

**DISTRIBUTION AND CONSERVATION STATUS OF *FERULA* L.
SPECIES INCLUDED IN THE RED BOOK OF UZBEKISTAN**

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Abstract: Nowadays, under the influence of humans, abiotic influences and other factors, many plant species are decreasing in number. In such plants, some species of the *Ferula* Tourn. ex L. genus need protection as a result of various biotic and abiotic effects. This article describes the information and analysis results of 9 species of the *Ferula* Tourn. ex L. genus included in the Red Book of Uzbekistan, additional protection measures, status according to the Red Book.

Keywords: *Ferula*, reserve, conservation status, red book.

**O`ZBEKISTON QIZIL KITOBIGA KIRITILGAN *FERULA* L.
TURKUMI TURLARINING TARQALISHI VA MUHOFAZA HOLATI**

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Annotatsiya: Hozirgi kunda insonlar, abiotik ta`sirlar boshqa faktorlar ta`sirida tabiatda ko`plab o`simlik turlari son jihatidan qisqarib bormoqda. Shu kabi o`simliklarda *Ferula* Tourn. ex L. turkumining ayrim turlari turli biotik va abiotik ta`sirlar natijasida muhofazaga muhtoj. Ushbu maqolada O`zbekiston Qizil kitobiga kiritilgan *Ferula* Tourn. ex L. turkumi 9 ta turining, qo`shimcha muhofaza choralari, tarqalish geografiyasi, qizil kitob bo`yicha statusi haqida ma`lumotlar va tahlillar natijalari bayon etilgan.

**Kalit so`zlar:** *Ferula*, qo`riqxona, muhofaza holati, qizil kitob.

РАСПРОСТРАНЕНИЕ И СОХРАНЕННЫЙ СТАТУС ВИДОВ *FERULA* L., ВКЛЮЧЕННЫХ В КРАСНУЮ КНИГУ УЗБЕКИСТАНА

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Аннотация: В настоящее время под влиянием человека, абиотических воздействий и других факторов численность многих видов растений

сокращается. У таких растений некоторые виды род *Ferula* Tourn. ex L. нуждаются в защите вследствие различных биотических и абиотических воздействий. В данной статье приведены сведения и результаты анализа 9 видов род *Ferula* Tourn. ex L., занесенных в Красную книгу Узбекистана, дополнительные меры охраны, статус по Красной книге.

Ключевые слова: *Ferula*, заповедник, высотный регион, охранный статус, красная книга

INTRODUCTION

Nowadays, biologically active substances isolated from natural medicinal plants are less harmful to the human body and have a higher level of effect than chemical preparations for human health. It is considered an urgent issue to increase the stock of medicinal plants, especially to pay attention to the types of plants that need both medicinal and protection. Taking into account this situation, one of the important criteria is the development of various effective protection measures for the species in need of conservation.

Most of the species of the *Ferula* (Apiaceae) family are distinguished by their medicinal properties. Various literatures contain information about the medicinal properties and economic efficiency of *Ferula* species. The territory of Uzbekistan is divided into 2 provinces (Mountainous Central Asia and Turan), 16 botanical-geographic regions, and into 38 districts [6]. The distribution of *Ferula* species in these regions is different. The latest edition of the Red Book of the Republic of Uzbekistan in 2019 lists 9 species of genus *Ferula*. Most of these species are unique and have medicinal properties. In addition, there are species of the *Ferula* Tourn. ex L. genus that are not included in the Red Book but have very high medicinal properties. *Ferula kuhistanica* Korovin. is one of the representatives of the genus *Ferula* Tourn. ex L. It is known from the literature that this species is not inferior to *Ferula tadshikorum* Pimenov in terms of medicinal properties.

MATERIALS AND METHODS.

As a research object, species of the genus *Ferula* Tourn. ex L. included in the "Red Book" of the Republic of Uzbekistan were selected. Analyses of sections of 9 species included in the Red Book were carried out using OriginPro graphic software (Fig. 1). The analysis of the conservation level of the species in the reserves and the graphs were made in the R statistical program. They got acquainted with the herbarium specimens kept in the TASH herbarium fund and obtained the following information based on them: The geography of the 9 *Ferula* Tourn. ex L. species listed in the Red Book and their status in the Red Book were directly used from the "Red Book" of the Republic of Uzbekistan (2019).

Table 1.

