

Selective Fermentations of Monosaccharides by Osmotolerant Yeast Cultures

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Abstract : The purification processes for mixtures of isomeric monosaccharides using industrial chromatographic methods poses a serious technical challenge. Mixtures of 2 or 3 monosaccharides are difficult to separate by strictly physical or chemical techniques. Differential fermentation by microbial cultures is an increasingly interesting way of selective enrichment in a particular kind of monosaccharides when a mixture of them is present in the solution, and only one has economical value. Osmotolerant yeast cultures provide an interesting source of biocatalysts for the selective catabolism of monosaccharides in media containing high concentrations of total soluble sugars. A collection of 398 yeast strains has been obtained using endemic and unique sources of fruit juices, industrial syrups, honey, and other high sugar content substrates, either natural or man made, products and by-products from Mexico. The osmotolerance of the strains was assessed by plate assay both in glucose (20-40-60%w/w). Strains were classified according to their osmotolerance in low, medium or highly tolerant to high glucose concentrations. The purified cultures were tested by their ability to growth in a solid plate media or liquid media of Yeas Nitrogen Base (YNB), added with specific monosaccharides as sole carbon source (glucose, galactose, lactose and fructose). Selected strains were subsequently tested in fermentation experiments with mixtures of two monosaccharides (galactose/glucose and glucose/fructose). Their ability to grow and selectively catabolize one monosaccharide was evaluated. Growth, fermentation activity and products of metabolism were determined by plate counts, CO₂ production, turbidity and chromatographic analysis by HPLC. Selective catabolism of one monosaccharide in liquid media containing two monosaccharides was confirmed for 8 strains. Ion Exchange chromatographic processes were used in production of high fructose or galactose syrup. Laboratory scale processes for the production of fructose or galactose enriched syrups is now feasible, with important applications in food (like high fructose syrup as edulcorant) and fermentation technology (for GOS production).

Keywords : osmotolerant yeasts, selective metabolism, fructose syrup, GOS

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