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SELECTION AND RESEARCH OF RAW MATERIALS FOR THE DEVELOPMENT OF PROMISING BIO COMPLEXES - CORNEL (CORNUS MAS L), EDIBLE LAVENDER (LAMIACEAE LABIATAE)

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ABSTRACT

We believe that, considering the current climatic conditions, one of the most effective approaches to correct various pathological conditions and increase adaptive potential is to develop new, promising biocomplexes made from natural, local raw materials using nutrients. Nutrients - food products and their components affect human health; they are used in the prevention and treatment of diseases. Nutrients include healthy and functional food products, as well as biologically active food supplements. Using nutrients allows us to: easily and quickly eliminate the deficiency of essential food products. Based on literature data, considering their chemical composition, we focused on two plants, namely: Cornel and lavender (Lamiaceae Labiatae). We separated biologically active substances using a two-phase solvent system. Different chemical substances were separated into one cycle. We dried the raw material containing essential oils – lavender (Lamiaceae Labiatae) slowly, at a temperature of about 30-35°C, because at a higher temperature the mentioned oils undergo volatilization and the value of the raw material decreases. The content of tannins was

confirmed. The percentage content of tannins was 1.306 ± 0.00225%. Among the organic acids, the coexistence of citric acid and malic acid was confirmed. The percentage content of organic acids in the water-alcohol extract was 0.4649 ± 0.002498%. Percentage content of polysaccharides: 5.4072 ± 0.00411%. The content of flavonoids calculated on the analytical extract was 1.7964±0.00145%. In the future, only natural components - plant extracts, vitamins and minerals of organic origin will be included in the composition of our biocomplexes. They are physiological, well absorbed, hypoallergenic and safe for long-term use.

KEYWORDS: cornel (Cornus Mas L), lavender (Lamiaceae Labiatae), biological complex, organic acids, complex preparations.

1. INTRODUCTION

The relevance of our research is due to the fact that in the conditions of the increase in the level of unfavorable stress factors, especially in the conditions of extreme climatic and technogenic loads, one of the most effective approaches to the correction of various pathological conditions, in order to increase the adaptive potential, is the development of new, promising biocomplexes made from natural, local raw materials. The function of biocomplexes includes the stage of detoxification of the internal environment of the body in relation to exo- and endotoxins. In this regard, the leading role belongs to the creation of complex high-tech medicines, biologically active additives (BAD) based on renewable raw materials, which will increase the bioavailability of the active substance, and at the same time will have a detoxification function. And, the obtained biocomplexes can be a source of various physiologically active substances. cornel (Cornus Mas L) is widely used for medicinal and prophylactic purposes.

The fruit of cornel (Cornus Mas L) is recommended for gout, anemia, piles, dysentery, typhoid, gastrointestinal diseases, arthritis and skin diseases. cornel (Cornus Mas L) has diuretic, antiscorbutic, bactericidal, antipyretic and anti-inflammatory effects. The tannins contained in cornel (Cornus Mas L) are an excellent astringent agent used in digestive disorders. cornel (Cornus Mas L) is taken prophylactically when there is danger of poisoning by mercury vapor, lead and other toxic substances. The fruit of cornel (Cornus Mas L) improves appetite and restores metabolism in the body. Also, the fruit of cornel (Cornus Mas L) is very useful for those prone to diabetes, cornel (Cornus Mas L) does not increase the blood glucose level and at the same time increases the enzyme activity of the pancreas, which

helps in the digestion of food cornel (Cornus Mas L) fruit drinks and tinctures are recommended for gastrointestinal disorders and bleeding, oral diseases. cornel (Cornus Mas L) juice has a pronounced tonic and invigorating effect.

Lavandula officinalis L is a perennial shrub cultivated mainly for its aromatic flowers, from which oils are extracted. Lavandula officinalis L oil is generally used for skin care. It has anti-inflammatory, analgesic, antiseptic, bactericidal, cicatricial (stomatitis) and fungicidal properties. The oils and extracts of Lavandula officinalis L contain more than 100 compounds, the two main components of which are linaloyl and linalyl acetate.

Lavandula officinalis L oil is one of the most valuable aromatherapy oils. We have selected it for its antibacterial and antifungal activities, these properties of Lavandula officinalis L can be explained by the main components such as linalool, linalyl acetate, lavandulol, geraniol.

