EURASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
Innovative Academy Research Support Center
IF = 9.2 www.in-academy.uz/index.php/ejmns

DEVELOPMENT OF A TECHNOLOGY FOR PREPARING A FOOD BASED ON ANTI-ANEMIA FOOD

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https://doi.org/10.5281/zenodo.18348545

ARTICLE INFO

Received: 15th January 2026
Accepted: 22nd January 2026
Online: 23rd January 2026

KEYWORDS

Anemia, iron deficiency, herbal raw materials, syrup, technology, medicinal plants, functional foods.

ABSTRACT

This article presents the results of research on the development of a syrup preparation technology based on plant raw materials with anti-anemic properties. The aim was to select biologically active components of plant origin, containing iron, vitamins and organic acids, which have the property of stimulating hematopoiesis processes. A technological scheme for syrup production was developed, its physicochemical, organoleptic and microbiological properties were evaluated. The possibilities of using the developed product as a functional food product and auxiliary agent in the prevention and complex treatment of anemia were demonstrated.

Introduction.

Anemia is one of the most common pathologies among various age groups of the population and is characterized by a decrease in the concentration of hemoglobin or the number of red blood cells in the blood. According to the World Health Organization, iron deficiency anemia accounts for up to 80% of all forms of anemic conditions and represents a serious medical and social problem. The most common method for correcting iron deficiency is the use of synthetic iron supplements. However, their use is often accompanied by side effects, such as dyspeptic disorders, allergic reactions, and decreased patient compliance. In this regard, the development of medicinal and prophylactic agents based on plant materials that have a mild effect, high bioavailability and good tolerability is relevant.

Of particular interest is syrup as a medicinal and food form, providing ease of dosing, rapid absorption of active substances and the ability to mask the specific taste of plant extracts. The aim of this work is to develop a technology for the preparation of a syrup based on plant materials with an antianemic effect.

Purpose of the study. Development and scientific substantiation of the technology for preparing syrup based on plant materials for the prevention and treatment of anemia.

Materials and methods of research.

Selection of plant materials

The following components were chosen as the plant base for the syrup:

- Stinging nettle (Urtica dioica) – a source of iron, chlorophyll, and vitamin C;

- Rose hips (Rosa canina) – a source of ascorbic acid, which promotes iron absorption;
- Beetroot (Beta vulgaris) – contains folic acid and trace elements;
- Apple juice or extract – improves flavor and contains organic acids.
- Fructus Anisi Vulgaris- contains estragole, organic acids, anisaldehyde, ketones, alcohols, terpenes;
- Blueberry Rubis Nigrum fruit- contains minerals, rich in vitamins A, C, B, E, K, PP and organic acids.

In order to treat and prevent anemia, the following composition was developed by the staff of the Department of technology of drug types of the Tashkent Pharmaceutical Institute: Fructus Anisi Vulgaris 0.1 g, Folia Urticeae (Urtica dioica) leaf 1.0 g, Rose hips (Rosa canina) fruit 1.0 g, Blueberry Rubis Nigrum fruit 1.0 g, Apple extract 10.0 g, red Beet (Beta vulgaris) 20.0 g. Syrop technology was developed in two different ways according to the general technology – with alcohol extracts obtained in water and 70% alcohol, and the quality indicators were determined in accordance with ozr State Pharmacopoeia.

Method I-aqueous extraction. Aqueous liquid extract from the anti-anemia compound was obtained according to the general technology (in a ratio of 1:1). The essence of the method: 35.1 g of the compound included in the anti-anemia compound was taken and placed in the perforated cup of the AI-3000 infuser, and 108.81 ml of purified water at room temperature, taking into account the water absorption coefficient (WAC=3.1), was added to it and installed in the infuser apparatus. After boiling the purified water in the infuser (in which the extract is extracted at a temperature of 85-90˚ C), it is extracted for 1 hour, then it is cooled to room temperature. After decanting and squeezing the aqueous extract, it is left in a cool place (at a temperature not exceeding 10˚C) for a day, and the settled extract is filtered and made up to the mark (up to 35 ml) with purified water. 65.0 g of sugar and 35 ml of purified water are added to the cauldron in the calculated amount and boiled for 20-25 minutes at a temperature of 60-700 C until a paste is formed. Boiling temperature of the finished mixture is 104±1˚C, density - 1,301-1,313 g/cm3.

Method II - alcohol extraction. liquid extract-concentrate (1:1 ratio) was obtained on the basis of this collection by percolation using 40% ethyl alcohol.

The amount of flavonoids in the solution was determined spectrophotometrically, using the reaction of aluminum with chloride at a wavelength of 415 nm, with a wall thickness of 10 mm cuvette.

Characteristics of plant materials. Table 1

Name of raw materials	Main active ingredients	Pharmacological action
Folia Urticeae (Urtica dioica)	Iron, chlorophyll, vitamin C	Stimulates hematopoiesis
Rose hips (Rosa canina)	Ascorbic acid, flavonoids	Increases iron absorption

Beet (Beta vulgaris)	Folic acid, microelements	Improves hematopoiesis
Apple extract	Organic acids, pectins	Improves taste and stability
Fructus Anisi Vulgaris	Anis acids,aldehyde	Improves taste
Blueberry Rubis Nigrum	Vitamin C,A, B,PP,K, pectins	Improves blood circulation

The technology of fermentation was developed using two different methods - water and 70% alcohol - with alcoholic extracts obtained according to the general technology, and the quality indicators were determined in accordance with the Federal Law of the Republic of Uzbekistan. The technology for preparing the syrup included aqueous extraction of biologically active substances, followed by concentration and stabilization.

Syrup production flow chart

Flow chart for the production of plant-based syrup:

Raw material preparation
(cleaning, washing, grinding)
↓
Aqueous extraction
(70–80°C, 30–40 min)
↓
Extract filtration
↓
Concentration
↓
Preparation of syrup base
↓
Mixing of components
↓
Pasteurization
(85°C, 5–10 min)
↓
Cooling
↓
Filling and capping

Results and discussion.

The developed syrup had a uniform consistency, a characteristic dark burgundy color, and a pleasant sweet and sour taste. It was also determined that the pH of the sour-sweet liquid (GOST 13685) is 4,2 - 4.5; the volume of the container (OST 64492-85) is from 100 to 500 ml - not less than ±1.5%; the content of dry matter (by refractometric method) is not less than 30%; sodium benzoate - not more than 0.2%; density (by pycnometric method) is from 1,100 to 1,300 g/cm3.The physicochemical properties are presented in Table 2.

Quality indicators of syrup. Table 2

Indicator	Value
Mass fraction of dry matter,%	62±1
Iron content, mg/100ml	8-12
pH	4.2-4.5
Amount of dry matter (refractometric method) Not less than 30%	34.0-35.3
Heavy metals, no more than 0.01%	0.280-0.283
Sodium benzoate content, not more than 0.2%	0.1-±0.01

Microbiological parameters comply with GOST standards.

The obtained data demonstrate the product's stability and safety. Iron content corresponds to the recommended dose, and the presence of vitamin C enhances its bioavailability.

Conclusion.

This study developed a technology for producing a plant-based syrup with antianemic properties. The resulting product boasts optimal organoleptic and physicochemical properties, as well as safety and functionality.

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