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Endophytic Fungi: An Ample Source of Structurally Diverse Bioactive Compounds

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New and more powerful drugs are needed to combat infectious diseases. Bioactive compounds originating as natural products can play a prominent role in this regard. Fungi are a good source of secondary metabolites which can be used for the treatment of human and plant diseases. The accidental discovery of Penicillin, a broad spectrum antibiotic ninety years ago paved the way for scientists worldwide to discover bioactive compounds hidden in the fungal world. The fungal kingdom includes many species with unique and unusual biochemical pathways, which produce a variety of secondary metabolites including important pharmaceuticals like penicillin, cyclosporine and statins, and potent poisons like aflatoxins and trichothecenes.

Fungi associated with plants can be categorized as epiphytic fungi and endophytic fungi. Epiphytic fungi live on the surface of their hosts while endophytic fungi live in the intercellular spaces of plants causing no discernible manifestation of their presence and have typically remained unnoticed. Endophytic fungi have proven to be an excellent source of bioactive natural products with diverse chemical structures. Some endophytic fungi have the ability to produce the same compounds that are produced by their host plant. The Natural Products Research Project of the National Institute of Fundamental Studies recently commenced a research project on the chemistry and bioactivity of fungal metabolites with special reference to endophytic fungi isolated from medicinal plants, edible fruits and insect sources. These studies led to the isolation and characterization of several secondary metabolites with interesting structural features and bioactivities, as well as several fungal species with biocontrol properties. These findings further suggested that some of these fungi could be used as sustainable sources of extracts/compounds with potential for development as food additives, food supplements and for use in crop protection. Some interesting results from this study will be presented.