Current issues in the preservation of wild plant resources in the Tashkent Region (Uzbekistan)

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Research

Abstract

Background: The article provides research on the biological resources of the natural medicinal flora of Tashkent region (Uzbekistan), which have started to decrease sharply in recent years due to anthropogenic factors.

Methods: The assessment of the distribution ranges of medicinal plants was carried out using the route-reconnaissance method widely applied in resource surveys. Field observations were conducted across all foothill and mountain regions of the Tashkent Province. To ensure data comparability, the standard methodology for evaluating the stocks of medicinal and technical plant raw materials (Borisova 1966; Khojimatov 2021) was employed, which includes delineation of population boundaries, characterization of habitats, estimation of projective cover, and assessment of resource potential.

Results: Annually harvested species of medicinal plants of the Tashkent region with a volume of more than 30 tons are such species as *Crataegus turkestanica* Pojark., *Ephedra equisetina* Bunge, *Ferula tenuisecta* Korovin, etc. Limited reserves, less than 1 ton are: *Dactylorhiza incarnata* subsp. *cilicica* (Klinge) H.Sund., *Helichrysum maracandicum* Popov ex Kirp., *Tussilago farfara* L. The main reasons for the ecological tragedy of the region and the reduction of the area of medicinal plants are the expansion of residential areas, the construction of industrial enterprises, cattle grazing, and the uncontrolled collection of plant raw materials, among others. In addition, the taxonomic analysis of the medicinal flora of the Tashkent region in recent decades and information on the dynamics of the decline of some medicinal plant resources in this region are presented.

Conclusions: Based on the results obtained, we have given recommendations on the collection of plant raw materials and their use on an industrial scale only for the mountainous part of the Tashkent region, since the foothills and plains are largely subject to anthropogenic pressure, that is, there is active urbanization of the territories, industrial enterprises are being built and lands are being developed for agricultural purposes.

Key words: harvesting; medicinal plants; resources; Tashkent region; sustainable using, plant introduction.

Background

Tashkent Region is located in northeastern Uzbekistan and covers an area of approximately 15,900 km². The administrative center is the city of Tashkent, which is administratively separate. The population of the Tashkent region, including the city of Tashkent, is just over 6.2 million (https://stat.uz/).

The Tashkent Region, characterized by a diverse combination of foothill, mountain, and plain ecosystems, hosts a rich flora with a high proportion of economically valuable and medicinal plant species. Despite this biodiversity, the conservation of plant resources in the region faces a number of critical challenges. These problems are mainly associated with increasing anthropogenic pressure, ecological degradation of habitats, and insufficient regulation of resource use. One of the major threats to plant resources is the intensification of agricultural activities. Expansion of irrigated croplands, overgrazing, and unsustainable pasture management lead to habitat fragmentation and degradation, particularly in foothill zones where many medicinal and endemic species are concentrated. Soil erosion and decreased soil fertility further limit the natural regeneration capacity of plant populations.

Over the last century, the development of light and heavy industry, the agricultural sector, and urban planning proceeding at a rapid pace, is accompanied by the daily loss of any species of plants or animals of the biological diversity of all mankind.

Consequently, the development of any measures to preserve biological diversity is an urgent problem of the present time. Over the past few decades, numerous protocols and conventions have been adopted aiming at preserving biodiversity, various kinds of funds have been created, which on an ongoing basis spend significant amounts to carry out activities related to the conservation of biological diversity, relict species of plants and animals, as well as to foster ecological culture among the younger generation (Khojimatov 2018).

However, the negative impact of human development continues to this day, and the process of loss of biological diversity of flora and fauna, mainly as a result of habitat destruction, overexploitation, environmental pollution and the harmful effects of invasive and introduced foreign plants and animals, continues (Kilpatrick 2017).Therefore, it is necessary to strengthen scientific capacity and material and technical support at the regional and international level in the field of biological diversity study, systematic monitoring, and evaluation. These allow for predicting the level of threat and the extent of disruption of ecological systems, as well as the development of measures to restore and maintain biodiversity.

At least 1,800 species of vascular plants grow in the Uzbekistan part of the Western Tien Shan (Pavlov 1980). The richness of the flora and the abundance of vegetation cover have determined the diversity of medicinal flora here, which includes at least 705 species belonging to 351 genera and 91 families. Medicinal plants are common in all zones and altitude belts, they grow in various plant communities, where individual species are dominant and subdominant. 83.26% of medicinal plant species are distributed in the middle belt of the mountains. This is due to a number of environmental, edaphic and climatic conditions, for example, such as temperature, humidity, soil, slope exposure, altitude, etc. The optimal combination of all these factors contributes to a more favorable process of accumulation of biologically active substances in all parts of plants (Khojimatov 2018).

The purpose of the research is to determine the raw material resources of the main medicinal plants in the flora of the Tashkent region.

