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CONTROL ANALYSIS OF ENERGY VALUES AND MYCOLOGICAL QUALITY OF HOME MADE – AJVAR

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ABSTRACT

High nutritional and biological values, as well as excellent sensory properties make peppers (lat. name) indispensable in the daily diet. The home-made spread Ajvar [1], as a national specialty, is prepared from thermally processed, chopped or ground peppers, with or without additives. Traditional preparation of ajvar implies heat treatments, which inflence the nutritional values. The aim of this scientific work is to examine the energy values of the home-made Ajvar. The energy value of Ajvar is calculated on the basis of the content of carbohydrates, proteins and fats, in accordance with the Regulations concerning the quality of fruit and vegetables, Official Bulletin of RS, no 128/2020, 130/2021. The results of these studies indicated that the home-made Ajvar is a good source of energy, fats and carbohydrates. In order to examine the frequency of yeasts and molds, microbiological methods were implied in accordance with SRPS EN ISO 21527-2: 2011 standard. The results showed a complete absence of yeast and mold.

Key words: Ajvar, nutritional values, yeasts, molds.

INTRODUCTION

Peppers (lat. name) originally came from South and Central America and they are a very old vegetable culture. After the discovery of the Americas, they were brought to Europe and Asia. Nowadays they are grown all over the world, mostly in Asia, Europe and America. Peppers belong to the group of the most important vegetables, primarily because of their high nutritional and biological value. The chemical composition of the peppers, which is reflected in the rich content of carbohydrates, proteins, plant fibers, oils, organic acids and mineral substances, with their characteristic sensory properties (taste, color, smell), makes them irreplaceable in the daily diet. Their high biological value is reflected in the content of vitamins, capsaicin, pigments and essential oils (Sallai et al. 2018). While it is recommended that they should be consumed fresh, they are widely transformed in many other processed food . Beside the extensive industrial processing, they are traditionally prepared at home. Ajvar is a product obtained from thermally processed, chopped or minced peppers, with or without additives. During the production of ajvar, spice extracts and vinegar, as well as acids are introduced in accordance with the regulations governing food additives. (Regulations and Official Gazette of the RS, No. 130/2021) Other additives such us eggplant up to 25% (m/m), cooking salt, cooking oil, sugar, garlic, spice can be added.

MATERIAL AND METHODS

Ajvar is traditionally prepared and consumed in our country. Recipes for the preparation of ajvar vary depending on the region. Ajvar samples for our research, were prepared

[1] Ajvar is a globally recognized product made of red peppers.

according to a traditional recipe, in the Radovanović family manufacture in the village of Mala Plana, situated in the administrative district of Toplica. The „Elephant ear“ peppers, used for the preparation of ajvar, were harvested off the Radovanović plantation two days prior to preparation. The peppers were washed and seeded. After that, they were roasted and peeled. Peeled peppers were minced using a kitchen mill. Ajvar was cooked to a certain content of dry matter, according to the recipe given in table 1. After the process of cooking at different temperatures, depending on the sample, the hot ajvar was poured into sterilized glass jars, which were then lidded manually.

Table 1. The recipe according to which ajvar was made:

Sample	**Ingredients**	**Cooking time and temperature**
Sample 1	15 kg of roasted, peeled and minced peppers	3 hours at 70 ° C
	1,5 dm^3 of cooking oil	
	250 g of sugar	
	80 g of salt	
	200 cm^3 of 9% of acetic acid	
Sample 2	15 kg of roasted, peeled and minced peppers	2 hours at 80 ° C
	1,5 dm^3 of cooking oil	
	250 g of sugar	
	80 g of salt	
	200 cm^3 of 9% of acetic acid	

The analysis focused on the content of carbohydrates, proteins and fat, according to standard methods (Vracar, 2001.), based on which the energy value of ajvar was calculated. The carbohydrate content was determined using the Luff-Schoorl volumetric method, which is based on the fact that reducing sugars reduce copper (II)-sulphate ($CuSO_4$) solution from Luff's solution to copper(I)-oxide (Cu2O). The unused quantity of copper (II) ions is titrated with sodium thiosulfate (Na2S2O3) solution. The protein content was determined by the Kjeldahl method, which consists of breaking down proteins by strong mineral acids with the addition of a catalyst and the conversion of nitrogen into ammonium sulphate. The fat content was determined using the Soxlett method. This method is based on the principle of extracting fat from the sample using an organic solvent. The fat content is determined based on the weight loss of the sample (Vracar, 2001.). The energy value is expressed in kJ (Grujić,2000). The second focus of our paper was mycological quality control of the final product. Mycological quality control was performed according to the current SRPS EN ISO 21527-2:2011 standard, which examines the frequency of yeasts and molds.

RESULTS AND DISCUSSION

The results of the comparative chemical analysis of ajvar, home-prepared using different temperatures and different cooking times, are presented in Table 2.

Table 2. Results of chemical analysis of ajvar

Ajvar sample	**Carbohydrates (g/100 g)**	**Proteins (g/100 g)**	**Fat (g/100 g)**
Sample 1	13,0	1,5	5,3
Sample 2	12,8	1,4	5,5

Both samples were consistent, creamy, without liquid separation. The color fully corresponded to the color of the vegetables used, the samples did not contain impurities. The difference in carbohydrate content in samples 1 and 2 is insignificant and amounts to 13.0 g/100 g for sample 1 and 12.8 g/100 g for sample 2. The protein content in sample 1 is 1.5 g/100 g, while it is 1.4 g/100 g in sample 2. There is no significant difference here either. The total fat content in sample 1 is lower than in sample 2 and amounts to 5.3 g/100g, while in sample 2 the total fat content is 5.5 g/100g. The results obtained are in accordance with those stated in the work by Popović et al., where the protein content was 1,8 g/100 g. Unlike the protein content, the fat content was significantly different, the obtained value being 2,8 g/100g. The energy value of the sample 1 was 406,53 kJ, compared to 408,19kJ of the sample 2. Our research has not shown any significant difference in relation to the cooking time and temperature.

Table 3. Results of mycological quality control

Microorganism	**Sampling plan**		**Threshold values (cfu/ml)**		**Method designation**	**Determined values**
	n	c	m	M		
Yeasts and molds	3	0	10		SRPS EN ISO 21527-2: 2011	None detected

n-number of units making up the sample, c-number of units giving values between m and M, m and M – limit values

The results of mycological analysis of the samples of ajvar show the complete absence of yeasts and molds.

CONCLUSION

Ajvar prepared using traditional recipes is widely used in our country. Numerous recipes, including various cooking times and temperatures led to different sensory characteristics, which raised doubts concerning the quality of the product. The conclusion is that there is no significant difference between the two samples in relation to the content of carbohydrates, proteins and fats. Both ajvar samples, prepared using two different recipes, are mycobiologically safe.

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