

## Flora of Andijan Region and Its Taxonomic Analysis

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### Abstract

*This article presents a comprehensive scientific analysis of the composition, taxonomic structure, and structural characteristics of the flora of the Andijan Region. Based on long-term field investigations, herbarium materials, and international digitized data sources, it was established that the regional flora comprises 653 species belonging to 341 genera and 67 families. The results of the taxonomic analysis indicate the predominance of low-diversity and moderately polymorphic families and genera, while the leading families account for the major proportion of the total number of species. The obtained findings provide an important scientific basis for assessing the biological and ecological significance of the flora of the Andijan Region, its conservation, and for conducting future comparative floristic studies.*

Keywords: Andijan Region, flora, anthropogenic factor, taxonomic analysis, family, genus, species, biodiversity.

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### 1. Introduction

The flora of any region is formed in close connection with its geographical location, climatic conditions, geomorphological structure, and the degree of anthropogenic impact. The Andijan Region is located in the eastern part of Uzbekistan, within one of the most densely populated areas of the Fergana Valley, and is characterized by a close interaction between natural and artificial landscapes.

The climate of the region has subtropical features and is characterized by hot summers, relatively mild winters, and a high proportion of irrigated lands. Such environmental conditions create favorable prerequisites for the formation of plant diversity. At the same time,

agricultural activities, urbanization processes, and intensive use of land resources exert strong anthropogenic pressure on the regional flora.

As noted by Shcherbakov and Mayorov (2006), the flora of the Andijan Region belongs to the group of artificial floras and is classified among floras of limited territories. Nevertheless, to date, targeted and comprehensive floristic and taxonomic studies of this region have not been sufficiently conducted. This circumstance makes the scientifically grounded study of the regional flora, determination of its taxonomic composition, and assessment of its current state a highly relevant scientific task.

### 2. Methods

In determining the composition of the flora of the Andijan Region, long-term field investigations conducted by the author served as the primary source of data. During fieldwork, plant specimens were collected from various ecotopes, prepared as herbarium samples, and systematized.

In addition, specimens collected from the territory of the Andijan Region and stored in international herbarium collections (AA, LE, MW, TASH, NY, K, P, and others), digitized herbarium data, and georeferenced information resources were used. All identified species were confirmed by herbarium specimens, ensuring a high level of reliability of the research results.

Taxonomic identification of plants was carried out in accordance with the international APG IV system (2016). The taxonomic analysis included the assessment of relationships among families, genera, and species, as well as the evaluation of structural characteristics and taxonomic richness of the flora.

### 3. Results and Discussion

#### 3.1. General Composition of the Flora of the Andijan Region

The conducted studies revealed that the flora of the Andijan Region consists of 653 species belonging to 341 genera and 67 families. This indicator reflects a relatively high level of taxonomic richness of the regional flora.

Analysis of the proportion of major taxonomic groups showed that spore-bearing plants (Lycophytes) are represented by 2 species belonging to 1 family and 1 genus, while gymnosperms (Gnetophyta) are represented by the same number of taxa. The remaining 649 species belong to angiosperms, indicating the absolute dominance of flowering plants in the floristic composition of the region.

#### 3.2. Proportions of Major Taxonomic Groups in the Flora

The analysis of the ratios of major taxonomic groups in the flora of the Andijan Region revealed patterns typical of other local floras of Central Asia and Uzbekistan. Spore-bearing plants (Lycophytes) and gymnosperms (Gymnosperms – Gnetophyta) are represented by very few species—only 2 species each. This can be explained by the limited distribution of moisture-dependent natural ecotopes and the predominance of anthropogenic landscapes within the region.

The main part of the flora is formed by angiosperms, comprising 649 species and representing the overwhelming majority of the total species diversity. Among flowering plants, eudicots account for 520 species (79.6%), while monocots comprise 129 species (19.7%). The ratio between monocots and eudicots is 1:4.03, indicating that the flora of the region is mainly adapted to arid and anthropogenically transformed environments.

