

SECTION 12. PHARMACOLOGY

DOI: 10.46299/ISG.2024.MONO.MED.1.12.1

12.1 Wild carrot Fruit *Dauci carotae fructus* in the composition of medical products presented on the pharmaceutical market in Ukraine

Due to their low toxicity, ease of digestion, mild action and the possibility of long-term use without side effects, herbal medicines are widely used in the complex treatment of various diseases. This is especially important in the treatment of diseases of the internal organs, especially those diseases that are chronic, for example, in urology and nephrology [527, 528]. The nomenclature of phytopreparations and medicinal plants that make up their composition is considerable, and in this paper we will focus on one of them, namely **wild carrot *Daucus carota***.

Wild carrot *Daucus carota* is biennial herbaceous, stiff-haired plant of the celery family (Apiaceae). The *Daucus* genus includes about 60 species. The name comes from: Latin and Greek *daukos* - various celery plants; *daio* - to burn, to heat and Latin *carota* - transliteration of Greek *karota* - carrot

The stem is erect, faceted-furrowed, branched at the top and can be 25-80 cm tall. The leaves are pinnately dissected twice or thrice, with oblong or linear, incisely toothed lobes. The flowers are regular, small, 5-petalled, white, collected in complex large umbels, at the base of which there is a wrapper formed by pinnately separated leaves; the central flower of the umbel is often sterile, dark red, on a long pedicel. The fruit is a two-seeded achene. Carrots germinate in March-May. Blooms - begins in the first year of life, in June-July. Fruits in July-August. Autumn shoots overwinter and continue to develop next year, forming fruits and seeds. Under unfavourable conditions, the seedlings overwinter twice, and the plant bears fruit once every two years, i.e. it develops as a biennial.

The germination depth is no more than 8-10 cm. The maximum fertility is 12600 cotyledons. Germination temperature: minimum +6...+8, and optimal +22...+28°.



Pic.1. Wild carrot *Daucus carota*

Wild carrot **grows** as a weed in fields and open areas throughout Ukraine, except in the highlands of the Carpathians. It outcompetes perennial grasses and other perennial crops [529-532].

The pharmacological properties of herbal medicines depend on the morphological parts of the plant from which they are made, i.e. on their qualitative and quantitative content of biologically active substances.

For medical purposes, the fruits of the plant (Fructus Dauci carotae) are used, which contain

- organic acids (formic, acetic, butyric);
- essential oil 0,5-2,9%, and in its composition (in %) - α -pinene 2-4,5, myrcene, limonene 0,2-1, camphene, p-cymene 0,1, geraniol 2-60, geranyl acetate 17-81, citronellol 1,5-2, linalool 0, 5, sabinene 0,5-20, thymol, β -pinene 0,5, citral, α -thujene, α -terpinene, γ -terpinene, terpinyl acetate, bornyl acetate, β -caryophyllene 2-4, epoxy hydrocaryophyllene, β -phellandrene, bergamotene 7, β -bisabolene 10-35, azarone, azarone aldehyde (2,4,5-trimethoxybenzaldehyde), carotene 20-55, cinnamaldehyde, β -elemenene, acorenone, unipercamphor, elemicin, daukol 0,5, dauzen, α -guruguenene, α -curcumin, nonene, γ -decalactone, tiglycolic acid, aliphatic hydrocarbon $C_{30}H_{62}$;

- coumarins 0.8%: umbeliferone, esculetin, scopoletin, ostol; steroids; flavonoids: 5-hydroxyflavone, zatinin, luteolin, 7- β -O-glucopyranoside and 7-rutinoside of luteolin, diosmetin, 7-O-glucoside of diosmetin, quercetin, 3-glucopyranoside of quercetin, chrysin, apigenin, 5-O-glucoside, 4'-O- β -D-glucoside, 7- β -D-glucopyranoside and 7-O- β -D-galactopyranosyl-(1 $\rightarrow$ 4)-O- β -D-mannopyranoside of apigenin, kaempferol, 3-O- β -D-glucoside of kaempferol, quercitrin;

- fatty oil 11-50%, it contains the following acids (in %): palmitic 3.6-6.87, petroselinic 13.66-71.2, oleic 11.6-53.75, linoleic 12.2-14.78, pelargonic 1.35, capric 3.29, undecyl 2.9, lauric 2.5, stearic 0.7-2.94;

-furanochromones (xanthotoxin, peucedanin);

Tannins - 0.2%;

-alkaloids - 1.4%. [529].

