reticulate) grown in three sites of organic/sustainable orchards in Fang District, Chiang Mai Province. A total of 101 isolates were obtained, 25 of them from leaves, 33 from branches and 43 from roots. The morphological and chemotaxonomic methods could classify isolates them in to 7 genera, Streptomyces (65.35%); Spirillospora (4.95%); Nocardia (3.96%); Nocardioides (0.99%); Nocardiosis (3.96%); Microbispora (3.96%); and Micromonospora (7.92%). Six representative isolates were identified using 16S rDNA sequencing and phylogenetic analysis to confirm their genera and examine some isolates that could not be clearly identified by the two methods mentioned. DNA sequences data indicated the similarity of one isolate, TGsL-02-05 to genus Nocardiosis; two isolates, TGsR-01-08 and TGsR-01-11 to genus Microbispora; and three isolates TGsR-02-01, TGsR-02-17 and TGsR-02-18 to genus Micromonospora. Unidentified isolates were remained after all methods applied and accounted for 8.91%. IAA synthesis and phosphate sulubilizing activity were examined to evaluate the potential of plant growth promotion. Cellulase production was also evaluated. The highest value of IAA synthesis in medium containing
tryptophan was obtained from TGsL-02-05 (\textit{Nocardiopsis}) (178.66 μmole/g of cell). Positive phosphate solubilizing activity and cellulase production accounted for 80.36% and 81.13%, respectively. Highest phosphate solubilizing activity was obtained from isolate TGsR-02-022 (\textit{Nocardia}) with the clear zone ratio of 2.25. Isolate TGsR-01-08 (\textit{Microbispora}) gave highest cellulase activity with the clear zone ratio of 6.13. Fifty six isolates were tested for their root infection ability and plant growth promotion using tangerine seedlings. All root samples were infected by each inoculated isolates. Then only two isolate (TGsR-02-21, TGsL-02-05) were selected for tangerine seedlings growth promotion. The results showed that root and shoot growth promotion was observed and the plant hight, fresh and dry weight of shoots and roots were significantly higher in endophyte inoculated-seedlings compared to an uninoculated control ($P$$\leq$0.05).