



# Ethnobotanical survey of the Ferghana and Andijan regions of Uzbekistan

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## Research

### Abstract

**Background:** This paper provides information on medicinal plants used by the local population of Ferghana and Andijan regions.

**Methods:** Data were collected during the 2022 and 2023 surveys as a result of interviews, rapid assessments, and the collection of field materials. Interviews with the local population were conducted in the form of a questionnaire, with the consent of the informants.

**Results:** During ethnobotanical studies conducted in the Fergana region, a total of 230 ethnobotanical records were documented regarding the use of plants by the local population. These records encompass 182 species belonging to 77 genera from 7 families. The 20 most frequently mentioned species are presented in Table 5. Similarly, our research in the Andijan region documented the use of 125 medicinal plant species belonging to 77 genera from 20 families. A total of 215 ethnobotanical records were collected, with the 18 most frequently mentioned species summarized in Table 5.

**Conclusions:** In the Ferghana region, of the most commonly used medicinal plants, the families *Asteraceae* (60.6%) and *Lamiaceae* (19.4%) are of leading importance, and the genera *Artemisia* L. (17/22.1%) and *Ferula* L. (13/16.8%) are distinguished by the largest number of species with medicinal properties. According to collected data in the Andijan region, species belonging to the *Lamiaceae* family are most often used by the local population for medicinal purposes, which is 25.7% of the total, followed by the *Asteraceae* (8.9%) and *Apiaceae* (6.9%) families. The species of these identified families are often used because of the greatest knowledge of them among the local population and the transmission of this information occurs from generation to generation.

**Keywords:** Ferghana and Andijan regions, medicinal plants, traditional medicine, human diseases, herbal drugs, WHO, JASP, ArcGIS.

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## Background

The Ferghana Valley is of great importance in the socio-economic, cultural, historical life of the peoples living in this region. Ferghana Valley includes 3 regions of the Republic of Uzbekistan - Andijan, Namangan and Ferghana regions, occupying 4.3% of the territory of Uzbekistan, in which 27.2% of its population lives. The Ferghana Valley is characterized by a high population density, the average population density as a whole is approaching 100 people/sq. km, and in the flat part of the valley is more than 350 people/sq. km (in the Andijan region exceeds 500 people/sq. km) <sup>2</sup> and a very high population growth (Dankov 2007).

Due to the high population density and the development of territories for agricultural land, only a very small part of the Ferghana Valley remains untouched. However, despite all these conventions, conducting ethnobotanical research among the indigenous inhabitants of the valley is of great scientific importance, since historically this region is characterized by a high development of agriculture and crop production.

Currently, many researchers are conducting floristic, systematic, geobotanical and environmental studies to identify the floristic composition, the systematic position of some groups of plants, the characteristics of the vegetation cover due to soil degradation, the negative impact of the anthropogenic factor, the position of rare and endemic species (Hoshimov 2023; Akbarova 2024).

But despite these works, the literature lacks full-fledged studies on the ethnobotanical study of the Ferghana and Andijan regions, which was the reason for this study.

## Materials and Methods

### Research area

Ferghana region - located in the east of the Republic, in the south of the Ferghana Valley. It borders with Namangan and Andijan regions in the north, Kyrgyzstan in the south and east, as well as Tajikistan in the west. Area 6800 km<sup>2</sup>. In 2020, the population was 3817000. It consists of 15 districts, 9 cities (Besharik, Margilon, Rishton, Fergana, Yaypan, Kuva, Kuwasoy, Kokand, Hamza), 10 urban-type settlements and 164 rural gatherings. the center is the city of Fergana.

Andijan region - located in the eastern part of the Ferghana Valley. Area 4303 km<sup>2</sup>. The population of 3283800 people (as of January 1, 2022). 11 cities (including 2 cities of regional significance), 79 urban settlements and 455 rural settlements (2022). The center is the city of Andijan.

### Study areas

During the study, interviews were conducted with local residents in 6 districts and 14 villages of the Ferghana region (Fig. 1).

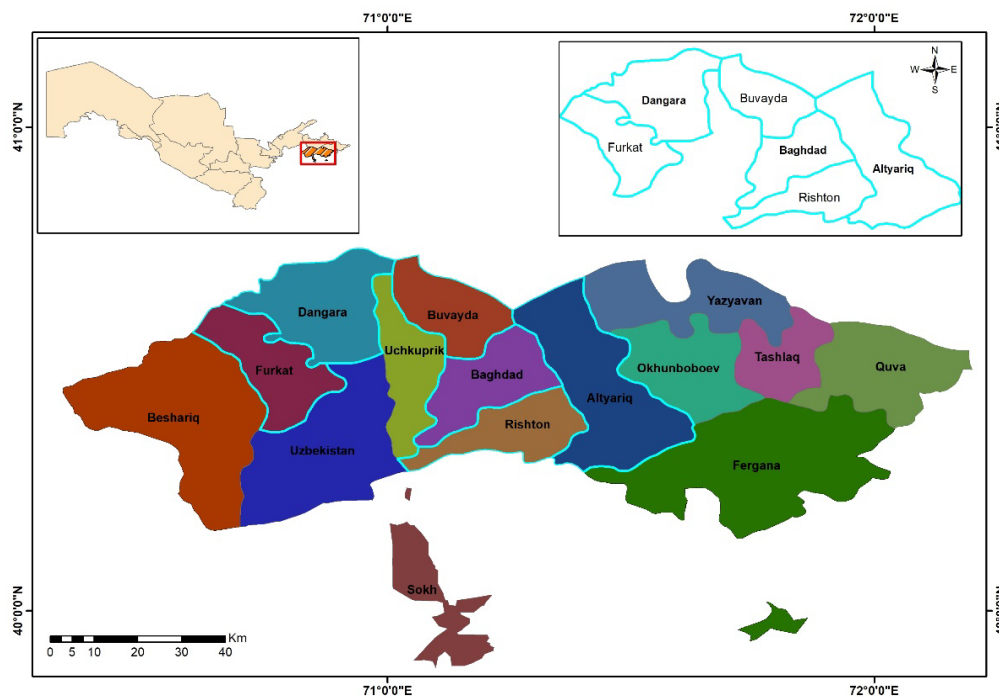


Figure 1. Map of Ferghana region

During the study, interviews were conducted with local residents in 5 districts and 11 villages of the Andijan region (Fig. 2).

