COMPARATIVE ANALYSIS OF ENDEMIC PLANT SPECIES INCLUDED IN THE RED BOOK OF THE REPUBLIC OF UZBEKISTAN ACROSS TASHKENT REGION AND THE FERGANA VALLEY

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Abstract. This article presents a comparative analysis of the distribution, family composition, life forms, mountain-range distribution, and conservation categories of endemic plant species included in the Red Book of the Republic of Uzbekistan for Tashkent region (69 species) and the Fergana Valley (47 species). A total of 116 endemic species were examined, of which 16 occur in both areas. The Fabaceae family leads in Tashkent region with 12 species, while Liliaceae predominates in the Fergana Valley with 9 species. Perennial herbs are the dominant life form in both regions. The Chatkal Range is the richest in endemics within Tashkent region, harboring 44 species.

Keywords: endemic plants, Red Book, conservation category, biodiversity, Western Tien Shan, Pamir-Alay, flora analysis.

Introduction

Uzbekistan is one of the botanically richest countries in Central Asia, harboring more than 4,500 species of vascular plants, over 500 of which are endemic [1]. A substantial share of these endemic species has been included in the Red Book of the Republic of Uzbekistan, and their conservation is of decisive importance for maintaining ecological stability.

Tashkent region and the Fergana Valley rank among the most important botanical areas of Uzbekistan. The mountain ranges of Tashkent region — the Chatkal, Piskom, Ugam, Kurama, and Qurdantov ranges — provide natural habitat for numerous rare and endemic plant species. In particular, 312 endemic species have been recorded in the Chatkal Range, 147 in the Kurama Range, and 135 in the Ugam Range [7]. The Fergana Valley, situated at the foothills of the Alay and Turkestan ranges, is home to a distinctive flora comprising 45 endemic plant species [2].

At present, climate change, anthropogenic pressure, and habitat degradation are causing a steady decline in populations of endemic plants. For this reason, clarifying the distribution of these species, assessing their conservation status, and conducting comparative analyses constitute an important scientific task [5]. The purpose of this article is to provide a comparative analysis of the distribution, family composition, life forms, and conservation categories of endemic plants included in the Red Book of the Republic of Uzbekistan across Tashkent region and the Fergana Valley.

Literature Review

A number of fundamental scientific studies have been conducted on the flora and endemic plants of Uzbekistan. The Red Book of the Republic of Uzbekistan (2019) records 314 plant species belonging to 48 families, of which 262 species, or 83.44%, are endemic [1]. The "Flora Uzbekistana" series prepared by Sennikov (2017) serves as a principal scientific source for the systematic study of the country's plant life [3].

A study by Mirzayeva and Gafurova (2026) analyzed the family composition and distribution areas of monocotyledonous endemic plants included in the Red Book. This study showed that 19.1% of monocotyledonous endemic species belong to the family Liliaceae, distributed mainly across the Western Tien Shan and Pamir-Alay ranges [4].

In an annotated checklist of endemic plants of the Tien Shan mountain system, Tojibaev et al. (2020) established that 320 Tien Shan endemics occur within the territory of Uzbekistan, of which 69 are national endemics unique to the country [7].

In a study of important plant areas (IPAs) of the Fergana Valley, Usmonov et al. (2022) demonstrated the necessity of designating special protected areas for 29 key endemic species found in the valley's northern foothills [6]. Usmonov et al. (2021) investigated the distribution and conservation status of Cousinia knorringiae, establishing that this species occurs in the botanical microrefugia of eastern Fergana and requires international protection [9].

The conservation of endemic plants of the Western Tien Shan — a territory inscribed on the UNESCO World Heritage List — is associated with the occurrence of 54 Red Book plant species in this area [8]. Taken together, these studies confirm the importance of conducting comparative analyses of endemic flora and of developing regional conservation strategies.

Materials and Methods

The Red Book of the Republic of Uzbekistan (2019) served as the primary data source for this study. Data were compiled separately for Tashkent region and the Fergana Valley, recording the following parameters for each species: plant name (Latin), family, life form, conservation category (0, 1, 2, 3), and area of distribution.

The following methods were applied in the analysis: taxonomic analysis, in which species were grouped by family; life-form analysis, distinguishing perennial herbs, shrubs, subshrubs, and bulbous/tuberous herbs; geographic analysis, in which species were distributed across mountain ranges; conservation-category analysis, determining the number of species within categories 0 through 3; and comparative analysis, identifying species common to both regions as well as those unique to each.

Results and Discussion

Based on data compiled from the Red Book of the Republic of Uzbekistan, 69 endemic species were recorded in Tashkent region and 47 in the Fergana Valley, for a total of 116 endemic species analyzed.

Table 1

Distribution of Endemic Species by Conservation Category

No.	Conservation category	Tashkent region	Fergana Valley	Total
1	0 — Extinct	1	2	3
2	1 — Very rare	19	14	33
3	2 — Declining	29	19	48
4	3 — Rare	20	12	32
	Total	69	47	116

According to Table 1, category 2 (declining) species predominate in Tashkent region with 29 species (42.0%), followed by category 3 species with 20 (29.0%) and category 1 species with 19 (27.5%). In the Fergana Valley, category 2 species likewise form the majority with 19 species (40.4%), followed by category 1 with 14 (29.8%) and category 3 with 12 (25.5%). Category 0 (extinct) species were recorded as 1 in Tashkent region and 2 in the Valley.