Wild carrots are **harvested** when fully ripe (cut umbels are dried and threshed). Dry fruits are stored in tightly closed boxes. Pharmacies do not sell the raw material.

Pharmacological properties and uses. Since ancient times, people have noticed that wild carrot seeds have useful and healing properties. It is used as a diuretic, choleric, salt-soluble, antispasmodic, sedative, anti-inflammatory and antimicrobial agent [532].

- In folk medicine , seed infusion is recommended for inflammatory processes and urinary retention. The use of the infusion is an effective prevention of urolithiasis and kidney stones, preventing surgical intervention as it accelerates urine formation and helps to remove sand and small stones from the kidneys. An infused weak decoction of the seeds is used on the recommendation of a doctor to improve digestion in infants. It relieves colic, relieves gas accumulation in the intestines and helps the child sleep well. In case of kidney stone disease, drink an infusion of the fruit, while following a diet, as in case of nephritis.

- Decoction, infusion and powder from the seeds:

- - improve digestion;

- - are a good laxative, anthelmintic, and carminative.

- They are used for:
 - - flatulence;
 - - inflammation of the gallbladder;
 - - cholelithiasis (powder from the seeds on the tip of a knife is washed down with broth, water, taken 3 times a day before meals).
- Preparation and use:
 - - Decoction of seeds: 1 tbsp. spoon of raw materials for 1 glass of water, boil for 1 minute, leave for 2 hours, strain before use, take from 1 tbsp. spoon to 1 glass (depending on the condition) 3 times a day before meals.
 - Infusion in the presence of sand: Place 1 tbsp of seeds in a glass of boiling water, cover and leave overnight. In the morning, strain the infusion, heat it up. Take 3 times a day, 1 tbsp. spoon. If the dose is followed, treatment lasts about 2 weeks [533].

Contraindications: individual intolerance and allergies.

Carrot seed oil, which is obtained by grinding the dry seeds of the plant, is also used as a medicine, as well as in cosmetics and cooking. The finished product is yellow-brown, viscous and has a specific woody-earthy aroma. The benefits of carrot seed oil are obvious: it has a positive effect on the nervous system (it contains B vitamins); it normalizes the water-salt balance with sodium; vitamin E rejuvenates the body; it helps heal wounds; it boosts immunity; it is an antioxidant; it has anti-inflammatory properties.

In **scientific medicine**, the fruits of this plant are used to make various herbal medicines. The analysis of the range of medicinal products available on the modern pharmaceutical market of Ukraine containing wild carrot *Daucus carota* was carried out based on the data of the State Register of Medicinal Products of Ukraine (as of January 2024) and the qualification system ATC (Anatomical Therapeutic Chemical classification system) [534], Compendium [535] and other printed and electronic publications, search scientific databases and resources [536]. The work was carried out using statistical, logical and graphical methods. Marketing research and analysis of the

range of herbal products containing wild carrot seeds were conducted for the products that are allowed for use in Ukraine after their state registration in accordance with the current legislation of Ukraine [537].