***Ferula* Tourn. ex L. species included in the latest edition of the Red Book of Uzbekistan (2019) and its category according to the Red Book.**

No	Name of taxa	status	distribution
1	<i>Ferula sumbul</i> (Kauffm.) Hook. f.	3	Jizzakh, Samarkand, Navoi, Distributed in Kashkadarya and Surkhandarya regions: Nurota, Turkestan, Zarafshan and Hisar ridges. It is also found in Tajikistan.
2	<i>Ferula tuberifera</i> Korovin	3	Surkhandarya region: It is distributed in the southwestern branches of the Khisar range (Ko'hitang, Cho'lbayir).
3	<i>Ferula kyzylkumica</i> Korovin	3	Bukhara, Navoi regions: remains in Kyzylkum; in the mountains (Tomditog, Beltog, Sangruntog, Bokantog, Kuljuktoglar) and distributed in variegated soils.
4	<i>Ferula pratovii</i> F.O. Khass. & I.I. Malzev.	1	Kashkadarya region: distributed in the southwestern branches of the Hisar ridge.
5	<i>Ferula fedtschenkoana</i> Koso-Pol.	2	Kashkadarya, Surkhandarya and Jizzakh regions: Hisar ridge (Upper Kizildarya), Turkestan and Molguzar ridges. Outside Uzbekistan: distributed in Tajikistan.
6	<i>Ferula korshinskyi</i> Korovin.	2	Fergana region: Oloy ridge (Shahimardan). Outside Uzbekistan: widespread in Kyrgyzstan.
7	<i>Ferula vicaria</i> Korovin.	1	It is distributed in the foothills of the Turkestan and Aloy ridges.

8	<i>Ferula helenae</i> Rakhm. & Melibaev	2	Jizzakh region: in Nurota's remnant mountains (Baliklitog, Egarbelistog). spread out.
9	<i>Ferula tadshikorum</i> Pimenov.	3	Kashkadarya and Surkhandarya regions: distributed in the southwestern branches of the Khysar ridge and in Bobotog. Outside Uzbekistan: distributed in Southern Tajikistan.

The status of plants included in the Red Book is represented by numbers 0,1,2,3. 0-lost or unlikely to be lost; 1- endangered species; 2-rare; 3 is decreasing in number. [5].

RESULTS

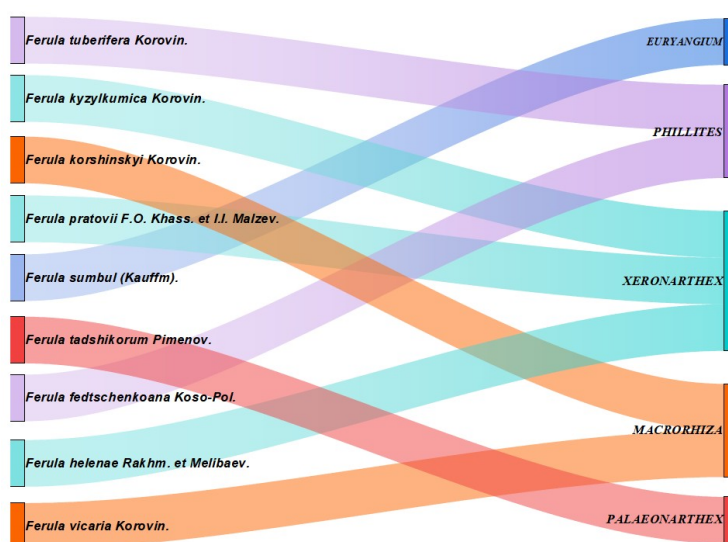


Figure 1. Distribution of species included in the Red Book by sections.

The conservation status of the species included in the Red Book was studied from the literature, and as a result, it was determined which of them are protected and for which protection measures should be developed (Fig. 2).

In addition, the process of collecting DNA materials from representatives of this group, which is not subject to protection, but has high economic and economic importance, can be valuable raw materials for the food and pharmaceutical industry (*Ferula kuhistanica* Korovin). In the future, molecular analyzes will be carried out on these species.