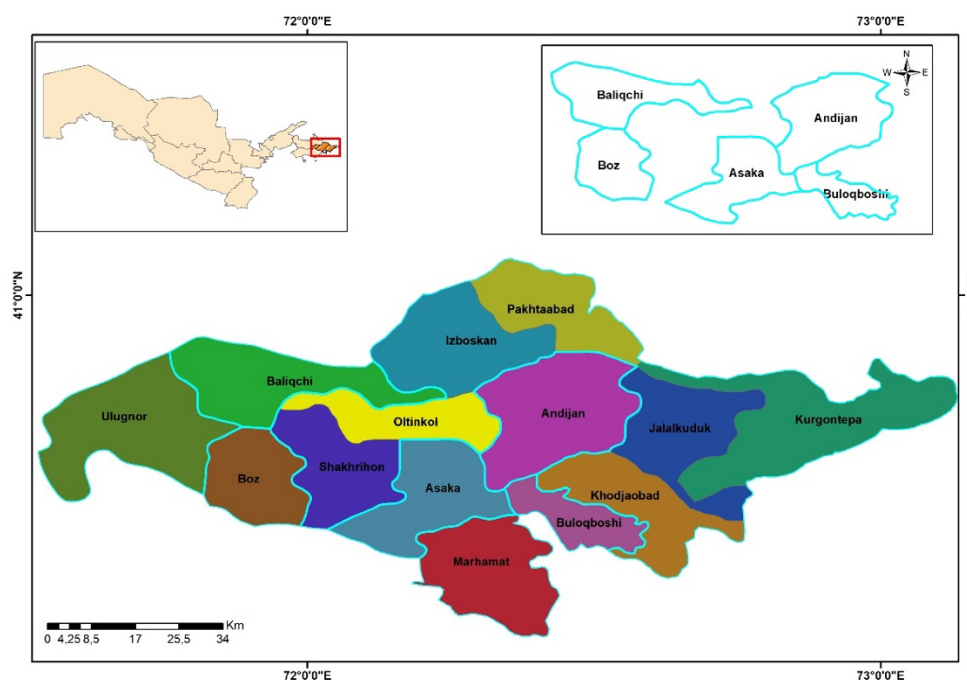


Figure 2. Map of Andijan region

#### Collection of ethnobotanical data.

Data were collected during the 2022 and 2023 surveys as a result of interviews, rapid assessments, and the collection of field materials. Interviews with the local population were conducted in the form of a questionnaire, with the consent of the informants. The interviews were conducted in accordance with the rules of the Code of Ethics (ISE Code of Ethics 2006) established by the International Society of Ethnobiology ([www.ethnobiology.net](http://www.ethnobiology.net)). The research was conducted in the district of Oltiariq, Rishton, Bogdod, Dangara, Buvayda, Furkat of the Fergana region, and Bulokboshi, Andijon, Buzsuv, Asaka, Balikchi or the Andijan region. The demographic distribution of the local population (gender, age, occupation) was also included in the surveys. Ethnobotanical data were obtained through direct observation, field interviews, group interviews, and interviews using open and semi-structured questioning techniques (Martin 1995). The definition of plant species is given according to the botanical nomenclature (<https://powo.science.kew.org/>). Voice messages and video recordings were recorded during the interview with prior consent by the participants. The purpose of the study was explained to each participant, and each participant in the study voluntarily agreed to provide information.

#### Data analysis

JASP version 0.14.1 and MapViewer Demo version 8 were used in the statistical analysis of the collected data and results. Maps of ethnobotanical expeditions and target field research were created in ArcGIS version 10.6.1 (Figure 1, 2). Geographical coordinates reflect the growth points of plants under natural conditions MAPS. Detected using ME (Offline Map & Nav) and Google Earth (Pro 7.1).

#### Identification and storage of plant specimens

Collected plant specimens were converted to herbarium forms, and taxonomic units were centrally identified using the Asian Plant Identifier (Institute of Botany of the Academy of Sciences of the UzSSR 1968-2016). The collected materials were submitted to the TASH database.

#### Quantitative ethnobotanical concepts

##### *Consensus Factor (ICF)*

The data consensus (analytical) factor (Logan 1986), was calculated using the following formula:

$$FIC = \frac{Nur - Nt}{(Nur - 1)}$$

Here, “Light” is the total number of data collected by each disease cluster (informant). “Nt” is the total number of species used for these diseases. This formula has been used in traditional ethnobotany to determine the uniformity of the data of informants (Logan 1986).

#### **Reliability Level (FL)**

$$FL (\%) = (N_p / N) \times 100$$

where  $N_p$  is the number of people who have reported the use of a plant species to treat a particular disease,  $N$  is the number of people who have used plants as a medicine to treat any disease (Friedman et al. 1986).

#### **Usage Value (Uv)**

According to (Friedman et al. 1986), FQ was calculated using the following formula:

$$UV = \sum / N$$

Here, “U” indicates the number of data provided by the informants for a particular species, and “N” indicates the total number of respondents. If a tour provides a multi-use indicator, it indicates that there are many useful reports for that type, and a low indicator means a low number of usage reports provided by the providers.

#### **Relative Frequency of Citation (RFC)**

RFC was calculated as follows:

$$RFC = FC / N.$$

The RFC index (Tardio & Pardo-De-Santayana 2008) is the number of informants that mention a plant species from that species (FC).  $N$  is the total number of informants. If there are no users of the plant (RFC) is "0" and "1" when all data providers call it useful.

#### **Family Importance Value**

The value of family significance (FIV) is calculated according to the following formula:

$$FIV = FC(\text{Family})/N \times 100$$

FC – frequency of plant family citations

$N$  – the total number of informants

The storage status of medicinal plants is given in accordance with the IUCN standard (IUCN 2001). FIV helps to characterize families according to the species of a particular plant family used as a drug (Asghar et al. 2018).

#### **Protection status**

Based on the parts used, the plants were assessed for their storage status according to IUCN criteria. The conservation status of medicinal plants is listed according to the parts they are used for, their lifespan, and the demand in the local and international market (IUCN 2001).

## **Results and Discussion**

### **Fergana region. Demographic classification of interviewed participants**

A total of 142 representatives of the local population from various professions were interviewed in the Fergana region. Of them, 15 (21%) were women and 127 (79%) were men. The interviews were mainly conducted with people of middle and older age who were active in public life and possessed a high level of local knowledge (Figure 3).

During the surveys, medicinal plants used by the local population were mentioned 182 times. Below is the taxonomic structure of the listed plants (Table 1).

In terms of the taxonomic composition of medicinal plants, the most prominent families are *Asteraceae* (60.6%) and *Lamiaceae* (19.4%), while the genera *Artemisia* L. (17 species, 22.1%) and *Ferula* L. (13 species, 16.8%) stand out with the highest number of species possessing medicinal properties (Table 1, Figure 4).