However, as emphasized by Tolmachev (1974), the ratio between monocots and eudicots should not be regarded as an independent and decisive indicator in comparative floristic analyses. A more representative indicator for an objective assessment of the taxonomic structure and evolutionary development of a flora is the number of species per family.

#### 3.3. Taxonomic Structure and Degree of Differentiation of the Flora

In the flora of the Andijan Region, an average of 5.08 genera and 9.74 species per family was recorded (1:5.08:9.74). This indicates a relatively high level of taxonomic richness and differentiation of the flora. These values are comparable to, and in some cases not lower than, those reported for the floras of certain mountainous regions of Central Asia (Kamelin, 1973; Krasovskaya & Levichev, 1986; Batashov, 2016) as well as adjacent local floras (Silant'yeva, 2008; Naumov, 2009).

Such taxonomic characteristics suggest that evolutionary processes in the flora of the Andijan Region have been relatively active and that sufficient ecological niches existed for species differentiation. At the same time, the relatively limited area of the region and the fragmented nature of its landscapes have constrained the development of high polymorphism within genera and families.

#### Analysis of Major Taxa and Families

According to the obtained data, the composition of major taxonomic units in the flora of the Andijan Region was structured in accordance with the international APG IV system (2016) (Table 1). Analysis of the table shows that the classes Monocots and Eudicots constitute the main part of the flora.

Within Monocots, the order Poales and its families Poaceae and Cyperaceae occupy leading positions in terms of species richness. In particular, the family Poaceae is represented by 71 species belonging to 38

genera, reflecting the wide distribution of open areas, irrigated lands, agrocenoses, and meadow landscapes in the region.

Within Eudicots, families belonging to the orders Asterales, Caryophyllales, Lamiales, and Brassicales are predominant. The family Asteraceae, in particular, maintains absolute dominance in the flora, being

represented by 94 species belonging to 52 genera. This indicates the xeromesophytic nature of the regional flora and the wide distribution of species resistant to anthropogenic impact.

**Major taxa and families of the Andijan flora, and the number of genera, species, and specimens represented in them**

Table 1

| №   | Families        | Number of genera | Number of species | Species (%) |
|---|-----------------|------------------|-------------------|-------------|
| <b>Lycophytes</b>                                       |                 |                  |                   |             |
| <b>Subclass Equisetidae</b>                             |                 |                  |                   |             |
| 1   | Equisetaceae    | 1                | 2                 |             |
| <b>Gymnosperms- Gnetophyta</b>                          |                 |                  |                   |             |
| 2   | Ephedraceae     | 1                | 2                 |             |
| <b>Monocots</b>   |                 |                  |                   |             |
| <b>Class Alismatales R.Br. ex Bercht. &amp; J.Presl</b> |                 |                  |                   |             |
| 8   | Araceae         | 1                | 1                 |             |
| 9   | Alismataceae    | 2                | 2                 |             |
|   | Butomaceae      | 1                | 1                 |             |
| <b>Liliales Perleb</b>                                  |                 |                  |                   |             |
| 13  | Liliaceae       | 3                | 17                |             |
| <b>Asparagales Link</b>                                 |                 |                  |                   |             |
| 15  | Ixioliriaceae   | 1                | 1                 |             |
| 16  | Iridaceae       | 1                | 2                 |             |
| 17  | Asphodelaceae   | 1                | 1                 |             |
| 18  | Amaryllidaceae  | 1                | 6                 |             |
| 19  | Asparagaceae    | 1                | 2                 |             |
| <b>Poales Small</b>                                     |                 |                  |                   |             |
| 20  | Typhaceae       | 1                | 3                 |             |
| 21  | Juncaceae       | 1                | 3                 |             |
| 22  | Cyperaceae      | 8                | 19                |             |
| 23  | Poaceae         | 38               | 71                |             |
| <b>Eudicots</b>   |                 |                  |                   |             |
| <b>Ranunculales Juss. ex Bercht. &amp; J.Presl</b>      |                 |                  |                   |             |
| 24  | Papaveraceae    | 6                | 10                |             |
| 25  | Berberidaceae   | 1                | 1                 |             |
| 26  | Ranunculaceae   | 7                | 16                |             |
| <b>Saxifragales Bercht. &amp; J.Presl</b>               |                 |                  |                   |             |
| 28  | Grossulariaceae | 2                | 2                 |             |

