



## Evaluation of sourdoughs prepared in different conditions using spontaneous fermentation technique

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**Abstract:** The aim of this study was to evaluate the suitability of different flours (corn, Einkorn wheat, whole wheat flour, rye flour) to produce spontaneously fermented sourdough. Sourdough type I was obtained by different ratio of flour: water, different mixture of flours and different fermentation temperatures (25°C and 35°C). The sourdough was evaluated for their pH, TTA and microbial populations (LAB and yeast) for 96 hours with three backslipping stages. The ideal fermentation time for the population of LAB and yeasts is 72 hours at 25°C, and the most productive sourdoughs were Einkorn wheat flour and 1:1 combination of rye and corn flours. Flour: water ratio 1:1 is recommended to obtain high quality sourdough with a better smell, with a high yield, easy to handle.

### Introduction

The microbial ecosystem in sourdough obtained from different flours may present distinct lactic acid bacteria communities that can contribute to many variation of sourdough flavors and antimicrobial compounds. In this study had been used different flours (wheat, corn and rye), variations and technological parameters in order to obtain sourdough with different microbial ecosystems and characteristics.

### Material and method

The raw materials used in experiments were procured from Romanian manufacturers. The flour samples are freshly ground at the time of product purchase, with a mill that does not heat the flour. The purpose of this practice is to ensure the highest nutritional values of the obtained flours. The flours were used immediately after milling in order to obtain different variations of sourdough.

#### Sourdough fermentation

Spontaneous dough was formed by fermenting a mixture of flour and water without the addition of an external starter culture. The four types of flour together with plain water were mixed to prepare seven different doughs. Mixing was done using a dough blender in a ratio of 1:1 to form dough. The dough was kneaded for 4 minutes for homogenization and left to ferment at 25°C and 35°C respectively for 24 hours. Every 24 hours the refreshing procedure (back-slopping) was carried out by adding 100 g of fermented dough, 100 g of white wheat flour 650 and 100 ml of plain water (ratio 1:1:1). Four refreshment steps were carried out to obtain mature doughs according to the traditional type I acid dough scheme.

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### Results and discussions

The population of lactic acid bacteria for the sourdough fermented 24 h at 25°C had an average of 6.29 log UFC/g. These values increased to 8.97 log CFU/g after 72 h of fermentation respectively 8.91 log CFU/g at 96 h. These values increased to over 8 log CFU/g after 48 h of fermentation at 25°C, value reached in 24 hours of fermentation at 35°C for all doughs tested. The lactic acid bacteria population was much more productive at 24 hours of fermentation at 35°C for all types of sourdough, but the growth during the fermentation period was very low.



Figure 1. Evolution of lactic acid bacteria and yeast populations compared to pH values in the case of doughs fermented at 25°C

### Conclusions

Sourdoughs fermented at 25°C showed an increase in volume characteristic of a good fermentation, all samples showed some level of bubbling and all smelled distinctly from each other. The characteristic smell was that of acid, earth, pungent, only the sample of 100% corn flour but also in combination with rye flour 50/50 had a pleasant, sweet smell. These two sourdoughs and the technological parameters (fermentation temperature of 25°C for a duration of 72 h) presented the best results, were selected for future experiments that implies phenotypic identification of isolated strains of lactic acid bacteria from selected sourdoughs and highlighting of strains with biotechnological potential for the bakery industry.