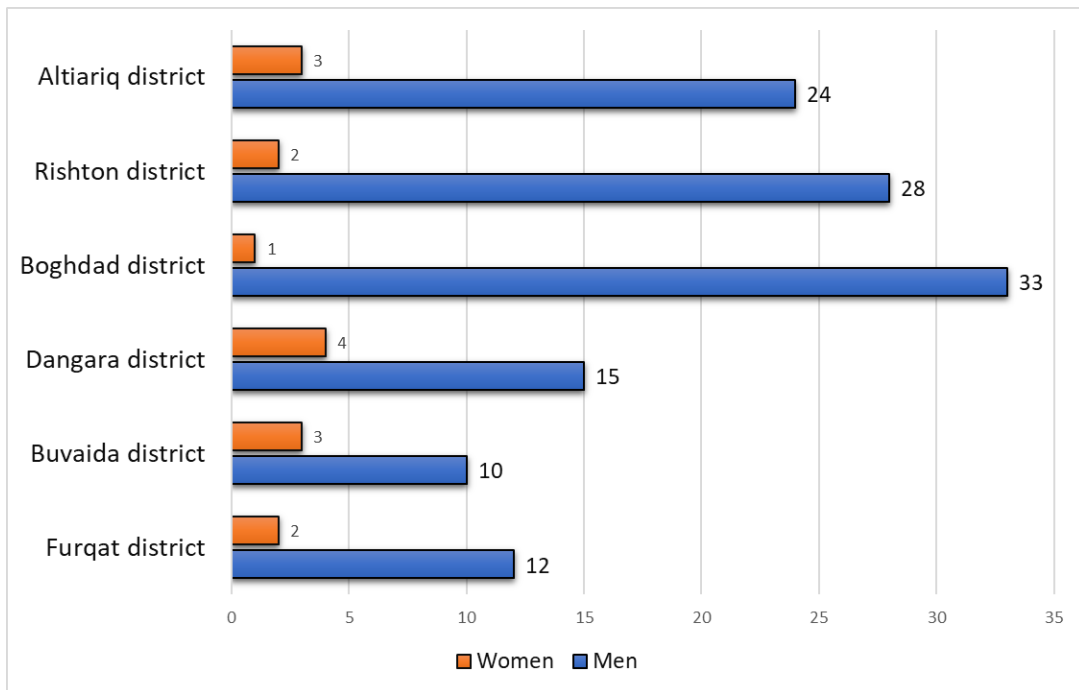


Figure 3. Gender analysis of respondents from the Fergana region.

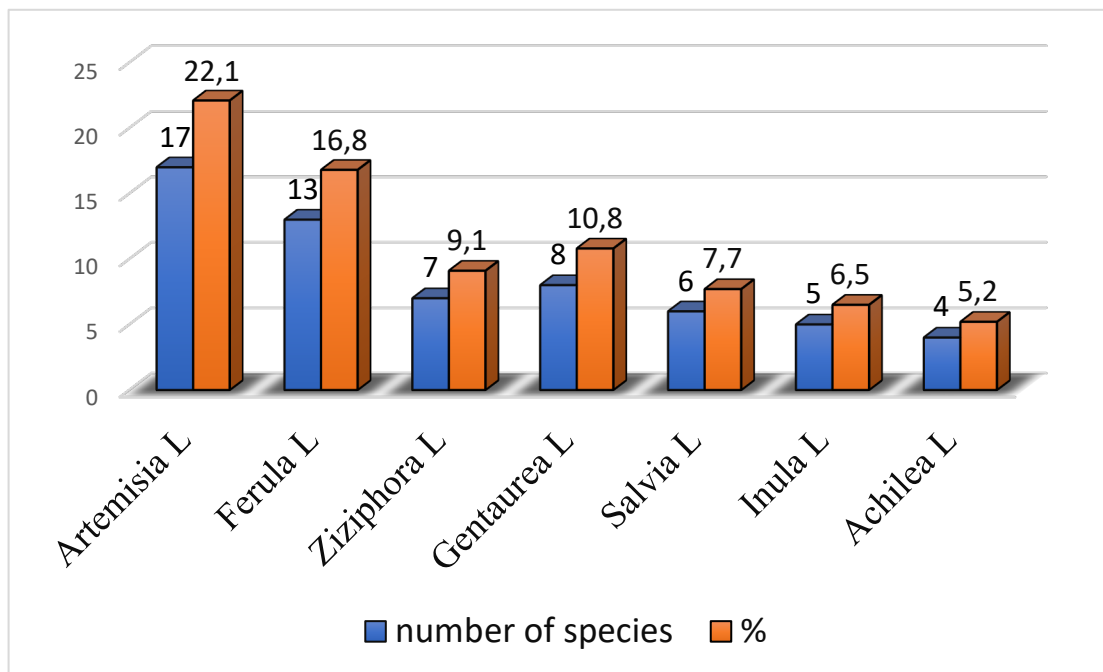


Figure 4. Leading genera of medicinal plants in traditional medicine of the Fergana region.

The analysis results revealed that the most commonly used species for medicinal purposes by the local population belong to the *Lamiaceae* family. Species from this family were mentioned 38 times in the surveys, accounting for 20.8% of the total. The next most common families are *Apiaceae* (17 mentions, 9.3%) and *Capparaceae* (16 mentions, 8.8%). Among the species, the most widely used are *Mentha longifolia* (L.) L., *Capparis spinosa* L., and *Peganum harmala* L.

During the surveys, the majority of mentions regarding the use of medicinal plants came from the Altyaryk (49 mentions, 24%), Buvaida (38 mentions, 21%), and Dangara (31 mentions, 17%) districts. When analyzing the use of plants for specific illnesses, the highest rates in the Rish-ton district were related to digestive disorders. In the Altyaryk and Dangara districts, the most common ailments were those associated with colds. Information on the use of medicinal plants for treating various groups of diseases is provided below (Table 2).

