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FERULA FERGANENSİS O'SIMLIGII ILDIZ QISMINING KIMYOVIY TARKIBI VA BIOLOGIK AKTIVLIGI.

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Annotatsiya: Maqolada *Apiaceae* oilasiga mansub *Ferula ferganensis* o‘simligining tabiatda tarqalishi va tashqi ko‘rinishi haqida, kimyoviy tarkibi va dorivor maqsadlarida qo‘llanilishi hamda maqolada o'simlikning gul va poyasidan olingan ekstraktlarning kimyoviy tarkibi haqida ma’lumotlar berilgan.

Kalit so'zlar: *Ferula ferganensis*, sesquiterpenol, karotin, *β*-sitosterin, *β*-stigmasterin, ferutinin, tenuferidin va ferrugin.

ХИМИЧЕСКИЙ СОСТАВ И БИОЛОГИЧЕСКАЯ АКТИВНОСТЬ КОРНЕВОЙ ЧАСТИ *FERULA FERGANENSIS*.

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Аннотация: В статье представлены сведения о распространении и появлении в природе растения *Ferula ferganensis*, относящегося к семейству

Зонтичные, его химическом составе и применении в медицинских целях, а также о химическом составе экстрактов, получаемых из цветков и стеблей растения.

Ключевые слова: *Ferula ferganensis*, сесквитерпенол, каротин, *β*-цитостерин, *β*-стигмастерин, ферутинин, тенуферидин и ферругин.

CHEMICAL COMPOSITIONS AND BIOLOGICAL ACTIVITY OF THE ROOT PART OF *FERULA FERGANENSIS*.

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Annotation: The article provides information on the distribution and appearance of the *Ferula ferganensis* plant belonging to the *Apiaceae* family in nature, its chemical composition and medicinal uses, and the chemical composition of the extracts obtained from the flowers and stems of the plant.

Key words: *Ferula ferganensis*, sesquiterpenol, carotene, *β*-cytosterin, *β*-stigmasterin, ferutinine, tenuferidine and ferrugine.

Acces

Since ancient times, *Ferula ferganensis* has been known as a medicinal plant and used for medicinal purposes. Even Avicenna wrote about it as an effective remedy against worms [1].

Literatures analysis

Today, the pharmaceutical market is the most dynamic and fastest growing market in the world. Increasing the well-being of the population, the environmental situation in the modern world, the increase in the population, the aging and obesity

of the population serve to increase the demand for medicines, including herbal medicines. The popularization and development of herbal medicines has helped to expand a significant share of the pharmaceutical market. In recent years, due to the continuous growth of consumers' interest in herbal pharmaceutical products, the large-scale study and introduction of new types of medicinal plant materials and the creation of local competitive drugs based on them and the relevance of production is increasing. A wide range of pharmacological activity, long-term availability in all age groups and the presence of sufficient effectiveness determine the wide use of phytopreparations [1-2]

Figure 1. *Ferula ferganensis* is a flowering plant belonging to the *Apiaceae* family.

Ferula (Latin *ferula*, "stick") - about 200 species belonging to the umbrella family (*Apiaceae*), 104 species in Central Asian Republics, more than 50 species in Uzbekistan, mainly in the Mediterranean Sea, North Africa, Western, Central and Eastern Asia distributed in temperate climates. The life form of *Ferula* is represented by thick and tall perennials, often 1-4 meters in height. They are herbaceous perennials with thick, hollow, slightly watery stems. The leaves are triangular or more finely divided and attached to the stem. The leaves are mostly basal, collected in a basal rosette, covered with a triangular plate. Leaves 1-3.5 mm long, flat or pressed along the central vein. The column is short, rarely thickened [3-4].

Flowers are usually yellow, rarely white, produced in large umbels. Many plants of this species, especially, are called "giant fennel", although they are not

strictly fennel. Umbels are of two main types: in the first case, central umbel with bisexual flowers, lateral with male or mixed; in the second case, all umbrellas are the same. Flowers are complex, clustered in umbels, unisexual or bisexual, pale yellow in color. It blooms in March-April, the fruits consist of pistachios and ripen in April-May. Based on the external climatic conditions, the growing part of the plants continues to grow for 1.5-2 months [5-6].

