

THE EFFECTS OF YEAST AND LACTIC BACILLI IN THE DEVELOPMENT OF ENZYMES AND THEIR RESULTS FOR THE GENERATION OF AMINO ACIDS IN DOUGH, A FACTOR THAT INFLUENCES THE AROMA OF BREAD

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Abstract

It was determined the release of amino acids in the dough obtained from wheat flour, water, salt, yeast and dough prepared from the same ingredients, but which were inoculated with lactic acidophilic bacteria. Following the proteolytic activity, the released amino acids were constant in both situations, although the yeasts presented a high demand for amino acids, and their concentration was not significantly affected by the activity of lactic bacilli. The content of amino acids was influenced by the pH during the period of fermentation and microbial metabolism. Proline formation was favored by values higher than pH 5.5, while the release of phenylalanine, leucine and cysteine occurred mainly at lower pH. In order to determine the effects of the amino acid concentration on the bread aroma, the fermented doughs were subjected to the baking test. Following the assessment, it was observed that the most pronounced aromas were obtained when baking the dough inoculated with lactic acid bacteria. These results support the hypothesis that the aroma of the bread is improved by increasing the concentration of free amino acids as a result of the activity of lactic bacilli in the dough.

Keywords: fermentation, lactic bacilli, aroma.

INTRODUCTION

The bread is prepared from practically tasteless ingredients, flour, water, salt and yeast. Almost all the aromatic active components are formed during the fermentation of the dough and baking. Increased amounts of free amino acids in the dough can improve the flavor of the bread. By stimulating proteolysis by adding lactic bacteria, during the fermentation period the sensory properties characteristic of bread are considerably improved compared to doughs obtained only with the addition of yeast and chemically acidulated. The aim of this work was to determine the contribution of flour obtained from wheat and microbial enzymes to the proteolytic release of amino acids during dough fermentation, as well as the relevance for the sensory attributes of bread. The effect of acidification and reduction was compared with proteolysis agents in doughs that were not inoculated and doughs fermented with different initial lactic cultures. The relevance of the levels of amino acids in the dough for the aroma of the bread was determined by the sensory analysis of the bread.

MATERIAL AND METHOD

The wheat flour used was from a local mill, having a moisture content of 13.9%, wet gluten of 32% and an ash content of 0.55%.

The initial cultures were obtained by thermostating them for 12 hours at a temperature of 35 degrees Celsius. Cultures and flour were prepared with an addition of 400% water, after which they were placed in 50ml glasses and left to incubate at a temperature of 30 degrees Celsius. Samples were taken at appropriate intervals to determine the number of viable cells, the pH level, the concentration of organic acids in the suspension, ethanol and amino acids. The absence of contaminants in the suspension fermentation was verified by determining the colony, morphology and microscopy of the colonies selected to determine the cell morphology. Fiecare fermentatie a fost efectuata in dublu exemplar. The baking test was made by obtaining a dough from 720g of flour, 120ml of suspension, 300ml of water, 40g of coarse non-iodized salt. The control sample was obtained by replacing the suspension with 120 gr of Pakmaya compressed yeast. The dough was kneaded with a Heiner planetary mixer at low speed for 2 minutes and at high speed for 4 minutes. After obtaining the dough, they were placed in molds and were thermostated for 35 minutes at a relative humidity of 80%. After fermentation, the samples were baked at a

temperature of 235 degrees for 20 minutes. After baking, the samples were taken out of the molds, left to cool for an hour, after which they were subjected to a sensory analysis made up of a team of 5 analysts.

RESULTS AND DISCUSSIONS

The release of total amino nitrogen is related to the growth and metabolism of microorganisms. In all yeast-fermented doughs, the lowest amounts of amino acids were detected in the multiplication and growth phase, and the highest in the stagnation period due to the oversaturation and increase in the acidity of the dough. A comparison of doughs fermented by inoculation with cultures of lactic bacilli with those obtained by fermentation with the help of yeast allows us to estimate the contribution of microbial proteases to proteolysis in the dough. Fermentation of the dough with yeast led to the decrease of free amino acids due to the microbial metabolism, and following the conversion of these metabolic products in the dough (leucine and phenylalanine) aromatic volatile products are obtained. Enhanced proteolysis during dough fermentation is in agreement with previous reports on amino acid evolution. Lactic bacteria require amino acids or peptides for growth, and after metabolism, volatile substances are obtained that contribute to the impregnation of the bread with an aroma.

CONCLUSIONS

The most important flavor elements are obtained during baking during the formation of the crust or crust of the bread. These, by combining with the volatile substances that are formed during fermentation, can intensify the organoleptic qualities of the bread. In the case of doughs fermented with the help of lactic bacteria, the volatile substances that remain in the bread are in larger quantities compared to those obtained by fermentation with yeast, where the concentration of ethyl alcohol is higher, but during baking it is almost completely eliminated. However, tasters preferred the bread obtained with yeast due to the texture of the core and the taste. The difference in taste can be attributed to the fact that the acidity of the dough in the bread made with the help of fermentation with lactic

bacteria is significantly higher, which after baking can contribute to the differences in the taste of the bread core. In addition, the porosity of the bread core and the volume were much lower in the bread obtained with lactic acid bacteria because the amount of carbon dioxide resulting from fermentation is much lower in this case.

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