

IMPROVING THE ANTIOXIDIZING CAPACITY OF CATERING PRODUCTS BY ADDING SPICES

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Abstract: *Biologically active compounds are chemical compounds of food with an essential role in the good development of the human body. To this category belong: proteins, fatty acids mono- or polyunsaturated, dietary fibers, vitamins, mineral salts, bioantioxidants, etc. These compounds are spread into a large variety of foods, but especially of vegetal origin. In this way, spices and aromatic herbs can represent important sources of antioxidants for the body. These can be found in different catering products but their quantities are limited by changes in sensory characteristics that are not always agreed by consumers. The study intends to assess the antioxidant potential of three spices (basil, thyme and oregano) and the acceptance by consumers of some catering products with the content of antioxidants improved by addition of these spices. To investigate the acceptability of new spreads by consumers a preference test was used, of 9-point hedonic scale, verbal anchors as those devoted. The preparation has been tasted by 106 consumers aged between 14 and 52 years (14-17 years, 18-20 years, more than 20 years). The medium scores were attained 6,19 for oregano dish, 6,88 for the thyme dish and for the one with basil, placed between „like moderately” and „like slightly”. The degree of sympathy has evolved differently between groups. For consumers under 16 years with basil product had the best scores, followed by thyme. For other consumers, the preparation with thyme had higher score, followed by basil.*

Key words: *bioactive compounds, basil, thyme, oregano, ORAC, sensory analysis*

Introduction

Antioxidants have gained a reputation of “miracle health component”, by 2007 being published over 45,000 scientific articles about natural antioxidants [1]. A bioantioxidant is a substance in food that significantly decreases the adverse effects of free radicals on normal physiological functions in humans demonstrated that free radicals are involved in the occurrence of many diseases and aging [2].

To assess the antioxidant capacity, a number of methods are used, the most commonly used being ORAC, TRAP, TEAC, FRAP, CUPRAC, DPPH. The best known method for determining and

expressing the antioxidant capacity is ORAC (Oxygen Radical Absorbance Capacity). It enjoys special advertising and also databases for total antioxidant capacity with most records are increasingly using this method, the most popular database at this time is the antioxidant capacity of the United States Department of Agriculture - USDA [3].

According to their origin, there are endogenous and exogenous antioxidants. Endogenous antioxidants play a crucial role in maintaining optimal health-related cellular functions, thus influencing the well-being of the body [4]. Endogenous antioxidants available to counteract free radicals are the body type enzymatic

(glutathione peroxidase, catalase and superoxide dismutase etc.) and nonenzymatic (vitamins E and C; thiol antioxidants: glutathione, lipoic acid; melatonin; carotenoids; bioflavonoids; etc.).

For proper functioning of the body, external support of antioxidants is needed, they are recommended to be taken from diet. The main role of the diet is to provide sufficient nutrients to meet metabolic requirements of an individual to give the consumer a good feeling, satisfaction and wealth but also to maintain a healthy and optimal development and reduce risk of disease [5]. These roles are fulfilled by the antioxidants present in preparations from the diet. Fruits, vegetables, grain products are considered good sources of antioxidants, due to their high content in vitamins, minerals, bioflavonoids, high components antiradical potential [6].

Aromatic herbs represent a reservoir of phenolic compounds concentrated in just a few grams of material and can represent one of the simplest ways to increase the phenolic content and antioxidant capacity of the daily diet, with possible health benefits [7].

There are many research studies on the influence of dietary flavonoids on consumer health, many of them referring to the effects on the circulatory system. Some of the conclusions of the studies from the first period are: (a) foods rich in flavonoids have a beneficial effect on flow-mediated dilation, blood pressure, lipid profile, which are relevant indicators of cardiovascular health [8]; (b) many food flavonoids proved to be beneficial in atherosclerosis, in platelet aggregation and vascular reactivity; (c) flavonoids may induce neutral lipid hydrolysis from lipid stores through cyclic nucleotide phosphodiesterase (PDE) inhibition in adipose tissue and liver [9]; (d) cocoa polyphenols reduce blood pressure [10].

