Sensory Evaluation of Bread with added Hemp Flour and its role in Consumers' Preferences

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Abstract

The purpose of this paper is to evaluate the sensory analysis of bread with added hemp flour in different proportions of 5%, 10%, 15%, 20% of two varieties (Zenit and Dacia Secuieni) compared to the control sample, to place the products in quality class and to determine consumer preferences. The preferential method performed on the 5-point hedonic test was used.

Keywords: bread, hemp flour, hedonic test.

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1.Introduction

Bread is part of the basic diet, being consumed daily, its quality and sensory attributes being important for consumers [7]. Bread is a very convenient food for supplementation with nutrients [3]. As far as nutrition is concerned, bread largely reflects the nutritional value of flour and other raw materials from which it is obtained. Functional products are natural products containing biologically active compounds that will positively influence key body functions of the human body, which are relevant for health or to reduce the risk of chronic diseases [2]. In the early stages of product development, sensory testing can help identify the sensory imperative characteristics that determine acceptability [10].

Hedonic testing is often used to determine consumers' attitudes towards food by measuring a degree of acceptance of a new product or improving the existing food product [6;9]. Hemp seeds (*Cannabis sativa* L.) have been a traditional source of nutrients in many countries over time, have high oil content rich in polyunsaturated fatty acids and antioxidants as an interesting nutritional aspect [4].

Hemp seeds are also rich in minerals such as calcium (essential for regulating heartbeat), magnesium, potassium (helps the nervous system and maintain regular heart rate), iron (facilitates the production of red blood cells), sulfur, zinc (important to maintain the reproductive system healthy) [12]. Hemp seeds are rich in all the essential amino acids and are therefore suitable for human consumption as a superior source of protein [1;5;13].

With a high protein content (29.4%), including the 8 essential amino acids, essential fatty acids in the optimal ratio for the human body, 29.5% fiber, sugars, vitamin E, lecithin, choline, inositol, phytosterols and rich minerals, especially calcium, iron and potassium, hemp flour contains many answers to the problems of the daily diet, being a food with special nutritional values [11]. Starting from these advantages, the use of hemp seed products and by-products as valuable food ingredients has gained more and more attention [8]. The purpose of this study is the sensory evaluation of two types of bread with the addition of hemp flour from two different varieties in different proportions to establish consumers' preferences.

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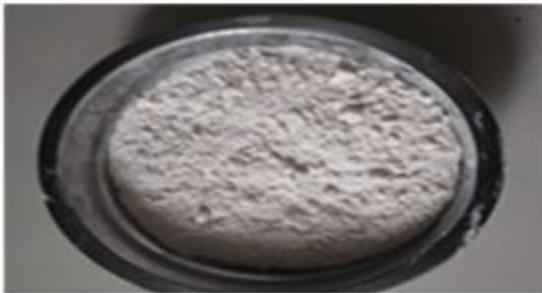Corresponding author: *e-mail:* crina.muresan@usamvcluj.ro

2. Materials and Methods

2.1. Materials

Bread from hemp flour in different proportions (5%, 10%, 15%, 20%) from two hemp varieties (Zenit and Dacia Secuieni) and the control sample bread (wheat flour) obtained after optimization of recipes, without addition of breeders.

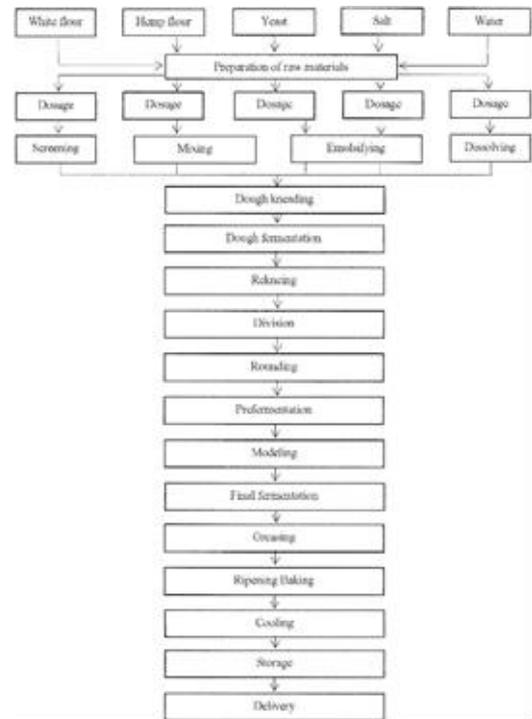**Figure 1.** Hemp flour

Figure 2. Wheat flour type 550

Figure 3. Hemp Seeds (variety Dacia Secuieni)

Figure 4. Hemp Seeds (variety Zenit)

Obtaining the Bread: The experimental studies took place in the Laboratory of Food Products Engineering, Faculty of Food Science and Technology of the University of Agricultural Sciences and Veterinary Medicine, Cluj - Napoca.

