



TITLE: CHARACTERIZATION AND PHYLOGENETIC AFFILIATION OF ACTINOBACTERIA OF BIOTECHNOLOGICAL INTEREST ISOLATED FROM TROPICAL SOILS

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ABSTRACT:

The phylum *Actinobacteria* represents a large and extremely diverse group of Gram-positive filamentous bacteria, normally aerobic, with a high G/C DNA content, distributed in a variety of aquatic and terrestrial environments worldwide. Secondary metabolites produced by actinobacteria of tropical soils represent a largely understudied source of novel molecules with relevant applications in medicine, pharmaceutical and food industries, agriculture, and environmental bioremediation. The present study aimed to characterize sixty-nine actinobacteria isolated from tropical soils using morphological and molecular methods, and to evaluate enzymatic activity (amylase, cellulase and lipase). The enzymatic index (EI) was estimated by the following equation: $(EI) = \text{ratio of halo diameter} / \text{ratio of colony diameter}$. All isolates showed a high variation for morphological traits considering the color of pigments of the aerial and vegetative mycelium, and spore chain morphology. Molecular analysis of the partial 16S rRNA gene sequencing revealed the existence of 49 species, being 38 species with only one representative member and 11 species represented by more than one strain. All species were grouped into three genera: *Streptomyces* (82.61%), *Amycolatopsis* (7.25%), and *Kitasatospora* (10.14%). The values of the enzymatic index (EI) for amylase, cellulase, and lipase were highly variable. The amylase activity was detected in 53 (76.81%) isolates, of which only eighteen showed $EI > 4.0$. The highest EI values were observed for the isolates ACT 1 (*S. curacoii*) and ACT 2 (*S. hygrosopicus*) which were of 6.44 and 6.42, respectively. The cellulose activity varied significantly ($P \leq 0.05$) among the isolates. Twenty-nine (42.02%) isolates showed high cellulase activity, and the isolates

ACT 3 (*S. chiangmaiensis*) and ACT 4 (*S. cylabdanicus*) showed the highest EI values (6.56 for both isolates). The lipase activity also varied statistically ($P \leq 0.05$), and fourteen isolates (20.29%) were considered as good lipase producers ($EI > 2.0$). The isolate ACT 2 (*S. hygrosopicus*) showed the highest EI value of 2.60. The present results showed the high biotechnological potential of different *Actinobacteria* from tropical soils.

Keywords: Actinomycetes, morphology, 16S rRNA gene, enzymes.

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