Calendula Officinalis L.: Study for Prospects of Creating Combined Dosage Forms with Naturally Similar Properties

Tetiana Yurchenko (Junior Researcher, State Enterprise "Ukrainian Scientific Pharmacopoeial Center for Quality of Medicines", Ukraine)
Corresponding author: Tetiana Yurchenko

Received: January 30, 2025
Published: February 14, 2025

Abstract. Calendula officinalis L. is a part of almost 200 dosage forms. Despite the long tradition of use, the genus has not been properly studied. Pharmacological studies show that C. officinalis exhibits antibacterial, antiviral, anti-inflammatory, antitumor and antioxidant properties. A multidisciplinary and comprehensive study of calendula (Calendula officinalis L.) and a review of several medicinal plant raw materials with a similar content of biologically active substances were conducted for the prospects of creating combined dosage forms with naturally similar properties based on them. As well as a study of medicinal plant raw materials with a similar composition of biologically active substances. A review of the literature showed that quite a few drugs with different pharmacological effects have been created from the raw material of calendula officinalis, such as Gastrofit, calendula tincture, calendula ointment, Clotrex, Bronhofit, Ugrin®, Phytodent®, Rotokan, Tazalok™ and others. The task was set to create combined drugs, combined dosage forms with naturally similar properties using analogues of chemical-pharmaceutical origin (synthesis) of known pharmacological substances (active pharmaceutical ingredients), as well as medicinal plant raw materials using the example of raw materials of calendula flowers, hemp flowers, their introduction into industrial pharmaceutical production and medical practice, or individual manufacture according to a doctor's prescription in pharmacies while ensuring their quality, safety, effectiveness and economic availability.

Keywords: calendula officinalis, biologically active substances, combined dosage forms.

Introduction. The modern integration processes that Ukraine is undergoing during its accession to the European Union require a comprehensive, complete, and objective implementation of pharmaceutical and medical legislation. European Union directives regulate the procedure (rules) for the circulation of medicinal products and medicinal herbal raw materials. It is also necessary to consider national characteristics. The European Medicines Agency is a decentralized agency of the European Union. It is responsible for the scientific assessment of the rules for the circulation (supervision, monitoring, safety, quality, use) of medicinal products. Up to 80% of active substances used in European countries come from outside the European Union [1].

In the structure of the European Medicines Agency the Committee on Herbal Medicinal Products is in the structure. It performs the following functions [2]:

- collect and evaluate scientific data on herbal substances, medicinal products, and their combinations with an emphasis on safety and efficacy;
- to support the harmonization of the European market: national competent authorities can refer to one unique set of information on herbal substance or preparation when assessing marketing applications;
- to publish the "European Union Herbal Monograph" (formerly known as the Community Herbal Monograph), which contains the scientific opinion of the Committee for Herbal Medicinal Products on the data on the safety and efficacy of herbal substance and its preparations intended for medicinal use;
- to evaluate all available information, including pre-clinical and clinical data, as well as documented long-term use and experience in the European Union;
- to summarize the European Union Monographs, which provide all the information necessary for the use of a medicinal product containing a particular herbal substance or preparation:
    - to study what the herbal product is used for and to monitor and analyze for whom the herbal product is prescribed (for example, for skin disorders The European Medicines Agency recommends traditional herbal medicinal products that have already demonstrated sufficient safety and probable efficacy, the biological activity of the

recommended herbal preparations and their components with emphasis on their antibacterial effect [3]);
    - safety information, such as information on side effects and interactions with other medicines;
- to assess each herbal preparation individually, as the available information may differ from one preparation to another. This is why some preparations will appear in the newly established use section of the monograph and others in the traditional use section. If there is insufficient data, some preparations may not be included;
- although Member States are not obliged to adhere to the monographs, any decision not to adopt the content of the monograph taken by The Committee on Herbal Medicinal Products must be duly justified, considering their important role in harmonizing this area and facilitating the use of the simplified registration procedure.

The research of medicinal plant raw materials and active pharmaceutical ingredients, the prospects for creating medicinal products based on them, and the regulation of circulation during pharmacotherapy, has been devoted in different years to the work of leading scientists of Ukraine: Stefanov O.V., Danilenko V.I., Trakhtenberg I.M., Gubsky Yu.I., Sosin I.K., Kutko I.I., Tykhonov O.I., Voloshyn P.V., Reminyak V.I., Georgievsky V.P., Obolentseva G.V., Serbin A.G., Tolochko V.M., Ponomarenko M.S., Litvinenko M.M., Pertsev I.M., Depeshko I.T. and others.

In modern conditions, multidisciplinary research is being conducted for the comprehensive treatment of Covid, post-Covid, long-Covid, infectious, non-infectious, chronic, comorbid, addictive health disorders in accordance with the ICD-11 by leading scientists Shapovalova V.O., Derkach A.I., Lyapunov M.O., Kazarinov M.O., Haiduchok I.G., Hrytsyk A.R., Gryzodoub O.I., Shapovalov V.V. Veits O.I., Kotov A.G., Kotova E.E., Chaika L.A., Linsky I.V., Osyntseva A.O., Komar L.O., Zbrozhek S.I., Tsysnetska A.V., Chuiev Yu.F., Nehretsky S.M., Khalin M.M., Galavan Z.S., Nikonov M.M., Nevzghoda O.E., Vasina Yu.V., Pyndus V.B., Pyndus T.V. [4-67].

The task is set to create combined drugs, combined dosage forms with naturally similar properties using analogues of chemical-pharmaceutical origin (synthesis) of known pharmacological substances (active pharmaceutical ingredients), as well as medicinal plant raw materials on the example of calendula, cannabis, their introduction into industrial pharmaceutical production and medical practice, or individual manufacture according to a doctor's prescription in pharmacies while ensuring their quality, safety, effectiveness and affordability

Among the 12-20 species of calendula, only 3 species – C. officinalis, C. arvensis and C. suffruticosa – have been evaluated for their pharmacological activity [68]. Several species of this genus have medicinal value. Among them, Calendula officinalis L., which is traditionally used to treat various skin tumors, dermatological lesions, ulcers, edema, and nervous disorders. It is also part of almost 200 dosage forms for cosmetology (creams, lotions, shampoos).

Despite the long tradition of use, the genus has not been properly studied. Pharmacological studies show that C. officinalis exhibits antibacterial, antiviral, anti-inflammatory, antitumor and antioxidant properties; C. arvensis has antibacterial, anti-inflammatory, antimutagenic and hemolytic effects; C. suffruticosa exhibits antimicrobial activity. C. officinalis is included in several herbal compositions that are clinically used in pharmacotherapy of various diseases (e.g., central nervous system disorders). Several previous pharmacological reports confirm the therapeutic potential of some species of Calendula. These species need to be systematically investigated to establish their diverse pharmacological activities and mode of action [68].

Considering the ethnopharmacological, phytochemical and pharmacological reports, low toxicity and frequency of use, C. officinalis has great potential for further in-depth research of diverse biological activities.

The purpose of the study was to conduct a multidisciplinary comprehensive study of Calendula officinalis L. and reviewing several medicinal plant raw materials with similar content of biologically active substances for the prospects of creating combined dosage forms based on them with naturally similar properties. As well as studying medicinal plant raw materials with similar composition of biologically active substances.

