

Effect of added carbohydrates on the quality of sourdough and sourdough bread



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INTRODUCTION & AIM

Sourdough bread is made through the fermentation of dough using naturally occurring lactobacilli and wild yeast, unlike common bread which uses commercial baker's yeast. It utilizes a starter culture of flour and water that captures wild yeast and bacteria, giving it a distinctive tangy flavor and chewy texture. Nutritionally, sourdough offers several advantages: The fermentation process breaks down gluten, making it easier to digest for those with gluten sensitivities. Additionally, lactic acid bacteria improve nutrient bioavailability, and the lower glycemic index of sourdough can help maintain stable blood sugar levels.

The aim of this work was to perform an absolute and relative comparison of the changes that occurred in bread dough and baked products when the same concentrations of specific types of carbohydrates were added, in order to gather information needed to optimize new recipes for the baking industry.



Figure1:
Rising and baking the loaves during the experiment

METHOD

To investigate the influence of adding selected carbohydrates (beet sugar, honey, active malt flour) on sourdough bread parameters, a modified three-stage sourdough management method was chosen. The dough, consisting of 65% rye and 35% wheat flour, was kneaded for 5 minutes for optimal ingredient homogenization and gluten development. It was then fermented at 28 °C for 160 minutes. The content of organic acids in the dough was measured using ion chromatography, and the increase in dough volume and pH was monitored. Oval loaves were baked from 350 g pieces of dough (Fig.1). Each loaf was cut transversely, and the cut from its middle was measured for resistance to pressure applied at right angles using a Brookfield LFRA 1500 texturometer.

