Selection of promising exopolysaccharide-producing starter cultures for gluten-free sourdough

Giovanna Iosca [1*], Camilla Febo [1], Luciana De Vero [1] , Hossein Haghighi [1] , Maria Gullo [1] and Andrea Pulvirenti [1,2]

1 Department of Life Sciences, University of Modena and Reggio Emilia, 42122 Reggio Emilia, Italy; giovanna.iosca@unimore.it (G.I.); camilla.febo@unimore.it (C.F.); luciana.devero@unimore.it (L.D.V.); hossein.haghighi@unimore.it (H.H); maria.gullo@unimore.it (M.G.)
2 Interdepartmental Research Centre for the Improvement of Agri-Food Biological Resources (BIOGEST-SITEIA), University of Modena and Reggio Emilia, 42124 Reggio Emilia, Italy
* Correspondence: giovanna.iosca@unimore.it

Celiac disease is an autoimmune enteropathy that affects the small intestine and is caused by the gliadin fraction of wheat gluten and other alcohol-soluble proteins (prolamines) of barley and rye in genetically predisposed subjects. Nowadays, the only recognized cure for this pathology is the use of gluten-free (GF) products. Although the market of GF products has been increased in the last few years, their improvement is still a challenge for the food industry. Considering the GF bakery products, some of them can result in unappetizing taste with high-fat content. These inconveniences can be minimized or solved by using sourdough fermentation. Sourdough is a stable culture of lactic acid bacteria (LAB) and yeast in a mixture of flour and water. In particular, GF sourdough represents a rich source of naturally occurring LAB and wild yeasts which play important roles in food fermentation. This is mainly due to their potential in improving functional, technological, and probiotics properties contributing to safe and more tasty food. Moreover, exopolysaccharide (EPS)-producing strains can contribute to improving the sensory and rheological quality of the different GF products as well.

This study aims to isolate and characterized the microbial pool from a GF sourdough made with rice flour and to evaluate the ability of selected LAB strains to produce exopolysaccharides (EPS).

The yeast and LAB were isolated in selective agar media. A total of 220 isolates (110 yeasts and 110 bacteria) were obtained. They were taxonomically identified and characterized using both traditional and molecular approaches. Sequencing analysis of the D1/D2 domain of the 26S rRNA and the 16S rRNA genes, for yeasts and bacteria respectively, revealed the occurrence of *Saccharomyces cerevisiae* as predominant yeasts and *Lactiplantibacillus plantarum* and *Pediococcus pentosaceus* as dominant LAB. Regarding the EPS production, 25 strains were able to produce dextran-like EPS with a maximum yield of 2 g/L.

This study allowed to isolate and select promising EPS-producing starter culture for the different type of flour sourdoughs, in particular GF sourdough.

Keyword: Sourdough, EPS, lactic acid bacteria