Flavonoids also play other beneficial roles

in the body: they enhance memory and concentration power, increase efficiency of vitamin C, prevent blood clots, maintain proper functioning of the immune system, etc. [11]. A recent study by French researchers on extracts of 30 plants has shown that there is a significant relationship between total phenolic compounds and antioxidant capacity, implying that these phenolic compounds have a major contribution to the antioxidant properties of plants analyzed [12]. Thus, the addition of spices and herbs to meals, in a percentage consistent with the sensory properties, can cause a significant increase in total antioxidant capacity.

This study proposes the introduction of spices of high antioxidant value (according to ORAC values of data taken from the USDA) in preparations catering assessing consumer acceptability of new products and coverage of the recommended daily dose of antioxidants (The Recommended Dietary Allowance - RDAax) by new preparations.

The selected spices were basil, thyme and oregano, and as the matrix-product, the cheese spread.

The reasons for the selection of spices refer to the antioxidant capacity, and in addition:

- the basil [hydrophilic-ORAC: (H-ORAC)– 64439 $\mu\text{mol TE}/100\text{g}$, lipophilic-ORAC (L-ORAC),– 3114 $\mu\text{mol TE}/100\text{g}$, Total-ORAC - 67553 $\mu\text{mol TE}/100\text{g}$, total phenolics (TP) - 4489 mg GAE/100g, as the USDA] is one of the most popular plants, being considered a "bridge" between medicine, food and tradition;
- thyme (H-ORAC - 27426 $\mu\text{mol TE}/100\text{g}$, Total-ORAC - 27426 $\mu\text{mol TE}/100\text{g}$, PT - 1734 mg GAE/100g, for fresh thyme and Total-ORAC - 391800 $\mu\text{mol TE}/100\text{g}$ for dried thyme) is a spice that grows well in our country conditions and it is spread in Romanian traditional recipes, being used both fresh and dried;
- oregano (H-ORAC - 183141 μmol

TE/100g, L-ORAC - 16988 $\mu\text{mol TE}/100\text{g}$, Total-ORAC - 200129 $\mu\text{mol TE}/100\text{g}$, PT - 7282 mg GAE/100 g) - a special spice with antioxidant properties (as ORAC value), less used in traditional Romanian, but frequently used in Mediterranean cuisine.

Materials and methods

Dry spices purchased from different manufacturing companies were used. Before being used, a rough division was made.

For the chosen matrix – product, namely cheese spread, the basic recipe is taken over by Stere Stavrositu [13] and is shown in Table 1.

In the original recipe for cheese paste, the classic spice – paprika was replaced by new spices, in the same amount.

The working stages were respected:

- preparatory operations: bread is browned on the stove or grill, cheese is washed, the two types of cheese are passed through the sieve, butter is rubbed, spices are sliced;
- getting cheese paste: mix all ingredients, mixing until it mixes;
- preparing the spreads: cheese paste is stretched on slices of bread with the toothed knife.

Table 1

Preparation recipe – Cheese spread

Material	UM	Quantity for 40 portions
White bread	slices	80
Cheese paste	Kg	1
Sheep cheese	Kg	0.150
Fresh cow cheese	Kg	0.600
Butter	Kg	0.150
Cream	Kg	0.100
Sweet paprika	Kg	0.020

To investigate the acceptability of new spreads by consumers, we used the sensory analysis, a preference test, of 9-point hedonic scale, verbal anchors as those devoted. [14].

In the preparatory phase samples were encoded (by numbers) and when analyzing, the purpose of the activity, conduct and document structure were presented to participants. Tasting sheet implied included: scoring scale, appropriate verbal anchors (like extremely, like very much, like moderately, like slightly, neither like nor dislike, dislike slightly, dislike moderately, dislike very much, dislike extremely), codes for the three samples (combinations of numbers), instructions for the tasters and a special rubric for comments.