Materials and methods. The study was conducted from November 2024 to February 2025. The main material of the study is medicinal plant raw materials Calendula officinalis L., Sea buckthorn fruits (Hippophaes rhamnoides fructus), Rowan fruits (Sorbi aucupariae fructus), Blackcurrant fruits (Ribis nigri fructus), Rosehip fruits (Rosae fructus), Medicinal hemp, (Cannabis officinalis) Cannabis sativa L.

The current legislation of the European Union, Ukraine, the State Pharmacopoeia of Ukraine, publications on the topic of the work were analyzed.

The methods of documentary, retrospective, bibliographic, regulatory, and legal analysis, physicochemical methods of analysis and pharmacognosy methods were used.

The research of the article is a fragment of research works of Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" on the topic "Multidisciplinary research of post-traumatic stress disorders during war among patients (primarily combatants)" (state registration number 0124U002540, implementation period 2024-2029); Lviv Medical Institute on the topic of "Improving the system of circulation of drugs during pharmacotherapy on the basis of evidentiary and forensic pharmacy, organization, technology, biopharmacy and pharmaceutical law" (state registration number 0120U105348, implementation period 2021-2026); Kharkiv Medical Academy of Postgraduate Education on the topic "Pharmaceutical and medical law: integrated approaches to the system of drug circulation from the standpoint of forensic pharmacy and organization of pharmaceutical business" (state registration number 0121U000031, terms 2021-2026); Luhansk State Medical University "Conceptual interdisciplinary approaches to pharmaceutical provision and availability of drugs, taking into account organizational and legal, technological, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, marketing, social and economic competencies" (state registration number 0123U101632, terms 2023-2027); Petro Mohyla Black Sea National University on the topic "Conceptual interdisciplinary approaches to the drug circulation system, taking into account organizational and legal, technological, biopharmaceutical, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, pharmacotherapeutic aspects" (state registration number 0123U100468, implementation period 2023-2028).

Results and discussion. Medicinal plants are considered an important source of treatment for a wide range of diseases, according to Sharma S., Kumari K. Medicinal plant juice is the basis of traditional medicine in India [69]:

- herbal therapy is cost-effective and has no side effects;
- there are about 8000 species of medicinal plants used by different communities in India in different ecosystems, only about 10% of them (880 species) are in the active trade system;
- there is a need to study plants for their therapeutic efficacy. for health care to prevent various diseases;
- calendula officinalis L. - marigold, is one of the aromatic herbs that have long been used in traditional medicine;
- calendula contains a wide range of phytochemical components: esters, carotenoids, polysaccharides, flavonoids, steroids, amino acids, essential volatile oils, saponins, triterpenes, triterpenoids;
- calendula acts as an analgesic, antidiabetic, antiulcer and anti-inflammatory agent;
- has a wide range of therapeutic effects: antibacterial, antifungal, anthelmintic, antiviral, antioxidant, hepatoprotective, cardioprotective, wound healing;
- such a range of pharmacological properties of calendula makes the search for new herbal medicines, new dosage forms based on calendula relevant;
- calendula is traditionally used in medical practice for the treatment of gastrointestinal diseases, eye diseases, skin injuries and burns.

Fig. 1. Marigold flowers growing in Ukraine [70].

Marigold (Fig. 1) [70] is valued for its anti-inflammatory, antiseptic and healing properties, due to which it is popular in pharmacy, medicine, and cosmetology. However, despite its benefits, calendula has contraindications that are important to remember before use.

Calendula is known for its wide range of health benefits [71]:

- flowers of the plant, due to biologically active compounds, have anti-inflammatory, antiseptic, healing, antispasmodic and immunomodulatory effects;
- medicinal forms of infusions, decoctions and ointments based on Marigold are used both internally and externally;
- calendula is actively used for the treatment of inflammatory and acute respiratory diseases due to its pronounced antiseptic, anti-inflammatory and expectorant properties;
- calendula infusions and decoctions relieve symptoms of angina, bronchitis, pharyngitis, and other diseases of the upper respiratory tract;
- gargling with calendula infusion reduces inflammation, relieves pain and irritation, which is especially important for angina;
- calendula helps to thin and eliminate phlegm, makes breathing easier and accelerates recovery from bronchitis and colds;
- calendula helps to relieve swelling and irritation of the mucous membrane, which makes it an effective remedy for inhalations and gargles for acute respiratory viral infections, flu and COVID-19.
- calendula, due to its anti-inflammatory, antiseptic and healing properties, is used in dentistry;
- calendula is effective in the treatment of inflammatory processes in the oral cavity (gingivitis, stomatitis, periodontitis, and other gum diseases):
- rinsing with calendula infusion helps reduce inflammation, relieve pain and swelling, and prevent the development of pathogenic bacteria in the oral cavity;
- the antimicrobial properties of calendula contribute to the rapid healing of small wounds and ulcers that occur with stomatitis or other diseases of the oral mucosa;
- regular use of calendula-based tooth rinses can significantly reduce the risk of infections and strengthen gum health, preventing their bleeding and inflammation, during complex therapy of dental diseases;
- calendula is effective for the treatment of various skin diseases and injuries; it has powerful anti-inflammatory and healing properties, which is important in dermatology (eczema, dermatitis, acne, and allergic reactions); calendula not only relieves inflammation, but also soothes the skin, accelerating the recovery process [72];
- the use of calendula is especially useful in the treatment of small wounds, cuts, burns and insect bites;

- medicinal forms of calendula ointments and creams create a protective layer on the surface of the skin, preventing infection and stimulating tissue regeneration;
- thanks to its antiseptic properties, calendula helps to avoid complications during wound healing, which makes it an indispensable remedy in a home medicine cabinet;
- calendula gently but effectively affects the gastrointestinal tract (gastritis, stomach ulcer, intestinal inflammation);
- anti-inflammatory and antispasmodic properties of calendula reduce irritation of the mucous membrane of the stomach and intestines, accelerate their recovery, which is important for gastritis and peptic ulcer disease;
- with gastritis, calendula helps to reduce the production of gastric juice, reducing acidity and alleviating symptoms; relieves spasms, pain;
- in case of intestinal diseases (colitis, enteritis), calendula soothes irritated mucous membranes, helps reduce inflammation and improve the general condition of the intestines;
- calendula helps restore the balance of microflora, prevents the development of pathogenic bacteria;
- calendula has a positive effect on the liver, one of the key organs responsible for filtering and cleansing the body;
- anti-inflammatory and detoxification properties of calendula help the liver cope with the load in hepatitis, toxic lesions;
- calendula supports the regeneration of liver cells, promotes their rapid recovery after damage caused by inflammation or toxins;
- calendula helps improve the production and outflow of bile, which is important for normal digestion and liver function;
- calendula is useful for gallbladder diseases, cleanses the body of decay products and toxins, protects liver cells from the harmful effects of oxidative stress, and stimulates metabolic processes, which makes it an important element in maintaining liver health.

