



Use of Phytonutrients Obtained from Natural Spices with Antioxidant and Preservative Effect by Production of New Kinds of Mayonnaise Produced in Hashemite Kingdom of Jordan

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Abstract: The natural spices (cloves, allspice, black pepper, coriander, cumin) with antioxidant and preservative action in the form of powders and extracts were considered and implemented to be used in new kinds of mayonnaise and their quality during storage was studied.

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INTRODUCTION

Jordan has quite an acute problem of improving the quality of food products by their processing and storage. Among oil and fat products mayonnaise occupies one of the leading places and enjoys high popularity in the population of all countries of the world, due to its high consumer properties and profitability of production. Mayonnaise is a lipid emulsion, stabilized by proteins, containing oil in dispersed condition that increases digestibility of mayonnaise. However, this product contains a small amount of Biologically Active Substances (BAS) and has a reduced stability during storage.

The main part of the mayonnaise is oil which is characterized by high content of polyunsaturated fatty acids. In the process of storage, they can be oxidized to form peroxide and hydroperoxide and be hydrolyzed to free fatty acids, forming aldehydes, ketones and other decomposition products by decay which leads to deterioration of the product. In this regard, the

development of formulations of mayonnaise with high content of BAS phytonutrients, antioxidant properties and preservative effect which have increased stability during storage is an urgent task.

Currently synthetic and natural substances with antioxidant properties, oxidation inhibitors are used by the production of fats all over the world. Natural antioxidants obtained from vegetable raw materials, including natural spices are practically not produced in Jordan, although, their effectiveness has been recently established but still little studied. Spicy-aromatic vegetable raw material is the source of BAS (essential oils, terpenoids, phenolic and polyphenolic substances, vitamins, dietary minerals, etc.). The advantage of spices is that they are not toxic, well accepted by the human body and have no side effects.

In this regard, the conduct of research related to the use of natural herbs phytonutrients in the form of extracts and powders for stabilization of lipids in mayonnaise during storage, as well as the study of their impact on the quality of mayonnaise is relevant and timely.

MATERIALS AND METHODS

Objective of the study: The aim of the research is the development of a new kinds of mayonnaise using phytonutrients with natural spices in the form of powders and aqueous-alcoholic extracts with antioxidant and preservative effect.

By the production of new kinds of mayonnaise natural spices (cloves, allspice, black pepper, coriander, cumin) in the form of powders and aqueous-alcoholic extracts are used as phytonutrients (Pawlyuk *et al.*, 2003).

It is shown that the natural spices (cloves, allspice, black pepper, coriander and cumin) differ in high BAS content (especially the essential oils -1.4, ..., 7.0% phenolic compounds -384, ..., 23250 mg/100 g, tannin -0.6, ..., 31.2%). Cloves, allspice, black pepper are distinguished by the largest concentration of essential oils, phenolic compounds, tannins (Afanasyva, 2001).

It is shown that extracts and powders obtained from natural spices contained a considerable amount of BAS (aromatic substances, phenolic compounds with P-vitamin activity, tannins). Extracts of cloves, allspice, black pepper are particularly rich in BAS similar to feedstock (Table 1).

In the absence of scientific data antioxidant properties of mentioned phytonutrients were studied in a model system on the rate of oxidation of oleic acid using extracts in the amount of 0.02% of dry matter.

It has been found that phytonutrients obtained from cloves and all spice which contain the largest amount of aromatic substances, common phenolic compounds, tannins have the greatest antioxidant activity (the correlation coefficient is 0.97, ..., 0.99 with probability 99.9%).

Note aromatic substances in powders are expressed in mass of mass fraction of essential oils, % in extracts-fo the number of flavor in the ml of thiosulfate Na fruits. The study of antibiotic and fungicidal activity of

phytonutrients obtained from spices revealed that the compound effect of volatile and non-volatile components of black pepper, clove and coriander led to an inhibition of the growth of bacteria (*Bacillus subtilis*, *Esherichia coli*) and moulds (*Alternaria tenuis*, *Fusarium sp.*), indicating their antibacterial and fungicidal activity. It is shown that the compound effect of volatile and non-volatile components of extracts with high content of aromatic substances-clove (319.6. ..., 350.4 mL Na thiosulfate), black pepper (179,8, ..., 200.2 mL Na thiosulfate), led to a significant inhibition of the growth of bacteria and moulds that illustrates their antibacterial and bacteriostatic, fungicidal action. Use of the coriander extract with lower content of aromatic substances (132.7, ..., 152.3 mL thiosulfate Na) led to a significantly smaller effect. It is shown that the greater the content of aromatic substances, the larger the lysis area of microorganisms and stronger antibacterial and fungicidal effect. The direct dependence between bacterial, fungicide activity of phytonutrients obtained from natural spices and content of aromatic substances has been found. Thus, the correlation coefficient makes up 0.97, ..., 0.98 with probability 99.9%.