The instructions on the form (taster's tasks) have two functions: first, to describe the test mechanism, then to encourage the freedom of reply: “You will be given multiple servings of food for consumption and asked to tell about each, how much you like or dislike. Use the scale to indicate your attitude, by marking (X) the score that best describes your feelings about food. Remember that you judge. You alone can say what you like. Nobody knows if these foods should be considered good, bad or indifferent. An honest personal opinion of you will help us decide. Take a glass of water after you finish each sample and then wait for the next sample.”

To assess the degree of coverage RDAax values in the USDA database, expressed in ORAC units were used.

Results and discussion

The preparation has been tasted by 120 consumers aged between 14 and 52 years (14-17 years, 18-20 years, more than 20 years). 14 of them say they do not like cheese, they wanted to participate in the test, but those records were not taken into account.

The distribution of responses, when using the hedonic scale, when tasting the three preparations is shown in Figure 1.

For each sample the average value, standard deviation, percent responses “Dislike” were calculated (Table 2).

By characterizing the products, the following ratings were obtained :

–for cheese spreads with oregano: 6,19

(“like slightly”);

–for cheese spreads with thyme: 6,88 (“like slightly”);

–for cheese spreads with basil: 7,25 (“like moderately”).

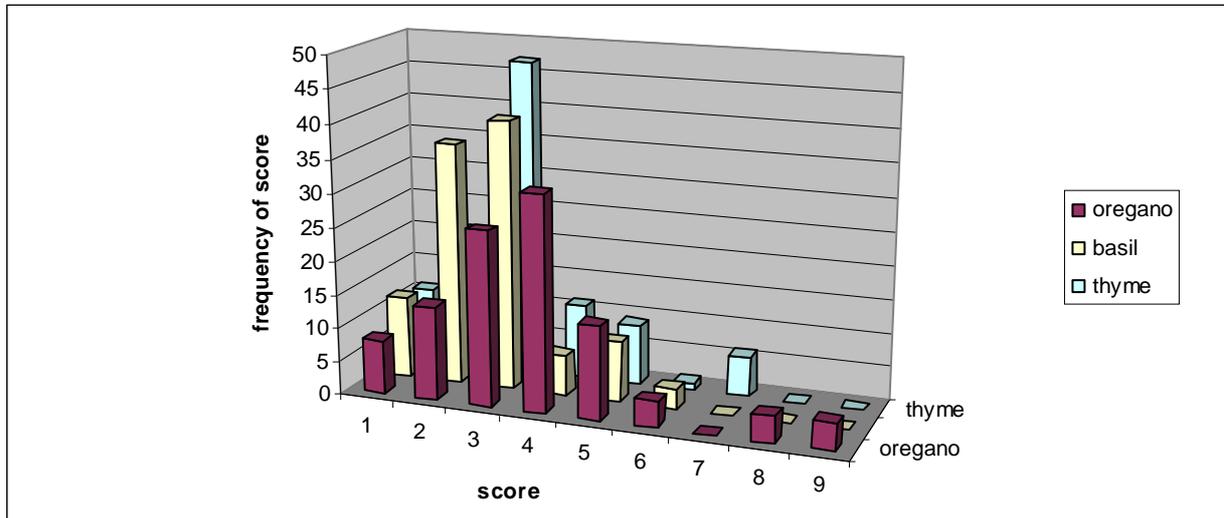


Fig. 1 - Distribution of responses when using hedonic scale

Table 2
Statistical values for sensory analysis

Statistical parameters	Age category	Cheese spread paste with		
		oregano	thyme	basil
Total of answers	14-16	70	70	70
	17-20	18	18	18
	>20	18	18	18
	Total	106	106	106
Total score		656	729	769
Average value	14-16	5.96	6.47	7.17
	17-20	6.61	7.67	7.44
	>20	6.67	7.67	7.39
	Total	6.19	6.88	7.25
Standard deviation	14-16	6.50	11.12	8.80
	17-20	2.50	2.65	3.43
	>20	2.55	3.04	3.46
	Total	7.68	10.09	9.86
Percentage responses to “Dislike”	14-16	17.14	10	4.28
	17-20	0	0	0
	>20	0	0	0
	Total	11.32	6.60	2.83

The degree of sympathy has evolved differently between groups. For consumers under 16 years with basil product had the best scores, followed by thyme. For other

consumers, the preparation with thyme had higher score, followed by basil.

