Biotechnological production of 2,3-butanediol by *Pantoea agglomerans* from various sources of carbon

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2,3-Butanediol (2,3-BD) is a valuable compound as it can be applied as intermediate in several types of chemical industries. It is possible to produce 2,3-BD chemically, based on oil cracking, or by biotechnological methods. Given the current economic and social issues of fossil fuels, there is great interest to find alternative technologies to obtain 23-BD. Therefore, the use of agroindustrial biomasses gains appeal within the concept of biorefineries. The aim of this study is to investigate the metabolism of the strain *Pantoea agglomerans* BL1, which was isolated from an environmental microbial consortium, employing as substrate a biomass submitted to diluted acid pretreatment. This procedure solubilizes the hemicellulose fraction of the biomass, resulting in a broth containing high xylose and arabinose content. First, synthetic culture media with different combinations of carbon sources were tested to evaluate the ability of the strain to consume pentose sugars: xylose (X, 30 $g \cdot L^{-1}$), xylose + arabinose (XA, 15 $g \cdot L^{-1}$ of each sugar), xylose + arabinose + glucose (XAG, 10 $g \cdot L^{-1}$ of each sugar). Then, soybean hull acid hydrolysate (SHA, xylose: 28.67 $g \cdot L^{-1}$ + arabinose: 8.20 $g \cdot L^{-1}$ + glucose: 5.18 $g \cdot L^{-1}$) was employed as substrate, in a total of four different conditions. All experiments were carried out in duplicates at 37 °C, in a rotary shaker at 120 rpm. The results indicate that *P. agglomerans* BL1 can metabolize all monosaccharides studied simultaneously in SHA, even though it presented high osmotic pressure (average of 2,110.64 $mmol \cdot kg^{-1}$). However, this behavior was not observed in XA and XAG, which is probably related to the initial glucose concentration in SHA. Moreover, similar yield and productivity of 2,3-BD was achieved using X when compared with SHA within 24 h. In ASH, 2,3-BD titer was 5.47 $g \cdot L^{-1}$, which corresponds to a yield of 0.34 $g \cdot g^{-1}$ (based on total monosaccharides consumption) and productivity of 0.23 $g \cdot L^{-1} \cdot h^{-1}$. In X, titer, yield and productivity corresponded to 8.09 $g \cdot L^{-1}$, 0.27 $g \cdot g^{-1}$ and 0.34 $g \cdot L^{-1} \cdot h^{-1}$, respectfully. In all conditions, acetic acid and ethanol were also produced in smaller amounts. Hence, these results demonstrate *P. agglomerans* BL1 is a promising microorganism for subsequent studies utilizing soybean hull acid hydrolysate as a broth to produce 2,3-BD. In order to have a better control of the bioconversion parameters, further research include scaling up the best results obtained in these experiments to bioreactors.

Keywords: 2,3-butanediol, pentose sugars, lignocellulosic biomass hydrolysates, *Pantoea agglomerans*, soybean hull.

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