Table 1. Taxonomic analysis of medicinal plants

| Family                  | Genus | Species | Repetition | %    |
|-------------------------|-------|---------|------------|------|
| <i>Amaryllidaceae</i>   | 2     | 2       | 6          | 3.3  |
| <i>Anacardaceae</i>     | 2     | 2       | 4          | 2.2  |
| <i>Apiaceae</i>         | 2     | 2       | 17         | 9.3  |
| <i>Asteraceae</i>       | 6     | 6       | 12         | 6.6  |
| <i>Berberidaceae</i>    | 1     | 1       | 3          | 1.6  |
| <i>Brassicaceae</i>     | 1     | 1       | 7          | 3.8  |
| <i>Capparaceae</i>      | 1     | 1       | 16         | 8.8  |
| <i>Caprifoliaceae</i>   | 1     | 1       | 2          | 1.1  |
| <i>Ephedraceae</i>      | 1     | 1       | 2          | 1.1  |
| <i>Equisetaceae</i>     | 1     | 1       | 1          | 0.5  |
| <i>Fabaceae</i>         | 2     | 2       | 6          | 3.3  |
| <i>Gentianaceae</i>     | 1     | 1       | 8          | 4.4  |
| <i>Geraniaceae</i>      | 1     | 1       | 2          | 1.1  |
| <i>Hypericaceae</i>     | 1     | 1       | 1          | 0.5  |
| <i>Lamiaceae</i>        | 7     | 7       | 38         | 20.8 |
| <i>Lythraceae</i>       | 1     | 1       | 3          | 1.6  |
| <i>Malvaceae</i>        | 1     | 1       | 5          | 2.7  |
| <i>Nitrariaceae</i>     | 1     | 1       | 14         | 7.7  |
| <i>Orchidaceae</i>      | 1     | 1       | 1          | 0.5  |
| <i>Orobanchaceae</i>    | 1     | 1       | 1          | 0.5  |
| <i>Plantaginaceae</i>   | 2     | 2       | 5          | 2.7  |
| <i>Polygonaceae</i>     | 1     | 1       | 4          | 2.2  |
| <i>Portulacaceae</i>    | 1     | 1       | 1          | 0.5  |
| <i>Ranunculaceae</i>    | 1     | 1       | 2          | 1.1  |
| <i>Rosaceae</i>         | 3     | 3       | 12         | 6.6  |
| <i>Scrophulariaceae</i> | 1     | 1       | 4          | 2.2  |
| <i>Solanaceae</i>       | 2     | 2       | 3          | 1.6  |
| <i>Urticaceae</i>       | 1     | 1       | 1          | 0.5  |
| <i>Violaceae</i>        | 1     | 1       | 1          | 0.5  |
| TOTAL                   | 48    | 48      | 182        | 100  |

#### Use of Medicinal Plants for Diseases

Medicinal plants that were frequently mentioned during the survey are used for 10 different diseases (Figure 5). Most medicinal plants are widely used by the local population for ailments such as colds, stomach pain, high blood pressure, and diarrhea. As spices, the following plants are commonly used: *Mentha longifolia*, *Origanum vulgare* subsp. *gracile*, and *Ziziphora pedicellata*. Among the diseases reported in the interviews, cold-related illnesses (36 mentions, 25%) and digestive system disorders (24 mentions, 20%) are the most frequently addressed through the use of medicinal plants.

Table 2. Use of Medicinal Plants for Diseases by Districts of the Fergana Region

| Group of diseases      | Districts |        |         |         |         |         |
|------------------------|-----------|--------|---------|---------|---------|---------|
|                        | Baghdad   | Furqat | Altariq | Buvaida | Dangara | Rishton |
| respiratory organs     |           | 4      | 12      | 11      |         | 9       |
| gastrointestinal tract |           | 2      | 11      | 5       |         | 6       |
| cardiovascular system  | 2         | 3      | 13      | 7       |         | 3       |
| genitourinary system   |           |        | 4       | 4       |         | 2       |
| liver and bile ducts   | 1         | 4      | 4       | 2       |         | 2       |
| gynecology             |           |        |         |         |         | 2       |
| parasitic              |           | 3      | 1       | 1       |         | 2       |

|                       |          |           |           |           |          |           |
|-----------------------|----------|-----------|-----------|-----------|----------|-----------|
| immune system         | 2        | 1         | 3         | 3         | 1        | 4         |
| organs of vision      |          |           | 1         | 2         |          |           |
| teeth and oral cavity |          | 2         | 2         | 3         |          | 1         |
| <b>Total:</b>         | <b>5</b> | <b>19</b> | <b>51</b> | <b>38</b> | <b>1</b> | <b>31</b> |

According to the analysis, 58% of the medicinal plants identified by the local population are used in the form of infusions, while the remaining plants are used as decoctions, ointments, balms, and other forms. When it comes to the plant parts used, the following distribution was observed: Leaf parts - 28%, Underground parts - 7%, Shoots - 27%, Flowers - 10%, Seeds and fruits - 14%, All parts - 14%.

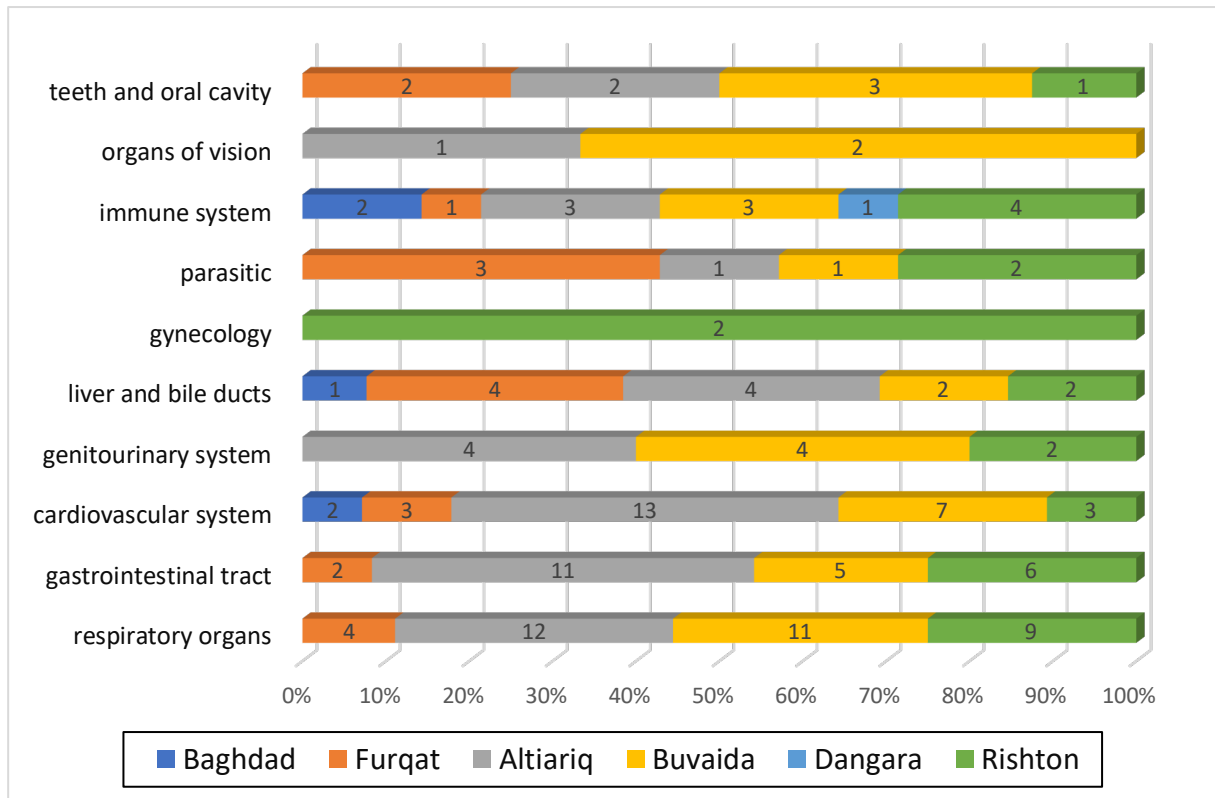


Figure 5. Use of medicinal plants in human diseases.