Figure 5. Technological scheme for obtaining bread with added hemp flour

Figure 6. Bread with added hemp flour of the Dacia Secuieni variety

Figure 7. Bread with added hemp flour of the Zenit variety

Abbreviations:

WE – Witness evidence
BHF 5% - bread with hemp flour 5%
BHF 10% - bread with hemp flour 10%
BHF 15% - bread with hemp flour 15%
BHF 20% - bread with hemp flour 20%

2.2. The Sensory bread evaluation was performed using the hedonic test according to ISO 13299: 2016 [1]. Thus the samples were cut into slices (thickness of slices was about 1.5 cm) coded and served to trained consumers. The samples were analyzed 6 hours after they were removed from the oven. The sensory characteristics were evaluated by a group of 30 trained assessors (17 female evaluators and 13 male assessors) aged 19-25. The degree of pleasure for the different types of bread was evaluated on the basis of a 5-point hedonistic staircase (1 - "very unpleasant" and 5 - "very pleasant"). The appearance, texture, color, smell, taste and general appreciation were the sensory attributes that were evaluated. The water was used to rinse the mouth before and after each test. The tasting sheet for all five features has a score of 1 to 5. Thus: 5 points - very pleasant; 4 points - pleasant, 3 points - indifferent, 2 points - unpleasant, 1 point - very unpleasant;

3. Results and Discussion

After production, the products were analyzed sensitively. The two types of bread obtained from the hemp flour of the two varieties were compared: Zenit and Dacia Secuieni, respectively the control sample.
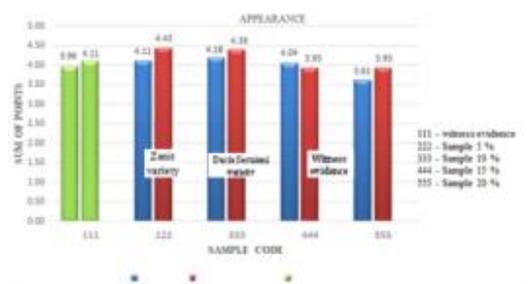
APPEARANCE

Figure 8. Comparison of the varieties and the blank sample in terms of appearance

According to Fig. 7. the samples of hemp flour from Dacia Secuieni variety with 5%, 10%, 20% had a higher score compared to samples of Zenit variety, except for the sample with 15% added, where the Zenit variety was more appreciated.

Following the difference between the sample and the Dacia Secuieni variety, it was observed that the latter was more appreciated with a higher score.
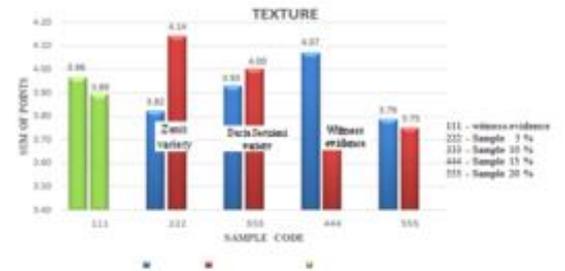
TEXTURE

Figure 9. Comparison of the varieties and the control sample in terms of texture

In terms of texture, samples of 5% (222) and 10% (333) of Dacia Secuieni variety were more preferred, whereas samples of 15% (444) and 20% (555) of the Zenit variety was more appreciated, having the higher score. The highest score was recorded for samples of 5% hemp of the Dacia Secuieni variety, while the lowest score was also observed in the same variety, but added in the concentration of 15%. Compared to the control sample, only bread with 15% hemp of the Zenit variety was appreciated, while for the Dacia Secuieni variety, the samples with 5% and 10% had a higher score.
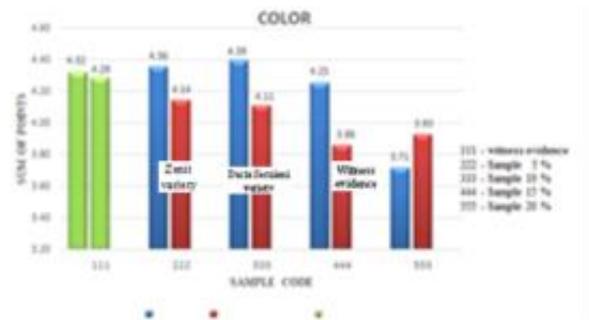
COLOR