MATERIALS AND METHODS

The *Ferula ferganensis* plant was extracted in 96% and 70% alcohol. The resulting alcohol extract was divided into fractions. The antioxidant andantimicrobial activity of extracts and fractions was prepared and studied.

Experiment part:

Antioxidant Activity. *The* DPPH was used to determine free radical scavenging activity as previously described by Shimada et al. [4]. About 3.94 mg of DPPH was first dissolved in 100 mL of ethanol to a concentration of 0.1 ml. About 1 mL of DPPH solution was added to 3 mL of the samples with different concentrations (250, 125, 62.5, 31.25, and 15.62 μg/mL). For the control test, the same amount of ethanol was added. All the mixture was mixed well by shaking vigorously and left to stand for 30 minutes at a room temperature. After that, the UV-Vis spectrophotometer was used to measure the value of absorbance of each mixture at 517 nm. e calculation for the percentage of inhibition (*I*%) of the DPPH radical is as follows:

$$\% \text{ Inhibition} = (A - B) / A \times 100\% \quad (1)$$

Note: A = blank absorption B = absorption of test material.

RESULTS AND DISCUSSION

According to the results obtained, the antioxidant properties of *Ferula ferganensis* extracts and fractions showed higher activity than the standard.

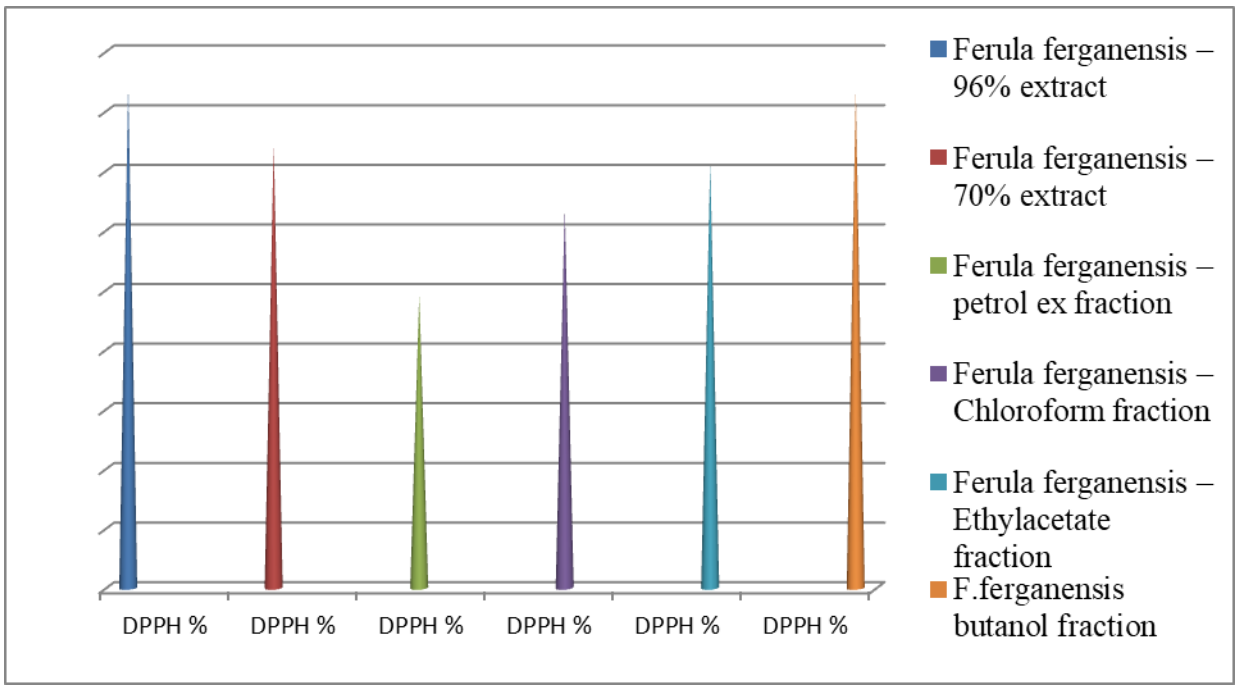

Diagram -1. According to the study, the fractions and extracts of the *Ferula ferganensis* plant have high antioxidant properties as shown in the diagram below.

