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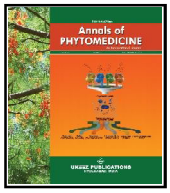

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The current state of endemic species, *Iris magnifica* (Vved.) F.O. Khass. (Iridaceae) in Kashkadarya region of Uzbekistan

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Abstract

The current state of *Iris magnifica* (Vved.) F.O. Khass. has been studied for the first time in the north-eastern part of Aknausai of Kashkadarya region in Uzbekistan. A list of 74 plant species with the participation of this species is given. The described grass-wormwood-shrub community (*Lonicera nummulariifolia, Amygdalus spinosissima, Cotoneaster multiflora, Artemisia tenuisecta, Hordeum bulbosum, Hypericum perforatum, Prangos pabularia, Rheum maximowiczii*) with the participation of *Iris magnifica* is very rich in species composition, the total number of species is 74, of which 4 are trees, 9 shrubs, 3 semi-shrubs, 43 perennials, 15 annuals. It should be noted that the predominance of perennial plants is a characteristic feature of the mountain systems of Central Asia. The edifiers of the studied community are: *Lonicera nummulariifolia, Amygdalus spinosissima, Cotoneaster multiflora, Ceracus erythrocarpa* and *Spiraea hypericifolia*, which are found with an abundance of sp1. In the first tier, trees - *Malus sieversii, Pyrus regelii* and *Acer semenovii* with a height of 1.5-3 m, as well as shrubs - *Crataegus turkestanica* and *C. pontica* met singly with a height of 1.5-2 m. Among the semi-shrubs, wormwood species - *Artemisia tenuisecta* (cop1) and *A. ferganensis* (sp2-sp3) with a height of 50-60 cm prevail. The object of the *Iris magnifica* study met with an abundance of sp2. Since there was an abundant occurrence of young individuals in this territory, *Iris magnifica* can be recommended for moving from the 2nd to the 3rd status in the Red Book of the Republic of Uzbekistan.

1. Introduction

The genus *Iris* L. is the most polymorphic genus in the family of the same name with more than 200 species. Fedchenko and Vvedenskyi in “Flora of the USSR” have been reported 5 genera and 117 species in Iridaceae, which 48 are growing in Central Asia. In the Flora of Uzbekistan, Vvedenskyi distinguished 2 independent genera from it - *Xiphium* Mill. and *Juno* Tratt. Cherneva (1971) in the Determinant of Plants of Central Asia were reported the genus *Iridodictyum* Rodion. with 2 views. One of the last large - scale revisions of the genus *Iris* was carried out by *P. wendelbo* in Flora Iranica, where he combined all 3 genera into genus *Iris* and were reported 45 species for this territory. Recent DNA based studies have been confirmed the correctness of this concept (2011). Without a doubt, the territory of Central Asia and, including Uzbekistan can be considered as one of the largest centers of biodiversity of the *Iris* species. The composition of the genus *Iris* is mainly represented by endemics of the Mountain-Middle Asian province (Khassanov and Rakhimova, 2012).

The problem of conservation and rational use of the gene pool of plants, including endemic and rare, has now acquired urgent importance. The expansion of the exploitation of plant resources has caused individual plant communities and their components to undergo changes, and some plant species are close to extinction. Especially vulnerable were endemic and rare plant species with high decorative qualities. The places of growth of these species are very limited and are further reduced as a result of ruthless destruction during flowering. Changes in the habitat conditions of endemic and rare species under the influence of anthropogenic factors can lead to a reduction in the range. In order to preserve plant species whose condition in nature causes serious concern, as well as for the rational use of plant resources, it is necessary to consider all plant species in need of protection. For this purpose, an inventory of rare species in need of protection is regularly carried out to include them in the Red Book (http://ekois.net/).

Species of the genus *Iris* have long been introduced into culture (including breeding) like beautiful decorative plants with a rich range of flower colors. Many species of the genus were used as medicinal plants, in perfumery, as well as technical raw materials (leaves, rhizomes and roots). The main use of iris is in decorative floriculture everywhere in the world (*iris, crocus, gladiolus, sisirinchium, ixia, tigridia, freesia, etc.*). The rhizomes of some iris, for example, *Iris florentina* L., find medical use. Dried stigmas of the flowers of *Crocus sativus* (*Crocus sativus* L.) give an expensive spice saffron. Many plants of the family contain essential oils, and alkaloids are found in some (https://ru.wikipedia.org/wiki/). The use of irises for a variety of diseases of the liver, gastrointestinal tract and throat allows bitterness and essential oil, which are contained in the root and are a powerful antiseptic. All the healing

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properties that iris possesses are associated with a unique essential oil and many other chemical elements that are contained in the root of the plant. And rice oil has a wide application in perfumery, cosmetology and Medicine. An increased content of vitamin C was found in the green leaves of the plant. It slows down the premature ageing of biological cells and is a very strong antioxidant (https://polzavred-edi.ru/iris-lechebnye-svojstva-i-protivopokazanija/).

