RESEARCH PAPER

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Enhancement of growth and biological activity of selected actinomycetes strains of *Melissa officinalis* and *Heracleum candicans* on different media

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Actinomycetes strains isolated from rhizosphere of two important medicinal plants *Melissa officinalis* and *Heracleum candicans* were evaluated for production of biological and proteolytic activities by selecting different media. In present investigations two strains Act-M-3 and Act-M-5 of *Melissa officinalis* produced maximum growth on Glucose ammonium salts (GAS) and Glycerol peptone beef (GPB) broths while strain Act-M-8 preferred GPB. Antibacterial and antifungal activities were registered more on GAS, GPB in addition to Nutrient broth (NB) against *Bacillus subtilis*, *Alternaria* and *Pythium* sp. by two strains Act-M-3 and Act-M-8 in comparison to Act-M-5. Proteolytic production was registered highest in Starch Broth (SB) by Act-M-3 than other two strains. However, Act-H-2 strain isolated from *H. candicans* recorded maximum growth on GPB while Act-H-5 and Act-H-6 obtained higher production on SB. GAS broth supported greater antibacterial activity by Act-H-2 and Act-H-6 strain towards *E. coli* and *B. subtilis* but less or weak effect was obtained by Act-H-5 strain in all the media tested. Antifungal effect against *Pythium* and *Phytopthora* sp. was found superior in GPB, GP, GAS and SB. Though proteolytic activity produced by Act-H-2 and Act-H-6 was more on SB, NB and GAS media. Strain Act-H-5 on other hand could not show any proteolytic production on GAS, GPB and SB.

Key words : Microflora, Nutritional selection, Secondary metabolites

INTRODUCTION

Actinomycetes constitute a significant component of microbial population in most soils and count over one million in gram of soil. Soil is also the most prolific source for their multiplication. According to Williams *et al*. (1983) over 200 genera have been isolated with Streptomycetes being ubiquitous and most numerous. Several reviews of soil Streptomycetes are available (Kuster and Williams, 1964; Kutzner, 1981; Lacey, 1973). Isolation of actinomycetes from mixed microflora is a complicated process due to their characteristics slow growth relative to other bacteria. It is resulted in the development of selective isolation procedure based primarily on nutritional selection in which media are formulated with nutritional selection which is preferentially utilized by actinomycetes (Kuster and Williams, 1964 ; Kutzner, 1981). This also depends on selective inhibition where compounds such as antibiotics are incorporated into media to selectively inhibit non-actinomycetes bacteria (Dulaney *et al.,* 1955; William and Devis, 1965; Preobrazhenshaya *et al*., 1978; Kutzner, 1981). Nutrients and growth normally influences secondary metabolite production by microbes. Production of secondary metabolites was normally favored by providing the carbon and nitrogen sources in the complex form such as corn steep liquor, so that their release to metabolism did not encourage a rival increase in biomass. All secondary metabolites can be expected to exhibit biological activity because they are formed from primary intermediates by the action of enzymes that confirm to biological principles. Free living microorganisms produce antibiotic that inhibit pathogens (Lynch, 1987). Betty and Duriraj, 1986 reported abundance of Actinomycetes strains particularly of Streptomyces in rice fields that suppress the pathogens (*Pyricularia oryzae* and *Xanthomonas compestris* pv. *oryzae*) of rice.

Actinomycetes protease are potentially of great economic importance in diverse fields, food, pharmaceuticals, tanning and detergents industries (Outtrup and Boyce, 1991; Gracia-Carreno, 1991). Proteases are enzymes which catalyze the hydrolysis of peptides bonds forming the primary structure of protein. Today, proteases are probably the most important class of industrial enzymes, with worldwide scales of 236 million US$ in 1981, rising to 242 million US$ in 1986, accounting for nearly 60 per cent of total enzyme sales, with 2/3rd of proteases produced commercially by microorganisms (Kalisz, 1988).

The present study was thus carried out to determine the effect of different media on biological action of