SCREENING OF LIGNINOLYTIC FUNGUS FOR POTENTIAL APPLICATION IN SAWDUST COMPOSTING

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INTRODUCTION

Sawdust is a source of organic matter that has been widely used in horticulture and soil amendments. There is increasing interest of using sawdust for growing containerized seedlings by forest plantation industry in Sarawak as this material is readily available to many forest plantation nurseries. Sawdust is known to not only improve the stability of soils, but also improves the water holding capacity of the media and allows for easier root penetration. However, the benefits of sawdust are only attained if sawdust is well-decomposed and the lignin has been converted to humus (Starbuck, 1994). Sawdust that is not well-decomposed will not only promote nitrogen immobilization, but also contain other organic compounds that may toxic to plants.

Naturally, sawdust decomposes at a very slow rate due to its lignin content. Lignin is a natural polymer of the cell wall that gives strength to wood. It is particularly recalcitrant to degradation and thus reduce the bioavailability of other cell wall constitute (cellulose and hemicelluloses). Therefore, lignin degradation represents an important step in total biological degradation of wood materials (Hernandez *et al*., 1998). Nevertheless, some wood-decay fungi, especially white-rot Basidiomycetes have been reported to develop the unique enzymes system for lignin biodegradation. They exhibit three kinds of lignolytic enzymes namely Lignin Peroxidase (LiP), Manganese Peroxidase (MnP) and Laccase which are responsible for initiating the depolymerization of lignin (Kirk and Farrell, 1987). Moreover, extensive studies of white-rot basidiomycetes have demonstrated their ability to degrade a wide variety of contaminants and potential application in bioremediation.

Looking at the remarkable biodegradation abilities of white-rot fungi, the present study was undertaken to screen the most potential ligninolytic white-rot fungus for future application in sawdust composting. By using dye screening method, lignin-degrading capabilities of several white-rot fungi were assessed. Production of ligninolytic enzymes (LiP, MnP and Laccase) were also evaluated.

MATERIALS AND METHODS

Fungi

Seventeen ligninolytic white rot Basidiomycetes were provided by Assoc. Prof Dr. Sepiah Muid (Universiti Malaysia Sarawak Fungi Collection). The cultures were maintained on malt-extract agar (MEA) plates at 4ºC.