Endemic and rare plants are an important component of flora. Many of them are listed in the Red Books of various regions and are formally protected by law. Almost nothing was known about the actual state of the populations of these species, since there are few studies of endemic and rare plants to date. The work on the study and analysis of the current state of endemics and rare species was carried out for the first time in the Republic of Uzbekistan.

The aim of the study is to study the current state of the red book rare endemic *Iris magnifica* (Vved.) F.O. Khass. in the northeastern part of Aknausai, Chirakchi district, Kashkadarya region (Uzbekistan).

2. Materials and Methods

The object of the study was Iris magnifica Vved., a perennial corm plant listed in the Red Book of Uzbekistan (2019), is an extremely rare endemic of the Zeravshan ridge with status 2. The roots are strongly thickened, fusiform. The diameter of the bulb is 3 cm. The stem is 25-70 cm tall, with leaves spaced; internodes are clearly visible. The leaves are light green, shiny, sickle-shaped, almost bordered on the edge, rough; the lower 3-5 cm wide. It is common in rock cracks and on shallow-earth sites among rocks in the lower belt of the mountains of the Samarkand region. Ecology: in the middle belt of mountains. Area: Endemic to the Zarafshan range (Samarkand Mountains) (Figure 1).

Figure 1: ***I. magnifica*** **in natural growing conditions (Zeravshan ridge, Samarkand Mountains).**

2.1 Research methods

2.1.1 Geobotanical study

Each geobotanical accounting was carried out on an area of 100 m^2 on the basis of generally accepted geobotanical methods (1980). The names of the plants were given on the basis of the latest data from Cherepanov (1995). The life forms of plants were given on the basis of "Flora of Uzbekistan". The abundance of plants was put on the Drude scale.

Below is a map of the distribution of *I. magnifica* in the Flora of Uzbekistan (Figure 2).

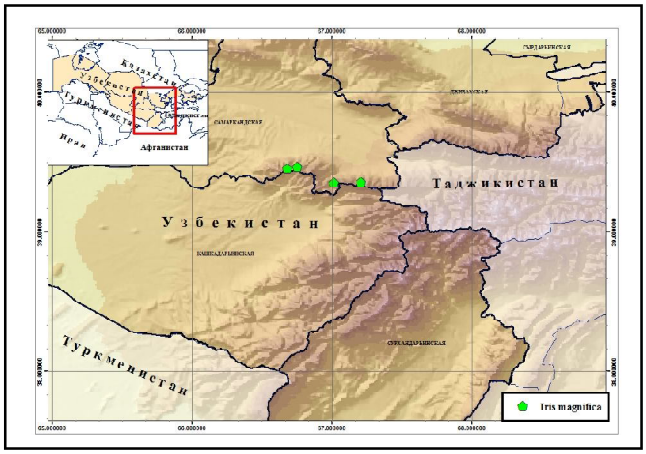

Figure 2: Map of the distribution of ***I. magnifica*** **in the Flora of Uzbekistan.**

3. Results

The grass-wormwood-shrub community described by us (*Lonicera nummulariifolia, Amygdalus spinosissima, Cotoneaster multiflora, Artemisia tenuisecta, Hordeum bulbosum, Hypericum perforatum, Prangos pabularia, Rheum maximowiczii*) with the participation of *I. magnifica* and *I. korolkowii* is located in the north, in the eastern part of Aknausai, Chirakchi district, Kashkadarya region (Zeravshan mountain system). Altitude 1580-1700 m above sea level. GPS coordinates: N39041'77"03 E 66076'18"47. The size of the plot is 50 × 50 sq. m. The soil is stony-gravelly. The projective cover of the soil is 80-85%. The edifiers of this community are: *Lonicera nummulariifolia, Amygdalus spinosissima, Cotoneaster multiflora, Ceracus erythrocarpa* and *Spiraea hypericifolia*, which are found with an abundance of sp1. In the first tier, trees, *Malus sieversii, Pyrus regelii* and *Acer semenovii* with a height of 1.5-3 m, as well as shrubs, *Crataegus turkestanica* and *C. pontica* met singly with a height of 1.5-2 m. Among the semi-shrubs, wormwood species, *Artemisia tenuisecta* (cop1) and *A. ferganensis* (sp2-sp3) with a height of 50-60 cm prevail. The objects of the study *Juno magnifica* and *I. korolkowii* met with an abundance of sp2. From perennial herbs, *Ferula tenuisecta, Eremurus regelii, Hordeum bulbosum, Rheum maximoviczii, Hypericum perforatum* and *Prangos pabularia, etc.*, they are found with an abundance of sp2-sp3.