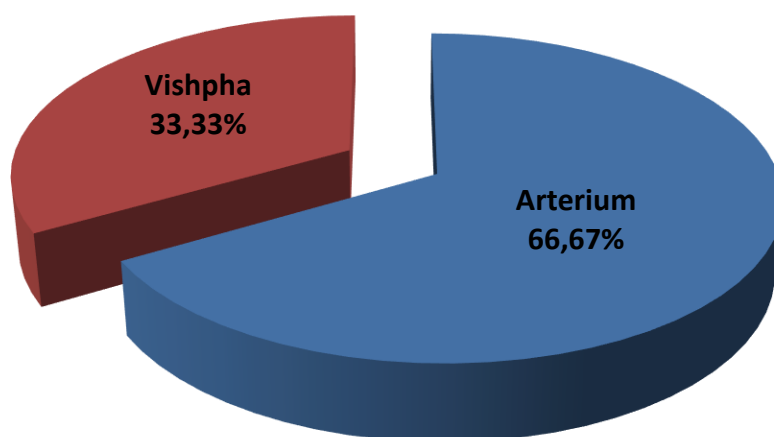
As of January 2024, 3 substances containing wild carrot seeds *Daucus carota* were registered on the pharmaceutical market of Ukraine (Table 1) [534-536].

Table 1: Herbal medicinal products containing wild carrot seeds *Daucus carota* and included in the State Register of Medicinal Products of Ukraine

Name and manufacturer	Pharmaceutical form	Number of forms	The amount of active ingredients in the product	Category
UROLESAN® (Arterium Corporation PJSC "Kyivmedpreparat", Kyiv Kyiv and Galychpharm PJSC, Lviv Lviv)	Oral drops / Syrup / Capsules	3	6/5/5	Diseases of the kidneys and bladder. Treatment of cystitis, pyelonephritis ATC code G04B X
UROCHOLUM (Vishpha LLC "DKP Pharmaceutical Factory", Zhytomyr)	Oral drops / capsules	2	10/11	In case of urolithiasis. Diseases of the kidneys and bladder. Treatment of cystitis, pyelonephritis ATC code G04B X
Cholelesan (Arterium Corporation PJSC "Kyivmedpreparat", Kyiv)	Capsules	1	8	Hepatoprotector. A choleretic agent. To restore liver function. ATC code A05A X.

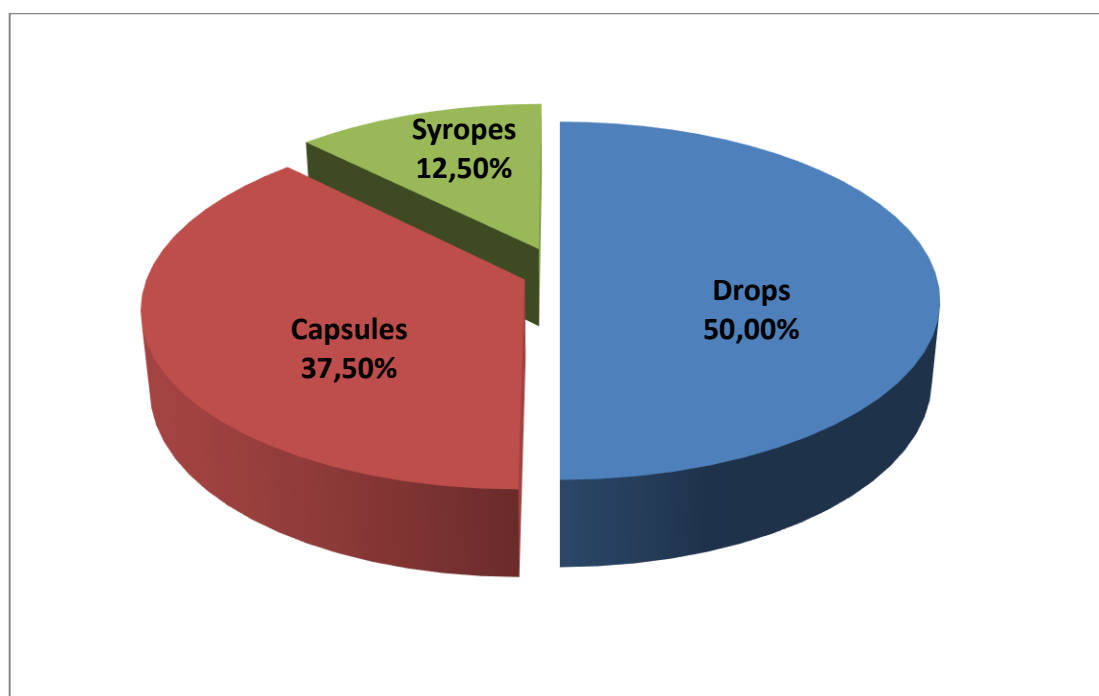
The distribution of registered herbal medicinal products by dosage forms is as follows: capsules - 3, oral drops - 2, syrups - 1. The largest number of dosage forms includes Urolesan (oral drops in 2 types of packaging, syrup and capsules), which makes it possible to prescribe this medicinal product to patients of different age groups. All products are manufactured in Ukraine and all of them are polycomponent (not a single monocomponent), which, given this trend, indicates the expediency of developing new polycomponent products. This is due to the higher efficacy of mixtures compared to single-component products, as several plants enhance each other's action through a synergistic effect.