Description of medicinal plant raw materials

Calendula is an annual herbaceous plant, namely:

- ❖ branched from the base, from 20 to 60 cm tall, with a strong aromatic odor;
- ❖ erect stem, sometimes branching from the base, hard, ribbed, covered with hairs;
- ❖ sessile leaves, light green, dark green, stem-enveloping, entire, wavy, or slightly toothed, with glandular hairs on both sides of the leaf blade; lower leaves - elongated-obovate, obtuse, sometimes pointed at the apex, 10-20 cm long and 1-4 cm wide; upper leaves are elongated and pointed, 4-7 cm long;
- ❖ inflorescence sheath 0.7-1.5 cm long, covered with long glandular hairs;
- ❖ inner leaves of the involucre with a transparent thinly membranous edge;
- ❖ outer flowers in cultivated forms are often multi-rowed;
- ❖ the corolla of reed flowers is elongated-scapular, rounded, one-, three-toothed, with 4-5 veins, 1.5-2.5 cm long and 0.3 cm wide, bright yellow or orange, with thick and long hairs at the base;
- ❖ the corolla of tubular flowers is rounded, five-toothed, 1.5-2.5 cm long and 0.4-0.7 cm in diameter, the tube with a small bend 0.5 cm long;
- ❖ the stigma is short, thick, pubescent;
- ❖ the ovary is elongated 0.05 cm long, pubescent, shrinks after pollination;
- ❖ achenes narrow-oblong, strongly curved, finely ribbed, finely pubescent, or smooth, 0.10–0.12 cm long;
- ❖ achenes located on the periphery, externally warty-ribbed, internal achenes spiny-warty and often with a wide thick border.

Marigold flowers

- ➢ whole or those whose flowers have partially fallen off;

- baskets up to 5 cm in diameter, without peduncles or with remnants of peduncles no more than 3 cm long;
- involucre gray-green, single- or double-rowed, of linear, pointed, densely pubescent leaves;
- basket bed somewhat convex and bare;
- marginal flowers are falsely ligulate, yellow, yellow-orange, bright red-yellow or pale yellow-pink, (15-28) mm long, (3-5) mm wide, arranged in (2-3) rows in non-double forms and in (10-15) rows in double forms;
- corolla of falsely ligulate flowers, which has a curved, short, pubescent tube and a tridentate, with (4-5) veins, which is twice as long as the perianth;
- pistil in carpels with a curved lower single-celled ovary, a thin column, and a two-lobed receptacle;
- central flowers are tubular with a five-toothed corolla, orange, yellow-brown or yellow-orange.

Distribution

The homeland of calendula is the countries of Asia, the Middle East, the Mediterranean and Europe. The flowering plant is quite widespread and is cultivated as an ornamental in the countries of the European Union, Ukraine, Moldova. Belarus and the countries of the North Caucasus and North America.

In the regions of Ukraine, wild calendula (marigolds) is not found, but the plant is widespread, it is grown for medical needs on special plantations or planted on household plots.

Chemical composition

The main components of the chemical composition of calendula (calendula flowers) include:

- ✓ derivatives of oleanolic acid (calendulosides), the content of which is 2-10%;
- ✓ flavonoids (0.3-0.8%), the main of which are isorhamnetin, isorhamnetin-glucopyranoside, quercetin and its glucoside quercitrin, astragoline, hyperoside, isoquercetin and rutin.
- ✓ carotenoids (3% and more), which include: violaxanthin, identified α-carotenes and β-carotene, lycopene, lutein, rubixantin, citraxanthin and others;
- ✓ oleanolic acid after hydrolysis (more than 4%);
- ✓ essential oil (0.02-0.12%) which includes: isomenthone, cadinene, caryophyllene, menthone, β-ionones, α-ionones;
- ✓ calendula polysaccharides contain 7 monosaccharides: arabinose, galactose, galacturonic acid, glucose, xylose, an unidentified substance, with the main component being D-galacturonic acid, rhamnose (2.5-4%);
- ✓ tannins (about 6.4%);
- ✓ bitter-tasting sesquiterpene lactones (calendin);
- ✓ resins (about 3.4%);
- ✓ organic acids 7-8% (ascorbic, traces of salicylic, malic);
- ✓ triterpene saponins containing: arnidiol, taraxasterol, calenduladiol, faradiol, β-amyrins, α-amyrins.

Introduction into circulation for industrial production and use in medical practice

Phytopreparations have been created based on calendula, which have been introduced into industrial production and medical practice. Currently, the following drugs are available in Ukraine:

Gastrofit, calendula tincture, calendula ointment, Clotrex, Bronchofit, Ugrin®,

Phytodent®, Rotokan, Tazalok™, Prostalad, Phytohepatol collection, Phytonephrol, Phytobronhol, Elekasol, therapeutic and prophylactic No. 2, 3, 4, Vagical suppositories, Sedative PC® tablets, Homeovox, Traumeel C gel, Traumeel.

Drugs whose registration period has expired and which are not available in Ukraine: Alorom, Venen Theiss gel, Pilex ointment, Flora, Heliskan®, Phytokan-GNTSLS, Gynecofit (anti-inflammatory effect), Elekafit-Viola, Kontuzin gel.

It should be noted that preparations and dosage forms of calendula officinalis (Table 1):

- exhibit anti-inflammatory and reparative effects;
- infusion, tinctures, and ointment of calendula are used as a wound-healing agent for inflammation of the skin and mucous membranes, externally in the treatment of long-healing wounds, cuts, bruises, boils, burns, ulcers;
- used internally as an anti-inflammatory and antispasmodic agent for cholecystitis, cholangitis, cystitis, gastrointestinal disorders (gastritis, colitis, enterocolitis, gastric and duodenal ulcers);
- it has been established that calendulosides reduce the concentration of cholesterol in the blood, and flavonoids exhibit choleretic activity;
- the drug is used in dentistry for gingivitis, periodontitis, thrush in children;
- marigold herbal preparations have a sedative effect, lower blood pressure, increase heart activity, slow down the rhythm of heart contractions and increase their amplitude.

Table 1. Medicinal preparations, dosage forms of calendula, their composition, ATC code and pharmacological action [73].

No.	Medicinal product, dosage form	Composition, active ingredients	ATC code, clinical and pharmacological group, application
1.	Calendulae flowers	1 pack contains calendula flowers 25 g, 40 g, 50 g, 55 g; 1 filter bag contains calendula flowers 1,5 g	ATC Code: R02AA20 Internally in the form of an infusion is used for gastritis, gastric ulcer and duodenal ulcer, colitis, enterocolitis, inflammatory diseases of the liver, biliary tract, and spleen; Externally in the form of an infusion - for diseases of the oral cavity (thrush in children, gingivitis, pyorrhea, inflammatory-dystrophic form of periodontitis), tonsillitis, tonsillitis
2.	Calendula ointment, 20 g	1 g of ointment contains 0.1 g of calendula tincture; excipients: white soft paraffin, purified water, emulsifier T-2	ATC code: D03 – preparations for the treatment of wounds and ulcers ATC subcode: D03AX – preparations that promote wound healing. Used externally for burns, cuts, cracks, wounds, etc. After applying the ointment to the skin, calendula has anti-inflammatory, wound healing, and antibacterial effects
3.	Carboactive, activated carbon with chamomile and calendula tablets 0.5 g No. 10	activated carbon, crushed chamomile and calendula flowers, excipients	ATC code: A07B A01 Recommended for use as a dietary supplement to the diet to remove toxic substances from the body, improve the secretory function of the intestine, reduce fermentation and gas formation
4.	Vagikal, vaginal suppositories of 150 mg, 10 pcs.	1 suppository contains Calendula officinalis 150 mg; excipients: macrogol 400, macrogol 1500, macrogol 4000	ATC code: G02CC – drugs used in gynecology Inflammatory diseases of the vagina, accompanied by discharge, itching, burning, redness
5.	Phytobronchol gather 1.5 g No. 20	1 g of the gather contains: Chamomile flowers 200 mg;	ATC code: R05C A10 – expectorant drugs In the complex therapy of inflammatory diseases of the respiratory tract (bronchitis, tracheitis) associated with disorders of

