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THE ROLE OF FUNGI IN THE CARBON- AND NITROGEN CYCLES

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The green plants fix a great amount of carbon (CO_2) and accumulate as different organic molecules mainly as lignocelluloses. Fungi belong not only to an independent group of Eukaryots but they have – in most of the cases – a specific biochemical, physiological ability to decompose organic molecules, to produce substrates of respiration and to mineralize these for the biological cycles of ecosystem.

Different groups of lower and higher fungi are able to degrade cellulose. Such genera of lower fungi are: *Trichoderma*, *Penicillium*, *Fusarium*, *Aspergillus*, etc.; the most powerful fungi are the so-called xylophageous or wood decaying fungi [1–3]. The classical mycological and biochemical investigations demonstrated the production of a synergistic, cellulase decomposing enzyme system. The lignin degrading ability is the property of different fungus taxa. Lignin degradation studies of white-rot fungi were performed extensively but basic questions remained problematic. The observations have led to the conclusion that the lignin degrading system is associated with the secondary metabolism of the fungi [4, 5]. This system consists of ligninase (lignin peroxidases), manganese peroxidase, phenoloxydase and peroxide producing enzymes. The lignin decomposition is regulated by various nutritional (N supply, Mn level) and ecological (pH, temperature) factors.

A lot of fungi have the required genetic information of the degrading enzyme system. After an adaptation time the following processes are going on: (1) uptake and utilization of soluble, free sugars, (2) increase of biomass, formation of new hypha- and mycelial system, starting of cellulose- and hemicellulose decay, (3) increase of secretion of organic acids, (4) increase of quantity and activities of intra- and mainly of extracellular oxidases, (5) cellulose and lignin decay are leading later to the complete decomposition (to mineralization) of lignocellulose substrates.

The ecological N-cycle is composed of different processes (nitrogen fixation, nitrification, nitrate-reduction, etc.). The fungi belong to the organisms of relative high N content (15–40% dry weight crude protein) but their common substrates contain low N level. There are three possibilities (6): a specific biological adaptation, a dynamic

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reutilization of nitrogen of older cells into the young mycelium or the utilization of N from different sources including the posibility of N fixation. The role of fungi in the N cycle is undoubtful, they can be important components of the soil-plant-animal chain

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