The medicinal effects of using Lavandula officinalis L in the treatment of anxiety disorders, fungal infections, hair loss and wounds have been investigated.

According to some studies, Lavandula officinalis L. can be used as a tincture to prevent digestive problems. Lavandula officinalis L is also used for headaches, toothaches and ulcers. It can also be used to prevent hair loss.

As a skin regenerator, it is widely used in the cosmetic industry in the form of safe toners, lotions, creams, shampoos, conditioners, shower gels and soaps. The most popular essential oils in the cosmetic industry are those derived from these plants. Nevertheless, their smell and chemical composition are determined by many factors: plant species or varieties, climatic conditions, growing method and conditions, harvesting, transportation, storage and oil preparation techniques. The oil of Lavandula officinalis L obtained from L. angustifolia is the most valuable.

2. Main Part

Prospective research objects

The application of scientific achievements in biotechnology is related to fundamental research that is carried out at the modern level. The use of biotechnological principles and biological processes in production can significantly change many directions in medicine, industry and agriculture.

We selected the following plants for research: fruits of cornel (Cornus Mas L) and lavender (Lamiaceae Labiatae).

Figure 1: Fruits of cornel (cornus).

The fruits of cornel (Cornus Mas L) contain up to 10-17% sugars (glucose and fructose), up to 3.5-4% organic acids (citric, malic, amber and nicotinic acids), pectins, tannins and nitrogenous substances, essential oils, phytoncides, flavonoids (1-5%), C (50-160 mg%) and P vitamins, provitamin A, potassium, iron, calcium, magnesium and sulfur salts. In terms of vitamin C content, cornel (Cornus Mas L) sometimes even surpasses black currant - 100 grams of its fruit contain more than 50 mg of ascorbic acid. There is up to 34% fat in cornel (Cornus Mas L).

Lavandula officinalis L is a perennial shrub cultivated mainly for its aromatic flowers, from which oils are extracted. A member of the Lamiaceae (Labiatae) family, grows in sun-dry, well-drained, rocky calcareous soils. Lamiaceae (Labiatae) oil is generally used for skin care. It has anti-inflammatory, analgesic, antiseptic, bactericidal, cicatricial (stomatitis) and fungicidal properties. Lavender oils and extracts contain more than 100 compounds, the two main components of which are linaloyl and linalyl acetate.

Figure 2: Edible Lavender (Lamiaceae Labiatae).

The purpose of the research is.

a) selection of plant raw materials based on the biologically active substances contained in them;

b) collection of raw materials (according to seasons).

c) preliminary processing of raw materials for plant collections, research and development of recipes based on them - considering biocompatibility (biocompatibility is defined as the ability of a biocomplex to perform the expected effects in the medical, nutritional or prophylactic direction).

Biocomplexes are multifunctional preparations containing living microorganisms, representatives of natural, plant and soil microflora, as well as their biologically active substances. These biological products are developed according to special formulations, considering the biological needs of each agricultural culture.

Bringing the raw material to a standard state

The raw material selected by us is a food plant rich in enzymes. Due to the influence of raw enzymes and self-heating under the influence of elevated temperature, it soon deteriorates, which leads to biological and biochemical processes. such as growth of microorganisms, spoilage.

To stop enzymatic processes in biological objects, it is necessary to correctly select the drying mode of raw materials. The freer water is in the raw material, the faster the mentioned processes take place and the more perishable the raw material is.

Figure 3: The Process of Drying Fruits of Cornel And Lavender Flowers.

Since the raw materials we have selected are rich in vitamins and are juicy, we dry them especially quickly. At the same time, we raised the temperature to 70°C, which preserves a large part of the vitamins.

We dried the raw material containing essential oils - Lamiaceae (Labiatae) slowly, at a temperature of about 30-35°C, because at a higher temperature the mentioned oils evaporate and the value of the raw material decreases. Under such conditions, the content of essential oils in medicinal raw materials can be increased, and their quality can be improved.

Extraction and research of active substances from air-dried raw materials

After drying the plant raw materials selected by us, we prepared alcoholic extracts. Dilution of alcohol was carried out according to the table (Sf XI edition). We used the following methods to prepare alcoholic aqueous extracts.

1. Maceration;
2. Percolation;
3. Opening of thick and dry extracts.

Percolation or filtration of the extract was carried out through the plant material in order to separate the soluble substances in the extract.