Table 2

Comparative Analysis of Family Composition of Endemic Species

No.	Family	Tashkent	Valley	Total
1	Fabaceae	12	7	19
2	Liliaceae	10	9	19
3	Apiaceae	7	6	13
4	Asteraceae	7	1	8
5	Lamiaceae	5	2	7
6	Chenopodiaceae	2	4	6
7	Amaryllidaceae	3	3	6
8	Brassicaceae	3	2	5
9	Asphodelaceae	3	1	4
10	Other families	17	12	29
	Total	69	47	116

The family-composition analysis (Table 2) shows that in Tashkent region the family Fabaceae ranks first with 12 species, whereas in the Fergana Valley the family Liliaceae leads with 9 species. The family Chenopodiaceae is represented by 4 species in the Fergana Valley but only 2 in Tashkent region — a pattern likely related to the drier and hotter climate of the Valley.

Table 3

Distribution of Endemic Species Across Mountain Ranges

No.	Mountain range	Tashkent region (no. of species)	Fergana Valley (no. of species)
1	Chatkal Range	44	16
2	Kurama Range	30	16
3	Ugam Range	25	—
4	Fergana Valley plain	—	30
5	Piskom Range	18	—
6	Alay Range	—	17
7	Qurdantov Range	10	—
8	Turkestan Range	—	4
9	Maydontol Range	5	—

The geographic analysis (Table 3) shows that the largest number of endemic species in Tashkent region occurs in the Chatkal Range — 44 species, or 63.8% of the region's 69 species — followed by the Kurama Range (30 species) and the Ugam Range (25 species). In the Fergana Valley, the valley plain (30 species) and the Alay Range (17 species) are the richest areas. The Chatkal Range also leads among the 16 species shared by both regions.

Table 4

Life-Form Composition of Endemic Species

No.	Life form	Tashkent (species)	(%)	Valley (species)	(%)	Total
1	Perennial herb	51	73.9	28	59.6	79
2	Bulbous and tuberous herbs	12	17.4	8	17.0	20
3	Shrub	10	14.5	9	19.1	19
4	Subshrub	5	7.2	4	8.5	9
5	Annual herb	—	—	3	6.4	3

The life-form analysis (Table 4) shows that perennial herbs dominate in both regions: 51 species (73.9%) in Tashkent region and 28 species (59.6%) in the Fergana Valley. Bulbous and tuberous herbs — represented by genera such as Tulipa, Eremurus, and Iris — also constitute a considerable share in both regions. Annual herbs were recorded only in the Fergana Valley, with 3 species, reflecting the lower-elevation climatic conditions of the Valley.

Table 5

Endemic Species Shared Between Tashkent Region and the Fergana Valley

No.	Species (Latin name)	Category
1	Aconitum talassicum Popov	3
2	Allochrusa gypsophiloides (Regel) Schischk.	3
3	Dracocephalum komarovii Lipsky	2
4	Eremurus robustus Regel	3
5	Hedysarum angrenicum Korotkova	1
6	Iris winkleri Regel	2
7	Lomatocarpa korovinii Pimenov	1
8	Parrya kuramensis Botsch.	1
9	Parrya saxifraga Botsch. et Vved.	2
10	Tulipa dasystemon (Regel) Regel	3
11	Tulipa dubia Vved.	3
12	Tulipa greigii Regel	3
13	Tulipa kaufmanniana Regel	3
14	Tulipa vvedenskyi Botschantz.	3
15	Ugamia angrenica (Krasch.) Tzvelev	2
16	Wikstroemia alberti (Regel) Domke	3

As shown in Table 5, 16 species occur in both regions. Among these, representatives of the genus Tulipa are the most numerous, with 5 species. Species restricted to Tashkent region alone number 53 (76.8% of the regional total), while species restricted to the Fergana Valley alone number 31 (66.0% of the Valley's total). This pattern clearly demonstrates the floristic distinctiveness of the two regions.

Conclusion

Based on the comparative analysis conducted, the following conclusions can be drawn:

First, 69 endemic species were recorded in Tashkent region and 47 in the Fergana Valley, for a total of 116 species, of which 16 occur in both regions.

Second, with respect to conservation categories, category 2 (declining) species form the majority in both regions, indicating that endemic plants remain under persistent threat.

Third, in terms of family composition, Fabaceae predominates in Tashkent region while Liliaceae predominates in the Fergana Valley.

Fourth, the geographic analysis shows that the Chatkal Range, with 44 species, is the richest area in Tashkent region, while the valley plain, with 30 species, is the richest in the Fergana Valley.

Fifth, perennial herbs predominate in both regions, accounting for 59–74% of all recorded life forms.

These findings can serve as a scientific basis for the conservation and monitoring of endemic plants and for expanding the network of specially protected natural areas.

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