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Itaconic acid production from sorghum bran: A biorefining approach

Amina Ahmed El-Imam^{1,2} and Du Chenyu² ¹University of Nottingham, UK ²University of Ilorin, Nigeria

I taconic acid (IA) is a unique di-carboxylic acid widely used as a platform chemical to produce several value-added industrial products. It is currently produced industrially by the fermentation of glucose-based sugar solutions using Aspergillus terreus which compete with potential food applications and this in turn limits its industrial applications. This work replaces commercial glucose with glucose from a relatively underutilised feedstock, sorghum bran the residue of the starch extraction process, for the production of IA to decrease its production cost. Compositional analyses of brans from the white and red sorghum varieties did not reveal significant differences in most parameters. The starch content was high in both brans, with white bran having 52.96% and Red bran having 67.26% starch content. They also contained fairly considerable amounts of minerals (1.4% and 1.7% respectively) and protein (19.2% and 21.4% respectively). The brans were saccharified enzymatically and using various chemicals and the hydrolysates obtained from the most efficient conditions were tested for their ability to support *A. terreus* growth using a phenotypic microarray process. The hydrolysates were then utilised in shake flask fermentations to produce IA. No inhibitory effect on *A. terreus* growth in the dilute acid hydrolysates while production was limited relative to glucose controls. The effects of various factors including phosphates, sulphates, sorghum tannins and buffer type as potential inhibitors of IA production were investigated. A yield of around 10 g/L IA was produced from the enzymatic hydrolysate.

Biography

Amina Ahmed El-Imam is currently a PhD student in Life Sciences in the University of Nottingham, UK with interests in the application of biotechnology in the production of biofuels and bio-based chemicals. She obtained her BSc and MSc in Microbiology and Industrial Microbiology respectively from the Ahmadu Bello University Zaria, in Nigeria. She is currently looking at the fermentative production of itaconic acid, a high-value albeit less-investigated monomeric organic acid from sorghum bran, a food-processing waste.

sxtaa50@nottingham.ac.uk

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