Introduction:

The paper and pulp industry typically generate large quantities of effluent, which represents significant environmental and economical problems[1,2]. At present, there are 666 pulp and paper mills in India including 632 agro-residue and recycled fiber based units, with a manufacturing capacity of 7.6 million tons out of which 34 large scale paper mills account for 51% of total capacity and 271 small paper mills account for the remaining 49% Chemical recovery is not carried out in small paper mills due to economic reasons. The pollution load in terms of BOD from small paper mills is 2.5 times higher than that of large paper mills. These produce nearly a million tons of all varieties of paper per annum [3]. However paper and pulp industry is highly energy intensive, consuming large amounts of fresh water, nearly 75% to 95% of which is discharged by the industries as effluent containing organic and inorganic pollutants, including coloring materials [4,5]. The lingo cellulosic material of plants consists of three main components, namely cellulose, hemicellulose and lignin. After cellulose, lignin is the second most abundant renewable biopolymer in nature [6]. It is the most abundant aromatic polymer in the biosphere. It is an essential part of the plant cell wall, imparting rigidity and protecting the easily degradable cellulose from attack by pathogens. Due to its complicated structure and no hydrolysable bonds, lignin is more difficult to break down than cellulose or hemicellulose[7]. Lignin surrounds cellulose in the plant cell wall forming a matrix, which itself is resistant to degradation [8,9]. In paper pulp and textile industry the major problem is the persistent dark brown color in the released effluent from waste water treatment which are majorly contributed by lignin and its derivatives[10]. Lignin and its derivatives are difficult to degrade because of the linkages within the molecule, especially the biphenyl type carbon-to-carbon linkages. Attempts have been made to remove the dark color from the effluent caused by lignin[11]. Whereas chemical oxidase or precipitation methods are tedious and high cost are involved, Henceforth biological methods are implemented for degradation of lignin using

several microorganisms. Biological methods are of particular interest because they can also reduce the chemical and biological oxygen demands (COD and BOD) , which are also significant problems in pulp wastewater, and so reduce holding times in aeration and sedimentation ponds prior to water discharge into the environment[12].In recent years microbial degradation of lignin by lignin degrading organisms and their enzymes namely lignin peroxidase, manganese peroxidase and laccase are one such group of oxidoreductive enzymes, have been well appreciated globally because of their potential applications and they may provide environmental friendly technologies for the paper pulp and various other industries[13].

Lignin peroxidase has been considered as the key enzyme for primary attack of lignin and impressive work has been done for their characterization .They occur in some bacterias like *pseudomonas aeruginosa, serretiamarcescens, nocardia, arthrobacter, flavobacterium, micrococcus, xanthomonas,* and frequently studied in white rot fungus *phanerochaetechrysosporium, dichomitussqualeus, pleurotusostreatus, rigidoporuslignosus, phlebiaochraceofulva, polyporusvercicolor, and agaricusbisporus,* have proved as ideal organism for decolorization.

The present study was conducted on *pleurotus ostreatus* [14,15]. This genus is distinguished by presenting fruiting bodies with concentric stems in the form of oyster shells, (fig1).The genus Pleurotus is a cosmopolitan group with mushrooms of a high nutritional value, therapeutic properties, and several environmental and biotechnological applications. Pleurotus fruiting bodies are edible, contain carbohydrates, proteins, vitamins, mineral salts and lipids [16, 17]. Furthermore, they have medicinal properties. These fungi are also able to secrete enzymes and metabolites that depolymerize hemicellulose and cellulose, besides promoting lignin fragmentation producing lignin peroxidase for the removal of color,

as well as for the reduction of absorbable organic compounds, COD, BOD and lignin content of pulp and paper mill effluent [18,19].

PLEUROTUS OSTREATUS

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Pleurotaceae

Genus: *Pleurotus*

Species: *P. ostreatus*

Fig: 1 Photo of PLEUROTUS *OSTREATUS* fungi