| <b>Rosids</b>  |                  |    |    |  |
|--|------------------|----|----|--|
| <b>Zygophyllales Link</b>                            |                  |    |    |  |
| 33   | Zygophyllaceae   | 2  | 2  |  |
|  | Tetradiclidaceae | 1  | 1  |  |
| <b>Fabales Bromhead</b>                              |                  |    |    |  |
| 34   | Fabaceae         | 12 | 42 |  |
| 35   | Polygalaceae     | 1  | 1  |  |
| <b>Rosales Bercht. &amp; J.Presl</b>                 |                  |    |    |  |
| 36   | Rosaceae         | 11 | 13 |  |
| 37   | Elaeagnaceae     | 2  | 2  |  |
| 38   | Rhamnaceae       | 1  | 1  |  |
| 40   | Cannabaceae      | 1  | 1  |  |
| 41   | Moraceae         | 1  | 1  |  |
| <b>Malpighiales Juss. ex Bercht. &amp; J.Presl</b>   |                  |    |    |  |
| 48   | Hypericaceae     | 1  | 1  |  |
| 49   | Violaceae        | 1  | 2  |  |
| 50   | Salicaceae       | 1  | 4  |  |
| 51   | Euphorbiaceae    | 3  | 9  |  |
| 52   | Linaceae         | 1  | 1  |  |
| <b>Geraniales Juss. ex Bercht. &amp; J.Presl</b>     |                  |    |    |  |
| 54   | Geraniaceae      | 2  | 7  |  |
| <b>Sapindales Juss. ex Bercht. &amp; J.Presl</b>     |                  |    |    |  |
| 58   | Nitrariaceae     | 1  | 1  |  |
| 59   | Anacardiaceae    | 1  | 1  |  |
| 61   | Rutaceae         | 1  | 2  |  |
| <b>Malvales Juss. ex Bercht. &amp; J.Presl</b>       |                  |    |    |  |
| 63   | Malvaceae        | 3  | 6  |  |
| 64   | Thymelaeaceae    | 1  | 1  |  |
| <b>Brassicales Bromhead</b>                          |                  |    |    |  |
| 67   | Capparaceae      | 1  | 1  |  |
| 69   | Brassicaceae     | 42 | 69 |  |
| <b>Superasterids</b>                                 |                  |    |    |  |
| <b>Caryophyllales Juss. ex Bercht. &amp; J.Presl</b> |                  |    |    |  |
| 72   | Tamaricaceae     | 1  | 2  |  |
| 73   | Plumbaginaceae   | 1  | 1  |  |
| 74   | Polygonaceae     | 5  | 17 |  |
| 75   | Caryophyllaceae  | 13 | 28 |  |
| 76   | Amaranthaceae    | 16 | 36 |  |
| 77   | Portulacaceae    | 1  | 1  |  |
| <b>Asterids</b>                                      |                  |    |    |  |
| <b>Ericales Bercht. &amp; J.Presl</b>                |                  |    |    |  |

