IN-SITU DEVELOPMENT OF A FUNCTIONAL PREBIOTIC STRAWBERRY PREPARATION

Agricultural, Marine and Food Biotechnology

PO - (730) - IN-SITU DEVELOPMENT OF A FUNCTIONAL PREBIOTIC STRAWBERRY PREPARATION

Gonçalves, Daniela (Portugal)[1]; Gonçalves, Vitor (Portugal)[2]; Teixeira, José (Portugal)[1]; **Nobre, Clarisse** (Portugal)[1]

1 - Universidade do Minho; 2 - Frulact

Body

Background

Consumers are becoming more conscious about the foods they eat, particularly in terms of sugar and calorie content. In this vein, the food industry has been pressed to offer products with low-sugar and reduced caloric value. The main challenge is keeping rheological and sensory characteristics unchanged when removing or replacing those sugars [1]. Herein we developed a functional strawberry preparation for the dairy industry by enzymatic conversion of its sucrose content into prebiotic fructo-oligosaccharides (FOS). Commercial enzymatic complexes with transfructosylation activity were applied to catalyze the conversion using an *in situ* approach.

Methodology

Two enzymatic complexes, Pectinex® Ultra SP-L and Viscozyme® L, were tested for application in the strawberry preparation. Operational parameters, including temperature, pH and enzyme:substrate ratio (E:S), were optimized to maximize FOS yield. Rheological, and physicochemical properties of the enzymatic-treated strawberry preparation were analyzed. INFOGEST gastrointestinal digestion protocol was used for evaluating its functional properties [2]. Sugars were analyzed and quantified by HPLC [3]. Finally, the enzymatic reaction was scaled-up to a lab size bioreactor (1.5 L).

Results and discussion

The optimal conditions found for both enzyme complexes were 60 °C and pH 5.0. At this conditions, Pectinex® Ultra SP-L produced 265±3 $g \cdot L^{-1}$ FOS, yielding 0.581±0.006 $gFOS \cdot g_{ini.GF}^{-1}$ after 7 h reaction (E/S: 1/40); and Viscozyme® L produced 295±1 $g \cdot L^{-1}$ FOS, yielding 0.664±0.004 $gFOS \cdot g_{ini.GF}^{-1}$ after 5 h (E/S: 1/30). Both resulted in preparations with 50% (w/w) FOS, with the sucrose content reduced by <80%. The synthesized FOS showed resistance to gastrointestinal digestion; only kestose was slightly hydrolysed in the presence of gastric and intestinal fluid. The scaled-up fermentation yielded 0.62±0.02 $g \cdot g_{ini.GF}^{-1}$, after 4 h reaction using Viscozyme® L, attaining a final FOS content of 281±7 $g \cdot L^{-1}$ with 46% (w/w) FOS. Differences in water activity, °*Brix* and consistency were not relevant, while colour had to be adjusted from browner to reddish and pH from 4.7 to 4.2.

Conclusions

A prebiotic strawberry preparation was successfully produced by enzymatic conversion of sucrose into functional prebiotics. The *in situ* fermentation proved to be efficient and suitable for industrial application.

Acknowledgements

The authors acknowledge the Portuguese Foundation for Science and Technology under the scope of the strategic funding of UID/BIO/04469/2019 unit and BioTecNorte operation (NORTE-01-0145-FEDER-000004) funded by the European Regional Development Fund under the scope of Norte2020 - Programa Operacional Regional do Norte and the Project ColOsH 02/SAICT/2017 (POCI-01-0145-FEDER-030071), and by National Funds through the FCT under the project cLabel+ (POCI-01-0247-FEDER-046080) co-financed by Compete 2020, Lisbon 2020, Portugal 2020 and the European Union, through the European Regional Development Fund (ERDF).

References

Clarisse Nobre

IN-SITU DEVELOPMENT OF A FUNCTIONAL PREBIOTIC STRAWBERRY PREPARATION

[1] "Value-Addition in Food Products and Processing Through Enzyme Technology", D.A. Gonçalves, J.A. Teixeira, and C. Nobre, Academic Press, 253–267 (2022)

[2] "In vitro digestibility and fermentability of fructo-oligosaccharides produced by Aspergillus ibericus", C. Nobre, S.C. Sousa, S.P. Silva, A.C. Pinheiro, E. Coelho, A.A. Vicente, A.M.P. Gomes, M.A. Coimbra, J.A. Teixeira, and L.R. Rodrigues, Journal of Functional Foods, 46, 278–287 (2018)

[3] "Production of fructo-oligosaccharides by Aspergillus ibericus and their chemical characterization", C. Nobre, E.G. Alves Filho, F.A.N. Fernandes, E.S. Brito, S.Rodrigues, J.A. Teixeira, and L.R. Rodrigues, LWT - Food Science and Technology, 89, 58–64 (2018)

Palavras-chave : Prebiotics, in-situ fermentation, fructo-oligosaccharides, fruit preparation