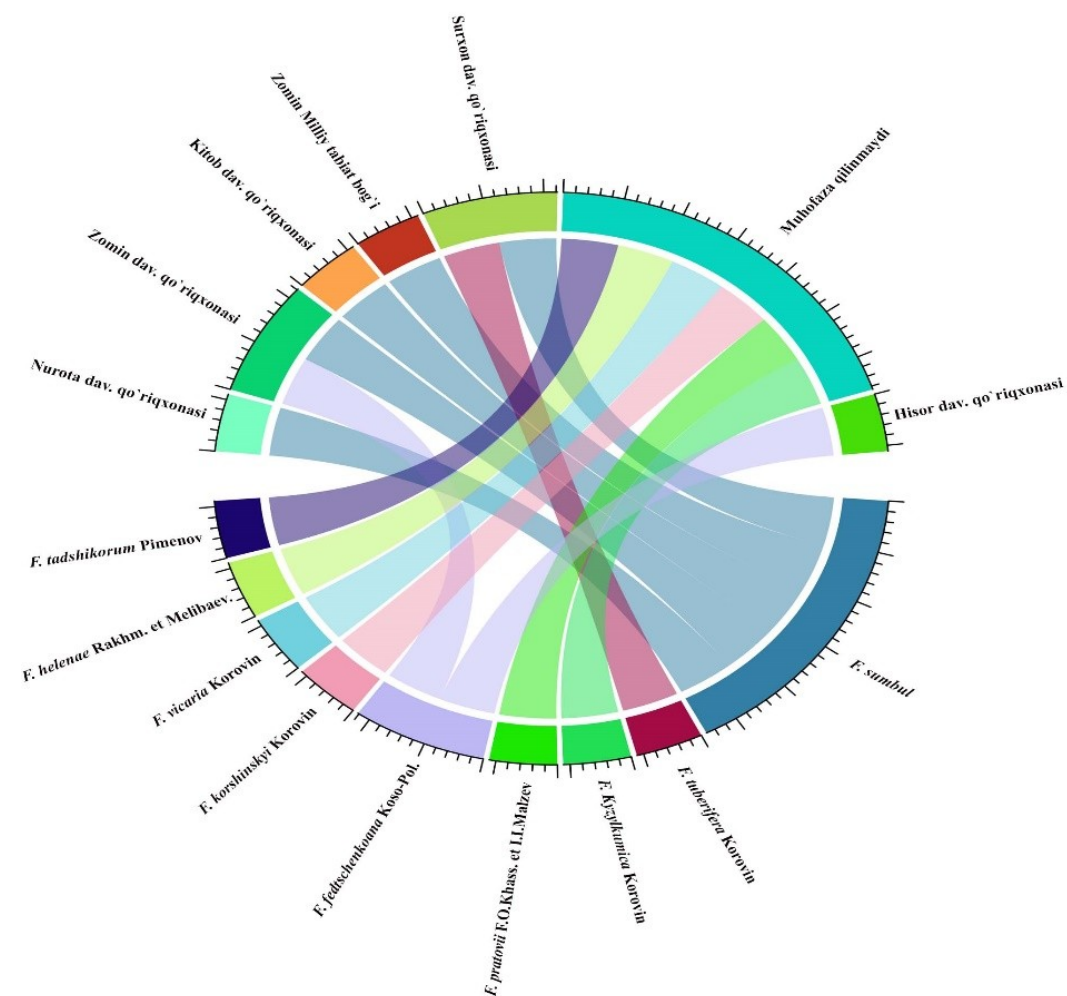


Figure 2. Conservation status of *Ferula* Tourn. ex L. species included in the Red Book.

As can be seen from the diagram, among the protected species, *Ferula sumbul* is protected in several nature reserves. The diagram also reflects information about species for which protection measures have not been developed or are not protected in special reserves, national nature parks. In particular, the species *F. tadshikorum*, *F. helenae*, *F. vicaria*, *F. korshinskyi*, *F. pratovii* and *F. kyzylkumica* form a group under the status of non-protected species in the diagram. This graph (Chorddiagram) was created using R statistical software.

As can be seen from the map, the species *F. pratovii*, *F. korshinskyi*, and *F. tadshikorum* are distributed in a very small area. Among the species included in the

Red Book, *Ferula kyzylkumica*, which has the widest distribution area, can be seen in the regions of Navoi, Zarafshan, and Bukhara.