|   |                  |            |            |  |
|---|------------------|------------|------------|--|
| 80  | Primulaceae      | 1          | 1          |  |
| <b>Gentianales Juss. ex Bercht. &amp; J.Presl</b> |                  |            |            |  |
| 81  | Rubiaceae        | 2          | 5          |  |
| 82  | Gentianaceae     | 1          | 1          |  |
| 83  | Apocynaceae      | 2          | 2          |  |
|   | Asclepiadaceae   | 1          | 1          |  |
| <b>Boraginales Juss. ex Bercht. &amp; J.Presl</b> |                  |            |            |  |
| 84  | Boraginaceae     | 13         | 24         |  |
|   | Heliotropiaceae  | 1          | 4          |  |
| <b>Solanales Juss. ex Bercht. &amp; J.Presl</b>   |                  |            |            |  |
| 85  | Convolvulaceae   | 3          | 7          |  |
| 86  | Solanaceae       | 5          | 6          |  |
| <b>Lamiales Bromhead</b>                          |                  |            |            |  |
| 87  | Oleaceae         | 1          | 1          |  |
| 88  | Plantaginaceae   | 2          | 12         |  |
| 89  | Scrophulariaceae | 2          | 4          |  |
| 90  | Lamiaceae        | 20         | 33         |  |
| 91  | Verbenaceae      | 1          | 1          |  |
| 92  | Mazaceae         | 1          | 1          |  |
| 93  | Orobanchaceae    | 2          | 3          |  |
| <b>Asterales Link</b>                             |                  |            |            |  |
| 95  | Asteraceae       | 52         | 94         |  |
| <b>Dipsacales Juss. ex Bercht. &amp; J.Presl</b>  |                  |            |            |  |
| 96  | Caprifoliaceae   | 4          | 9          |  |
| <b>Apiales Nakai</b>                              |                  |            |            |  |
| 97  | Apiaceae         | 20         | 27         |  |
|   | <b>Jami</b>      | <b>341</b> | <b>653</b> |  |

**3.5. Spectrum of Polymorphic Families**

Based on the obtained data, nine polymorphic families comprising more than 20 species each were identified in

the flora. These families collectively include 424 species, accounting for 75.3% of the total number of species. Thus, the main core of the flora is concentrated within a limited number of leading families (Table 2).

**Spectrum of Polymorphic Families**

Table 2

| Family               | Number of genera | Number of species | Species (%) |
|----------------------|------------------|-------------------|-------------|
| <i>Asteraceae</i>    | 52               | 94                |             |
| <i>Poaceae</i>       | 38               | 71                |             |
| <i>Brassicaceae</i>  | 42               | 69                |             |
| <i>Fabaceae</i>      | 12               | 42                |             |
| <i>Amaranthaceae</i> | 16               | 36                |             |

|                        |            |            |             |
|------------------------|------------|------------|-------------|
| <i>Lamiaceae</i>       | 20         | 33         |             |
| <i>Caryophyllaceae</i> | 13         | 28         |             |
| <i>Apiaceae</i>        | 20         | 27         |             |
| <i>Boraginaceae</i>    | 13         | 24         |             |
| <b>Жами 9</b>          | <b>226</b> | <b>424</b> | <b>75.3</b> |

The polymorphic families of the Andijan flora include Asteraceae, Poaceae, Brassicaceae, Fabaceae, Amaranthaceae, Lamiaceae, Caryophyllaceae, Apiaceae, and Boraginaceae. The high taxonomic contribution of these families confirms patterns characteristic of the Mountainous Central Asian floristic province (Tojibaev, 2010).

Following the leading families, a substantial proportion of the flora is formed by moderately polymorphic families. The number of such families is 33, comprising a total of 204 species. In addition, the flora includes low-diversity (monotypic) families represented by only one species; their number reaches 24. This pattern indicates a highly fragmented taxonomic structure of the flora.

### 3.6. Genus-Level Structure and Floristic Fragmentation

The flora of the Andijan Region consists of 341 genera, with an average of 1.91 species per genus. This value reflects the significant contribution of low-diversity genera to the overall floristic composition. In particular, 203 genera are represented by a single species, accounting for the major proportion of all genera in the flora.

At the same time, six polymorphic genera containing more than eight species each were identified, collectively comprising 69 species. The majority of genera in the flora belong to moderately polymorphic groups, including from two to eight species. This pattern indicates that local environmental conditions, natural selection, and anthropogenic influences have played a key role in the formation of the flora.

