

Bioprospecting of Endophytic Actinomycetes- a review

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Abstract

The soil inhabits large number of microorganisms in it. There are many microorganisms which are useful to mankind like Actinomycetes. These are gram +ve bacteria like sporulating organisms which are the source of several antibiotics with high commercial value and form an integral part of the soil ecosystem. Actinomycetes are known for their anti-microbial activity and anti fungal activity (Inderiati and Franco, 2008). Vast numbers of antimicrobial agents and secondary metabolites with biological activities such as antibiotic, antifungal, antiviral, anticancer, enzyme, and other industrially useful compounds (Baltz, 2006 & 2007; Demain and Sanchez, 2009; Kekuda et al., 2010; Naine et al., 2011) are produced from actinomycetes. Despite increase in antibiotic resistance to commonly used drugs, there is still a steady supply of novel antimicrobial agents from actinomycetes isolated from the natural environment (Xi et al., 2012).

Endophytic micro-organisms are microbes that colonize inside plant tissue without causing any harm to the host (Stone et al. 2000). The endophytes include the bacteria, actinomycetes and fungi. These help in colonizing inner tissues of plants usually draw nutrition and protection from host plants and in return, confer enhanced fitness to the host by producing a variety of bioactive metabolites and providing protection for the plant (Tan and Zou, 2001). Endophytic microorganisms are microbes that colonize inside plants tissues without causing any harm to the host. Endophytic micro-organisms play an important role sharing the information with the host leading to conclude that plants with an ethnobotanical history are more potent source of endophytes producing active natural products (Strobel and Daisy, 2003.; 2004). It is necessary to carry out the bioprospecting of these endophytic microorganisms to explore new field of metabolites which are industrially important. Antagonistic bioactivity of endophytic actinomycetes isolated from medicinal plants was carried out by M. Gangwar, S. Dogra and N. Sharma (2011); Shenpagam et al (2012) and Mini Priya (2012). The endophytic actinomycetes which are associated with plants play an important role in protection of the host plant from phytopathogenic invasion. Several endophytic actinomycetes acts as growth promoters by producing phytohormones such as Indole-3-Acetic Acid. The reports (Tian et al., 2004; Cao et al., 2004) suggest that endophytic actinomycetes are potential biological control agents for use in agricultural practices. Endophytic actinomycetes are particularly, considered as potential sources of bioactive compounds and various novel compounds. They have different morphological, cultural, biochemical and physiological characters. This group is a potential producer of many enzymes, enzyme inhibitors, growth promoting substances and antibiotics. The need for new and useful compounds to provide assistance and relief in all aspects of the human condition is ever growing. Only limited attempts have been made to study endophytic actinomycetes and their metabolites in India (Verma et al. 2009). Natural products still remain the most important source for discovery of new and potential bioactive molecules that can be used to design new drugs to replace those against which pathogenic strains have rapidly acquired resistance. The discovery of anti-microbial compounds like Penicillin and Tetracycline helped for better health for millions around the world. The screening approach has been employed extensively in the search for microorganism capable of producing useful antibiotics. Li et al. (2008) isolated 41 endophytic streptomycetes from pharmaceutical plants in rainforest for antimicrobial and antimicrobial