From ephemeroids, the species *Carex turkestanica* and *Poa bulbosa*, with an abundance of sp1-sp2; from annuals *Astragalus dipelta, Capsella bursa-pastoris, Taeniatherum crinitum, Gentiana olivierii, Veronica cardiocarpa, Anisantha tectorum, Meniocus linefolius* and

Bromus dantoniae, with an abundance of sp1-sp2. This community is very rich in species composition, the total number of species is 74, of which trees-4, shrubs-9, semi-shrubs-3, perennials-43, annuals-15. It should be noted that the predominance of perennial plants is a characteristic feature of the mountain systems of Central Asia.

The list of plants of the grass-wormwood-shrub community with the participation of *I. magnifica* is given below in the table (Table).

Table: List of plants of the grass-wormwood-shrub community with the participation of *I. magnifica*

S. No.	Species	Height, cm	Abundance
	Trees		
1.	*Acer semenovii* Regel et Herd.	400-600	sol
2.	*Malus sieversii* (Led.) M. Roem.	300-500	sol
3.	*Padellus mahaleb* (L.) Vass.	400-600	sol
4.	*Pyrus regelii* Rehd.	200-300	sol
	Shrubs		
5.	*Amygdalus spinosissima* Bunge	150-200	sp_1
6.	*Cerasus erythrocarpa* Nevski	100-120	sp_1
7.	*Crataeguspontica* C. Koch.	300-400	sol
8.	*C. turkestanica* A. Pojark.	300-400	sol
9.	*Cotoneaster multiflora* Bunge	200-300	sp_1
10.	*Ephedra equisetina* Bunge	100-150	sol
11.	*Lonicera nummulariifolia* Jaub. & Spach.	200-250	sp_1
12.	*Rosa maracandica* Juz.	150-200	sol
13.	*Spiraea hypereicifolia* L.	100-150	sp_1
	Semi-shrubs		
14.	*Artemisia ferganensis* H. Krasch.	60-80	sp_2-sp_3
15.	*A. tenuisecta* Nevski	60-80	cop_1
16.	*Acanthophyllum* sp	30-40	sol
	Perennial herbs		
17.	*Acanthophyllum borszczowii* Litv.	30-40	sol
18.	*Achillea filipendulina* Lam.	70-80	sol
19.	*Allium barsczewskii* Lipsky	30-40	sol
20.	*Alcea nudiflora* (Lindl.) Boiss.	100-150	sol
21.	*Artemisia dracunculus* L.	60-90	sp_2
22.	*Arum korolkowii* Regel	10-15	sp_1
23.	*Astragalus eximus* Bunge	50-80	sol
24.	*A. peduncularis* Royle	25-30	sol
25.	*A. sieversianus* Pall.	60-130	sol
26.	*Carex turkestanica* Regel	15-20	sp_2
27.	*Cousinia microcarpa* Boiss.	30-50	sp_1
28.	*C. vicaria* Kult.	60-120	sp_1
29.	*C. umbrosa*Bunge	100-120	sol
30.	*Eminium lehmannii* (Bunge) O. Ktze Regel	20-30	sp_1
31.	*Eremurus regelii* Vved.	150-180	sol
32.	*Ferula tenuisecta* Eug. Kor.	80-100	sp_2

