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Measuring and evaluating spelt bread texture

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Texture analysis is an objective physical examination of baked products and gives direct information on the product quality, oppositely to dough rheology tests what inform on the baking suitability of the flour, as raw material. It is the major criterion in assessing the eating quality of bread because of its close association with the consumer's perception of freshness. During the years 2010–2011 selected indicators for bread texture quality of three *Triticum spelta* L. cultivars – Altgold, Ostro and Franckenkorn grown in an ecological system were analyzed. The bread texture quality was evaluated on texture analyzer, following the AACC (74-09) standard method and expressed as crumb firmness, stiffness and relative elasticity. The influence of the variety as well as weather condition on textural properties of bread crumb values was statistically significant. The spelt wheat bread crumb texture required further investigation as it can be a reliable quality parameter.

Keywords: spelt bread, texture, firmness, stiffness, elasticity

1 Introduction

The bread quality is considerably dependent on the texture characteristic of bread crumb (Nagy et al., 2006). Traditional mimetic methods, such as texture profile analysis, firmness, stress relaxation, penetration and compression tests provide useful and well-recognised information about bread crumb mechanical properties (Liu and Scanlon, 2004; Mandala et al., 2007). Texture analysis is an objective physical examination of baked products and gives direct information on the product quality, oppositely to dough rheology tests what inform on the baking suitability of the flour, as raw material. It is the major criterion in assessing the eating quality of bread because of its close association with the consumer's perception of freshness (Cauvian and Young, 2007). Primary texture property of bread is crumb firmness. From the physical point of view it is the power that is needed to reach a given deformation. To the key characteristics related to freshness belong crumb softness and its ability to recover its shape after exposition to deformation power (Krkošková, 1986). The objective of our study was to determine the texture of spelt wheat bread (crumb firmness, stiffness and relative elasticity) of three *Triticum spelta* varieties grown in ecological system.

2 Material and Methods

During the years 2010–2011 was analyzed selected indicators for bread texture quality of three *Triticum spelta* L. cultivars – Altgold, Ostro and Franckenkorn grown in an ecological system at the locality of Dolna Malanta near Nitra in Slovak Republic. The bread texture quality was evaluated on texture analyzer TA.XT Plus (Stable Micro Systems, Surrey, UK), following the AACC (74-09) standard method and expressed as crumb firmness (N) – the maximum force needed to compress the bread crumb sample, stiffness (N mm^{-1}) – the linear part of the slope of the force/deformation curve and relative elasticity (%) – ratio between the remaining force measured 20 seconds after the maximum force was reached and the maximum force. The measurements were done in six replicates. All data were statistically

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analysed by analysis of variance (ANOVA) and Fischer test. The least significant difference at the 5% probability level ($P < 0.05$) was calculated for each parameter.

3 Results

The influence of the variety as well as weather condition on the firmness, stiffness and relative elasticity of bread crumb values was statistically significant. The used firmness test method was found to be suitable for the evaluation of the bakery products texture. Mostly breads with softer texture are required, it means that low maximum forces by compression of the crumb sample is in demand (Sipos et al., 2008). The most soft bread was measured in Franckenkorn. The highest firmness and stiffness of Altgold is probably due to more compact crumb structure than in other varieties. In overall evaluation of bread crumb we could suppose that spelt bread crumb was resist to the compression. The test method developed provide a reliable evaluation procedure of bread crumb texture quality for research purposes and the bakeries, as well. High correlation coefficient confirmed the dependence among bread crumb firmness and stiffness. Correlation analysis showed negative correlation between relative elasticity and bread crumb firmness as well as bread stiffness.

4 Conclusions

Texture analysis is one of the most helpful analytical methods of the product development, as it is suitable to quantify the effects of flour blends and additives on physical properties of crust and crumb of the breads. It is also suitable to examine the effects of storing on different sensory properties of these products and hence it is suitable to analyze the results of different recipes in product development. The spelt grain can be a good source for making bread flour, but it is closely related to the choice of spelt variety. The spelt wheat bread crumb texture need further investigation as it can be a reliable quality parameter.

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