Figure 10. Comparison of the varieties and the control sample in terms of color

As far as the color is concerned, the sample of bread with added hemp flour, the Zenit variety, presents the average of the scores higher than that of the Dacia Secuieni variety and the control sample, except the samples with 20% added, where the Dacia Secuieni variety presents a score and a better appreciation of the color compared to the Zenit variety.
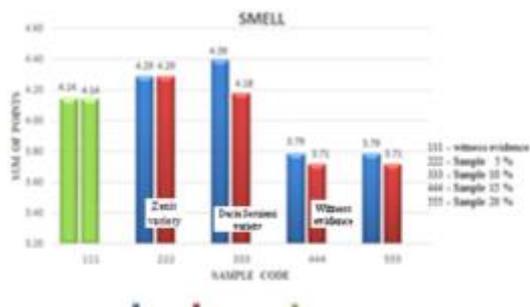
SMELL

Figure 11. Comparison of the varieties and the control sample in terms of smell

Following the results of the smell, it was observed that samples with hemp added to the Zenit variety had a higher score, except for the 5% variants, where both varieties had the same score (4.29), being equally appreciated. The highest score was recorded in the case of sample with the addition of hemp of the Zenit variety in the proportion of 10%. In the case of variants with 5% and 10% hemp flour, the average score was higher compared to the control sample, which is no longer observed in samples with 15% and 20% added.
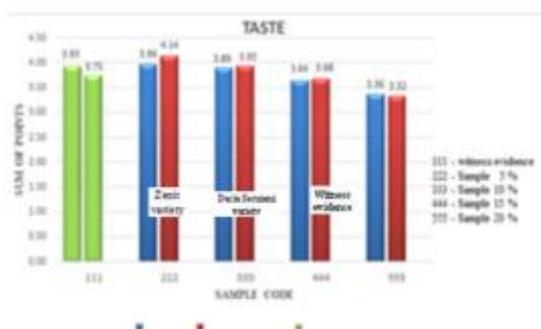
TASTE

Figure 12. Comparison of the varieties and the blank sample in terms of taste

According to figure 11, the samples of bread with added hemp flour of the Dacia Secuieni variety were appreciated by the evaluators, except for the 20% addition sample where the Zenit variety had a higher score. Comparing the blank sample with the variants with the addition of hemp flour of the Zenit variety, higher values were recorded compared to the samples with 10%, 15% and 20%, while compared to the variants of the Dacia Secuieni variety, the values recorded were higher only for samples with 15% and 20%.
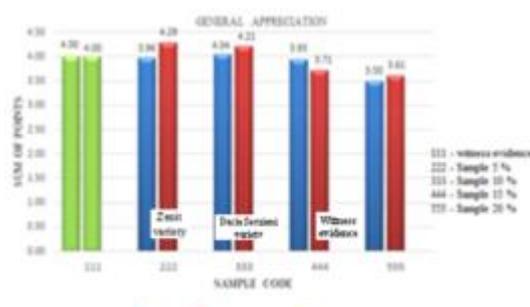
GENERAL APPRECIATION

Figure 13. Comparison of the varieties and the control sample in terms of general appreciation

As a general appreciation, the evaluators preferred the variant with 5% added hemp flour from the Dacia Secuieni variety (4.29), while the sample with 20% Zenit flour scored the lowest score (3.50). It can also be observed that samples of bread with 5%, 10% and 20% added hemp flour from the Dacia Secuieni variety had higher scores compared to the Zenit variants, except for the sample with 15%.

4. Conclusion

Sensory processing techniques can be very useful for optimizing, monitoring and developing new bakery products.
According to the scores given by the evaluators, the 5 characteristics were appreciated as follows:

➢ The Dacia Secuieni variety was more appreciated, having the highest score in appearance, texture and taste for the addition of 5% hemp flour.
➢ The Zenit variety had a higher score for color and smell for the addition of 10% hemp flour.

In conclusion, both samples from the two varieties were accepted by the assessors, the bread obtained from the hemp flour of the
Dacia Secuieni variety being more appreciated than the other variety in terms of appearance, texture and taste.
This can be correlated with the slightly different chemical composition between the two varieties (Dacia Secuieni variety is richer in protein and with higher content of micro and macroelements), but also with the increase of the percentage of added hemp flour.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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