33.	*Gageachomitovae* (Pasch.) Pasch.	10-20	sp_1-sp_2
34.	*Galium pamiroalaicum* Pobed.	50-80	sol
35.	*Gentiana olivieri* Griseb.	15-25	sp_1
36.	*Geranium rotundifolium* L.	10-20	sp_1
37.	*Hypericum perforatum* L.	30-60	sp_2-sp_3
38.	*H. scabrum*L.	30-50	sol
39.	*Hordeum bulbosum* L.	100-120	sp_3
40.	*Inula grandis* Schrenk	120-150	sol-sp_1
41.	*Iris korolkowii* Regel	40-60	sp_2
42.	*Iris magnifica* (Vved.) F.O. Khass. and Rakhimova	20-40	sp_2
43.	*Ixiolirion tataricum* (Pall.) Herb.	30-40	sol
44.	*Lamium album* L.	50-60	sol
45.	*Mentha asiatica* Boriss.	60-100	sp_1
46.	*Onosma dichroantha* Boiss.	20-50	sol
47.	*O. gmelinii* Ldb.	20-50	sol
48.	*Oxytropis pilosissima* Vved.	25-30	sol
49.	*Poa bulbosa* L.	20-35	sp_1
50.	*Prangospabularia* Lindl.	120-120	sp_2
51.	*Pseudosedum longidentatum* Boriss.	25-40	sol
52.	*Ranunculus komarovii* Freyn	35-60	sol-sp_1
53.	*Rhinopetalum stenantherum* Rgl.	10-20	sol
54.	*Rheum maximowiczii* A. Los.	40-50	sp_2
55.	*Stachys betoniciflora* Rupr.	60-70	sol
56.	*Taraxacum montanum* (CAM) DC.	12-15	sol
57.	*Tulipa uzbekistanica* Botschantz. & Scharipov	20-25	sol
58.	*Verbascum songaricum* Schrenk	120-150	sol
59.	*Ziziphora pedicellata* Pazij et Vved.	20-40	sp_1
	Annuals		
60.	*Alyssum desertorum* Stapf.	10-15	sp_1
61.	*Anisantha tectorum* L.	15-20	sp_1-sp_2
62.	*Arenaria leptoclada* Guss.	10-15	sp_1
63.	*Astragalus dipelta* Bunge	20-30	sol-sp_1
64.	*Bromus dantoniae* Trin.	20-40	sp_1-sp_2
65.	*B. oxyodon* Schrenk	20-40	sp_1
66.	*Capsella bursa-pastoris* (L.) Medik.	20-30	sp_1-sp_2
67.	*Dianthus tetralepis* Nevski	30-40	sol
68.	*Papaver pavoninum* Schrenk	20-30	sol
69.	*Phleum alpinum* L.	30-40	sp_1
70.	*Pleconax conica* L.	20-25	sol-sp_1
71.	*Roemeria refracta* DC.	20-30	sol
72.	*Taeniatherum crinitum* (Schreb.) Nevski	15-40	sp_1
73.	*Veronica cardiocarpa* (K. et K.) Walp.	10-15	sp_1
74.	*Bunium capusii* (Franch.) Korovin	20-25	sp_1

4. Discussion

During the last decade (1999-2008), over 90 flavonoid constituents have been discovered and characterized, including 38 new compounds, from 15 species of *Iris*. This review elucidates the structural features of these flavonoid constituents, and gives the details of their source, identification, biological activity and chemotaxonomy significance.

To date, the issues of systematics and taxonomy of most genera of the iris family are very relevant (Rodionenko, 2002, 2005, 2008; Àlexeeva, 2003, 2005, 2008, 2010, 2011, 2013; Khassanov and Rakhimova, 2012; Crespo *et al*., 2018).

Chinese scientists, Hui Wang *et al*. (2010) have provided a checklist of flavonoid compounds in *Iris* by species. Chikhi *et al*. (2012) reported free radical scavenging and antibacterial activity of essential oil and solvent extracts of *Iris planifolia* (Mill.) from Algeria. Phytochemical analysis revealed the presence of flavonoids, terpenoids, saponins, alkaloids and tannins which may be responsible for antimicrobial and antioxidant activities.

Dorofeeva (2013) studied the embryological features of the structure and development of ovules and germ sacs of some species of the genus *Iris* L. *Limniris* (Tausch) Spach.