**Andijan Region. Demographic Classification of Surveyed Participants**

To identify the use of medicinal plants, 178 local residents were surveyed, representing various professions (Table 3). Among them, 42.1% were women and 57.9% were men. The majority of the population willingly agreed to participate in the survey, primarily consisting of middle-aged and elderly individuals who possessed the highest level of knowledge about herbal medicine.

According to the analysis of the survey results of local residents from 5 districts of the Andijan region, the widespread use of medicinal plants was primarily noted in the city of Andijan (55/30.1%), the Asaka district (32/41%), and the Balykchi district (31/41%).

**Taxonomic Analysis of Medicinal Plants**

During the study, 215 ethnobotanical records of medicinal plants were documented, belonging to 20 families, 77 genera, and 125 species (Table 4). According to the ethnobotanical data, species from the *Lamiaceae* family are most frequently used by the local population for medicinal purposes. Species from this family were noted 63 times, accounting for 25.7% of the total. The next highest percentages were for the *Asteraceae* family (8.9%) and the *Apiaceae* family (6.9%).

Table 3. Analysis of Respondents by Gender and Age Composition

| Factors    | Category             | Districts |        |          |         |             | %    |
|------------|----------------------|-----------|--------|----------|---------|-------------|------|
|            |                      | Asaka     | Buzsuv | Baliqchi | Andijan | Buloqboishi |      |
| Gender     | Men                  | 22        | 15     | 21       | 33      | 12          | 57,9 |
|            | Women                | 11        | 17     | 10       | 22      | 15          | 42,1 |
| Profession | Teacher              | 6         | 5      | 6        | 9       | 5           | 17,4 |
|            | Farmer               | 7         | 4      | 7        | 10      | 6           | 19,1 |
|            | Shepherd             | 9         | 6      | 7        | 17      | 5           | 24,7 |
|            | Businessman          | 4         | 7      | 4        | 8       | 4           | 15,2 |
|            | Housewife            | 3         | 5      | 4        | 7       | 4           | 12,9 |
|            | Temporary unemployed | 4         | 5      | 3        | 4       | 3           | 10,7 |
| Age        | <30                  | 3         | 2      | 4        | 6       | 2           | 9,6  |
|            | 30-40                | 5         | 6      | 5        | 9       | 4           | 16,3 |
|            | 40-50                | 11        | 8      | 6        | 15      | 8           | 26,7 |
|            | 50-70                | 11        | 12     | 9        | 23      | 9           | 35,9 |
|            | >70                  | 3         | 4      | 7        | 12      | 4           | 16,9 |

Table 4. Taxonomic analysis of medicinal plants

| Family                | Genera    | Species    | Repetition | %          |
|-----------------------|-----------|------------|------------|------------|
| <i>Amaryllidaceae</i> | 3         | 5          | 11         | 4,5        |
| <i>Anacardaceae</i>   | 2         | 2          | 8          | 3,3        |
| <i>Apiaceae</i>       | 7         | 11         | 17         | 6,9        |
| <i>Asteraceae</i>     | 8         | 13         | 20         | 8,9        |
| <i>Berberidaceae</i>  | 2         | 4          | 9          | 5,3        |
| <i>Brassicaceae</i>   | 5         | 8          | 10         | 4,9        |
| <i>Capparaceae</i>    | 1         | 1          | 14         | 6,5        |
| <i>Caprifoliaceae</i> | 6         | 8          | 4          | 1,6        |
| <i>Ephedraceae</i>    | 1         | 1          | 5          | 2,1        |
| <i>Equisetaceae</i>   | 1         | 1          | 2          | 0,8        |
| <i>Fabaceae</i>       | 8         | 15         | 15         | 6,1        |
| <i>Gentianaceae</i>   | 3         | 5          | 8          | 3,3        |
| <i>Geraniaceae</i>    | 1         | 1          | 2          | 0,8        |
| <i>Hypericaceae</i>   | 1         | 1          | 7          | 2,8        |
| <i>Lamiaceae</i>      | 13        | 17         | 43         | 25,7       |
| <i>Lythraceae</i>     | 1         | 1          | 8          | 3,3        |
| <i>Malvaceae</i>      | 3         | 6          | 11         | 4,5        |
| <i>Polygonaceae</i>   | 2         | 7          | 4          | 1,6        |
| <i>Ranunculaceae</i>  | 4         | 10         | 5          | 2,1        |
| <i>Rosaceae</i>       | 5         | 8          | 12         | 4,9        |
| <b>Total</b>          | <b>77</b> | <b>125</b> | <b>245</b> | <b>100</b> |

The most popular species among the local population are *Mentha longifolia*, *Origanum vulgare* subsp. *gracile*, *Peganum harmala*, and *Ziziphora pedicellata*.



### Use of Medicinal Plants for Diseases

The medicinal plants mentioned in the survey are widely used by the local population for 14 different diseases, including colds, digestive disorders, as antihypertensive and antipyretic agents, and as ingredients in vitamin salad seasonings (Figure 6). Among the registered diseases related to the use of medicinal plants, those associated with blood pressure issues are the most prevalent, occurring 31 times (17%), followed by colds, recorded 22 times (12%). In the Asaka district, plants are mainly used for digestive system disorders, while in the Balykchi and Andijan districts, high usage rates are noted for colds and nervous diseases.