Antimicrobial activity of the *Ferula ferganensis* plant

Test culture. The antimicrobial activity of plant extracts was determined by the honeycomb diffusion agar method. Gram-positive bacteria ***Staphylococcus aureus, Bacillus subtilis***, gram-negative bacteria ***Escherichia coli, Pseudomonas aeruginosa***, microscopic fungi ***Candida albicans*** test cultures were used for antimicrobial screening. 96% and 70% of the extracts showed above-standard results for ***Candida albicans*** fungus. The following diagram is shown in-2.

Antimicrobial bioassay procedure. Suspensions of all test cultures were set at 1.5 × 108 KOE / ml according to the McFarland Standard. Test cultures were incubated on a surface of Nutrient agar medium for 15 minutes in a thermostat at 37 ° C. The extracts are diluted with DMSO to a concentration of 50 mg / ml. DMSO was taken as a negative control. Extracts diluted with DMSO were placed at 100 µl in the pits formed in the Petri dish. Petri dishes in which test cultures were planted and plant extracts were infused were incubated for 24 h in a thermostat at 37 ° C after incubation, the diameter measuring range of the inhibition zone rings was determined as follows.

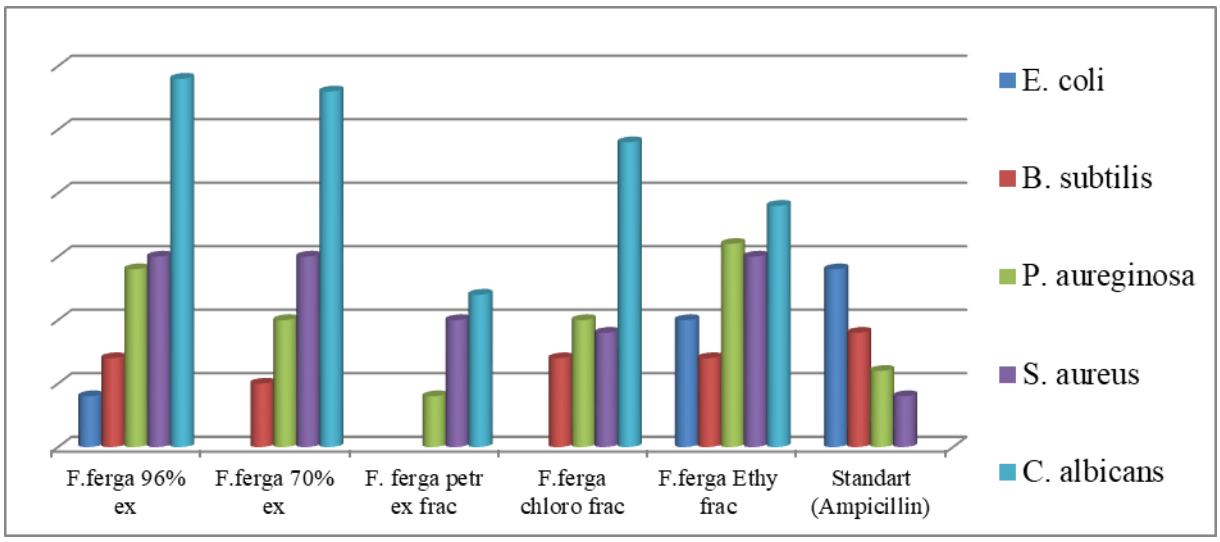

Diagram -2. Extraction and fraction of *Ferula ferganensis* plant has a dual effect on bacteria and fungi.The highest results of antibacterial activity of extracts and fractions of type *Ferula ferganensis* are clearly shown in the following diagram.

F.ferganensis is of scientific and practical importance as it is little studied. Therefore, we aimed to study the biological activity and chemical composition of the *Ferula ferganensis* plant. The isolated compounds were identified using ^{1}H and ^{13}C NMR spectra, which were compared with the literature as well as samples, such as (1) *β*-sitocterin $C_{29}H_{50}O$, (2) *β*-stigmasterin $C_{29}H_{40}O$, (3) ferutinin $C_{22}H_{30}O_4$, (4) tenuferidine $C_{22}H_{30}O_5$, (5) ferugin $C_{22}H_{30}O_5$.

