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PROSPECTS OF USING BIOLOGICALLY ACTIVE SUBSTANCES OF DOG-ROSE AND LAUREL WILD-GROWING IN GEORGIA

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Abstract:
The use of natural plant components (fatty oils) and biologically active additives (extracts, vitamins, essential oils) strengthens the beneficial effects of cosmetic oils. When using biologically active additives, the skin is enriched with all the necessary nutrients, which helps to obtain the desired effect. Research covered the fruits of dog-rose *Rosa canina L.* (family *Rosaceae*) and laurel *Laurus nobilis* L. (family *Lauraceae*) that grow wild-growing in Georgia. We used superfluid CO_2 extraction to obtain the extract from raw materials. Oils were obtained with yield capacity: dog-rose oil - 8.12 - 10.17% whose refraction indexes 1.4782 units and laurel oil - 4.9 - 6.11% with the refraction index of 1.4723. From the remaining crushed seeds, using co-solvent, we obtained the extracts rich in phenolic compounds: total phenols from dog-rose crushed seeds - 3032 mg/100g, and total flavonoids at 1501 mg/100 g by dry mass. Total phenols from laurel crushed seeds - 283.03 mg/100 g and total monomeric anthocyanins at 135 mg/100 g by dry mass.
The antioxidant activity of hydrophilic extracts was determined – dog-rose extract - In %-54, laurel extract- In %-42.

Keywords:
CO_2 extraction, dog-rose oil, laurel oil, phenolic compounds, antioxidant activity

Introduction

The use of natural plant components (fatty oils) and biologically active additives (extracts, vitamins, essential oils) strengthens the beneficial effects of cosmetic oils. When using biologically active additives, the skin is enriched with all the necessary nutrients, which helps to obtain the desired effect (restoration of the pH scale of the skin, cell regeneration, tonic effect, restoration of the structure, etc.) [1, 2].

Vegetable oils are similar in composition to intercellular lipids (fatty acids, triglycerides), cholesterol and ceramides (fatty acid + sphingosine)). Vegetable oils, which balance or replenish the fatty acids in the lipid layer, prevent dehydration and breakdown of the skin deep structure, they can saturate the skin as much as possible with vitamins, essential fatty acids, phytosterols and other nutrients necessary for the skin. Vegetable oils are the main source of unsaturated fatty acids (omega-3, omega-6 and omega-9) [1].

Herbal extracts enrich the skin with various nutrients, help fight the harmful environmental factors and age-related changes in the skin, and improve its appearance. Plant extracts contain various beneficial substances (vitamins, flavonoids, essential oils, trace elements, etc.) that counteract the early signs of skin aging, stimulate metabolic activity and structural skin proteins such as collagen and elastin [3,4].

Due to the high permeability of the skin and its versatile cosmetic action (normalizing blood circulation, stimulating cell renewal, hydrating and moisture retaining, reducing secretion and narrowing pores, rejuvenating effect), essential oils are successfully used to improve skin condition.

Enrichment of cosmetic oils for skin care with natural vegetable oils and natural plant extracts makes it possible to combine both medicinal and cosmetic properties in one product.

As biologically active additives we can use plant extracts and essential oils that have a beneficial effect on human skin. Such properties are characteristic of CO_2 extract and oil of dog-rose and laurel fruit [10].

Results and discussion

Dog-rose oil is used due to the high content of vitamins A, D, E, F, phospholipids, tocopherols, fatty acids, macro and micro elements and other biologically active substances. Also of high importance is the content of fatty acids such as omega-3, omega-9 and omega-6, which protect the skin from ultraviolet rays, retain moisture in the cells and enhance regeneration capacity of tissues, and prevent the formation of wrinkles; as well as palmitic acid, which stimulates the production of hyaluronic acid, collagen and elastin by skin cells [5,6].