		Ledum marsh shoots 200 mg; calendula flowers 200 mg; Violae herba 200 mg, Liquorice root 150 mg, peppermint leaves 50 mg	bronchial secretion and weakening of mucus movement
6.	Calendula 50 ml	tincture of calendula flowers (1:10) extractant - ethanol 70% - 40 ml or 50 ml	ATC Code D03AX – drugs that promote wound healing. Locally - as an antiseptic for infected (purulent) wounds, cuts, skin burns and inflammation of the mucous membranes of the oral cavity, gums (stomatitis, gingivitis), pharynx, tonsils (pharyngitis, tonsillitis); internally – as a choleretic for biliary dyskinesia, cholangitis, cholecystitis (as part of complex therapy)
7.	Healing hand cream with calendula 50 ml	calendula hydrolate; Bidentis tripartitae extract • rosehip oil; • shea oil; • grape seed oil; • provitamin B5 (panthenol)	Nourishment, soothing, healing of wounds and cracks, prevention of premature aging, natural protection against external factors
8.	Yodis-calendula (500 ml)	Yodis concentrate; Tincture of calendula flowers; Ascorbic acid	In inflammatory processes caused by streptococcal and staphylococcal flora, candida fungi. Promotes the acceleration of the healing of lacerated wounds

Side effects

Calendula medicinal plant raw materials, its herbal preparations and dosage forms can cause allergic reactions, especially in people who are allergic to plants of the Asteraceae family (Ambrosia, Chrysanthemum, Tagetes, Matricaria).

Contraindications to the use of calendula flowers:

- alcoholism;
- stomach ulcer;
- acute gastritis and increased acidity of the stomach.
- children under 18 years of age;
- liver diseases;
- calculous cholecystitis;
- pregnancy and lactation (breastfeeding). The use of calendula during pregnancy can lead to miscarriage!
- craniocerebral injuries.

Standardization of medicinal plant raw materials (quality control) [74]

Calendula medicinal plant raw materials are described in the leading Pharmacopoeias of the world: British Herbal Pharmacopoeia [75], British Pharmacopoeia [76], Český Lékopis [77], European Pharmacopoeia [78], Deutsches Arzneibuch [79].

The State Pharmacopoeia of Ukraine presents the national monographs “Calendula flower” [80] and “Calendulae tinctura” [81].

They provide standardization methods for the quantitative content of the sum of flavonoids in terms of hyperoside with regulation (not less than 0.4%) [82].

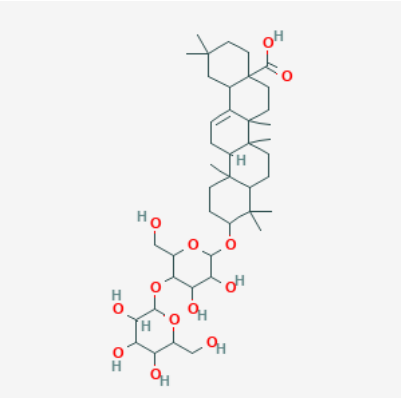
The national monograph of the State Pharmacopoeia of Ukraine “Calendula flower” includes the following quality indicators [80]:

- loss in mass during drying;
- total ash;
- identification by thin-layer chromatography:
- determination of flavonoids using the Pharmacopoeial Standard Sample of the State Pharmacopoeia of Ukraine rutin [83]
- phenolcarboxylic acids using the Pharmacopoeial Standard Sample of the State Pharmacopoeia of Ukraine chlorogenic and caffeic acid [84]
- identification by thin-layer chromatography for the determination of triterpene saponins, derivatives of oleanolic acid using the Pharmacopoeial Standard Sample of the State Pharmacopoeia of Ukraine calendulosides [85]
- quantitative determination by spectrophotometry for the content of the sum of flavonoids in terms of hyperoside, the Pharmacopoeial Standard Sample of the State Pharmacopoeia of Ukraine is not used;
- macro and microscopy;
- foreign impurities.

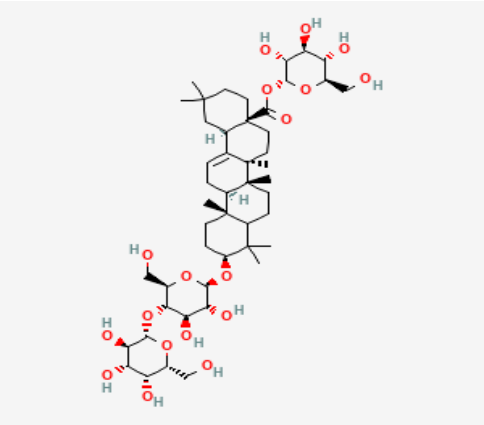
Standardization of calendula preparations

Standardization of calendula tincture in control and analytical laboratories of most pharmaceutical enterprises in Ukraine, in particular FF "Viola", PrJSC "Liktravy", LLC "Fitosvit LTD" is carried out by determining flavonoids (identification by thin-layer chromatography and quantitative determination by spectrophotometry), additionally standardization of the preparation is carried out by identifying calendulosides by thin-layer chromatography.

Calenduloside A: 10-[3,4-dihydroxy-6-(hydroxymethyl)-5-[3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]oxyoxan-2-yl]oxy-2,2,6a,6b,9,9,12a-heptamethyl-1,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydropicene-4a-carboxylic acid (3-O-(4-β-D-galactopyranosyl-β-D-glucopyranosyl)-oleanolic acid)



Calenduloside B: [(2R,3R,4S,5S,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl] (4aS,6aR,6aS,6bR,10S,12aR,14bR)-10-[(2R,3R,4R,5S,6R)-3,4-dihydroxy-6-(hydroxymethyl)-5-[(2S,3R,4S,5R,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]oxyoxan-2-yl]oxy-2,2,6a,6b,9,9,12a-heptamethyl-1,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydropicene-4a-carboxylate



Calendula flower preparations containing a sum of carotenoids (e.g. Carophyllen) are standardized for the quantitative content of the sum of carotenoids, the preparation being the sum of water-soluble polysaccharides of calendula flowers, standardized for the content of mono- and polysaccharides [99].

Medicinal plant raw materials with a similar composition of biologically active substances to Calendula officinalis raw materials and are promising in the creation of combined medicinal products and dosage forms

Sea buckthorn fruit (Hippophaes rhamnoides fructus)

Fig. 2 shows Hippophaes rhamnoides fructus [86, 87]. Genus. Olive – Elaeagnaceae.

Fig. 2. Hippophaes fructus [87].

