

Development of functional food products based on safflower oil

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Abstract. In this article, it is proposed to create a recipe and technology for creating functional food products based on safflower oil with the goal of increasing their culinary value, improving organoleptic and physico-chemical indicators. In the quality of cheese at the production of functional pishchevye emulsion (mayonnaise), it is necessary to use the safflower oil, which is based on the analysis of its pishchevye value and nutritional adequacy of the norms of preventive nutrition. There are ingredients, such as fiber, in the first place, which are necessary for the functioning of the human body. The introduction of fiber increases the yield and biological value of products, improves technological quality, as well as their organoleptic characteristics.

1 Introduction

In this article, it is proposed to create a recipe and technology for creating functional food products based on safflower oil with the goal of increasing their culinary value, improving organoleptic and physico-chemical indicators.

Mayonnaise is one of the most necessary products of domestic cuisine in the diet of Russia: it is used as home cooking in quality to improve the quality of food, so and in public dishes in natural and thermally processed foods [1,2]. Mayonnaise in the greater part of the body is formed by straight concentrated emulsions. Emulsions are included in the class of dispersed systems, which consist of highly unstable compounds, where one substance has been distributed in other parts of the chapel. Such systems consist of two phases: dispersed and non-dispersed [3,4,5]. In the quality of cheese at the production of functional pishchevoy emulsion (mayonnaise), it is necessary to use the safflower oil, which is based on the analysis of its pishchevoy price and nutritional adequacy of the norms of preventive consumption [6]. The safflower oil is used for low-fat and olive oil, which is used in culinary purposes for the preparation of margarine, spreads and mayonnaise. The safflower oil is absorbed by the lungs and many inhospitable tissues [7]. It is a particular dietary product for people who suffer from severe obesity [8, 9, 10]. Zubkovym V. V. [4, 8] the prospects for the use of safflower oil in culinary and pharmaceutical industry are studied. It is worth noting that the safflower oil costs a lot of unnecessary ingredients and elements, the properties of which are very high to penetrate and penetrate deeply into the epidermis. The benefit of vitamin K, the content of

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safflower is shown by the number of fat cells, as the active growth of the environment, the density of capillaries and SPT [11]. According to his studies, a high-quality structure presents such a complex of red meat, which is covered with linoleum (78.5%), which made it possible to assume the quality of the safflower oil of biological activity, as well as hypocholesterolemic, which it is a promising product for use in scientific medical practice. According to the research of the Kazakh National Medical University. S. D. Asfendiyarov [12] added that the consumption of safflower in semen is analogous to olive oil and includes 72% of linoleic acid and half of anti-toxic serotonin. It is recommended to use the safflower oil in the quality of the antioxidant. Beneficially affects the high content of vitamin C, the content of trace elements in the body, as a result, the activation of the environment, the structural growth and the structure of capillaries and the wind-sensitive tract [11,13,14]. The analysis was carried out from the family of safflower, as the three foreign parties of the family of two different varieties of low-grade and high-grade varieties, recruited in the work of Australian students, which is aimed at ensuring the safety of red meat. Linoleic acid is 75.3 %, omega-3 Red acid - 0.2 %, omega-6 Red acid - 75.3 %, omega-9 Red acid - 13.2 %. The research of the red-hot sector is being carried out in the region of the safflower Almaty technological university bulletin. №2. 18 masla 93% monounsaturated, 1.5% polyunsaturated and 4% saturated [15,16,17].

Thus, the actual direction of research is the development of recipes, technology improvement and the study of consumer properties of new food products using vegetable oils with physiological and technologically valuable properties. To achieve this goal, the development of functional food products based on safflower oil, the following tasks were solved: to investigate the fatty acid composition of safflower oil; to analyze the nutritional values of soy fiber and mustard powder; to investigate the organoleptic parameters of the developed mayonnaise recipe.

2 Materials and methods of research

Safflower oil, soy fiber, mustard powder and other ingredients were selected as research materials [18,19,20].

Safflower seeds are a unique natural source of protein (up to 17%), oil (up to 37%) and a number of valuable macro- and micro-components [21]

Soy fiber is a product made from low-fat soy flour [22]. Despite the fact that fiber is a by-product at the stage of soy isolate production, its technological purpose in the food industry has great potential. Soy fiber is both a fat-emulsifying and moisture-binding ingredient in a food product [23]. Such a functional and technological advantage can be found perhaps only in this product (soy fiber). Due to the relatively high content of dietary fiber, high protein content, soy fiber is widely used in the food industry. It is used as a neutral filler. Also, soy fiber has already established itself as a low-calorie prebiotic and has a high nutritional value [24]. Mustard powder is a product obtained by processing mustard grains [25]. Mustard powder has a powdery structure, a rich mustard shade of color, a subtle spicy aroma and a burning taste. The product is used as a basis for creating mustard sauce, marinades [26].

We have proposed the development of formulations of water-oil food (oxystable) vegetable compositions and emulsions based on the analysis of fatty acid composition.