The phytochemical investigations of various species of *Iris* have resulted in the isolation of variety of secondary metabolites. Approximately, more than two hundred compounds have been reported from the genus *Iris* which includes flavonoids, isoflavonoids and their glycosides, benzoquinones triterpenoids and stilbenes glycosides. This genus is rich in isoflavonoids which have a wide range of biological activity including anti-inflammatory, antioxidant and cancer chemopreventive properties. Nowadays, phytochemical and pharmacological investigations bring new knowledge about chemical compounds in roots, leaves and flowers of the *Iris* species, about their chemical content and possible pharmacological and medicinal usage. The article of Choudhary and Frozen (2017) presents the results of the iris research in last few decades, putting together the information about the isolation of isoflavones and their associated pharmacological activities. The reviews also signify the direct benefits of consumption of isoflavone rich-diet and reduction of various diseases such as cancer, cardiovascular disorder, and osteoporosis or against the bacterial and viral infections.

We have previously studied the morpho-anatomical structure of the vegetative organs of some *Iris* species (*I. sogdiana, I. korolkowii, I. stolonifera, I. alberti*) and *Juno* (*J. svetlanae, J. hippolytii, J. narbuti*) in order to identify diagnostic and adaptive features (Abdinazarov *et al*., 2017; Duschanova *et al*., 2017; 2018; Rakhimova, 2017 a, b; Rakhimova *et al*., 2017; Rakhimova, Duschanova *et al*. 2020).

Kryukova *et al.* (2014) studied the distribution and phytocenotic confinement of rare species of the genus *Iris* L. in the southern Urals (Republic of Bashkortostan). The results of studying the distribution and phytocenotic association of 4 rare species of the genus *Iris, I. humilis* Georgi, *I. pseudacorus* L., *I. pumila* L., *I. scariosa* Willd. ex Link on the territory of the Republic of Bashkortostan are presented.

Features of the reproductive strategy of *Iris (Juno) orchioides* (Carr.) Vved. (Iridaceae) under the conditions of introduction of the Tashkent Botanical Garden studied by Turgunov and Pechenitsyn (2014).

Kryukova *et al*. (2018 a; 2018 b) present the results of studying the biology and ecology of 3 rare species of the genus *Iris* L. (Iridaceae Juss.) in the Southern Urals: *Iris pumila* L., *I. scariosa* Willd. ex Link, *I. humilis* Georgi.

In recent years, taxonomic studies using molecular methods have been conducted to identify phylogenetic relationships within and between genera (Makarevich *et al*., 2001; Ikinci *et al*., 2011; Crespo *et al*., 2018).

Phytochemicals investigations have revealed that the plant extracts are rich in phenolic compounds, especially flavonoids and phenolic acids. As such, they constitute a promising lead for seeking new drugs with high susceptibilities towards various health issues, particularly oxidative-stress-related diseases such as cancers, neurodegenerative diseases, cardiovascular diseases, diabetes, *etc*. (Sohaib *et al*., 2022).

Plant communities are formed by species that differ in their ecological and biological properties and are more often represented by various life forms. Thus, the composition of the plant community of spruce forests includes trees, shrubs, shrubs and grasses. The complex species composition of a community of living organisms is an important factor in increasing the stability of biogeocenosis. In the plant community, there are predominant species that form the bulk of the aboveground organs (dominants), and species that take a relatively small part in its formation. Dominants that have a large environment-forming ability are called edifiers. Mainly due to the vital activity of the latter, a special climate (phytoclimate) and special soil conditions are created in plant communities (https://studme.org/272153/geografiya/rastitelnye_soobschestva). A plant community is a collection of plants growing on the same part of the earth's surface, adapted to living together and influencing each other and the environment. A plant association is a general generic concept that differs not only in volume, but also in its essence. Community is a local, concrete concept, whereas association is an abstract concept, the result of generalization (http://www.bibliotekar.ru/2-7-67-fitocenologiyageobotanika/5.htm).

In the monograph "Vegetation cover of Uzbekistan" (1984), geobotanists described associations with the participation of some objects of research. However, communities with the participation of species *Iris alberti, I. orchioides, I. svetlana, I. maracandica, I. hippolyti* and *I. magnifica* in Uzbekistan have not been studied.

5. Conclusion

Thus, the species *I. magnifica* was first studied in the northeastern part of the Aknausai of the Chirakchi district of the Kashkadarya region in Uzbekistan on a grass-wormwood-shrub community, found with an abundance of sp2 at an altitude of 1580-1700 m above sea level. For the first time, a list of 74 plant species with the participation of *I. magnifica* is given. Since there was an abundant occurrence of young individuals in this territory, *I. magnifica* can be recommended for moving from the 2nd to the 3rd status in the Red Book of the Republic of Uzbekistan.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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