Chemical composition of sea buckthorn fruits:

- the pulp of sea buckthorn fruits contains up to 8% fatty oil;
- fruit oil is intensely orange in color, contains many carotenoids (up to 300 mg %), vitamin E (100-160 mg %);
- seed oil is pale yellow in color, contains vitamin E (105-120 mg %) and a small number of carotenoids;
- the pulp of the fruit of the plant contains vitamins B1, B2, C, E, K, P, carotenoids, folic acid, choline (50-110 mg %), betaine, coumarins, phospholipids (up to 1%), sterols up to 2%, triterpene substances, sugar – up to 7%, organic acids (malic, citric, tartaric) – up to 3%, tannins, macro- and microelements (sodium, magnesium, silicon, iron, aluminum, calcium, lead, nickel, molybdenum, manganese, strontium);
- the seeds and seeds contain up to 12% fatty oil.

Pharmacological properties of sea buckthorn raw materials:

- ✓ Sea buckthorn juice exhibits:

- ✓ bactericidal effect;
- ✓ stimulates digestion, increases the secretion of digestive enzymes and bile;
- ✓ increases the resistance of animals to infections;
- ✓ exhibits a biostimulating effect;
- ✓ Sea buckthorn oil, obtained from the meal, after squeezing 60-70% of the juice, exhibits:
- ✓ regenerative ability;
- ✓ accelerates epithelialization and stimulates the growth of granulation in case of skin and mucous membrane injuries, has an antibacterial effect;
- ✓ activates the exocrine activity of the pancreas;
- ✓ protects biological membranes from the damaging effects of chemical agents;
- ✓ contains a unique set of vitamins and biologically active substances for the treatment of atherosclerosis, dystrophic processes in the myocardium;
- ✓ accelerates hair growth.

Application in medical practice of sea buckthorn preparations:

- ✓ Sea buckthorn oil 50 ml in a bottle – a remedy that affects the digestive system and metabolism, for the treatment of acid-dependent diseases.
- ✓ Sea buckthorn oil "Ekooil" 100 ml in a bottle (not a medicine) – used as a multivitamin for hypo- and avitaminosis, asthenia. Regular use is a prevention of several diseases of the liver, digestive system (gastritis, gastric and duodenal ulcers, gastroduodenitis, constipation, colitis, hemorrhoids, etc.), thyroid gland, kidneys.
- ✓ Sea buckthorn oil has choleretic properties and helps improve intestinal peristalsis, helps the body cleanse itself of toxins and toxins.
- ✓ Sea buckthorn oil helps the rapid healing of postoperative sutures and wounds, burns, boils, fistulas, skin ulcers, scars.
- ✓ Film "Oblekol" – collagen film with sea buckthorn oil for the treatment of various wounds.
- ✓ The drug "Gipozol" is a foam aerosol containing sea buckthorn oil, used in gynecology.
- ✓ Sea buckthorn oil suppositories No. 10 Monfarm (1 suppository contains: sea buckthorn oil concentrate 0.3 g; excipients: solid fat) – prevention – for chronic diseases of the rectum, hemorrhoids, colitis (not a medicinal product).
- ✓ Sea buckthorn oil AN NATUREL capsules 1000 mg No. 30 (1 capsule: sea buckthorn oil – 1000.0 mg (mg); excipients (shell composition): gelatin, glycerin (E 422), nipagin (E 218), water) - recommended as a source of carotenoids, polyunsaturated fatty acids, vitamin E; helps improve the condition of the mucous membrane of the gastrointestinal tract; improves blood circulation; has antioxidant and tonic properties. Before use, a doctor's consultation is required.
- ✓ Mucolux Sea Buckthorn with Vitamin C – chewable tablets to ease breathing 3 blisters of 10 pieces; Solution Pharm – 1 tablet contains active pharmaceutical ingredients: marshmallow herb dry extract (Extractum herbae Althaeae officinalis siccum) - 100.0 mg, L-ascorbic acid (vitamin C) – 25.0 mg, crushed sea buckthorn fruits (Hippophae rhamnoides L. fructus conciderunt) – 25.0 mg; excipients: sugar, filler microcrystalline cellulose, anti-caking agents calcium stearate, amorphous silicon dioxide, flavoring "Orange") – recommended as an additional source of biologically active substances of plant origin to ease breathing in seasonal colds and bronchopulmonary diseases.

Rowan fruit (Sorbi aucupariae fructus)

Fig. 3 illustrates Sorbi aucupariae fructus [88, 89]. Rowan – Sorbus aucuparia L. Genus. (Sorbus) Rosaceae.

Fig. 3. Sorbi aucupariae fructus [89].

Chemical composition of rowan fruits:

- carotene up to 18 mg %;
- cryptoxanthin, flavonoids, quercetin, isoquercetin and rutin, vitamins E and B, anthocyanins, tannins, phospholipids;
- pectic substances up to 2%;
- ascorbic acid, triterpene saponins, sorbitol, sugars, malic, tartaric, citric acids;
- seeds contain fatty oil (up to 22%) and glycoside amygdalin;
- leaves contain up to 200 mg % ascorbic acid.

Pharmacological properties of rowan fruits:

- In folk medicine, it is used for:
- formation of stones in the kidneys and urinary tract (diuretic effect);
- liver and gallbladder diseases (cholergic effect);
- chronic constipation (laxative effect);
- uterine bleeding (hemostatic effect);
- Dosage forms of infusion, decoction, juice of rowan berries are used for:
- atherosclerosis;
- hypertension;
- diseases of the gastrointestinal tract;
- diabetes;
- Dosage form of infusion of rowan flowers has:
- diuretic properties;
- laxative effect;
- Rowan berries are contraindicated in patients with increased blood clotting.

Use of rowan berries in medical practice:

- Vitamin collection No. 2 – collection of 100 g in a package; 1 g of the collection contains rose hips (Rosae fructus) – 0.5 g, mountain ash fruits (Sorbi fructus) - 0.5 g
- Vitamin collection No. 2 – collection of 3 g No. 20 in a fil.-pack.;
- Rowan fruits 100 g in a pack.
- Flamikar syrup in a bottle. 200 g each.
- Hyperton Pharm, Solution Pharm, herbal tea in filter bags of 1.5 g each 20 pcs. Composition:
- Crataegi flore, Sorbi aucupariae fructus, Valerianae extractum, Urticae herba, Menthae piperitae folium, Melissae folium, Polygoni avicularis herba, Equiseti herba, Thymi herba,

Rosae fructus) - a dietary supplement to the diet. Contributes to the normalization of blood pressure, improvement of the general condition of the body, has mild sedative properties.

- ThyroKlin, capsules of 370 mg No. 60 – a complex remedy for restoring thyroid function, used as a source of biologically active substances of plant origin.
- Monomakh balm, 200 ml in a bottle. Composition: Liquiritiae radix, Origani vulgaris herba, Pini sylvestris gemmae, Millefolii herba, Hyperici herba, Acori calami rhizomata, Menthae piperitae folium, Sorbi aucupariae fructus, Aroniae melanocarpae fructus.

Blackcurrant fruits (Ribis nigri fructus)
Fig. 4 illustrates Blackcurrant - Ribes nigrum L. [90, 91].
Genus. Gooseberry – Grossulariaceae.

Fig. 4. Ribis nigri fructus et folium [91].

Chemical composition of currant raw materials:

- vitamins – vitamin C, B1, B2, B6, B12, D, E, K;
- substances with P-vitamin activity (flavonoids) – up to 1.5%;
- carotenoids, sugar (glucose, fructose 4.5-17%);
- organic acids (citric, malic) – 2.5-4.5%;
- tannins (up to 0.5%);
- proteins, pectins (up to 1%);
- anthocyanins (cyanidin, delphinidin), glycosides, essential oils.

