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Tropical Wood Degrading Fungi as a Means of Conversion of Agricultural Plant Residues into Animal Feed.

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Abstract

The digestibility of agricultural plant residues in the rumen of domestic animals is restricted by the lignin content of the material. Selective delignification using ligninolytic microorganisms in a solid state fermentation process may help to overcome this problem. The principle of these process is the splitting of lignocellulose complex by decomposition of lignin. The aim of this work was to determine the influence of the incubation temperature on the production of extracellular ligninolytic enzymes and the degradation of lignocellulose by selected tropical fungi. Four wood-degrading fungi, *Auricularia sp.*, *Coriolus versicolor*, *Lentinus edodes* and *Polyporus sp.* were grown on milled wheat straw for five weeks at 18°C, 25°C or 30°C, respectively. The activities of extracellular ligninolytic enzymes (laccases and manganese peroxidases) were assessed weekly. In addition the substrates were analysed with regard to the *in vitro* digestibility, the loss of organic matter and lignin. Generally higher incubation temperature enhanced the colonization of the straw substrate by the fungal mycelium and the increase of enzymatic activities. The peak level of laccase and manganese activities was between 1st – 2nd week of incubation. Moreover the highest enzyme levels were usually found at 30°C. Only *Lentinus edodes* displayed highest enzyme activities at 18°C or 25°C. *Coriolus versicolor* produced more laccase (160 mUg⁻¹) while *Lentinus edodes* produced more manganese peroxidases (2,380 mUg⁻¹). The degradation of organic matter and lignin of wheat straw were highest at 30°C, with the exception of *Lentinus edodes* (25°C temperature optimum). *Coriolus versicolor* degraded more lignin compared to the other fungi tested (69% of initial after 5 weeks). High degradation of lignin and *in vitro* digestibility along with relatively low degradation of other straw components was performed by *Auricularia sp.* and *Lentinus edodes* at 25°C, which makes these fungi seem promising with regard to selective delignification of plant waste materials.

Keywords: Digestibility, lignin, wheat straw, wood degrading fungi