

Effects of sprouting under controlled conditions on gluten properties

G. Cardone*, M.A. Pagani, A. Marti

Università degli Studi di Milano, Department of Food, Environmental and Nutritional Sciences (DeFENS), Milan, Italy

*gaetano.cardone@unimi.it

Sprouting is a natural process associated with many nutritional enhancements of grains: i.e. decrease in antinutritional factors increase in bio-availability of vitamins and minerals, and an increase in amino acids and sugars. All these improvements are related to the activity of hydrolytic enzymes (e.g. proteases and amylases) developed during the sprouting process. However, from the technological point of view, a high accumulation of hydrolytic enzymes negatively impacts on flour performance. Usually, a high proteolytic activity causes detrimental effects on gluten aggregation properties, making sprouted wheat unsuitable for baked products. However, recent studies have reported that flours from sprouted wheat under controlled conditions, in terms of time, temperature and relative humidity, could be used to improve the baking performances of flours. To understand why sprouting process under controlled conditions improves the bread-making performance of wheat flours, the purpose of this work was to evaluate the effects of sprouting on gluten properties. Specifically, the study focused on gluten protein formation in different hydration and shear stress conditions (GlutoPeak vs Farinograph test), as well as, its viscoelastic properties (Glutograph test) and its ability to retain gas during the leavening phase (Rheofermentograph test). Finally, bread characteristics were also measured.

In slurry system, the gluten proteins were still able to aggregate. However, the decrease in maximum torque and in aggregation energy required for gluten aggregation suggested gluten weakening. In dough system, the decrease in dough water absorption, development time and stability during mixing confirmed the worsening of gluten quality due to sprouting time. On the other hand, the sprouting process led to an increase in gluten stretching, suggesting an increase in dough extensibility, giving rise to bread with great capacity to retain gas and high specific volume.