Pharmacological properties of currants:

- Infusions and decoctions of medicinal plant raw materials have:
- diuretic, diaphoretic, antimicrobial, capillary strengthening, antiallergic, astringent and tonic properties;
- increase immunity;
- are used for diseases of the kidneys, urinary tract, upper respiratory tract, gastrointestinal tract, cardiovascular system, skin, as well as for atherosclerosis, hypertension, rheumatism, gout, diabetes mellitus, pulmonary tuberculosis.
- Fresh and dried currant fruits are used for:
- hypo- and avitaminosis;
- hypochromic anemia;
- periodontitis;
- diseases of the upper respiratory tract, gastrointestinal tract, liver;
- heart rhythm disorders, hypertension, cardioneurosis;
- hemorrhagic vasculitis;
- infectious diseases.

Application in medical practice of currant raw materials:

- Hexoral loracept with blackcurrant flavor lollipops No. 8 (4x2) (amylmetacresol, 2,4-dichlorobenzyl alcohol; 1 lollipop contains: amylmetacresol 0.6 mg, 2,4-dichlorobenzyl alcohol 1.2 mg; excipients: sucrose, glucose solution, citric acid monohydrate, carmoisine dye (Azorubine E122), diamond blue dye (E133), Peppermint oil, blackcurrant flavoring) – symptomaticc treatment of infectious and inflammatory diseases of the oral cavity and pharynx.
- Echinasal syrup bottle 125 g (15 ml of syrup contains: liquid complex extract (1:4.4) – 1.0 g, made from: plantain leaves (Plantaginis lanceolatae folio), grindelia herb (Grindeliae herba), rosehip fruits (Rosae fructus) (3:1:1) (extractant – ethanol 50% (v/v); thyme herb extract (Thymi herbae extractum) (1:4) – 0.6 g (extractant – ethanol 30% (v/v), glycerin, ammonia water 25%); purple echinacea herb juice (Echinaceae purpureae herbae succus) (1:1) – 0.4 g, (extractant – ethanol 96% (v/v), purified water); excipients: blackcurrant concentrate, sucrose, purified water) – used in the complex treatment of inflammatory diseases of the upper respiratory tract, bronchitis against the background of weakening of the body's protective functions; for the purpose of prevention in case of reduced immunity.
- "Allergo-biol" 90 tablets of 0.4 g. (composition: Violae herba cum flore, Bidentis tripartitae herba, Arctii radix, Liquiritiae radix, Anisi fructus, Ribis nigri folium, Quercus cortex.) – a dietary supplement to the diet. It is recommended to use for therapeutic and prophylactic purposes in: -allergic conjunctivitis; -allergic dermatitis, urticaria, neurodermatitis; -allergic rhinitis; -atopic dermatitis; -eczema; bronchial asthma; -hemorrhagic vasculitis. -pollinosis (hay fever).
- "Immuno-biol" 90 tablets (composition: Rubi idaei folium, rosae fructus, cerasorum folia, Ribis nigri folium, Phaseoli pericarpium, fructus citri, Fagopyrum herba.) – a dietary supplement to the diet. It is recommended to use for therapeutic and prophylactic purposes in: -allergic manifestations against the background of reduced immunity; -recovery programs after long-term illnesses and operations; -colds (flu, acute respiratory viral infections, acute respiratory viral infections); -mental and physical overwork; -neutralization of adverse environmental influences -increasing immunity and overall body resistance; -increasing immunity against the background of diabetes mellitus, helminthic and bacterial invasions.
- "Uro-biol" 90 tablets (composition: Hyperici herba, Myrtilli fructus, Myrtilli cormus, Vaccinium vitis-idaea folium, Ribis nigri folium, fructus, Leonúrus herba) – a dietary supplement to the diet. It is recommended to use for therapeutic and prophylactic purposes in: -enuresis, including nocturnal; -inflammatory diseases of the urinary system; -urinary incontinence in old age.

Rosehip fruits (Rosae fructus).

Fig. 5 illustrates Rosehip – Rosa canina. L., Genus Rosa L., Rosaceae family [92, 93].

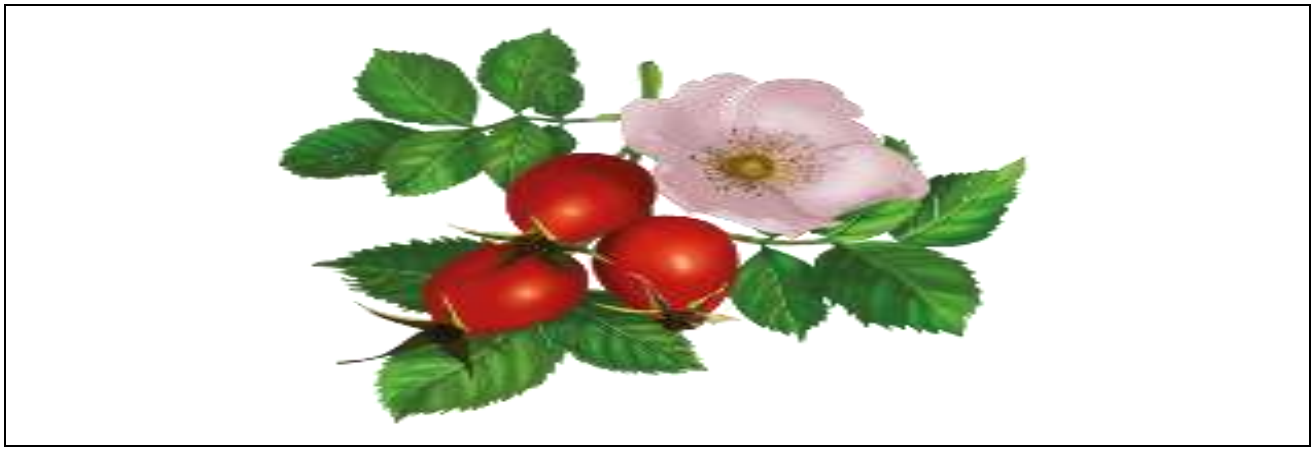


Fig. 5. Rosa canina. L [93].

Chemical composition of rose hips:

- The dry pulp of rose hips contains up to 23.9% sugars, of which 18.5% is invert sugar;
- pectins 3.7-14%;
- ash 6.4%;
- malic and citric acids, potassium salts (23 mg %);
- sodium (5 mg %); calcium (26 mg %);
- magnesium (8 mg %); phosphorus (8 mg %); iron (11.5 mg %);
- flavonoids (quercetin, kaempferol, isoquercitrin). The total flavonoid content in cinnamon rose hips is 4%, in wrinkled rose hips 2.13%;
- catechins;
- the content of tannins in dry fruits is 4.6%;
- content of anthocyanins 45 m g %;
- content of tocopherols (vitamin E) 170 mg %.
- in rose hips found: ascorbic acid, carotene, vitamins B2, K1;
- rosehip seeds and fruits contain carotene, vitamin E, acids (linoleic – 57.8%, linolenic – 14.3%, oleic – 19.1%, palmitic – 5.3%, myristic – 1.15%, stearic – 0.31%;
- rosehip leaves contain ascorbic acid (up to 1.5%);
- Tannins are found in the leaves, branches, and roots of rosehip.