Less than 5% of consumers 14-16 years group (and none of the other groups) reported that “they didn’t like” the preparation with basil, compared with more than 17%, declaring that they didn’t like the product with oregano.

Varied distributions of responses and high standard deviations resulting from all the products are typical. They do not necessarily indicate the lack of precision of the method, but it reflects the fact that normally there are large differences among people, about feelings related to food analysis.

Of data analysis there was also found a greater inconstancy in options for age group 14 – 16 years. Also, in the same category were included those who declared that they do not consume cheese (they do not like it).

We can say that all the three products can be placed in consumption, but especially those with basil.

Considering RDAax 3000 ORAC units

($\mu\text{mol TE}/100\text{g}$), the recommended minimum value of Cao and Prior [15], we determined the percentage that can be met

by consuming a portion of preparations analyzed. The comparison includes the spreads with paprika (Figure 2).

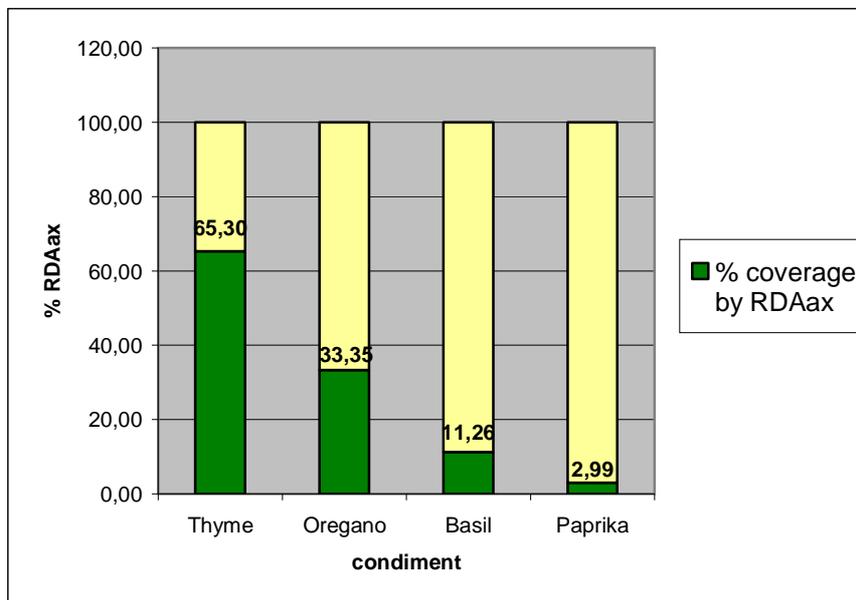


Fig. 2 – The percentage of coverage by the RDA of antioxidants spices used to obtain various types of spreads

The obtained spreads which normally cover 4-5% of energy, can cover up to 1/3 (for oregano), of daily requirement of antioxidants. The highest value is for thyme, oregano and basil followed.

To increase the effectiveness of this approach for safe food preparation, preparations frequently used should be chosen and those which ideally combine with good sources of antioxidants.

Conclusions

1. In the case of spreads with cheese paste, the matrix - preparation chosen to introduce the spices accepts, in terms of sensory analysis, a large number of recipes and a significant percent represent those which include different spices, resulting in preparation of a high antioxidizing capacity;
2. The results obtained when tasting the products recommend the basil paste cheese spreads as a preparation that can be

successful, followed close enough by the thyme preparation ;

3. A simple sandwich can cover more than 1/3 of daily requirement of antioxidants for a day.

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