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Különböző szubsztrátumokon történő oligoszacharid szintézis *Aspergillus aculeatus* eredetű enzimkészítménnyel

Oligosaccharide synthesis on different substrates by commercial enzyme preparation from Aspergillus aculeatus

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Summary

Carbohydrates play an important role in biological systems such as energy source, cell-cell communication, prebiotics etc. The enzyme-catalyzed synthesis of carbohydrates represents an interesting alternative. Several enzymatic synthetized oligosaccharides (OS) are already marketed, but in the last some years, the interest of new types of carbohydrates with different specific glycopyranosyl-residues has become to front.

The commercial available enzyme preparation (Pectinex ultra) from *Aspergillus aculeatus* can catalyze synthesis of oligosaccharides via fructosyl-transferase activity on sucrose and stachyose as well as via galactosyl transferase activity on lactose and lactulose. In this study, glycosyltransferase and reverse hydrolytic activities of the preparation was investigated on new substrates to produce oligosaccharides and disaccharides. The bioconversion was monitored by HPLC and TLC method.

Pectinex ultra was able to catalyze glucosyl-transferase reaction on many substrates composed by different monosaccharide units and bounds including maltose, trehalose, cellobiose, turanose, palatinose and maltulose. It also shows galactosyl-transferase activity not just on β-glycosidic substrates like lactose and lactulose, but also on α-linked melibiose. Reverse hydrolysis was also studied on monosaccharides. The preparation synthetized di- and trisaccharides on glucose and mannose, but rhamnose, sorbose, xylose, fructose and arabinose were not to be substrates.

The effect of substrate concentration (10-80 g/100ml), temperature (50-80°C), pH (pH 3.0-7.0) and enzyme/substrate ratio (0.04-1.9 mg protein/g substrate) were investigated on mannose substrate. The best synthesis was achieved on 60 g/100 ml mannose concentration, on 70°C, pH 5.0 and in case of 1.9 mg protein/g substrate enzyme amount. With use of these parameters 5.96 g/100ml mannobiose and 0.5 g/100ml mannotriose was detected on the 96 h of bioconversion. The product synthesis was analysed in presence of other monosaccharides (arabinose, fructose, glucose, galactose, sorbose and xylose) with part of 1/3. In case of arabinose the trisaccharide concentration was 10 times higher than in case of control mannose substrate on 24 h of bioconversion.

Our results may give new information about carbohydrate synthesis mechanisms of Pectinex ultra, as well as development of technology for synthesis of novel oligosaccharides.

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