

SENSORY PROPERTIES OF WHEAT BREAD WITH RASPBERRY MARC

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Abstract

The aim of the study was to determine the influence of raspberry marc on the degree of liking of the wheat bread and the intensity of the main sensory properties (colour of breadcrumb, aroma, flavour, porosity and sourness). The evaluation took place in the sensory laboratory at the Faculty of Food Technology, Latvia University of Agriculture. The berry marc used in the research was prepared according to the technology worked out in Latvia State Institute of Fruit Growing. The control sample and wheat bread samples with 3%, 5%, and 7% of raspberry marc (from the flour mass) were made and baked in experimental bakery. The intensity of the main sensory properties was determined by using the line scale. The nine point hedonic scale was used to evaluate the degree of liking for wheat bread with raspberry marc. The analysis of variance (ANOVA) and Tukey's test were used to analyze the results of sensory evaluation. The results of the sensory analysis show that the use of raspberry marc in baking high milling wheat bread influence colour of breadcrumb, flavour, aroma and sourness but it does not affect porosity. The hedonic evaluation of the bread samples show that there do not exist any significant differences in the degree of liking among the wheat bread control sample and the new wheat bread samples with 3%, 5%, and 7% of raspberry marc.

Key words: wheat bread, raspberry marc, sensory properties

Introduction

Bread and its products are an integral part of nourishment for the human body. Notwithstanding the long history of bread it is one of the most unique foodstuffs for human bodies (Кострова, 2001).

Statistical data show that the tendency to eat wheat bread is increasing. (Consumption of Food Products..., 2004, 2005; Statistical Yearbook..., 2005), therefore it is essential to enrich bread with fiber, vitamins, mineral substances and other substances, which improve nutritional value of the bread.

Raspberries are a widely spread cultivar that is grown all over the world. These berries are popular because of their colour, lovely flavour, juiciness and sweetness (Laugale, 2002). 100 grams of raspberries contain 3–8 g of sugar (glucose, fructose), 0.9–1.4 g of organic acids (malic acid, citric acid, salicylic acid), vitamin A and vitamins of B group, P, E, C, 0.5 g of fat, 3.7 g of fiber, pectin substances (Strautina, 2005). Fresh and frozen raspberries are used for food, as well as they are processed to obtain juice, fruit salad and jam; raspberries are used as additive in yoghurt and confectionery production. After juice is obtained with the pressing method the berry marc is 36% of the berry raw material, therefore some fiber, sugar, organic acids, pectin and other substances remain in the marc (Deval, 1996).

Raspberry marc, that is a by-product remaining after juice is produced, is not used any further so the possibility to use this valuable product with the aim to enrich the nutritional value of wheat bread is being studied.

The aim of the study was to determine the influence of raspberry marc on the intensity of the main sensory properties (colour of breadcrumb, aroma, flavour, porosity and sourness) and on the degree of liking of the wheat bread.

Materials and Methods

Dried raspberry marc has been made in Latvian State Institute of Fruit Growing production site. When the juice is liquidized by using the pressing technology, the marc is dried in a dryer with forced air circulation; the temperature is suggested not higher than 40 °C, the content of moisture in marc should be 9%. Raspberry marc was ground in the grinder and sifted.

control sample (A) and the wheat bread samples (B, C, D) with raspberry marc. When raspberry marc, which is pink, is added to the wheat flour, the soft part of the bread has riched shade of raspberries.

The analysis of variance of flavour $F_{(\text{calculated})}=4.98 > F_{(\text{critical})}=2.68$ reveal significant differences in flavour intensity exist among the four evaluated bread samples. The results of Tukey's test demonstrate that sample (C) with 5% of raspberry marc and sample (D) with 7% of raspberry marc have the most intensive flavour, but the bread sample (B) with 3% of berry marc and control sample (A) have no difference in flavour intensity. When 5 and 7% of raspberry marc is added to the new bread samples, alongside with the bread flavour the flavour of raspberries can be felt.

