

Gluconic acid production by *Aspergillus niger* from sugarcane molasses and grape must: effect of increased air pressure and operation mode

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Feedstock costs for the biosynthesis of gluconic acid (GA) represent most of the operating costs at an industrial scale. The increasing demand for GA boosts the search for alternative substrates to pure glucose. The oxidation reaction of glucose to GA, catalyzed by glucose oxidase, is strongly dependent on oxygen availability in the culture medium. The high viscous *Aspergillus niger* culture, together with the use of agro-industrial by-products rich in sugars, could be a challenge in the biotechnological production of GA. This work showed the strong effect of air pressurized at 4 bar on batch and step-wise fed-batch production of GA by *A. niger* MUM 92.13 from sugarcane molasses and grape must. A 3-fold enhancement in GA productivity was obtained in batch experiments at 4 bar compared to those at atmospheric pressure. Moreover, step-wise fed-batch cultures carried out at 4 bar showed to be an alternative to traditional batch strategies, with similar GA yields. This study demonstrates the possibility of replacing pure glucose with two different sugar-rich by-products in the microbial production of GA under pressurized air conditions, becoming its production more sustainable and eco-friendlier within a circular bioeconomy concept.

Acknowledgments: Portuguese Foundation for Science and Technology (FCT) - UID/BIO/04469/2019 and the PhD grant SFRH/BD/129475/2017.