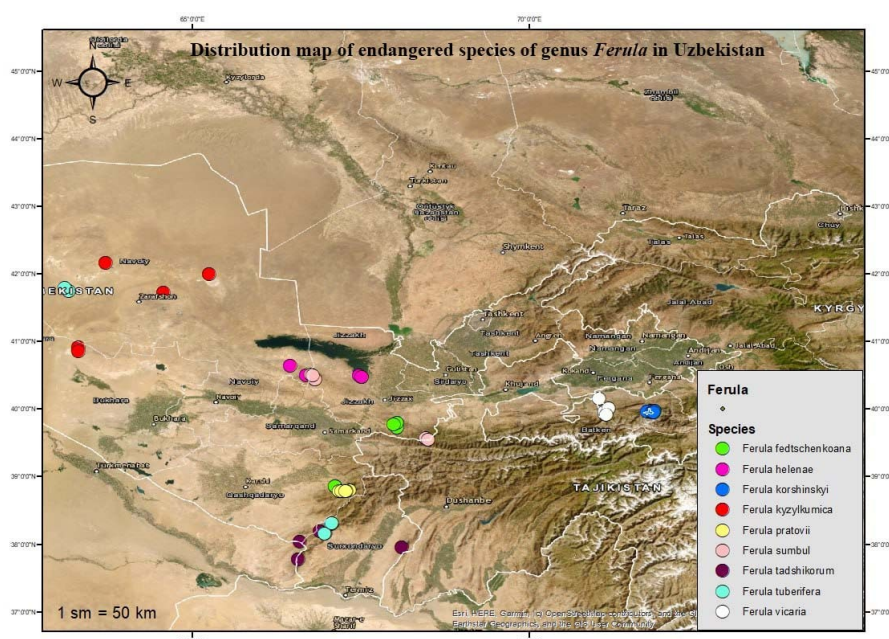


Figure 3. Distribution geography of *Ferula* Tourn. ex L. species included in the Red Book of Uzbekistan.

Protection measures: As protective measures, using the bioclimatic modeling scenarios for the above-mentioned species, it is possible to establish small protected zones in the areas favorable for these species, and in order to ensure the density and stability of individuals, it is possible to plant seeds of plant species and create plantations. In addition, planting seeds under optimal conditions in accordance with the scenarios for *F. tadshikorum*, *F. helenae*, *F. vicaria*, *F. korshinskyi*, *F. pratovii* species, for which special protection measures have not been developed, and strict must control of the dynamics of the resulting populations.

CONCLUSION

In order to further strengthen the protection of *Ferula* Tourn. ex L. species included in the Red Book, it is necessary to use methods of high accuracy and speed of identification using the molecular-ecological diagnostic method. Among the species of the category, it is appropriate to control the natural populations of species that are not included in the Red Book but have high economic efficiency.

The most endangered species in terms of their status in the Red Book should be bred *in vitro* and returned to nature. Protection measures have not been developed for 6 species of the *Ferula* Tourn. ex L. genus included in the Red Book (according to the 2019 edition of the Red Book of Uzbekistan). *Ferula* Tourn. ex L. is the most endangered among the species: *Ferula pratovii* F.O. Khass. et I.I. Malzev., *Ferula vicaria* Korovin.

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References

1. Lei Yang, Ozodbek Abduraimov, Komiljon Tojibaev, Khabibullo Shomurodov, Yuan-Ming Zhang and Wen-Jun Li "Analysis of complete chloroplast genome sequences and insight into the phylogenetic relationships of *Ferula* L".
2. Lei Yang, Hikmat Hisoriev, Parvina Kurbonova, Mariyo Boboev, Kobil Bobokalonov, Ying Feng, Wenjun Li. "High genetic diversity and low differentiation of endangered *Ferula tadshikorum* M. Pimen. in Tajikistan". Global Ecology and Conservation journal homepage: www.elsevier.com/locate/gecco
3. F. Djumaniyozova, 2I.U. Mukumov, 3T.Kh. Mukimov, 1K.T. Ismoilov "Distribution of the genus *Ferula* L. In the flora of Uzbekistan" Turkish Online Journal of Qualitative Inquiry (TOJQI) Volume 12, Issue 10, October 2021: 2116-2127.
4. O.K. Khojimatov, Rainer W. Bussmann and D.T. Khamraeva "Some aspects of morphobiology, conservation of resource potential, crop cultivation and harvesting of raw materials of promising *Ferula* species" Ethnobotany Research & Applications 22:31 (2021)
5. O`zbekiston Respublikasi "Qizil kitobi" 2019. 4-b
6. K.Sh. Tojibaev, N.Yu. Beshko, V.A. Popov, Jang C.G. and Chang K.S "Botanical Geography of Uzbekistan" 2016.
7. plantarium.ru
8. powo.org

9. Каримов Б.К., Аромов Т.Б. Распространение видов *Ferula* L. в Гиссарском государственном заповеднике (Узбекистан) // Материалы X-ой Международной конференции «Экологические особенности биологического разнообразия» 2023, Душанбе. – С. 21-22.