### 3.7. Anthropogenic Impact and the Role of Adventive Species in Floristic Structure

Anthropogenic factors play a decisive role in the formation and current state of the flora of the Andijan Region. The region is one of the most densely populated areas of Uzbekistan, and intensive land use, large-scale agricultural activities, and ongoing urbanization have led

to substantial transformations of natural ecosystems.

As a result of landscape fragmentation, reduction of natural habitats, and the dominance of artificial agrocenoses, an increasing proportion of adventive and synanthropic species is observed in the flora. Species belonging to the families Asteraceae, Poaceae, Brassicaceae, and Amaranthaceae are particularly notable for their high adaptability to anthropogenic environments.

While the widespread occurrence of adventive species has increased the overall taxonomic richness of the flora, it has also intensified competition with native autochthonous species and, in some cases, has led to the disruption of natural phytocoenotic structures. From the perspective of floristic stability and long-term conservation, this represents a serious scientific and practical challenge.

### 3.8. Ecological Stability and Dynamics of the Flora

Despite the pronounced anthropogenic transformation of the flora of the Andijan Region, a relative stability of its overall taxonomic structure has been maintained. This stability can primarily be explained by the wide ecological amplitude of the leading families and moderately polymorphic genera forming the core of the flora.

The predominance of low-diversity and moderately polymorphic families and genera indicates that evolutionary processes have proceeded under the influence of local environmental conditions. The distribution of species has been determined by the combined effects of climate, soil types, water resources, and human activity.

At the same time, dynamic changes in species composition have been observed in certain ecotopes. In particular, an increase in the number of synanthropic species has been recorded in irrigated lands, along roadsides, and around settlements, while a decline of some mesophytic and xerophytic species has been noted

in natural landscapes. These trends highlight the necessity of developing comprehensive measures for floristic conservation and ensuring sustainable development.

### 3.9. Biogeographical Significance of the Flora of the Andijan Region

The taxonomic structure and spectrum of leading families in the flora of the Andijan Region clearly reflect characteristics typical of the Mountainous Central Asian floristic province. The dominance of families such as Asteraceae, Poaceae, Brassicaceae, and Fabaceae indicates the xeromesophytic and mesophytic nature of the regional flora.

The high proportion of low-diversity genera suggests that geographical isolation and ecological mosaicism played an important role during the historical formation of the flora. This makes the flora of the Andijan Region a valuable model object for comparative floristic studies within Central Asia.

### 4. Conclusion

The conducted research provides a comprehensive and scientifically grounded characterization of the composition, taxonomic structure, and structural features of the flora of the Andijan Region. It was established that the regional flora comprises 653 species belonging to 341 genera and 67 families, with each species confirmed by herbarium specimens, ensuring a high level of reliability of the obtained results.

The taxonomic analysis demonstrated the predominance of low-diversity and moderately polymorphic families and genera, while the leading families form the core of the flora. The proportions of major taxonomic units correspond to patterns typical of other local floras of Central Asia and Uzbekistan.

Despite strong anthropogenic pressure and landscape fragmentation, the species composition and taxonomic structure of the flora of the Andijan Region remain relatively stable overall. The obtained results provide an important scientific basis for floristic conservation, biodiversity preservation, and future comparative floristic research.

### References

1. Ramensky, L.G. (1938). Introduction to Geobotany. Moscow: Selkhozgiz.
2. Korchagin, A.A. (1964). Plant Ecology. Moscow: Vysshaya Shkola.
3. Shennikov, A.P. (1964). Plant Ecology. Leningrad: Nauka.
4. Larcher, W. (1995). Physiological Plant Ecology. Moscow: Mir.
5. Takhtajan, A.L. (1986). Floristic Regions of the World. Leningrad: Nauka.
6. Walter, H. (1973). Vegetation of the Earth. Berlin: Springer.
7. Odum, E.P. (1971). Fundamentals of Ecology. Philadelphia: Saunders.
8. Whittaker, R.H. (1975). Communities and Ecosystems. New York: Macmillan.