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Fungal Inulinases: Enzymology, Molecular Biology and Biotechnology

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Inulin is a fructan in which linear chains of β-(2→1)-linked D-fructofuranose molecules are attached to sucrose at the reducing end. Inulinases have been encountered in higher plants and in microorganisms, including filamentous fungi, yeasts and bacteria. Exoinulinases exo- and endoinulinases from filamentous fungi have been purified and characterized as monomeric glycoproteins. The inulinase genes from *Aspergillus* and *Penicillium* spp. have been cloned and the deduced amino acid sequences included conserved sequences in the β-fructofuranosidase superfamily. A phylogenetic analysis showed that fungal exo- and endoinulinases have independently evolved the respective hydrolytic activities toward terminal and internal β-(2→1)-fructofuranosidic linkages in inulin. *Aspergillus niger* inulinases in an immobilized form were applied to the continuous production of fructose syrup or inulo-oligosaccharides from inulin. High concentrations of ethanol were produced from pure inulin or Jerusalem artichoke tubers by a simultaneous saccharification and fermentation process using *A. niger* and *Saccharomyces cerevisiae*.

Key words: ethanol fermentation, filamentous fungi, immobilized enzyme, inulinase, molecular evolution

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