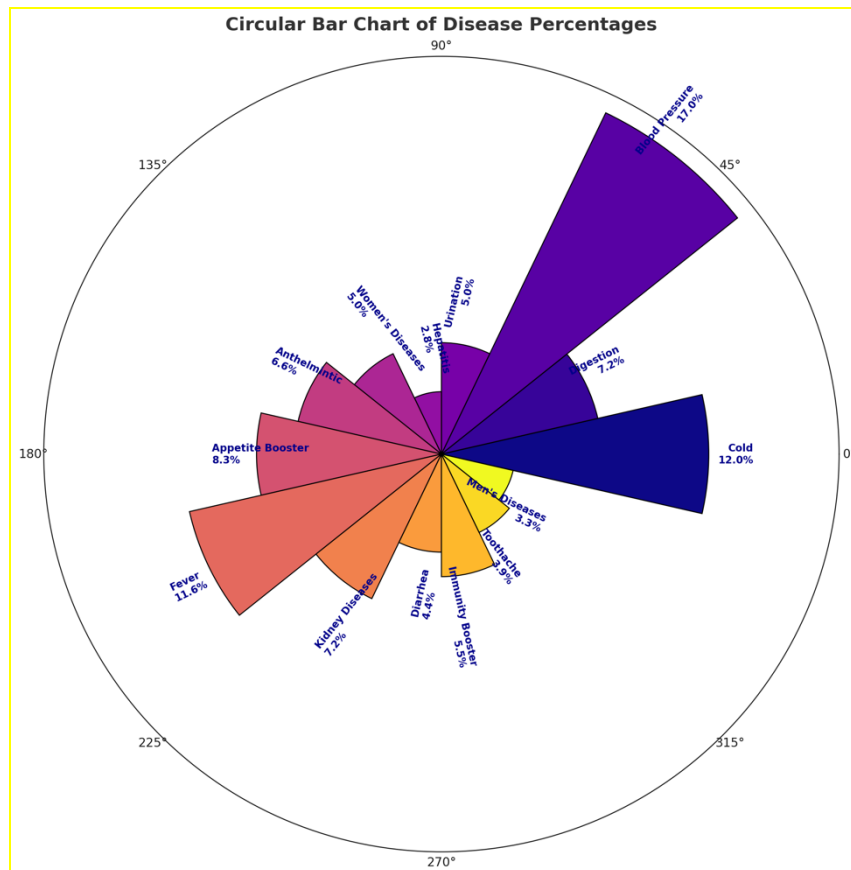


Figure 6. Percentage of the use of plants in diseases

According to the analysis, 49% of the medicinal plants recognized by the local population are used in the form of infusions, while the rest are used as decoctions, ointments, powders, teas, and other forms. We also determined which plant parts are used to prepare medicinal remedies: leaves (28%), shoots (27%), seeds and fruits (14%), flowers (10%), underground parts (7%), and all parts of the plant (14%).

### Results of Ethnobotanical Research

Ethnobotanical studies conducted in the Fergana and Andijan regions have provided valuable insights into the traditional knowledge and practices of local people regarding the use of plants. According to the research findings, in the Fergana region, a total of 230 ethnobotanical records were documented, covering 182 plant species belonging to 77 genera and 7 families. The 20 most frequently mentioned plant species are presented in Table 5. In the Andijan region, a total of 215 ethnobotanical records were collected, documenting 125 medicinal plant species belonging to 77 genera and 20 families. The 18 most frequently mentioned plant species are listed in Table 5. A comparative analysis revealed that 13 plant species (Figure 7) were commonly recorded in both regions, highlighting similarities in regional phytotherapy and traditional medicine practices. These findings provide scientific evidence of the ethnobotanical utilization of local biodiversity and its role in sustainable natural resource management.

Table 5. In the case of the most frequently repeated plants in the study area (Fergana and Andijan)

| MEDICINAL PLANTS GROWING IN FERGANA REGION |                        |                                                                 |                                              |                                      |
|--------------------------------------------|------------------------|-----------------------------------------------------------------|----------------------------------------------|--------------------------------------|
| Voucher number                             | Family                 | Scientific name                                                 | Name of the species in the national language | Use                                  |
| O'ZETB 108                                 | <i>Equisetaceae</i>    | <i>Equisetum arvense</i> L.                                     | Dala qirqbo'g'imi                            | Blood and heart diseases             |
| O'ZETB 106                                 | <i>Ephedraceae</i>     | <i>Ephedra equisetina</i> Bunge                                 | Qirqbo'g'imsimon zog'oz                      | Blood pressure and lung diseases     |
| O'ZETB 87                                  | <i>Capparaceae</i>     | <i>Capparis spinosa</i> L.                                      | Tikanakli kovul                              | Skin diseases                        |
| O'ZETB 331                                 | <i>Rosaceae</i>        | <i>Rosa canina</i> L.                                           | Itburun namatak                              | Nervous system and internal diseases |
| O'ZETB 372                                 | <i>Polygonaceae</i>    | <i>Polygonum aviculare</i> L.                                   | Chumchuqtil toron                            | Kidney and liver diseases            |
| O'ZETB 181                                 | <i>Polygonaceae</i>    | <i>Rheum maximowiczii</i> Losinsk.                              | Maksimovich rovochi                          | Blood and digestive system diseases  |
| O'ZETB 89                                  | <i>Caryophyllaceae</i> | <i>Acanthophyllum gypsophiloides</i> Regel                      | Kachimsimon yetmak, bex                      | Respiratory tract diseases           |
| O'ZETB 353                                 | <i>Berberidaceae</i>   | <i>Berberis integerrima</i> Bunge                               | Butunbargli zirk, qizil zirk                 | Internal diseases                    |
| O'ZETB 85                                  | <i>Malvaceae</i>       | <i>Alcea nudiflora</i> (Lindl.) Boiss.                          | Gulxairi                                     | Respiratory tract diseases           |
| O'ZETB 336                                 | <i>Rosaceae</i>        | <i>Crataegus turkestanica</i> Pojark.                           | Turkiston do'lanasi, qizil do'lana           | Heart diseases                       |
| O'ZETB 284                                 | <i>Fabaceae</i>        | <i>Glycyrrhiza glabra</i> L.                                    | Silliq shirinmiya                            | Lung and kidney diseases             |
| O'ZETB 362                                 | <i>Zygophyllaceae</i>  | <i>Tribulus terrestris</i> L.                                   | O'rmalovchi temirtikan                       | Cardiovascular diseases              |
| O'ZETB 332                                 | <i>Hypericaceae</i>    | <i>Hypericum scabrum</i> L.                                     | Dalachoy                                     | Nervous system diseases              |
| O'ZETB 135                                 | <i>Lamiaceae</i>       | <i>Origanum vulgare</i> subsp. <i>gracile</i> (K.Koch) letschw. | Maydagulli tog'rayxon                        | Skin and digestive system diseases   |
| O'ZETB 138                                 | <i>Lamiaceae</i>       | <i>Salvia sclarea</i> L.                                        | Mavrak                                       | Digestive diseases                   |
| O'ZETB 141                                 | <i>Lamiaceae</i>       | <i>Ziziphora pedicellata</i> Pazij & Vved.                      | Gulbandli kiyiko't                           | Respiratory tract diseases           |
| O'ZETB 73                                  | <i>Asteraceae</i>      | <i>Tussilago farfara</i> L.                                     | Oddiy oqqaldirmoq                            | Stomach and liver diseases           |
| O'ZETB 51                                  | <i>Asteraceae</i>      | <i>Achillea filipendulina</i> Lam.                              | Tobulg'ikabi bo'yomodaron                    | Digestive diseases                   |
| O'ZETB 52                                  | <i>Asteraceae</i>      | <i>Artemisia absinthium</i> L.                                  | Achchiq shuvoq                               | Nervous system diseases              |
| O'ZETB 56                                  | <i>Asteraceae</i>      | <i>Artemisia tenuisecta</i> Nevski                              | Ingichkabargli shuvoq                        | Blood and heart diseases             |
| MEDICINAL PLANTS GROWING IN ANDIJAN REGION |                        |                                                                 |                                              |                                      |
| Voucher number                             | Family                 | Scientific name of the species                                  | Name of the species in the national language | Use in diseases                      |
| O'ZETB 108                                 | <i>Equisetaceae</i>    | <i>Equisetum arvense</i> L.                                     | Dala qirqbo'g'imi                            | Blood and heart diseases             |
| O'ZETB 160                                 | <i>Nitrariaceae</i>    | <i>Peganum harmala</i> L.                                       | Oddiy isiriq                                 | Diseases of the nervous system       |
| O'ZETB 87                                  | <i>Capparaceae</i>     | <i>Capparis spinosa</i> L.                                      | Tikanakli kovul                              | Skin diseases                        |