The bay tree leaves contain up to 4.5% of essential oil (composed of cineole, pinene, geranium, eugenol) [10-11], the leaves and fruits contain tannins. Traditionally, raw laurel has been used as an antimicrobial, anti-inflammatory agent in the treatment of chronic cholecystitis, gallstone disease, improves digestion, and has also been used in psoriasis, arthritis, rheumatism, diabetes, and stomatitis [12, 13].

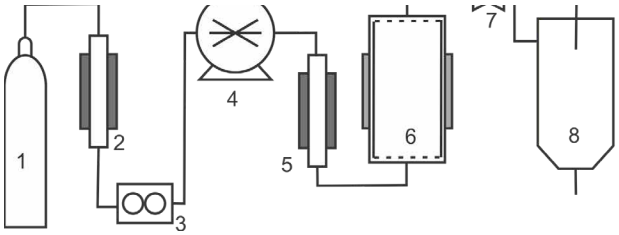
Antibacterial properties of laurel oil, antioxidant activity of the extract (aqueous, ethanol and methanol), which, according to researchers, is associated with the presence of terpene and phenolic substances, including predominant compounds identified: epicatechin (0.65%), epicatechin gallate (0.51%) and gallic acid (0.02%) [13,14].

Laurel essential oils are used in cosmetology, in perfume and soap factories.

Experimental Section

Research was the fruits of dog-rose (Rosa canina) and laurel (Laurusnobilis L) wild-growing in western Georgia.

We carried out extraction of the liophilically dried samples by superfluid extraction. In the first stage, the fat fraction was separated. The following parameters were used for maximum fat extraction: pressure - 300 bar, temperature – 40°C, CO_2 delivery rate - 1.2 kg/h, extraction duration - 3 hours. In the second stage, hydrophilic extract was obtained by means of co-solvent ethyl alcohol (20% carbon dioxide), optimal extraction condition: pressure 300 bar, CO_2 delivery rate - 4 kg/h.



Scheme 1. Superfluid extraction
CO_2 balance. 2. Fridge; 3. –Flow counter; 4. –High-pressure pump; 5. - Heater; 6. Extraction vessel with a heating jacket; 7. –Automatic pressure controller, 8. Polymeric cyclone separator

The yield of fat ranges from 8.12 - 10.17% and the refraction index is 1.4782 units. The yield of laurel essential oil ranges from 4.9-6.11% and the refraction indexis 1.4711-1.4723.

The refraction index was determined using a digital refractometer 300034, the accuracy of which was determined in advance with distilled water whosen20Dis equal to 1.3330.

The amount of total phenols in the hydrophilic extract of dog-rosewas determined by Folin-Ciocalteu reagent, while the content of total flavonoids was determined by $AlCl_3$ reagent using the spectrophotometric method. Antioxidant activity of the hydrophilic extract was determined by the DPPH method [7,8,9]. Table 1.

Table 1. Biologically active compounds of the dog-rose hydrophilic extract and their antioxidant activity

Dog-rose hydrophilic extract	
Total phenols mg /100 g on dry mass basis	3032
Flavonoids mg /100 g on dry mass basis	1501
Antioxidant activity In % Dilution factor F=75	54

A high antioxidant activity of the hydrophilic extract of dog-rose fruit allows it to be used in cosmetic oils as a stabilizer and preservative.

In the hydrophilic extract of laurel fruit, the amount of total phenols was determined by the Folin-Ciocalteu method, the anthocyanin content by the pH differentiated method and antioxidant activity was determined by the DPPH method.

Table 2. Biologically active compounds of the laurel hydrophilic extract and their antioxidant activity

Laurel hydrophilic extract	
Total phenols mg /100 g on dry mass basis	283.03
Total monomeric anthocyanins, mg/100 g	135
Antioxidant activity In % Dilution factor F=75	42

The dog-rose and laurel fruit extract holds much promise for the composition of cosmetic oil, as a result of which the skinbecomesmoisturized, dense, and smooth, and besides, it has a beautiful appearance. The presence of plant components makes a person feel the life-giving power of flowers and plants.

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