PREBIOTIC POTENTIAL OF FRUCTO-OLIGOSACCHARIDES PRODUCED BY ASPERGILLUS IBERICUS IN A BACTERIAL COMMUNITY REPRESENTATIVE OF THE GUT MICROBIOTA

Agricultural, Marine and Food Biotechnology

PO - (729) - PREBIOTIC POTENTIAL OF FRUCTO-OLIGOSACCHARIDES PRODUCED BY ASPERGILLUS IBERICUS IN A BACTERIAL COMMUNITY REPRESENTATIVE OF THE GUT MICROBIOTA

Roupar, Dalila (Portugal)[1]; González, Abigail (Portugal)[1]; Martins, Joana (Portugal)[1]; Botelho, Cláudia (Portugal)[1]; Teixeira, José (Portugal)[1]; **Nobre, Clarisse** (Portugal)[1]

1 - Universidade do Minho

Body

Introduction

The positive effects of prebiotics on human health are associated to their capacity to modulate gut microbiota and consequently, regulate the production of metabolites, such as the short-chain fatty acids (SCFA). Herein, the prebiotic potential of microbial-fructo-oligosaccharides (microbial-FOS) produced by a co-culture of *Aspergillus ibericus* and *Saccharomyces cerevisiae YIL162 W* [1] was evaluated in a designed bacterial consortium representing the healthy human gut microbiota.

Methodology

The prebiotic effect of the microbial-FOS was compared with two non-microbial commercial inulin-type samples: Raftilose®P95 and Frutalose®OFP. The bacterial consortium was composed by *Bacteroides dorei, Bacteroides vulgatus, Bifidobacterium adolescentis, Bifidobacterium longum, Escherichia coli, Lactobacillus acidophilus,* and *Lactobacillus rhamnosus* at a similar phyla proportion as found in the human colon. Fermentations were run for 30 h in FEED media [2]. During fermentation, the pH, bacterial growth (monitored by optical density measurement and selective media inoculation), SCFA production and sugar consumption (assessed by HPLC) were evaluated.

Results and Discussion

Bacterial growth decreased in the following order: glucose > microbial-FOS > Raftilose® P95 > Frutalose® OFP. Microbial-FOS stimulated a higher *Bifidobacterium* and *Lactobacillus* probiotic strains growth, as compared with other samples. The *E. coli* growth was suppressed at the beginning of fermentation, probably due to a pH reduction caused by lactate produced by *Lactobacillus*. Lactate and SCFA (such as acetate, propionate, and butyrate) were produced using all samples. The microbial-FOS sample (initial concentration: 20 g/L) produced the highest amount of lactate (12.2±0.1 g/L) and SCFA (4.0±0.1 g/L). The bacterial consortium seems to consume preferentially microbial-FOS presenting higher degree of polymerization (consumption: 60.8±0.1 % GF_4 (1- fructofuranosyl nystose); 57.2±0.1 % GF_3 (nystose); 49.6±0.1 % GF_2 (kestose)).

Conclusions

Microbial-FOS were successfully used as a substrate by a microbiota bacterial consortium. Also, microbial-FOS stimulated higher *Bifidobacterium* and *Lactobacillus* growth as well as higher total SCFA and lactate concentrations among the other substrates studied. The prebiotic potential of microbial-FOS produced by *A. ibericus* was demonstrated, providing a promising indication of its usability as a food ingredient with strong prebiotic features.

Acknowledgements

Dalila Roupar and Abigail González acknowledge the grants SFRH/BD/139884/2018 and SFRH/DB/06268/2021 respectively, from the Portuguese Foundation for Science and Technology (FCT). This study was supported by the FCT under the scope of the strategic funding of UIDB/04469/2020 unit and the Project ColOsH PTDC/BTM–SAL/30071/2017 (POCI–01–0145–FEDER–030071), also by the European Regional Development Fund (ERDF) through the

Clarisse Nobre

PREBIOTIC POTENTIAL OF FRUCTO-OLIGOSACCHARIDES PRODUCED BY ASPERGILLUS IBERICUS IN A BACTERIAL COMMUNITY REPRESENTATIVE OF THE GUT MICROBIOTA

Competitiveness factors Operational program – Norte 2020, COMPETE and by National Funds through the FCT - under the project AgriFood XXI (NORTE- 01-0145-FEDER-000041).

References

[1] One-step co-culture fermentation strategy to produce high-content fructo-oligosaccharides. Nobre, C., Gonçalves, D. A., Teixeira, J. A., Rodrigues, L. R. *Carbohydrate Polymers, 201:* 31–38 (2018).

[2] *Lactobacillus acidophilus* CRL 1014 improved "gut health" in the SHIME® reactor. Sivieri, K., Morales, M. L. V., Adorno, M. A. T., Sakamoto, I. K., Saad, S. M. I., Rossi, E. A. *BMC Gastroenterology*, *13:* 1-9 (2013).

Palavras-chave : Fructo-oligosaccharides, Aspergillus ibericus, Gut microbiota, Prebiotics, Short-chain fatty acids