|            |                        |                                                                 |                                    |                                      |
|------------|------------------------|-----------------------------------------------------------------|------------------------------------|--------------------------------------|
| O'ZETB 331 | <i>Rosaceae</i>        | <i>Rosa canina</i> L.                                           | Itburun namatak                    | Nervous system and internal diseases |
| O'ZETB 372 | <i>Polygonaceae</i>    | <i>Polygonum aviculare</i> L.                                   | Chumchuqtil toron                  | Kidney and liver diseases            |
| O'ZETB 180 | <i>Polygonaceae</i>    | <i>Persicaria hydropiper</i> (L.) Spach                         | Suv qalampir                       | Women's diseases                     |
| O'ZETB 89  | <i>Caryophyllaceae</i> | <i>Acanthophyllum gypsophioides</i> Regel                       | Kachimsimon yetmak, bex            | Respiratory tract diseases           |
| O'ZETB 284 | <i>Fabaceae</i>        | <i>Glycyrrhiza glabra</i> L.                                    | Silliqliq shirinmiya               | Lung and kidney diseases             |
| O'ZETB 362 | <i>Zygophyllaceae</i>  | <i>Tribulus terrestris</i> L.                                   | O'rmalovchi temirtikan             | Cardiovascular diseases              |
| O'ZETB 332 | <i>Hypericaceae</i>    | <i>Hypericum scabrum</i> L.                                     | Dag'albargli qizilpoycha, dalachoy | Diseases of the nervous system       |
| O'ZETB 132 | <i>Lamiaceae</i>       | <i>Mentha longifolia</i> var. <i>asiatica</i> (Boriss) Rech. f. | Osiyo yalpizi, suvyalpiz           | Stomach and intestinal diseases      |
| O'ZETB 135 | <i>Lamiaceae</i>       | <i>Origanum vulgare</i> subsp. <i>gracile</i> (K.Koch) letsw.   | Maydagulli tog'rayxon              | Diseases of the nervous system       |
| O'ZETB 138 | <i>Lamiaceae</i>       | <i>Salvia sclarea</i> L.                                        | Mavrak                             | Skin and digestive system diseases   |
| O'ZETB 141 | <i>Lamiaceae</i>       | <i>Ziziphora pedicellata</i> Pazij & Vved.                      | Gulbandli kiyiko't                 | Digestive diseases                   |
| O'ZETB 51  | <i>Asteraceae</i>      | <i>Achillea filipendulina</i> Lam.                              | Tobulg'ikabi bo'yomodaron          | Stomach and liver diseases           |
| O'ZETB 56  | <i>Asteraceae</i>      | <i>Artemisia tenuisecta</i> Nevski                              | Ingichkabargli shuvoq              | Diseases of the nervous system       |
| O'ZETB 194 | <i>Rosaceae</i>        | <i>Prunus amygdalus</i> Batsch.                                 | Oddiy bodom, Shirin bodom          | Stomach and liver diseases           |
| O'ZETB 195 | <i>Anacardiaceae</i>   | <i>Pistacia vera</i> L.                                         | Pista                              | Diseases of the nervous system       |

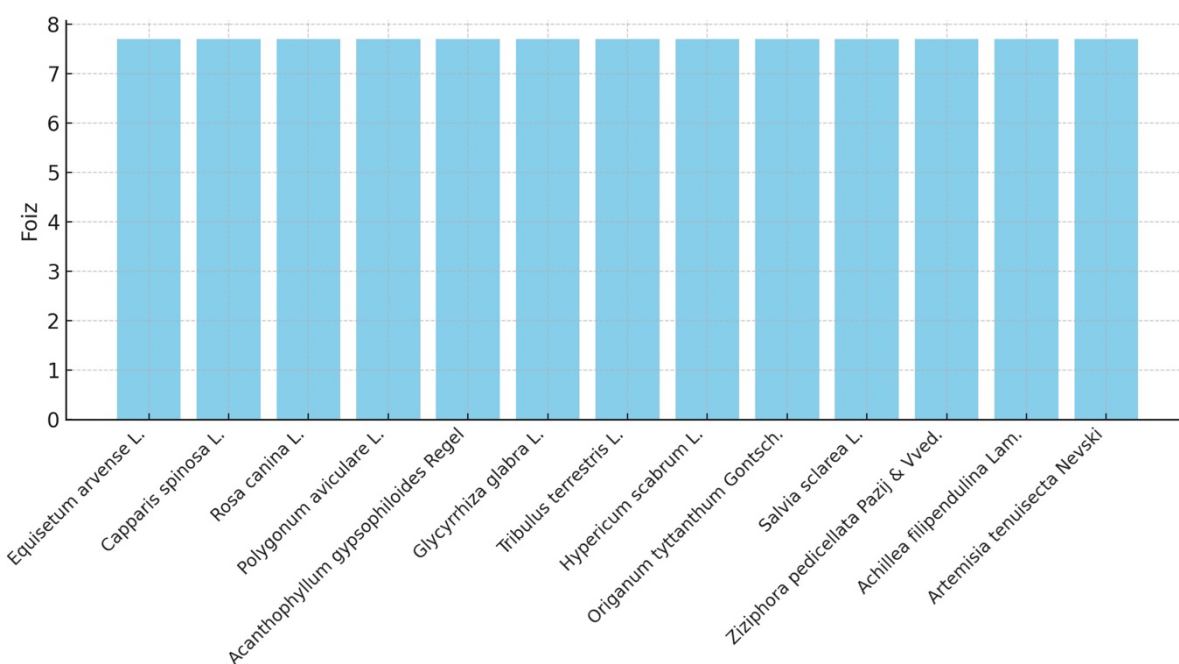


Figure 7. The most common medicinal plants recorded in both regions

## Discussion

The similarity in the ethnobotanical knowledge of these two regions can be attributed to their shared cultural practices, geographic proximity, and historical ties. Both regions are part of the fertile Fergana Valley, a region known for its rich biodiversity and long-standing traditions of medicinal plant use. This geographic overlap has facilitated the exchange of knowledge, seeds, and practices among communities, contributing to a shared understanding of medicinal plant utilization.

