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ZH.A. TURDIYEVA[1], M.YU. ISHMURATOVA[2], G.A. ATAZHANOVA[1]
[1]NJSC"Karaganda Medical University", 100000, Republic of Kazakhstan, Karaganda, Gogol str. 40
[2]NJSC"Buketov Karaganda University", 100028, Republic of Kazakhstan, Karaganda, Universitetskaya str. 28, campus 3

MORPHOLOGICAL STUDY OF THE AERIAL AND UNDERGROUND PARTS OF FERULA SOONGARICA PALL. EX SPRENG.GROWING IN THE TERRITORY OF CENTRAL KAZAKHSTAN

Resume: *The work is devoted to the study of the morphological features of the aerial and underground parts of the herb Ferula soongarica Pall. ex Spreng. using Digital Microscope Levenhuk DTX 30.*
Keywords: *Ferula soongarica, macroscopic indicators, stems, shoots, shoot pubescence, inflorescence form.*

Ж.А. Тұрдиева[1], М.Ю. Ишмуратова[2], Г.А. Атажанова[1]
[1]«Қарағанды медицина университеті» КЕАҚ, 100000, Қазақстан Республикасы, Қарағанды қ., Гоголь көш. 40
[2]«Бөкетов атындағы Қарағанды университеті» КЕАҚ, 100028, Қазақстан Республикасы, Қарағанды қ., Университетская көш. 28, кампус 3

ОРТАЛЫҚ ҚАЗАҚСТАН АУМАҒЫНДА ӨСЕТІН FERULA SOONGARICA PALL. EX SPRENG. ЖЕР ҮСТІ ЖӘНЕ ЖЕР АСТЫ БӨЛІКТЕРІН МОРФОЛОГИЯЛЫҚ ЗЕРТТЕУ

Түйін: Жұмыс Digital Microscope Levenhuk DTX 30 көмегімен Ferula soongarica шөптерінің жер үсті және жер асты бөліктерінің морфологиялық ерекшеліктерін зерттеуге арналған.
Түйінді сөздер: Жоңғар Феруласы, макроскопиялық көрсеткіштер, сабақтар, өркендер, өркендердің түктенуі, гүлдену формасы.

Ж.А. Турдиева[1], М.Ю. Ишмуратова[2], Г.А. Атажанова[1]
[1]НАО «Карагандинский медицинский университет», 100000, Республика Казахстан, г. Караганда, ул. 40
[2]НАО «Карагандинский университет имени Букетова», 100028, Республика Казахстан, г. Караганда, ул. 28, кампус 3

МОРФОЛОГИЧЕСКОЕ ИССЛЕДОВАНИЕ НАДЗЕМНОЙ И ПОДЗЕМНОЙ ЧАСТИ FERULA SOONGARICA PALL. EX SPRENG., ПРОИЗРАСТАЮЩАЯ НА ТЕРРИТОРИИ ЦЕНТРАЛЬНОГО КАЗАХСТАНА

Резюме: Работа посвящена изучению морфологических особенностей надземных и подземных частей травы Ferula soongarica с помощью Digital Microscope Levenhuk DTX 30.
Ключевые слова: Ферула джунгарская, макроскопические показатели, стебли, побеги, опушение побегов, форма соцветия.

Introduction. One of the main objectives of the State Program of Industrial Innovative Development of the Republic of Kazakhstan for 2015-2019, 2020-2025 is to reduce the import of medicines, increase domestic production capacity, raw material and scientific and technical potential. Thus, one of the most promising objects for research is Ferula soongarica. The species Ferula soongarica Pall. ex Spreng. belongs to the Apiaceae family, whose plants are of interest as sources of medicinal preparations and widespread in Kazakhstan. There are 48 species of Ferula in Kazakhstan [1]. It has pronounced healing properties. The roots of the plant contain about 120 components.

Ferula has a peculiar life cycle that lasts from 6-7 years or more. Throughout its life, the plant accumulates nutrients in the root in order to use them in one year for the formation of the stem and generative organs. Once it blooms, it bears fruit and dies off - this is a typical monocarpic plant. Almost all types of Ferula are well propagated by seeds.