We percolated the extracts we received in the following order.

Wetting of raw materials, infusion and percolation itself.

We soaked outside the percolator. We used 50% solvent for wetting. After mixing, we kept the raw material for 4-5 hours in a closed vessel. During this time, the extractor penetrates between the particles of the plant material and inside the cells, the raw material is puffed up and increases in volume. In this case, the active substances are broken down inside the cell.

Infusion is the second stage of the percolation process. The dry material was loaded into the percolator at the optimal density at the bottom, so that as little air remained in the raw material as possible. We covered the filter material on top, poured the solvent on the raw material, the height of the layer above the raw material was about 30-40 mm, we delayed the infusion for 24-48 hours.

Percolation is the continuous passage of the solvent through the layer and the collection of the percolate. We selected the percolation speed so that the substances obtained in the extract were diffused in time.

Since the extracts we obtained are non-turbid liquids containing a significant number of particles, we clarified the extract with a delay at 10°C until a clear liquid was obtained. At this temperature, the solubility of the separated substances decreases, and therefore, in the future, when the tincture is stored at a temperature of 15°C, the probability of precipitation is low. After 2 days of delay, filtration was carried out by decantation to avoid accidental inclusions.

Organoleptic characteristics check

During the organoleptic examination of the extracts obtained by us, it was observed - the color is transparent, the taste and smell are characteristic of the given plant raw material. The content of extractive substances was determined by the SF XI method: 5 ml of tincture was placed in a weighing bottle 2-3 cm high and 5-7 cm in diameter, evaporated in a water bath, then dried in an oven at 100-105°C for 3 hours to a constant weight. As a result of the experiment, we determined that the content of dry residues in the extract is 0.2624±0.000252 g.

Qualitative analysis of extracts

We performed qualitative analysis using the following method

1) Detection of tannins according to SF XI edition

We added a few drops of ferric ammonium solution to 2 ml of the extract, because of the experiment we got a black-green color of the solution. which indicates the content of tannins.

The content of tannins was determined using the permanganometric method: 25 ml. We placed the extract in a flask, added 500 ml. Distilled water, 25 ml. Indigo sulfonic acid solution and titrated under constant stirring with 0.02 mol/L potassium permanganate solution until a golden-yellow color was obtained.

We calculated the content of tannins using the formula:

$$\times = \frac{(V1 - V2) \cdot 0.004157 \cdot 100\% \cdot K}{25}$$

X - percentage content of tannins

V1 - titran volume

V2 - the volume spent during titration in the control trial

0.004157- titer

K- conversion factor

As a result of the analysis, the following data were obtained.

V1=8.23 ml; V2 = 2.12 ml

The percentage content of tannins was 1.306 ± 0.00225%

2) The detection of organic acids was also carried out according to the methods of SF XI edition.

Citric acid: Place 1 ml of the extract in an evaporating dish, add a few vanillin crystals and evaporate to dryness. We added 2 drops of concentrated sulfuric acid to the residue and heated it in a water bath. As a result of the reaction, a purple color was formed. which indicates the citric acid content.

Malic acid: 2 ml. We added 0.1 ml to the extract. β-naphthol and 1 drop of concentrated sulfuric acid. We placed the test tube in a boiling water bath for 1/2 min, the reaction produced a bright-red, green fluorescence. which indicates the content of malic acid.

We calculated the content of organic acids using the alkalimetry method: we placed 5 ml of the extract in a 500 ml flask, added 200 ml of distilled water, 1 ml of 1% alcoholic solution of phenolphthalein, 2 ml of 0.1% methylene blue and titrated with 0.1 mol/l sodium hydroxide, purple - until the formation of red color.

We calculated the content of free organic acids as a percentage of malic acid using the formula (1).

$$\times = \frac{V \cdot 0.0067 \cdot 100\% \cdot K}{5}$$

0.0067 - titer;

V - titrant volume, ml;

K - conversion coefficient;

X - percentage composition of organic acids.

We got the following data: Vsr = 3.47 ml.

The percentage content of organic acids in the water-alcohol extract was 0.4649 ± 0.002498%

3) We performed a qualitative analysis of polysaccharides according to the methodology: (ГФ XI): 10 ml. We added 30 ml to the extract. 95% alcohol and mix. A precipitate formed, then we transferred part of the precipitate to a test tube and added 2 ml. dilute hydrochloric acid, heat it on a water bath, then add 10 ml. Felling's reagent and heated again. As a result of the reaction, an orange-red precipitate was formed. which indicates the content of polysaccharides.

