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HEXOSE AND PENTOSE MIXED SUBSTRATE CONSUMPTION AND SUGAR TRANSPORT SYSTEMS IN THE HALOTOLERANT YEAST *DEBARYOMYCES HANSENII*

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Debaryomyces hansenii is a yeast species well known by its halotolerance. In turn, it has been seldom mentioned as a pentose consumer. The low yield of ethanol production probably generated by redox unbalance in this species can be overcome in terms of biotechnological interest by xylitol production and accumulation[1]. In the present work, the ability of *D. hansenii* to grow on mixtures of pentoses and hexoses was studied.

Kinetic parameters of growth indicated slower but efficient growth on pentoses in relation to hexoses. Yields obtained in either glucose, galactose, mannose, xylose or arabinose as single carbon sources, were identical. Accordingly, the biomass yields obtained in sugar mixtures were also identical for each mixture of (i) two hexoses, (ii) two pentoses or (iii) an hexose with a pentose. Preference for the consumption of one carbon source was translated by a slower growth rate on the second carbon source, but yield maintained. Thus, the consumption of one sugar did not hinder the second sugar consumption. Transport of glucose and xylose was also studied. A facilitated diffusion common to glucose and xylose was present on cells grown on glucose, being Michaelis-Menten constant for xylose 8 times higher than for glucose. Cells derepressed by growth on xylose presented two distinct higher affinity transport systems for these sugars. A thorough characterisation evidenced the dependence on NaCl or KCl presence for the detection and quantification of proton uptake associated with glucose or xylose uptake. A reevaluation of Michaelis-Menten parameters in the presence of NaCl, allowed the calculation of a 1:1 stoicheiomentry for proton and radiolabelled glucose or xylose uptake, which, together with results concerning (i) the inhibition of uptake by ionophores and (ii) the sensitivity to inhibition effect on transport V_{max} by ethanol, led us to consider these as proton symports. Substrate specific consumption rates determined for glucose and xylose as single carbon sources are lower than transport V_{max} for either glucose or xylose, considering the facilitated diffusion present in glucose-grown cells and facilitated diffusion plus xylose proton symport present in xylose-grown cells. We can thus consider transport not to be the rate limiting step for growth on either sugar.

[1] Duarte, Nobre, Gírio, and Amaral-Colaço (1994) Biotechnol. Techniques, 8: 859-864

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