

❖ **FOOD CHEMISTRY, OENOLOGY AND BIOTECHNOLOGIES IN THE FOOD INDUSTRY**

The effect of brewer's spent grain concentration on the degree of maturation of bread sourdough

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Abstract

Brewer's spent grain is a secondary product of brewing production, which accumulates in large quantities and needs further disposal. Due to the high moisture content (68-75%), brewer's spent grain has a short shelf life and emit toxic substances into the atmosphere at the time of spoilage. The purpose of this research work is to study the microflora of sourdough obtained from white wheat flour and brewer's spent grain, as well as to identify the optimal concentration of used raw materials for its further use in baking. Brewer's spent grain can be offered in the production of healthy foods to enrich their nutritional value. It is known that brewer's spent grain are rich in B vitamins (B1, B2, B5), minerals (P, K, Mg) and essential amino acids (arginine, leucine, valine).

Dried brewer's spent grain, white wheat flour and distilled water were used to produce sourdough starter. Five types of white wheat flour and brewer's spent grain sourdough starter were studied: a reference sample of 100% wheat flour, 75/25%, 50/50%, 25/75% respectively and 100% of brewer's spent grain. The fermentation process took place at 27±1 °C for 168 hours. Every 24 hours the starter was renewed with nutrient medium consisting of the used ingredients.

Microbiological analysis of the flour mixture was done before fermentation - 0 hours and every 24 hours of fermentation. As a result, a significant growth of microorganisms consisting of *Streptococcus lactis*, *Lactobacillus casei*, *Lactobacillus acidophilus* and especially a significant number of *Saccharomyces cerevisiae*, typical for the microbiota of used wheat flour, was observed. With increasing the concentration of added brewer's spent grain in the starter a decrease in growth and activity of microorganisms, as well as a marked decrease in the number of *Saccharomyces cerevisiae* was observed. Thus, sourdough made of 100% brewer's spent grain is characterized by low content of microorganisms and lack of yeast. For sourdough made only on brewer's spent grain flour and water the presence of *Streptococcus lastis* and *Lactobacillus casei* is characteristic. The percentage of development of the microorganisms in this sample is 70 %. The most successful sourdough by its microbiological composition stands out 75/25% sample, which has 95% of microorganisms, most of which are *Saccharomyces* species yeast at the stage of multiplication. This sourdough is also characterized by the presence of *Streptococcus lactis*, *Lactobacillus casei* and a small amount of *Lactobacillus acidophilus*. The presence of yeast in the sourdough facilitates fermentation of carbohydrates and produces carbon dioxide, which loosens the dough, and the presence of lactic acid bacteria contributes to the rich flavor and aroma of the finished product. Baking trials showed that the optimum concentration of a mixture of wheat wallpaper flour and brewer's spent grain to obtain starter is a concentration of 75/25%, respectively. The resulting products have a pleasant aroma of cereal products, with a well-developed porosity, with a sour taste and have a long shelf life of freshness.

Keywords: Brewer's spent grain, White wheat flour, Barley malt, Sourdough microbiota, Spontaneous fermentation.

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