Most foods may not contain a complete set of vitamins and minerals. Therefore, it is important to eat a variety of foods to fill the body's needs for vitamins and minerals. [27].

Knowing the contribution of proteins, fats and carbohydrates to caloric content, it is possible to understand how the product or diet meets the norms of a healthy diet or the requirements of a certain diet. For example, the US and Russian Ministries of Health

recommend getting 10-12% of calories from proteins, 30% from fats and 58-60% from carbohydrates. [28].

The new product was developed at the Department of "Technology and Standardization", JSC "Kazakh University of Technology and Business", a study of the fatty acid composition of the developed 20 samples of water-oil food (oxystable) plant compositions was conducted in order to optimize the ratios.

Generally accepted methods were used to determine the fatty acid composition and nutritional value of safflower oil and the developed emulsions and compositions [29]. Determination of the fatty acid composition of safflower oil was carried out by gas-liquid chromatography [30].

3 Results

The physico-chemical parameters of the ingredients used and the emulsions developed were determined in an accredited laboratory of the Scientific Research Institute of Food Safety of Almaty Technological University. In table 2 . The fatty acid composition of safflower oil is presented.

Table 1. Fatty acid composition of safflower oil

№	The name of the indicator	The value of the indicator
1	Saturated fatty acids,%	8.0
2	Monounsaturated fatty acids, %	10.6
3	Polyunsaturated fatty acids, %	81.3
4	Linoleic acid content, %	76

Table 2 shows the nutritional value of soy fiber.

Table 2. Nutritional value per 100 g of soy fiber

№	Names	Quantity	Fraction,%
1	Caloric content	87 kcal	5.72%
2	Squirrels	20 g	21.98%
3	Fats	0.8 g	1.19%
4	Carbohydrates	0 g	0%
5	Dietary fiber	77 g	385%

Mustard powder contains fatty acids — saturated and unsaturated. Contains vitamins and oils: 35-47% mustard oil; 0.5-1.7% essential oils; nitrogenous substances; fiber; pectin; glucoside synegrine; potassium sulphate; allyl mustard oil; vitamin A; vitamin E.

Table 3. Recipe of mayonnaise "Salat with safflower oil"

№	Name of raw materials	Mass fraction of components, %
1	Safflower oil refined, deodorized	50.00
2	Soy fiber	2.00
3	Water	30.75
4	Skimmed milk powder	6.50
5	Mustard powder	0.50-0.75
6	Sodium bicarbonate	0.05
7	Sugar (sand)	1.50
8	Table salt	1.10
9	Ascorbic acid 10%	0.45

Based on the research carried out, a scientific and practical approach to the use of safflower oil as the main raw material for the creation of water-oil emulsions (mayonnaise) of various types has been developed and substantiated. Table 3 shows the recipe for mayonnaise "Salat with safflower oil". Received a patent for utility model No. 7864 dated 03.03.2023. "Food emulsion for mayonnaise production".

The technological process of mayonnaise production provides for the creation of optimal conditions that allow to obtain a homogeneous (close to homogeneous) and stable system of components that are practically insoluble in each other (for example, water and oil) [31]. Emulsifiers are used to ensure the stability of emulsions. The emulsifier of classic mayonnaise is mainly lecithin, the source of which is egg yolk. In our development, soy fiber in a mass fraction of 2% was used as an emulsifier. Soy fiber is both a fat-emulsifying and moisture-binding ingredient in the developed emulsion. Provides strong retention and uniform distribution of moisture and fat throughout the volume in the structure of mayonnaise. Mustard adds a little flavor, but also helps to keep the mayonnaise stable. Along with soy paste, mustard helps to emulsify the mixture, reducing the risk of stratification of our mayonnaise. Ascorbic acid 10% gives the mayonnaise an incredible taste, but also helps to stabilize the mixture. Figure 1 shows mayonnaise developed according to our recipe.

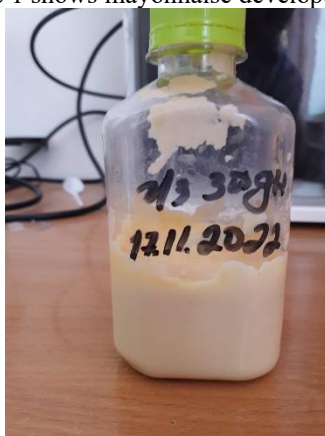


Fig.1. Mayonnaise "Salat with safflower oil"

4 Conclusions

The analysis of organoleptic indicators shows that water-oil food emulsions (mayonnaise) have high organoleptic indicators.

Developed technology for the production of water-oil food emulsions (mayonnaise) based on safflower oil, they allow to expand the range of products obtained with high nutritional value and improved consistency. The proposed formulation of mayonnaise allows you to extend the shelf life, preserve the freshness and microbiological stability of the product by reducing the activity of water and the absence of egg powder. The research results are confirmed by the utility model patent No. 7864 dated 03.03.2023. "Food emulsion for mayonnaise production".

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