Since ancient times, Ferula has been used in folk medicine of various peoples and states (in Central Asia, Iran, China, India, etc.) for the treatment of various diseases. Ferula root resin is used for medicinal purposes. In Ferula roots can be found: glycosides; tannins; polysaccharides; resins; essential oils; organic acids (oxalic, formic, linoleic, palmitic, oleic); phytosterol; steroids; saponins; alkaloids; carotenoids; starch; coumarins; carbohydrates; nitrogen-containing compounds.

Ferula also contains polysaccharides, which form the basis of

the plant cell. In plants, they perform a wide variety of functions, many of them have a pronounced physiological activity. In this regard, of particular interne stare polysaccharides containing glycuronic acids residues in their structure and belonging to such classes of plant polysaccharides as pectins, gums and mucus. Carotenoids contained in the plant participate in photosynthesis during seed maturation, performing light-harvesting and protective functions specific for photosynthetic tissues. In dormant seeds, carotenoids help to maintain the structural integrity of membranes and provide protection against the destruction of reserve nutrient compounds. Carotenoids are a nessential component of the pigment systems of all photosynthetic organisms. In the process of photosynthesis, there are four main functions that carotenoids perform: antenna (light-harvesting), antioxidant, photoprotective and structural [2].
The main medicinal component is air-dried milky juice (gum) obtained from the roots of the plant. Alcohol tinctures are made from it in the pharmaceutical industry - tinctures, water infusions, emulsions, pills used for nervous diseases, hysteria; anti-asthma, cough, anticonvulsant pills, tablets that improve digestion. Many drugs were created from Ferula of various species, which are currently widely used in medicine, for example, 1.0% diversolide ointment (from Ferula diversivittata Regel &Schmalh.) is effective in the treatment of traumatic corneal eye erosions. Ferula is widely used in gynecology and urology. When using agents based on this plant as an addition to the main course of treatment, the tendency to recovery is noticeably accelerated. In women, omic helps to cure mastopathy, fibroids, endometritis, cycle disorders, diseases of the reproductive organs. In men, the plant helps to improve potency, helps to accelerate the treatment of prostate adenoma. Children prone to frequent colds or with established diagnoses of abnormalities in the functioning of the organs of the respiratory system are recommended to take Ferula in the form of decoctions or compresses. Due to the ability to improve immunity and normalize the functioning of internal systems, the plant will increase the level of health of the child and have a preventive effect on the growing body [3, 4].
In the anatomical and biomedical study of Ferula diversivitata Regel & Schmalh., the antibacterial activity of this species, which is characteristic of some plants of Turkmenistan, was revealed. In this regard, a targeted search for new drugs based on Ferula soongarica should be considered an urgent and promising direction in the practical aspect [5, 6].
The aim of our study was to analyze the macroscopic parameters of Ferula soongarica and to identify the diagnostic features of plants.
Materials and methods. The objects of the study were the aerial and underground parts of the plant. The aerial part of the plant was collected in the flowering phase, the place of collection was the steppe areas in the vicinity of the village of Matak (Karkaraly district, Karaganda region), July 2021. The underground part of the plant and mature fruits were collected in the phase of dying off of the aerial organs, the place of collection was the vicinity of the village of Matak (N 49.700735, E 74.657787), September 2021.
During the analysis of morphological indicators, we studied the features of growth, appearance, shape, surface structure, color of shoots, leaves, fruits, roots, inflorescences and flowers. Samples of raw materials were analyzed using a Levenhuk DTX 30 Digital Microscope, the resulting photographs were processed in the Paint 10.1 program.
When describing the morphology, the principles set forth in the works of V.N. Vekhov, L.I. Lotova were used [9].
Results and discussion. Table 1 summarizes the macroscopic description of the aerial and underground organs of Ferula soongarica.
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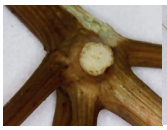
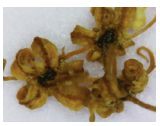
Conclusion. Thus, the following diagnostic features of raw materials at the macroscopic level were defined:
1 Stems: the shape and arrangement of the leaves on the stem, the branching of the shoots in the upper part, their color, the ribbing of the surface and the absence of pubescence.
2 Leaves:the shape and size of the leaf blades, the degree of dissection - triple-dissected, the color of the surface is green, the shape of the edge is even, the absence of pubescence, the surface structure is smooth and dull.

