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Effects of Phytic Acid Breakdown and Taste Components in Sourdough Produced by Mixed Fermentation of Various Lactic Acid Bacteria and Yeast

Jeehye Ouyang*

Department of Food Science and Biotechnology, Andong National University, Gyeongbuk, Republic of Korea

Introduction

Although yeast-fermented dough accumulated some acetic acid, no lactic acid was produced. Sourdough fermented with lactobacillus accumulated a lot of lactic acid, but the amount of acetic acid increased much less. The sourdough L1 that contained the most lactic acid had a concentration of 4.35 mg/g, while the mixed sourdough MY1L1 that contained the most acetic acid had a concentration of 1.24 mg/g. The study found that adding yeasts reduced the amount of lactic acid in the fermented sourdough compared to the single strain and the mixed strain. This was because the number of LAB colonies decreased, which decreased lactic acid production. However, due to the yeasts metabolizing the glucose produced by LAB, mixed-fermented sourdough had higher acetic acid content than either yeast-fermented or lactobacillus-fermented sourdough, or increased acetic acid production. Sourdough L3 had lower acetic acid content than L1 and L2, and the difference was significant (P0.05). This was mostly because Lactococcus lactis LG0824, Lactobacillus plantarum LG1034, and Lactobacillus paracasei LG0260 had different ways of fermenting. The first two were homofermentation-related, while the third and fourth were heterofermentation-related. The production of microorganisms carried by the flour itself could account for the lower level of acetic acid in L3. In sourdough bread making QF values between 1.5 and 4 were considered positive. In this study, the QF values of the three groups of lactobacillus-fermented sourdough were higher than those of the other groups. However, it was discovered that the QF value can be reduced to a range that is more suitable when the strains of LAB and yeasts are co-fermented [1].

Under the action of amylase, the variation of reducing sugar content in sourdough starch is broken down into reducing sugar and monosaccharide, the primary raw material for yeast respiration. The amount of reducing sugar in sourdough that was fermented using LAB showed a general upward trend as the fermentation time increased, whereas the amount of reducing sugar in dough that was fermented using yeast showed a trend of first increasing and then decreasing. Since various endogenous amylases of microorganisms' hydrolyzed starch into reducing sugar in the early stages of fermentation, while yeast respiration could consume some of the reducing sugar, reduced sugar content began to decrease when the rate of consumption exceeded the rate of production. L3's content of reducing sugar continued to rise. The reducing sugar content was the highest at 24 hours, at 31.89 mg/g, when compared to other sourdoughs, and the difference was significant (P0.05). Lowering the pH had the effect of boosting amylase activity and expanding starch molecules.

However, the activity of amylase was inhibited at pHs below 4.0 in sourdough, and LAB was able to consume some of the monosaccharide. Since the pH of sourdough L3 was higher than that of L1 and L2, there was less inhibition of amylase, which led to an ongoing increase in the amount of reducing sugar. On the other hand, LAB was able to consume some of the disaccharide, which led to a decrease in the amount of reducing sugar in L2. The relationship between the aforementioned yeasts and LAB for the formation and utilization of reducing sugar may also be explained by the alteration in reducing sugar in mixed fermented sourdough. The reducing sugar content of sourdough MY1L3 reached 20.99 mg/g, which was significantly higher than that of other mixed sourdough (P0.05). Sourdough produced a significant amount of reducing sugar for yeasts to use under the influence of LAB, which may have contributed to the higher acetic acid content of the previous mixed fermentation [2,3].

Discussion

12 distinct kinds of acidic volatile compounds were present in MY1L2 and MY2L3. The most important acids in sourdough were acetic acid, caproic acid, and caprylic acid. L1 and L2 had a higher concentration of acetic acid than L3. As was the case with sourdough's organic acid, the mixed fermentation produced more acetic acid. The content and type of ester substances in LAB samples were extremely low, and the single-strain fermentation showed very little improvement in these substances.

The variety of esters significantly increased after mixed fermentation, indicating that mixed fermentation was beneficial for increasing ester accumulation and abundance. Ethyl caproate, ethyl caprylate (brandy flavor), and ethyl acetate were the three esters in mixed fermented sourdough with the highest concentrations. Also, the most of it was ethyl acetate, a typical compound with obvious fruity and wine aromas made by alcohol acyltransferase from ethanol and acetic acid. According to Kaseleht et al.'s research, higher levels of ethanol and acetic acid were always accompanied by higher levels of ethyl acetate. However, a non-linear relationship between these compounds was discovered in this study. Among the samples, ethyl acetate had the highest concentration, while ethanol and acetic acid were the lowest in LB. The highest levels of ethyl acetate and ethyl lactate were found in LB, at 79.31 mg/kg and 25.64 mg/kg, respectively. These levels were significantly higher than those found in commercial sourdough, suggesting that ethyl acetate and ethyl lactate are the distinctive flavor compounds of LB [4,5].

Conclusion

The yeasts used the reducing sugars produced by both LAB and yeasts in the sourdough system, which may have improved the production of flavor compounds. The ability of mixed fermentation to break down phytic acid was stronger. Contrasted and the batter aged by LAB single strain, its complete polyphenol content was decreased, however the DPPH free extremist rummaging skill was improved. Additionally, during mixed fermentation, the variety of volatile flavor compounds and their content significantly increased. Alcohols decreased in fermented dough made with a single strain of yeast, but acids, esters, and aldehydes significantly increased. However, homofermentative LAB had distinct effects on sourdough. It had a lower acetic acid content and a slower rate of acidification. Both the total amount of polyphenols and their antioxidant properties decreased as a result, and the proportion of aldehydes increased. As a result, mixed-fermented sourdough has a lot of potential applications.

***Address for Correspondence:** Jeehye Ouyang, Department of Food Science and Biotechnology, Andong National University, Gyeongbuk, Republic of Korea, E-mail: ouyang@andong.ac.kr*

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Conflict of Interest

None.

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