RESULTS & DISCUSSION

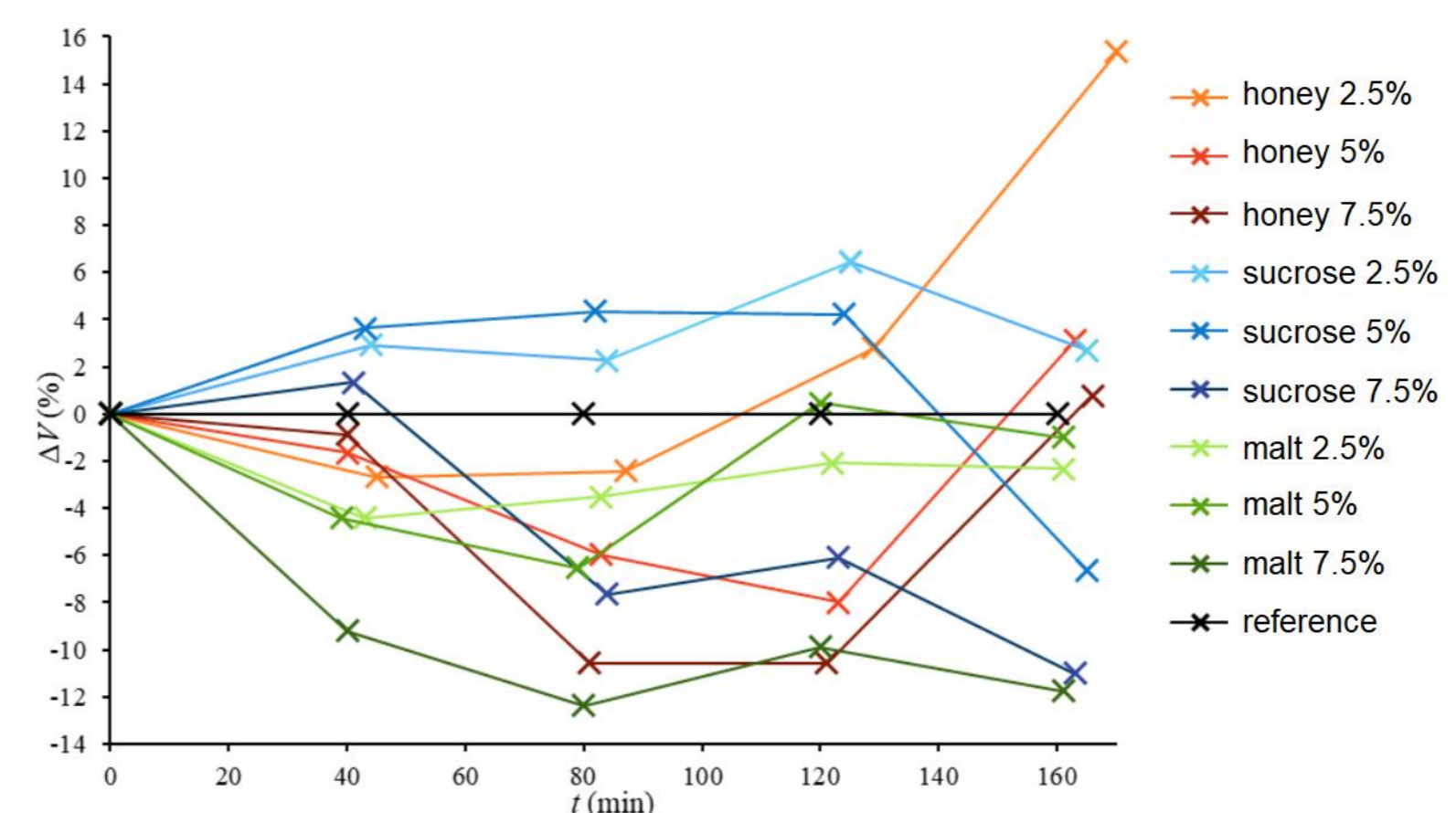


Figure2: Rising and baking the loaves during the experiment

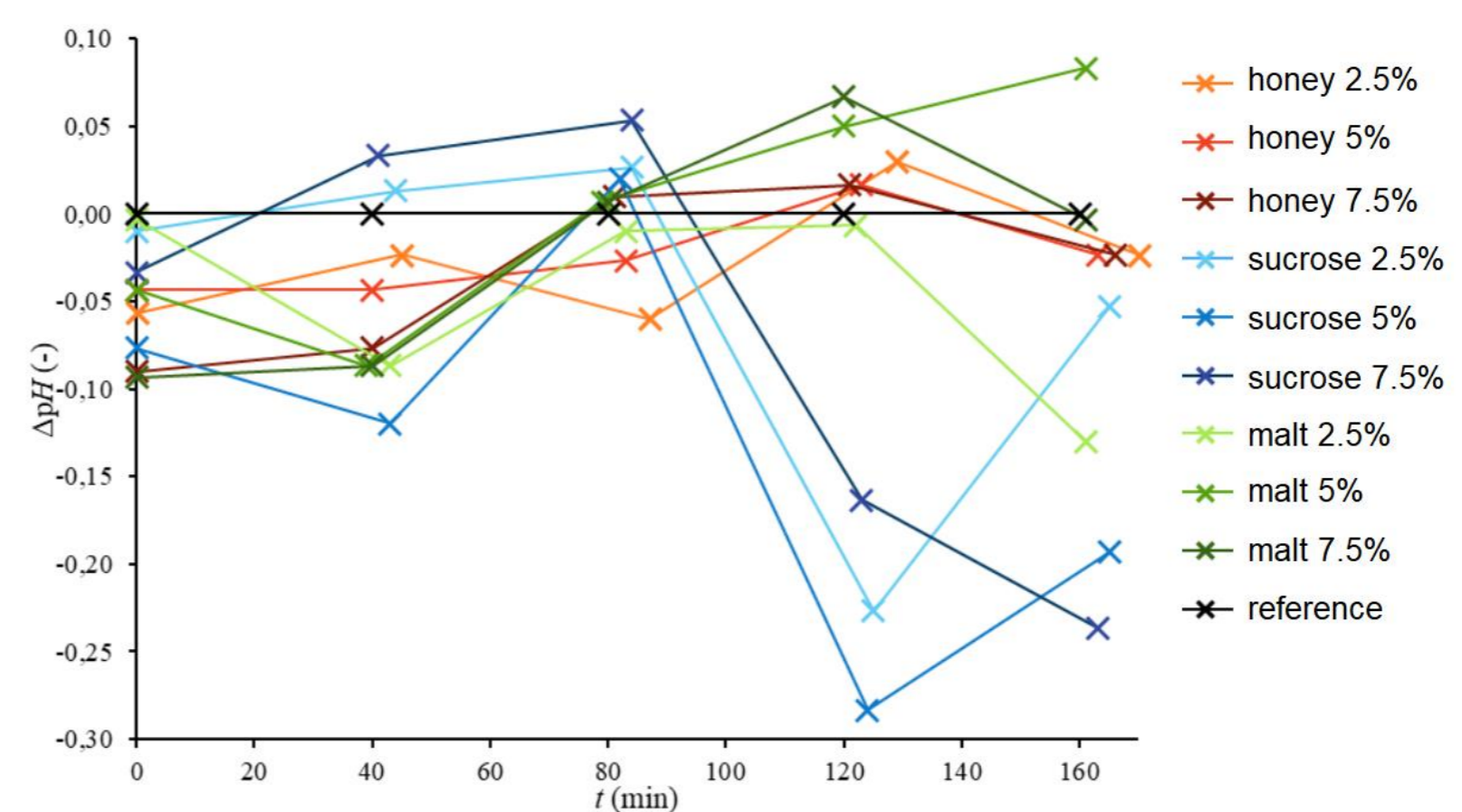


Figure 3. Comparison of the change in pH when different types of carbohydrates were added to the dough

Table 1: Values of the crumb strength of sourdough bread with varying concentrations of carbohydrates added to the dough.

	strength (g)	difference comp. to ref.
malt 2.5%	796	-16,7
malt 5%	926	-3,1
malt 7.5%	1187	24,2
honey 2.5%	706	-26,2
honey 5%	737	-22,9
honey 7.5%	959	0,3
sucrose 2.5%	962	0,6
sucrose 5%	678	-29,1
sucrose 7.5%	698	-27,0
reference	956	0,0

Based on the analysis, enhancing sourdough with honey leads to the largest loaf volume and the softest crumb simultaneously (Fig.2, Tab.1). Greater amounts of beet sugar significantly elevate the dough's total acidity (Fig.3), while malt flour imparts a smooth, mildly sweet aroma to the bread. The inclusion of malt flour inhibits acetic acid production during sourdough fermentation. Regrettably, the reduced acetate concentration and increased levels of residual sugars together result in a shorter microbial shelf-life for the baked bread.