Figure 1- Flowering plant Ferula soongarica, internal view

Table 1 - Morphological indicators of the aerial and underground organs of Ferula soongarica

Indicators	Description
Shoots	  Stems are up to 1.7 m tall, loosely branched in the upper part. Stem diameter is from 0.5 to 3 cm; surface finely ribbed, smooth, glabrous. Young shoots at the top may have rare curly trichomes. The color in the upper part is brown, in the middle and lower part - light green or yellow. Stems at fracture are white or yellowish.
Shoot pubescence	Shoots are glabrous
Leaves	 Basal and lower stem leaves on short leafstalks, the plate is ovate, heart-shaped at the base, the top is obtuse, the edge is finely dentated. The middle leaves are larger, the upper ones are sessile. Petiolate leaves are large, up to 80 cm long, five- or six-fold pinnately dissected; terminal lobules - linear, long, up to 4-6 mm wide.
The structure of leaf upper side	 The upper side is green or dark green, scabrous, with an indistinct mid-rib, pubescence consists of rare simple trichomes.
The structure of leaf lower side	 The lower side is dark green, scabrous, with a more prominent mid-rib; rare simple trichomes are noted.
Inflorescence form	 Inflorescences are apical. Umbels of two types: central on more shorter legs, 10-20-rayed, 4-5 cm in diameter; lateral umbels - on long legs, 15-20-flowered. All umbels have a wrapper of five grassy leaves, their shape is lanceolate. The surface is scabrous, color - brown-green.
Flower	 Flowers are androgynous; calyx teeth are very short, petals - oblong-ovate, up to 1-1.5 mm long, yellow, with brown colored central stripe.
Fruits	 The fruit is a cremocarp, which, upon maturation, splits into two single-seeded mericarps with very wide marginal ribs. The shape is elliptical, flat-compressed from the back. The ribs are filiform, the tubules between the ribs are single, on one side - 4, on the other - 2. Color - brown or yellow-green.
Underground part	 The underground part is represented by a strongly overgrown napiform root; the cervix is separate, densely shrouded in brown fibers of dead leaves. At the fracture, the root is yellowish, breaking up into separate fibers.
Habitat	Grows in mountains, low-hill terrain, on steppe grassy slopes, in small hills, among meadow steppes and in thickets of bushes.

3 Inflorescence: large, type - complex umbel, apical, consists of 4 to 10-12 whorls, length from 5 to 10 cm, width 1.2-2 cm, whorls contain 1-2 bracts.

4Flower: shape and color of the corolla (flower is actinomorphic, corolla of 5 free petals, bright yellow), diameter 1-1.5 mm.

5 Fruit: fruit shape - elliptical, compressed, surface structure - finely ribbed, scabrous, color - from yellow to brown-yellow and yellow-green.

6 Roots: surface structure - gray-brown with peeling bark; the structure of the inner part is fibrous, loose, painted in white-yellow color.

The analysis of morphological indicators and diagnostic features of the plant was carried out. Distinguishing features have been established that make it possible to distinguish Ferula soongarica from other representatives of this genus.

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Сведения об авторах:
Турдиева Ж.А. - докторант 2 года обучения специальности 8D07201 – «Технология фармацевтического производства», НАО «Медицинский Университет Караганды», г. Караганда, e-mail: turdieva.janel@mail.ru, тел: +7 778 357 13 45
Ишмуратова М.Ю. - кандидат биологических наук, профессор кафедры ботаники НАО «Карагандинский Университет имени Е.А. Букетова», г. Караганда, e-mail: margarita.ishmur@mail.ru , тел: +7 777 354 91 91
Атажанова Г.А. - доктор химических наук, профессор школы фармации, НАО «Медицинский Университет Караганды», г. Караганда, e-mail: g-atazhanova@mail.ru , тел: +7 701 779 29 65