β-sitocterin, *β*-stigmasterin, ferutinin, tenuferidine and ferugin isolated from *Ferula ferganensis* for the first time.

CONCLUSIONS

According to the results obtained, *Ferula ferganensis* extracts and fractions showed higher than standard activity against? ***Bacillus subtillis, Pseudomonas aerugenosa, Escherichia coli, Staphylococcus aureus*** and ***Candida albicans (fungi)***.

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REFERENCES

1. A. U. Babekov, N. M. Yuldasheva, A. M. Ismailova, B. Dzh. Komilov, K. K. Turgunov, B. Tashkhodzhaev, and K. A. Eshbakova. Terpenoids from the plant *Ferula ferganensis.* ***Chem Nat Compd,*** 2022, Vol. 58, No. 5, pp. 967-969. ***Химия природ. соедин.*** 2022, №5, С. 813-814.

2. N.M. Yuldasheva, A.U. Babekov, A.M.Ismailova, B.J. Komilov, K.A. Eshbakova. Terpenoids of the *Ferula ferganensis* // 7th International Symposium on Edible & Medical Plant Resources and the Bioactive Ingredients (ISEPR 2022), 2022, China, Urumqi, 19-20 November

3. Juraev Q. S., Yuldasheva N.M., Eshbakova K. A., Q.D.Davronov. Antimicrobial activity of the *Ferula lehmannii* plant root. Сборник материалов III международной научно-теоретической конференции «Актуальные вопросы естественных наук» 12 мая, 2022 г. Нукус. P.76.

4. Jurayev Q. S., Yuldasheva N. M., Eshbakova K. A., Mamarasulov B. D. Antioxidant activity of the aerial part of *Ferula lehmannii*. According to Resolution No. 1101 of the Cabinet ofMinisters of the Republic of Uzbekistan dated March 7, 2022. Namangan, P. 341-343.

5. Бердиев Э.Т., Ахмедов Э.Т. Табиий доривор усимликлар (укув кулланма). -Тошкент, УзР ФА Минитипографияси, 2017. - Б. 252.

6. Зубайдова Т.М., Джамшедов Дж.Н., и др. О фармакологическом изучении разных видов рода *Ferula* в медицине XX века - Вестник Таджикского Национального Университета. Серия Естественных Наук. 2014. - 1-3. - С.225-229.

CrysAlis PRO, Oxford Diffraction, Agilent Technologies UK Ltd., Yarnton, England, 2009.

13. G. M. Sheldrick, Program for Empirical Absorption Correction of

Area Detector Data, University of Goettingen,
Goettingen, 1996.
14. G. M. Sheldrick, Acta Crystallogr., Sect. A: Found. Crystallogr., 64, 112 (2008).
15. G. M. Sheldrick, Acta Crystallogr., Sect. C: Struct. Chem., 71, 3 (2015).
CrysAlis PRO, Oxford Diffraction, Agilent Technologies UK Ltd., Yarnton, England, 2009.
13. G. M. Sheldrick, Program for Empirical Absorption Correction of Area Detector Data, University of Goettingen,
Goettingen, 1996.
14. G. M. Sheldrick, Acta Crystallogr., Sect. A: Found. Crystallogr., 64, 112 (2008).

15. G. M. Sheldrick, Acta Crystallogr., Sect. C: Struct. Chem., 71, 3 (2015).
CrysAlis PRO, Oxford Diffraction, Agilent Technologies UK Ltd., Yarnton, England, 2009.
13. G. M. Sheldrick, Program for Empirical Absorption Correction of Area Detector Data, University of Goettingen,
Goettingen, 1996.
14. G. M. Sheldrick, Acta Crystallogr., Sect. A: Found. Crystallogr., 64, 112 (2008).
15. G. M. Sheldrick, Acta Crystallogr., Sect. C: Struct. Chem., 71, 3 (2015).
G. M. Sheldrick, Acta Crystallogr., Sect. A: Found. Crystallogr., 64, 112 (2008).

15. G. M. Sheldrick, Acta Crystallogr., Sect. C: Struct. Chem., 71, 3 (2015).