Metabolic preference of fructiphilic lactic acid bacteria for fructose: a way to reduce FODMAPS in wheat-derived baked goods

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Abstract:

FODMAPs intake is associated with the onset of irritable bowel syndrome symptoms. Fructans, galacto-oligosaccharides (GOS), lactose, fructose in excess of glucose, and sugar polyols (sorbitol and mannitol) are the main FODMAPs found in foods. Bioprocessing by endogenous enzymes and microbial fermentation may reduce FODMAPs content in wheat-derived baked goods. Because of the inherent enzyme activities, bread made by baker's yeast and sourdough may result in decreased levels of FODMAPs, whose values are still not low enough. Fructophilic lactic acid bacteria (FLAB) are found in fructose-rich habitats such as flowers, fruits, fermented foods. FLAB are heterofermentative lactobacilli that prefer fructose instead of glucose as carbon source, but additional electron acceptors (e.g. oxygen) remarkably enhance their growth on glucose. As a newly discovered bacterial group, FLAB are gaining increasing interest. Our study investigated the complementary capability of targeted commercial enzymes and metabolically strictly fructophilic lactic acid bacteria (FLAB) to hydrolyze fructans and deplete fructose during wheat dough fermentation. FLAB strains displayed higher fructose consumption rate compared to conventional sourdough lactic acid bacteria. Fructose metabolism by FLAB was faster than glucose. The catabolism of mannitol with the goal of its reuse by FLAB was also investigated. Under sourdough conditions, higher fructans breakdown occurred in FLAB inoculated doughs compared to conventional sourdough bacteria. Preliminary trials allowed selecting Lactobacillus kunkeei B23I and Fructobacillus fructosus MBIII5 as starter candidates, which were successfully applied in synergy with commercial invertase for low FODMAPs baking. Results of this study clearly demonstrated the potential of selected strictly FLAB to strongly reduce FODMAPs in wheat dough, especially under liquid-dough and high oxygenation conditions.

Biography:

Marta Acín-Albiac got her Bsc. in Food Science at University of Barcelona (UB) and she got specialized during her Msc. In Bioengineering at Sarrià Chemical Institute (IQS-URL, Spain).

Currently, she is pursuing her PhD in Food Engineering and Biotechnology at the Free University of Bolzano (UNIBZ) under Prof. Di Cagno supervision.

Recent Publications:

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4. Yan, Y.L.; Hu, Y.; Gänzle, M.G. Prebiotics, FODMAPs and dietary fiber—conflicting concepts in development of functional food products? Curr. Opin. Food Sci. 2018, 20, 30–37.
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