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Phanerochaete chrysosporium mediated biocompost and its effect on growth in *Vigna radiata* L.

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ABSTRACT

Coir pith, an agro waste obtained from coconut husk contains high level of cellulose and lignin. These complex polymers need effective microorganisms for their degradation. One such lignocellulolytic fungus is *Phanerochaete chrysosporium*, which produce lignin peroxidase and cellulase which aids in the bioconversion of coir-pith into compost. The biocompost obtained was tested for its physio-chemical characteristics and growth promoting ability in 40 days old seedlings of *Vigna radiata*. The appealing results obtained were that the total carbon, protein and chlorophyll content of the test plants proved higher than that of the control.

Key words : Inoculation, *Azospirillum*, *Azotobacter*, Growth attributes, Yield attributes, Economics.

INTRODUCTION

Coir pith is an agro waste produced by coir fiber extraction from coconut husk. It is difficult to get degraded in soil but can be well degraded by microorganisms like *Phanerochaete chrysosporium, Humicola griea, Streptomyces* spp., *S.viridosporus, S.setonii, Nocardia* spp., *Micromonospora* spp. and *Arthobacter* spp. (Sheeba, 2005;Padmaja and Lavanya, 2006). *P. chrysoporium* is the common thermo-tolerant lingo-cellulose degrading fungus stored in wood chip piles.

Coir pith contains high level of cellulose and lignin and hence difficult to degrade. The cells are thin and empty cavities are rich in potash having low amounts of nitrogen and phosphorus. Coir pith waste causes pollution and disposal being a serious problem, can be utilized as organic manure after decomposing (Padmaja and Lavanya, 2006).

Cellulases produced by various fungi, hydrolyse cellulose into simple sugars to be used as a carbon source for their metabolism. Fungal cellulases are glycosylated which protects the enzyme from proteolysis and helps in secretion of proteins.Lignins are thermophilic and thermo-tolerant polymers composed of phenolic compounds and attacked most readily by fungi. The acid precipitable polymeric lignin (APPL) fraction released due to microbial decay is useful as an antioxidant surfactant and as a component of adhesives and resins (Crawford *et al.*, 1986).

Due to intimate association of cellulose with lignin it is not readily available as a carbon source and so delignification becomes necessary. Though chemical delignification is rapid it is not eco-friendly and so microbial delignification is preferred (Kirk and Farrell,1987).

P.chrysosporium releases two extra cellular enzymes lignin peroxidase and manganese peroxidase which are preferred for lignin decomposition. Nitrogen has a profound effect in degradation of lignin by *P.chrysosporium* (Kirk and Farrell, 1987; Reid, 1979; Yang *et al.*, 1980). Basidiomycetes colonizing ruminant dung in grassland ecosystem represent the ecological equivalents of white rot fungi *P.chrysosporium*.

Composting of coir pith helps in detoxifying phenolic compounds (Natarajan *et al.*, 1987). In the present investigation "Biodegradation of coir pith using *Phanerochaete chrysosporium*" the strain MTCC 787 was challenged for its cellulose and lignin degradation ability and biological assay of the enzymes responsible for degradation were undertaken.

MATERIALS AND METHODS

Collection of coir pith and its processing:

Coir pith collected in Pollachi, Tamilnadu, India from coir industry was allowed to degrade in a pot containing four alternative layers of soil and coir pith. Fresh and degraded coir pith was used for the following studies.

Standard plate count:

The garden soil utilized in study showed predominant population of *Aspergillus* spp., confirmed through macroscopic and microscopic tests. In addition the lignolytic fungi *Phanerochaete chrysosporium* was inoculated to enhance coir-pith degradation.

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