Three new recipes of mayonnaise (under the common name Bavarian Provansal with herbs with fat content of 50, ..., 51%) were developed on the basis of aqueous-alcoholic extracts and powders from natural spices. Aromatic composition with spices (cloves, allspice, black pepper, coriander, cumin) were added to the recipe: mayonnaise Bavarian Provansal with herbs-in the amount of 2%; mayonnaise Bavarian Provansal with herbs (cloves)-in the amount of 1.5% and an extra clove powder was added in the amount of 0.5%: mayonnaise Bavarian Provansal with herbs (coriander) in the amount of 1.5% and an extra coriander powder was added in the amount of 0.5%: New kinds of mayonnaise have got original taste and aroma (Yu *et al.*, 2003) (Table 2).

It is shown that mayonnaise contain a significant amount of biologically active substances: the amount of

Table 1: BAS content of phytonutrients obtained from natural spices in the form of powder and extracts

Phytonutrients obtained from natural spices	Mass fraction of essential oils, % (*)	Mass fraction of phenolic compounds with p-vitamin activity (mg/100 g)			Mass fraction of tannins (%)
		Total (for chlorogenic acid)	Flavonol glycosides (for ruthin)	Free catechins (for d-catechin)	
Powdered phytonutrients					
Clove**	7.2±0.5	23263.2±125.4	954.0±39.4	1125.2±24.5	31.1±2.5
Allspice**	5.3±0.4	5688.1±502	171.6±10.2	853.6±15.2	6.60±0.5
Black pepper**	4.6±0.3	4991.2±42.5	107.9±4.8	801.6±22.4	1.02±0.1
Coriander Seeds	1.4±0.1	526.9±10.8	104.7±5.6	269.4±11.2	0.70±0.01
Cumin seeds	1.3±0.1	383.2±6.4	293.5±8.2	261.9±12.4	0.60±0.01
Phytonutrients in the form of extracts					
Clove**	335.0±15.4	2970.0±35.2	338.8±16.8	570.0±18.2	3.46±0.2
Allspice**	242.5±12.1	690.2±25.8	69.0±34.4	315.7±14.8	0.78±0.01
Black pepper**	190.0±10.2	162.1±9.8	12.9±0.8	305.9±11.9	0.31±0.01
Coriander seeds	142.5±9.8	94.3±6.8	11.4±0.7	78.2±4.6	0.29±0.01
Cumin seeds	115.0±7.6	92.0±5.5	10.0±0.5	75.2±5.8	0.14±0.01

Table 2: Physico-chemical parameters of quality and BAS content in the new kinds of mayonnaise Bavarian Provansal with herbs

Bavarian Provansal	Mass fraction (%)			Mass fraction (mg/100 g)		The total number of MAFAM, rate of volume increase in 1 g
	Fat	Protein	Carbohydrates	The amount of phenolic compounds (for chlorogenic acid)	Tanning substances (%)	
With spices	50.0±1.0	2.5±0.1	4.5±0.1	490.8±17.4	218.4±13.5	3.5×10 ³
With spices (clove)	50.5± 0.5	2.6±0.1	4.8±0.1	578.4±18.8	302.4±15.4	3.0×10 ³
With spices (Coriander)	50.51±1.0	1.8±0.1	4.2±0.1	524.2±20.4	268.5±10.2	3.6×10 ³

*-MAFM-mesophilic aerobic and facultative anaerobic microorganisms

phenolic compounds in them is 490.8, ..., 578.4 mg/100 g; tannins-218.4, ..., 302.4 mg/100 g (Table 2). Thus, the chemical composition of the new kinds of mayonnaise surpass domestic counterparts in BAS content.

The quality of mayonnaise during storage under the temperature 18, ..., 20°C within 30 days has been investigated. It is shown that in the test sample, the accumulation of peroxide and hydroperoxide (in comparison with the original mayonnaise) was 300% in mayonnaise with a composition of the spices - 230% with higher content of clove -170%, coriander -195%. This is due to the fact that clove contains greater amounts of essential oils (7.0%) than coriander (1.4%). Similar patterns were obtained also by the accumulation of free fatty acids. The increase in acidity of mayonnaise during storage proves that there is the process of accumulation of organic acids as the result of vital activity of microorganisms in mayonnaise microflora. The accumulation of acids in the test sample of mayonnaise within 30 days of storage was 152% in the mayonnaise with the composition of the spices -135% n the mayonnaise with increased number of cloves -120%, coriander -125%.

RESULTS AND DISCUSSION

Indicated that microbial processes are less intensive in a sample of mayonnaise with a greater content of essential oils which have antibacterial and fungicidal action.

CONCLUSION

The normative documentation on mayonnaise Bavarian Provansal with herbs is developed and approved and testing has been held in production conditions.

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