

Bioactive Metabolites Produced by Endophytic Microbes

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Endophytic microbes spend most of their life cycle within the plant tissues without causing any visible damage to the host plant. Endophytes are including bacteria and fungi that symbiotically live within the plant tissues. The endophytes produce an array of secondary metabolites i.e. alkaloids, flavonoids, steroids, phenolic, peptides, terpenoids [1]. According to different reports, 55% biologically active metabolites including 40% novel metabolites are produced by endophytes. It has been estimated that 20,000 biologically active produced by endophytes which have great influence on performance of other organisms including plants, microbes and human being [2]. These bioactive metabolites have greater medicinal role and are used as cardiovascular, anti-hypertensive, anti-lipidemic, anti-glycaemic, anti-cancer, antithrombotic, and anti-diabetic [2,3]. These medicinal bioactive metabolites are used in medicines against various diseases because of minimum side effects [3].

The bioactive compounds produced by endophytic are including steroids, quinols, alkaloids, polyketones have great role in agriculture. The bio-pesticide compound are used in agriculture against the insect, pathogenic microbes including fungi and bacteria causing infectious diseases [3,4]. Many endophytes also secrete specialized metabolites or biologically active compounds [5]. Endophytic bacteria are also having the potential due to their ability to produce plant growth hormones, phosphate solubilization, nutrient acquisition and fixation of N₂ [5]. In addition endophytes perform nutrients mobilization such as nitrogen production and phosphorus solubilization [6], providing plant hormone such as auxin and gibberellin [7] and protect the diseases caused by soil-borne pathogens [4,8] and hence plants are enabled to tolerate that heavy metal toxicity and go for phytoremediation.

Bacterial mediated phytoremediation have been used to detoxify the heavy metal such as zinc (Zn) by immobilization and turn them harmless to the soil, water or air [9]. Contaminants such as minerals, pesticides, solvents, explosives, crude oil and derivatives have been detoxified by bacterial mediated phytoremediation [10]. Phytoremediation technique is a method of treatment that takes advantage of the ability of hyper-accumulator plants to accumulate heavy metals and toxic compounds from the environment and metabolize them in their tissues [2,11,12].

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