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Fungal Treated Rice Straw for Microbial Improvement

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Microbial improvement of nutritive value for rice straw is not only aids in the prevention of Egyptian environmental pollution but also solve the problem of shortage in animal feeds ingredients. The current study was designed to investigate the microbial improvement of rice straw via solid state fermentation using five strains of fungi namely *Trichoderma viride*, *Trichoderma reesei*, *Pleurotuso streatus*, *Aspergillus oryzae* and *Aspergillus foetidus*. This fermentation results in improving of nutritive value of rice straw by increasing its dry matter, protein, fat, ash and energy content with decreasing of fiber and organic matter content. These effects were variable according the type of fungi, which were very high for rice straw treated with *Trichoderma viride* and *Trichoderma reesei* followed by that treated by *Pleurotuso streatus* then those treated by *Aspergilluso ryzae* and *Aspergillus foetidus*. In Egypt the annual agriculture by-products estimated to be around 30 million tons of dry material. Approximately, two thirds of the crop residues are burned or wasted, and hence lead to environmental pollution and consequently health hazards. Burning of agricultural wastes specially rice straw form 42% of Egyptian environmental pollution. Utilization of such by-products cannot only be used in solving for problem of animal feed shortage but also as a method to control environmental pollution. To increase the nutritive value of rice straw, many efforts have been carried out. Several reports have been documented on the use of chemical, physical, mechanical and biological treatments. Cultivation of rice in the rain fed conditions is threatened by frequent spells of water deficits and limits the productivity to a greater extent. Root system plays a major role in uptake of water and they contribute to drought tolerance in a major way. In this study, root QTL were pyramided and evaluated under aerobic and drought conditions and the stable genotypes were identified. Two QTL and three QTL pyramid lines for roots were developed and evaluated under drought, aerobic and in different locations to study the performance. Biotechnological approaches as the use of suitable microorganism have been employed. This approach is believed to be more safe and environment friendly than using of chemicals. Recently, biological degradation of agricultural residues by Solid State Fermentation (SSF) using selected microorganisms should have the ability to produce sufficient amount of appropriate enzymes that are able to degrade the cellulose and hemicelluloses in the substrate. By this method, lignin is preferentially decreased. Fungal organisms have the ability to utilize starch of the substrate to produce single cell protein. However, the reduction of lignin and lingo-cellulosic complex depend on the strain of fungi and the cultural conditions. Among different fungal strains, treatments with *Asprigillus* spp. increase crude protein content of different substrates such as rice bran, sugar cane and corn-cob. Furthermore, several reports revealed the ability of certain species of fungi such as white rot fungi *Pleurotus*to enhance the nutrients in both stem and leaves of rice straw within 30 days incubation period. Moreover, treatment of agricultural wastes with *Pleurotus* species resulted in increased its ether extract, crude protein and minerals contents, while decreasing crude fiber and cell wall constituents. The ability of white-rot fungi is in degrading lignin due to secreting ligninases enzymes. Furthermore, Studies found that rice straw treated with three different edible mushrooms.

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