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The influence of fermentation conditions on the exopolysaccharides and β -glucan content of barley sourdough

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Barley is cereal rich in non-starch polysaccharides, particularly β -glucan (BG), however rarely used in bakery due to poorer technological and sensory properties of final products. Those properties can be improved by application of sourdough. Sixteen different barely sourdoughs were prepared with lactic acid bacteria (LAB) *L. reuteri* and *W. cibaria* with/without the addition of *L. plantarum*, xylanase and sucrose with the purpose of producing sourdough with higher concentration of exopolysaccharides (EPS) and β -glucan (BG), which could improve the bread properties. Sucrose and *L. plantarum* positively affected the kinetics of acidification during sourdough fermentation and total acidity of sourdoughs, while LAB and sucrose interaction had positive effect on the maximum acidification rate. Sourdoughs fermented with *L. reuteri* showed higher acidity (14.31-16.63 mL NaOH) than those fermented with *W. cibaria* (12.16-15.85 mL NaOH). Fermentable coefficient (FQ) was significantly influenced by sucrose addition while six sourdoughs had an optimal FQ. Fermentation negatively affected total BG (79.72-93.65% in regard to unfermented sourdough), but positively affected soluble BG (40.72-75.88%) if compared to unfermented sourdough (19.28%). Xylanase ($p=0,039$) and sucrose ($p=0,007$) positively affected soluble BG while fermentation process increased the relative molecular weight (Mw) of soluble BG (111-378 kDa; unfermented sourdough Mw=87 kDa). In all sourdough EPS was produced (1.485-2.530 mg/g), but addition of sucrose ($p=0,001$) and *L. plantarum* ($p=0,001$) showed the most positive impact on the EPS synthesis. Mw of EPS in sourdoughs fermented with *L. reuteri* and *W. cibaria* was 254-492 and 170-280 kDa, respectively. Fermentation optimization resulted in five sourdoughs with the most desirable characteristics: (1) *L. reuteri*, (2) *L. reuteri*+sucrose, (3) *L. reuteri*+sucrose+xylanase, (4) *W. cibaria*+sucrose, and (5) *W. cibaria*+sucrose+xylanase. Barely flour showed to be suitable for production of sourdough with higher concentration of EPS using selected LAB and can be used for the production of dietary fiber enriched wheat bread with prolonged shelf-life.

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