Pharmacological properties of rosehip raw materials

Experimentally proven:

- antisclerotic effect of ascorbic acid, which is manifested by a decrease in the level of cholesterol and total lipids in the blood, inhibition of the deposition of atheromatous masses in the walls of blood vessels;
- choleretic effect of rosehip preparations (one of the stimulants of which is magnesium salts, present in rosehip in significant quantities), also contributes to the removal of cholesterol from the body and his predecessors.

Application in medical practice of rosehip raw materials:

- arfazetin, dosage form – collection of 1.5 g No. 20 in a filter pack; 1 g of collection contains: blueberry shoots (Myrtilli cormus) – 0.2 g; bean fruits (Phaseoli pericarpium fructus) – 0.2 g; Eleutherococcus rhizomes with roots (Eleutherococci rhizomata et radices) – 0.15 g; rosehip fruits (rosae fructus) – 0.15 g; horsetail grass (Equiseti herba) – 0.1 g; St. John's wort grass (Hyperici herba) – 0.1 g; chamomile flowers (Matricariae flos) – 0.1 g.
- indications for the use of arfazetin: diabetes mellitus type II of mild and moderate severity (as part of complex therapy). Contraindications – arterial hypertension, biliary dyskinesia, exacerbation of chronic pancreatitis or chronic enterocolitis, nephritis, nephrosis, nephrosonephritis, hyperthermic syndrome, increased excitability, epilepsy, acute infectious diseases, myocardial infarction, arrhythmias, insomnia, neurocirculatory dystonia, thrombophlebitis and predisposition to it, circulatory failure, endocarditis, uncompensated diabetes mellitus, severe kidney disease, gallstone disease.
- phytodent, dosage form – tincture of 100 ml in a bottle, 100 ml of the drug contains tinctures from a mixture of medicinal plant raw materials (1:10) (extractant – ethanol 40%): calamus rhizome (Acorus calamus rhizomata) – 2 g; marigold flower (calendulae flos) – 1.5 g; nettle leaves (Urticae folium) – 1 g; chamomile flowers (Matricariae flos) – 1 g; Japanese sophora fruits (sophorae japonicae fructus) – 2 g; celandine grass (chelidonii herba) – 1.5 g; rose hips fruits (rosae fructus) – 1 g;);
- phytodent has anti-inflammatory, analgesic, disinfectant, fungicidal effects, is well absorbed by the mucous membrane of the oral cavity and periodontal tissues, has wound healing, hemostatic, tonic, and analgesic properties.

- gastrophyte, dosage form – collection of 1.5 g No. 20 in a filter pack., 1 filter pack (1.5 g) contains a mixture of medicinal plant raw materials: licorice roots (Liquiritiae radix) 120 mg, Japanese sophora fruits (Sophorae japonicae fructus) 120 mg, marshmallow roots (Althaeae radix) 105 mg, nettle leaves (Urticae folium) 105 mg, peppermint leaves (Menthae piperitae folium) 105 mg, marigold flowers (Calendulae flos) 105 mg, chamomile flowers (Matricariae flos) 105 mg, sand marigold flowers (Helichrysi arenarii flos) 105 mg, rosehip fruits (Rosae fructus) 105 mg, calamus roots (Acorus calamus radix) 90 mg, elderberry flowers (Sambuci flos) 90 mg, yarrow herb (Millefolii herba) 90 mg, St. John's wort herb (Hyperici herba) 90 mg, sage leaves (Salviae officinalis folium) 90 mg, wormwood herb (Absinthii herba) 75 mg;
- Gastrofit is used for: chronic gastritis with preserved or reduced acid-forming function of the stomach; functional dyspepsia; duodenitis; prevention of relapses and as part of the complex treatment of gastric and duodenal ulcers, colitis.
- Holosas, dosage form – syrup 130 g in a jar, 1 g of syrup (corresponding to 0.7 ml) contains rosehip extract liquid (Rosae fructus) (1:0.7); extractant – purified water, with an acidity of at least 3.5% in terms of malic acid – 0.4 g; excipient – sugar;
- holosas is used as an adjuvant for chronic cholecystitis, cholangitis, chronic hepatitis; for C and P hypovitaminosis; for drug and alcohol intoxications.
- echinasal, dosage form - syrup 125 g in a bottle, 15 ml of syrup contains: liquid complex extract (1:4.4) – 1.0 g, made from plantain leaves (Plantaginis lanceolatae folium), grindelia herb (Grindeliae herba), rosehip fruits (Rosae fructus) (3:1:1), extractant – ethanol 50%; thyme herb extract (Serpylli herba extract) (1:4) – 0.6 g, extractant – ethanol 30%, glycerin, ammonia water 25%; juice from the herb Echinacea purpurea (Echinaceae purpureae herba) (1:1) – 0.4 g, extractant – ethanol 96%, purified water); excipients – blackcurrant concentrate, sucrose, purified water;
- Echinasal is used in the complex treatment of inflammatory diseases of the upper respiratory tract, bronchitis against the background of weakening of the body's protective functions; for the purpose of prevention in cases of reduced immunity.

Hemp flowers, (Cannabis flos.) Medical cannabis (Cannabis sativa L)
Fig. 6 illustrates Medicinal cannabis [94, 95].

Fig. 6. Hemp flowers (Cannabis flos.) [95].

The monograph is described in the State Pharmacopoeia of Ukraine, second edition, supplement 7 “Hemp flowers, (Cannabis flos.) [96].

Content: if the plant material is prescribed to patients as a medicinal product, the measured content of total tetrahydrocannabinol and total cannabidiol, respectively, should not differ from the content indicated on the label by more than ± 10%.

Tetrahydrocannabinol (THC) – dominant type:

- total tetrahydrocannabinol, calculated as Δ9-tetrahydrocannabinol ($C_{21}H_{30}O_2$; M.w. 314.5): not less than 5.0%, calculated on dry raw material;
- total cannabidiol, calculated as cannabidiol ($C_{21}H_{30}O_2$; M.w. 314.5): not more than 1.0 %, calculated on dry raw material.
- tetrahydrocannabinol/cannabidiol – intermediate (medium) type:
- total tetrahydrocannabinol, calculated as Δ9-tetrahydrocannabinol ($C_{21}H_{30}O_2$; M.w. 314.5): not less than 1.0%, calculated on dry raw material;
- total cannabidiol, calculated as cannabidiol ($C_{21}H_{30}O_2$; M.w. 314.5): not less than 1.0 %, calculated on dry raw material;
- ratio of total tetrahydrocannabinol to total cannabidiol: from 0.2 to 5.0, calculated on dry raw material.