Moreover, the cultural values and behavioral patterns of the people in these regions reflect a deep respect for traditional medicine and natural resources. The reliance on medicinal plants for healthcare can be traced back to centuries-old practices, where these plants served as primary remedies in the absence of modern medicine. This shared cultural reliance is further reinforced by similar agricultural practices, dietary habits, and environmental conditions that influence the availability and utilization of specific plant species.

The overlap of 13 common plant species underscores the interconnectedness of these regions' ethnobotanical traditions. It highlights how the cultural and geographical continuum of the Fergana Valley fosters a unified approach to plant-based medicine. Despite administrative boundaries, the populations of Fergana and Andijan share a collective knowledge that bridges their communities, demonstrating the profound impact of geography, culture, and shared heritage on the preservation and practice of traditional medicine.

Comparing the results of ethnobotanical studies in various regions of Uzbekistan, it can be concluded that representatives of the families *Apiaceae*, *Asteraceae*, *Lamiaceae*, *Polygonaceae* are the leading families for their application in folk medicine. The most popular among folk practitioners (tabib's) and the local populations are considered species of the genera *Inula*, *Hypericum*, *Rheum*, *Origanum*, *Ziziphora* (Kosimov 2023; Khojimatov 2023; Makhkamov 2024).

This comparative analysis not only illustrates the deep-rooted ethnobotanical knowledge in these regions but also emphasizes the importance of safeguarding this cultural heritage. As modernity advances, the documentation and promotion of such practices are critical for maintaining biodiversity and ensuring sustainable use of medicinal plants for future generations.

## Conclusions

The conducted research in the Fergana region revealed that colds and digestive system diseases are the most commonly treated with medicinal plants, while in the Andijan region, diseases related to blood pressure are predominant. The medicinal plants mentioned in the survey are widely used by the local population in the Fergana region for 10 different diseases, whereas in the Andijan region, they are used for 14 diseases. In order to enrich the collection of medicinal and essential plants, seeds and living plants of the most widely used species, such as *Hypericum scabrum*, *Origanum vulgare* subsp. *gracile*, *Ziziphora pedicellata* were collected and planted at the experimental site of medicinal plants of the Tashkent Botanical Garden (Khamraeva 2024).

## Declarations

**List of abbreviations:** Not applicable.

**Ethics approval and consent to participate:** All participants provided oral prior informed consent.

**Consent for publication:** All participants shown in images agreed to have their image taken and published.

**Availability of data and materials:** All the data are presented in tables in the manuscript and are available with the corresponding authors.

**Competing interests:** The authors declare that they have no competing interests.

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**Authors' contributions:** OK, DK, ZK collected, analyzed the data and drafted the manuscript. OK, RB and advised, reviewed, and approved the final manuscript.

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### Literature Cited

- Akbarova MKh. 2024. Taxonomy, geography and phytocenology of the genus *Scutellaria* L. (Lamiaceae) widespread in the flora of the Fergana Valley. PhD thesis in Biology. Namangan. (Акбарова М.Х. Таксономия, география и фитоценология рода *Scutellaria* L. (Lamiaceae) распространенного во флоре Ферганской долины // Автореф. ... дисс. док. филос. по биол. наук. Наманган. 2024. 48 с.)
- Asghar A, Badshah L, Hussain F. 2018. Ethnobotanical appraisal and conservation status of medicinal plants in Hindukush Range, District Swat, Pakistan. *Journal of Herbs, Spices & Medicinal Plants* 24(4):332-355.
- Dankov A. 2007. Fergana Valley: problems of ensuring economic stability. *Central Asia and the Caucasus*. 2(50): 130-142. (Данков А. Ферганская долина 2007.: проблемы обеспечения экономической стабильности // Центральная Азия и Кавказ. 2(50), 2007. – С. 130-142.)
- Friedman M, Thoresen C, Gill JJ, Ulmer D, Powell L, Price V, Brown B, Thompson L, Rabin D, Breall W, Bourg EF, Levy RP, Dixon T. 1986. Alteration of type A behavior and its effect on cardiac recurrences in post myocardial infarction patients: summary results of the recurrent coronary prevention project. *American Heart Journal* 112(4):653-665.  
<https://powo.science.kew.org/>
- IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission, Vol. 2. IUCN, Gland, Switzerland and Cambridge, UK. pp. 30
- Khamraeva DT, Fakhridinova DK, Khojimatov OK, Bussmann RW, Abdinazarov SKh 2024. Introduction of valuable medicinal plants of traditional medicine of Lamiaceae family in the conditions of the Tashkent Botanical Garden *Ethnobotany Research and Applications* 29:11. doi: 10.32859/era.29.11.1-10
- Khojimatov OK, Gafforov, Y, Bussmann, RW. 2023. *Ethnobiology of Uzbekistan: Ethnomedicinal Knowledge of Mountain Communities*. Springer: Cham.
- Khojimatov OM, Khamraeva DT, Khujanov AN, Bussmann RW. 2020. An overview of Ethnomedicinal plants of Uzbekistan. *Ethnobotany Research and Applications* 20:08. doi: 10.32859/era.20.08.1-19
- Khoshimov HR. 2023. Flora of the northern foothills of the Fergana Valley. PhD thesis in Biology. Tashkent. (Хошимов Х.Р. Флора северных предгорий Ферганской долины // Автореф. ... дисс. док. филос. по биол. наук. Ташкент. 2023. 46 с.)
- Kosimov ZZ, Khojimatov OK, Bussmann, RW. 2023. Quantitative Ethnobotany of medicinal plants used by the mountain population of the Kitab Region, Uzbekistan//*Ethnobotany Research and Applications* 26:37 doi: 10.32859/era.26.37.1-13
- Logan MH. 1986. Informant consensus: a new approach for identifying potentially effective medicinal plants. In Etkin N: *Plants in Indigenous Medicine and Diet: Biobehavioral Approaches*. Bedford Hills, NY: Redgrave; pp. 91-112.
- Makhkamov T, Eshonkulov A, Bussmann RW, Khojimatov K, Zafar M, Ahmad M, Ruzmetov U, Ergasheva N, Sattarov A, Polatova A, Karieva G, Asadullina N, Khakimova D. 2024. Ethnobotanical knowledge of medicinal plants from Bukhara Region of Uzbekistan// *Ethnobotany Research and Applications* 27:26. doi: 10.32859/era.27.26.1-46
- Martin GJ. 1995. *Ethnobotany: A Methods Manual*. London, UK: Earthscan.
- Tardio J, Pardo-De-Santayana M. 2008. Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). *Economic Botany* 62:24-39. doi: 10.1007/s12231-007-9004-5  
[www.ethnobiology.net](http://www.ethnobiology.net)