

Novel fructooligosaccharide conversion from sugarcane syrup using a specialised enzymatic pH-stat bioreactor

ABSTRACT

Fructooligosaccharides (FOS) have gained significant attention for their prebiotic properties. Given that sugarcane syrup (SS) is sucrose-rich but with other nutritional benefits, its direct transformation into FOS may add value to this product. Therefore, the aims of this study were to develop FOS conversion from SS and to define the kinetic behaviour of FOS synthesized in a 1-L specialized pH-stat bioreactor (SPSB). The SS was composed of sucrose (58.93%) with considerable antioxidant capacities and γ -aminobutyric acid. The developed SPSB process consisted of three stages: evaporation of sugarcane juice into syrup (68–75 °Brix) (stage 1), optimization of the Viscozyme L and SS mixture at different reaction temperatures (47–55 °C) (stage 2), and upscaling of the optimized reaction system under defined conditions in a 1 L-SPSB system (stage 3). In the 1 L-SPSB system, the enzymatic reaction yielded 32.22% of FOS from SS after a 6 h reaction, which is comparable with a pure system containing an equivalent concentration of 10% of sucrose as initial substrate with 39.55% yield. This result demonstrated the efficient conversion of SS into FOS, supporting the utilization of sugarcane juice for its health benefits.

Keyword: Sugarcane syrup; FOS; pH-stat bioreactor; Enzymatic synthesis; Prebiotics; Native sugar