Cannabidiol (CBD) – dominant type:

- total tetrahydrocannabinol, calculated on Δ9-tetrahydrocannabinol ($C_{21}H_{30}O_2$; M.w. 314.5): not more than 1.0 %, calculated on dry raw material;
- total cannabidiol, calculated on cannabidiol ($C_{21}H_{30}O_2$; M.w. 314.5): not less than 5.0 %, calculated on dry raw material

Use of hemp flowers

Phytopreparations and dosage forms from hemp flowers are used in medical practice:

- Kuralif, dosage form – full spectrum extract; content of Tetrahydrocannabinol 10 mg/ml: cannabidiol 10 mg/ml;
- dosage form – liquid (substance) in glass bottles of 30 ml for pharmaceutical use;
- dosage form – liquid extract from hemp flowers (Cannabis sativa L.) (DER Tetrahydrocannabinol 0.9-1.7:1; DER cannabidiol 1-2:1); extractant: anhydrous ethanol; manufacturer "Medalchemy", Spain, registration certificate number UA/20737/01/01 [97];
- Kuralif, dosage form - full spectrum extract, content of Tetrahydrocannabinol 25 mg/ml; cannabidiol 25 mg/ml; liquid (substance) in glass bottles of 30 ml for pharmaceutical use;
- dosage form - liquid extract of hemp flowers (Cannabis sativa L.) (DER Tetrahydrocannabinol 0.9–1.7:1; DER cannabidiol 1–2:1); extractant: anhydrous ethanol; manufacturer "Medalchemy", Spain, registration certificate number UA/20738/01/01 [97];
- kuralif, dosage form – full-spectrum extract (Tetrahydrocannabinol content 25 mg/ml).
- cannabison, dosage form – capsules of 0.4 g No. 30; composition: tryptophan – 100, Melissa dry extract – 50, cannabis seed extract – 50, melatonin – 1.5, maltodextrin (filler); dietary supplement, can be recommended for use in states of anxiety, sleep disorders (due to nervous tension, irritability, excessive nervous excitement); to improve the general condition, improve well-being and performance; the drug does not have a direct hypnotic effect, but in case of insomnia it is possible to facilitate the onset of physiological sleep, deepen it and improve the quality of sleep (in case of impaired falling asleep, frequent awakenings at night, early morning awakenings);
- dosage form – alginate mask, cannabis, and olive leaves, Alginmask, 200 g;
- dosage form – facial balm with Cannabidiol (900 mg CBD), in cosmetology for care and rejuvenation;
- dosage form – medical lipstick with Cannabidiol (CBD) (60 mg CBD), in cosmetology for lip care;
- Cannabidiol (CBD), dosage form – facial scrub "le-kku with cannabidiol" (300 mg), composition: glycerin; caprylic, capric triglyceride; volcanic sand; Quillaja Saponaria tree extract; cannabidiol; Saponaria Officinalis extract; limonene and linalool;
- dosage form - suppositories Cannabidiol (CBD) Suppositories CBD 750 mg.
- dosage form - Cannabidiol (CBD) oil for animals 600 mg 2%.
- dosage form - Cannabidiol (CBD) oil for animals 1500 mg 5%.

The use of the dosage form of calendula flower gel, as noted by Shafeie N., Naini A.T, Jahromi H.K., has a slight positive effect on the early stage of wound healing in experimentally induced skin wound healing in rats [98]. However, 7% gel led to better tissue alignment, differentiation, and maturation of collagen fibrils. While 10% and 5% gel showed better results in the control and placebo groups. Therefore, 7% gel is more effective, especially during the first fourteen days, since the wound has less coverage, and this gel has fewer toxic effects.

Based on the Scientific Research University of Medical and Pharmaceutical Law, the Department of Pharmacy of Lviv Medical University and the Pharmacopoeia Center, multidisciplinary scientific, theoretical, and applied research is conducted, based on the principles of pharmaceutical and medical law and evidence-based pharmacy. Physical and chemical, technological, pharmacological research is carried out to find ways to create combined herbal medicines, herbal preparations, dosage forms (syrup, extract, lyophilized substance, sachet, ointment, tablets, capsules, packaged tea) containing:

- Hippophae rhamnoides fructus;
- Sorbi aucupariae fructus;
- Ribis nigri fructus;
- Rosae fructus;
- Cannabis flos.

Thus, the prospects for the creation of combined medicinal products with naturally similar properties based on Calendula (officinalis) flos and plant raw materials with a similar composition of biologically active substances are considered.

Conclusions. Modern integration processes carried out by Ukraine during its accession to the European Union require comprehensive, complete, and objective implementation of pharmaceutical and medical legislation (Directives) regulating the procedure (rules) of circulation of medicinal products, considering national characteristics. Calendula officinalis L. is part of almost 200 dosage forms. Despite the long tradition of use, the genus has not been properly studied. Pharmacological studies show that C. officinalis exhibits antibacterial, antiviral, anti-inflammatory, antitumor and antioxidant properties; C. arvensis has antibacterial, anti-inflammatory, antimutagenic and hemolytic effects; C. suffruticosa exhibits antimicrobial activity. C. officinalis is included in several herbal compositions that are clinically used in pharmacotherapy of various diseases (for example, central nervous system disorders). Several previous pharmacological reports confirm the therapeutic potential of some types of calendulas. These species need to be systematically studied to establish their diverse pharmacological activity and mode of action. A multidisciplinary - comprehensive study of calendula (Calendula officinalis L.) and a review of several medicinal plant raw materials with a similar content of biologically active substances were conducted for the prospects of creating combined dosage forms with naturally similar properties based on them. As well as research on medicinal plant raw materials with a similar composition of biologically active substances. Multidisciplinary scientific, theoretical and applied research based on the principles of pharmaceutical and medical law and evidence-based pharmacy (physicochemical properties, technological compatibility, pharmacopoeial analysis, etc.) on the creation of a combined medicinal product (syrup, extract, lyophilized substance, sachet, ointment, tablets, capsules, packaged tea) consisting of: - sea buckthorn fruits; - mountain ash fruits; - black currant fruits; - rose hips fruits; - medical cannabis. A review of the literature showed that quite a few drugs with different pharmacological effects have been created from the raw material of calendula officinalis, such as Gastrofit, calendula tincture, calendula ointment, Clotrex, Bronhofit, Ugrin®, Phytodent®, Rotokan, Tazalok™, Prostalad, Phytohepatol, Phytonefrol, Phytobronhol, Elekasol, therapeutic and prophylactic No. 2, 3, 4, Vagical suppositories, Sedative PC® tablets, Homeovox, Traumeel C gel, Traumeel. It should be noted that a small number of drugs use calendula extract in their composition, and there are no combined drugs in the form of syrup at all. The task is set to create combined drugs, combined dosage forms with naturally similar properties using analogues of chemical-pharmaceutical origin (synthesis) of known pharmacological substances (active pharmaceutical ingredients), as well as medicinal plant raw materials using the example of raw materials of calendula flowers, hemp

flowers, their introduction into industrial pharmaceutical production and medical practice, or individual manufacture according to a doctor's prescription in pharmacies while ensuring their quality, safety, effectiveness and economic accessibility. An important component of the safety of treatment is the proper quality of the derived raw materials and finished medicinal products. The source for obtaining homeopathic drugs is mainly raw materials obtained from various vegetative organs of officinal and non-officinal medicinal plants. Methods for standardizing medicinal raw materials are revised and improved every year, as an integral component in pharmaceutical production.

Declaration of conflict interest. The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. The author confirm that they are the authors of this work and have approved it for publication. The author also certify that the obtained clinical data and research were conducted in compliance with the requirements of moral and ethical principles based on medical and pharmaceutical law, and in the absence of any commercial or financial relationships that could be interpreted as potential conflict of interest.

Funding. The author state, that this research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability statement. The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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