The results of the analysis of variance of aroma ($F_{(\text{calculated})}=9.17 > F_{(\text{critical})}=2.68$) show that there significant difference in aroma intensity among the evaluated wheat bread samples with raspberry marc and the control sample. Tukey's test results show that bread sample (D) with 7% of raspberry marc has a distinctly marked difference in aroma, then it is followed by the bread sample with 5% of raspberry marc, but there is no difference in aroma in bread sample (B) with 3% of raspberry marc and the control sample (A). The amount of the marc added to the wheat bread increase the intensity of bread aroma, because the aroma of raspberries enrich aroma.

The consequently of the analysis of variance of porosity evaluation show that $F_{(\text{calculated})}=0.84 < F_{(\text{critical})}=2.68$, it means that no significant differences were discovered among the four evaluated bread samples in the intensity of porosity. The porosity of the wheat bread is not influenced by raspberry marc added to the dough.

The results of the analysis of variance of sourness show that $F_{(\text{calculated})}=27.48 > F_{(\text{critical})}=2.68$, it means there exist significant difference in sourness intensity among the evaluated four wheat bread samples. Raspberry marc contains organic acids and it influences the intensity of sourness of the new bread samples (Gailite *et al.*, 2006). Tukey's test results show that bread sample (D) with 7% of raspberry marc has the highest degree of sourness, then it is followed by the bread sample with 5% of raspberry marc, and bread sample (B) with 3% of raspberry marc. The control sample (A) has the least sourness.

The obtained results show that the hedonic evaluation is from 5.7 (neither like nor dislike) to 6.5. (like a little). The results of analysis of variance of bread are shown in Table 3.

Table 3

Results of analysis of variance of bread samples using hedonic scale

Source of variation	Degree of freedom, df	Sum of squares SS	Mean square MS	Variance ratio, F
Treatments	3	10.61	3.53	1.96
Panellists	24	46.72	1.95	1.08
Error	72	129.77	1.80	
Total	99	187.10		

$\alpha \leq 0.05$

The results of the analysis of variance show that $F_{(\text{calculated})}=1.96$ does not exceed $F_{(\text{critical})}=2.68$ therefore there do not exist any significant differences in the degree of liking among the wheat bread samples. That means that the panelists liked all the bread samples equally.

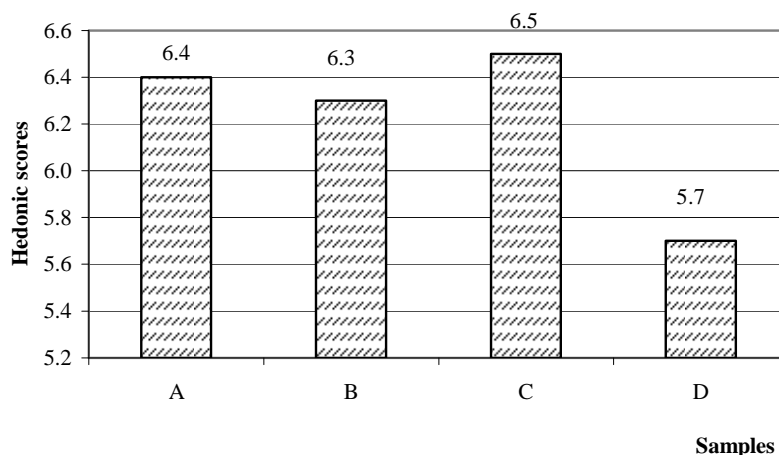


Figure 1. Hedonic scores for the four bread samples

A – wheat bread (control); B – wheat bread with 3% raspberry marc; C – wheat bread with 5% raspberry marc; D – wheat bread with 7% raspberry marc.

Figure 1 shows the degree of liking of the four estimated wheat bread samples, the results have been obtained by using hedonic scale.

Conclusions

1. The results of evaluating the sensory properties show that the use of 3%, 5%, and 7% raspberry marc in the wheat bread technology influence the colour of breadcrumb, aroma, flavour and sourness of the wheat bread differently but it does not influence its porosity.
2. The sample containing 3% of raspberry marc has the least changes in the intensity of sensory properties, when compared with the control sample wheat bread, which has only some differences in their color of breadcrumb, and sourness.
3. The hedonic evaluation of the bread sample show that there do not exist any significant differences in the degree of liking among the wheat bread control sample and the new wheat bread samples with 3%, 5%, and 7% of raspberry marc.

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