The first place in the nomenclature of products among all manufacturers of registered herbal medicines containing wild carrot seeds *Daucus carota* belongs to Arterium Corporation (Pic. 2).



Pic. 2. Share of companies manufacturing products containing *Daucus carota*

We have analysed which dosage forms of *Daucus carota* products are currently registered on the Ukrainian market and their range depending on the packaging. The results are presented in Figure 3, which shows that the widest range of herbal medicines made from wild carrot seeds is produced in the form of drops - 50%, followed by capsules - their share is 37.5%. The last place is occupied by syrups - 12.5%, and there are no tablets, solutions for injection, sprays, lozenges and dragees at all.



Pic. 3. Breakdown of medicinal products containing *Daucus carota* by product range.

The analysis of data on the production and distribution of natural medicinal and cosmetic products from the seeds of wild carrot *Daucus carota* showed that only one manufacturer uses this raw material in the Ukrainian market. This is Simona-Life (Kyiv), a manufacturer of natural cosmetics based on natural ingredients [538].

This company produces an oil extract from wild carrot of the following composition: wild carrot (seeds), distilled water, vegetable glycerin, alcohol (as a preservative). Application: 2-4 drops per 30 ml of cream base or liquid.

The manufacturer claims that the use of this oil extract in cosmetology is promising due to the following beneficial properties:

- - relieves irritation and inflammation;
- - gives the skin a healthy colour;
- - tones up the skin and hair;
- - prevents the appearance of wrinkles;
- - Significantly slows down the process of skin aging;
- - moisturises and nourishes the skin with useful elements;
- - provides an excellent, even tan;
- - protects the skin from the effects of harmful ultraviolet radiation;

- - promotes skin elasticity;
- - neutralises free radicals.

Use of carrot seed oil extract for the manufacture of the following cosmetic products

- - creams for oily and problem skin;
- - all kinds of suntan and after-sun products;
- - nourishing and healing products. [538].

Thus, the market research and analysis of the range of medicinal products containing wild carrot seeds *Daucus carota*, which are registered in Ukraine, showed that

1. The range of phytopreparations made from wild carrot seeds is quite wide, and most often the dosage forms are produced in the form of drops (50 %).

2. All the products on the market are multicomponent medicinal products manufactured at Ukrainian enterprises, among which the leader is Arterium Corporation.

3. Most often, medicinal products containing wild carrot seeds *Daucus carota* are used to treat kidney and bladder diseases, as well as cystitis and pyelonephritis.

4. The development of new modern original medicinal and cosmetic products based on wild carrot seeds *Daucus carota* is promising and competitive in the domestic pharmaceutical market. In particular, attention should be paid to the least numerous (syrups) or not represented at all forms (tablets, sprays, lozenges and dragees), and especially to the development of new cosmetics based on oil from the seeds of wild carrot *Daucus carota*.