We determined the content of polysaccharides by the following method: 25 ml. We placed the extract in a centrifuge tube, added 75 ml. 95% alcohol, stir, heat on a water bath to 300C for 5 minutes. After 1 hour, centrifuge at 5000 rpm. for 30 minutes. We transferred the sediment to the filter and successively washed 15 ml. 95% alcohol, 10 ml. with acetone and 10 ml. with ethyl acetate. We dried the filter first with air, then at 100-1050C, until constant weight.

The percentage content of polysaccharides was calculated by the formula (3).

$$X = \frac{(m2 - m1) \cdot 100}{V}$$

m1 - filter weight in grams;

m2- filter mass with sediment;

V - weight of extract;

As a result of the analysis, we obtained the following results.

m(1)=1.0289 g; m(2)=2.3807 gr.

Percentage content of polysaccharides: 5.4072 ± 0.00411%.

4) Qualitative detection of flavonoids.

The common reaction of flavonoid compounds is the cyanidin test - 10 ml. Evaporate the extract to a volume of 2 ml, add 3 drops of concentrated hydrochloric acid, then add 0.05 g. zinc dust and heat in a water bath until boiling. As a result of the reaction, the liquid turned red. which indicates the content of flavonoids.

2. Interaction with alkalis: 2 ml of NaOH alkali was added to 10 ml of the extract, a yellow color was observed.

We determined the content of flavonoids by spectrophotometric method: 2 ml. We placed 25 ml of the extract. We added 2 ml to the volumetric flask. 5% aluminum chloride solution, 6 drops of dilute hydrochloric acid. Fill the flask to the brim with 95% ethyl alcohol. After 45 minutes, we measured the optical density of the solution on a spectrophotometer, wavelength 410 nm. in the cuvette with a layer thickness of 10 mm. The comparable solution consists of: 2 ml. 25 ml of a diluted solution of the extract and 6 drops of hydrochloric acid, filled to the brim with 95% ethanol. in a measuring flask. In parallel, we measured the optical density of the PCO solution in 95% ethanol.

Preparation of PCO solution: about 0.025 g. We dried 50 ml of comparable solution (exact weight) at 130-1350C for 3 hours. We opened the volumetric flask with 95% ethyl alcohol. 1 ml. 25 ml of the obtained solution. We added 1 ml to the volumetric flask. 5% aluminum chloride solution and 6 drops of dilute hydrochloric acid and make up to the mark with 95% ethyl alcohol.

We calculated the content of flavonoids using the formula.

$$X = \frac{D \times m_0 \times 1 \times 50 \times 25 \times 100 \times 100\%}{D_0 \times 50 \times 25 \times V \times 2 \times 100} = \frac{D \times m_0 \times 5000}{D_0 \times V \times 100}$$

were, D - optical density of the analysis solution;

D0 - PCO optical density of the comparable solution;

V – volume of extract, ml;

m - sample PCO comparable solution, g;

(of a comparable solution) =0.0257 g.

D0 = 0.402

D = 1.124

During the research, it was determined that the content of flavonoids was 1.7964±0.00145% based on the analytical extract.

The quantitative content of active substances in alcohol-water solutions is as follows

Organic acids 0.4649 %

Tannins 1.306 %

Polysaccharides 5.4072 %

Flavonoids 1.7964 %

3. CONCLUSION

1. Separation of biologically active substances was carried out using a two-phase solvent system. Separation of substances of different chemical nature took place in one cycle.

2. Raw materials containing essential oils - Lamiaceae (Labiatae) were dried slowly, at a temperature of about 30-35°C, because at higher temperatures the mentioned oils evaporate, and the value of the raw materials decreases.

3. The content of tannins was confirmed. The percentage content of tannins was 1.306 ± 0.00225%.

4. Among the organic acids, the co-existence of citric acid and malic acid was confirmed.

5. The percentage content of organic acids in the water-alcohol extract was 0.4649 ± 0.002498%.

6. Percentage content of polysaccharides: 5.4072 ± 0.00411%.

7. The content of flavonoids calculated on the analytical extract was 1.7964±0.00145%.

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