Materials and Methods

Medicinal plants from the Tashkent region were used as research materials. During the years 2021–2025, studies were conducted to determine the distribution area of the main medicinal species of the wild plants of the Tashkent region, the industrial-scale harvesting areas, and the availability of the resource base.

The scientific names of the plants are taken from Plants of the World Online (https://powo.science.kew.org/). Resource studies were conducted using generally accepted methods (Borisova 1966; Khojimatov 2021) for the identification and mapping of medicinal plant raw material resources: (i) accounting of raw material resources in the calculation areas (in the absence of cartographic materials); (ii) accounting of raw material resources in the main sections.

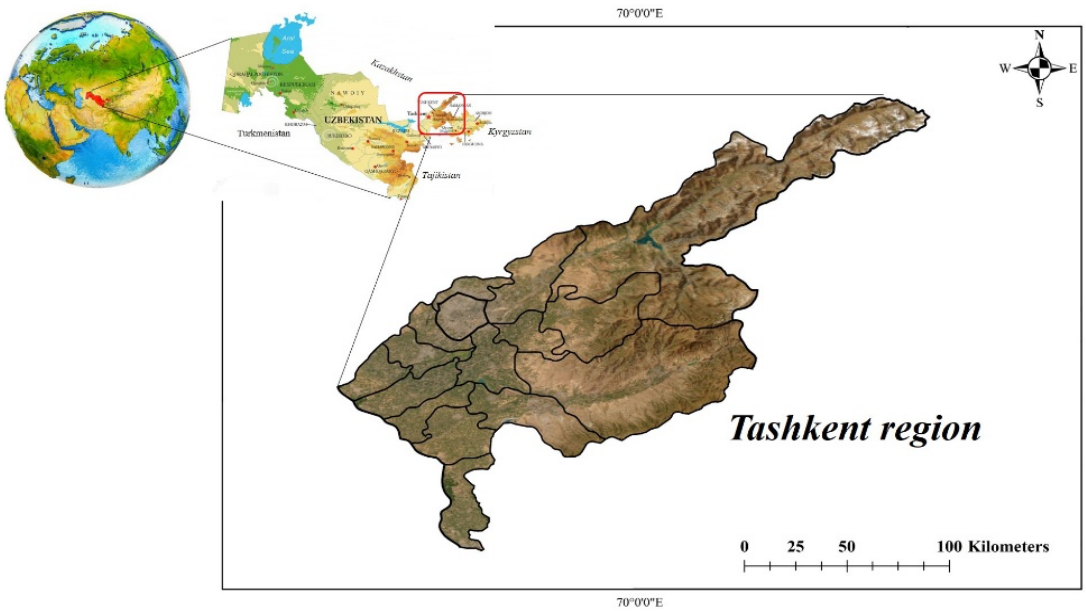

Figure 1. Map of Tashkent region of Uzbekistan - research site

Results and Discussion

In recent years, the popularity of plant-based medicines has increased significantly, which has led to a significant increase in the demand for wild medicinal, food, and some technical plant raw materials collected in Uzbekistan. As a result of scientific research and the study of literature sources, it was found that there are 60 annually harvested species of medicinal and other raw plants in the territory of the Tashkent region (Khojimatov 2021).

According to the cameral analysis of the materials collected during the trips and the received information, it was found that 15 families of medicinal plants were divided into relatively polymorphic families in the territory of the Tashkent region. They include 420 species of plants belonging to 212 genera, and these constitute the majority (65.66%) of all medicinal species and genera growing in the region (Fig. 2).

Generally, the general spectrum of plant genera and species in this region is very similar to the spectrum of plants in other Central Asian regions (Khojimatov 2008). The species spectrum of the leading 15 genera (Fig. 3 is relatively insignificant, as they include 19.31% of the species of the medicinal flora. Such an analysis is only appropriate for the resource-based perspective, that is, from the point of view of searching and researching new species of medicinal plants based on the principle of phylogenetic affinity.

Thus, the medicinal plant flora of the studied area is taxonomically polymorphic and generally reflects the main parts of the entire flora. The largest number of species (65.72%) and genera (65.66%) are embodied in 15 large families typical for the entire flora of the Central Asian mountains (Khassanov 2022; Khojimatov 2021; Khamraeva 2025).

Together with specialists from the Ministry of Ecology, Environmental Protection, and Climate Change of the Republic of Uzbekistan and the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan, a list of 182 species of wild edible plants in Uzbekistan was prepared and approved.

From these, we have selected about 70 species of plants for which harvesting applications are accepted by nature users every year; that is, based on the results of scientific research, a conclusion is given to give or reject a quota for taking these species from the natural environment. 60 species of wild plants are given a quota for the Tashkent region (https://planta-medica.uz/). During field research in 2021–2023, great attention was paid to identify the resources of these species. (Table 1, Fig.4).

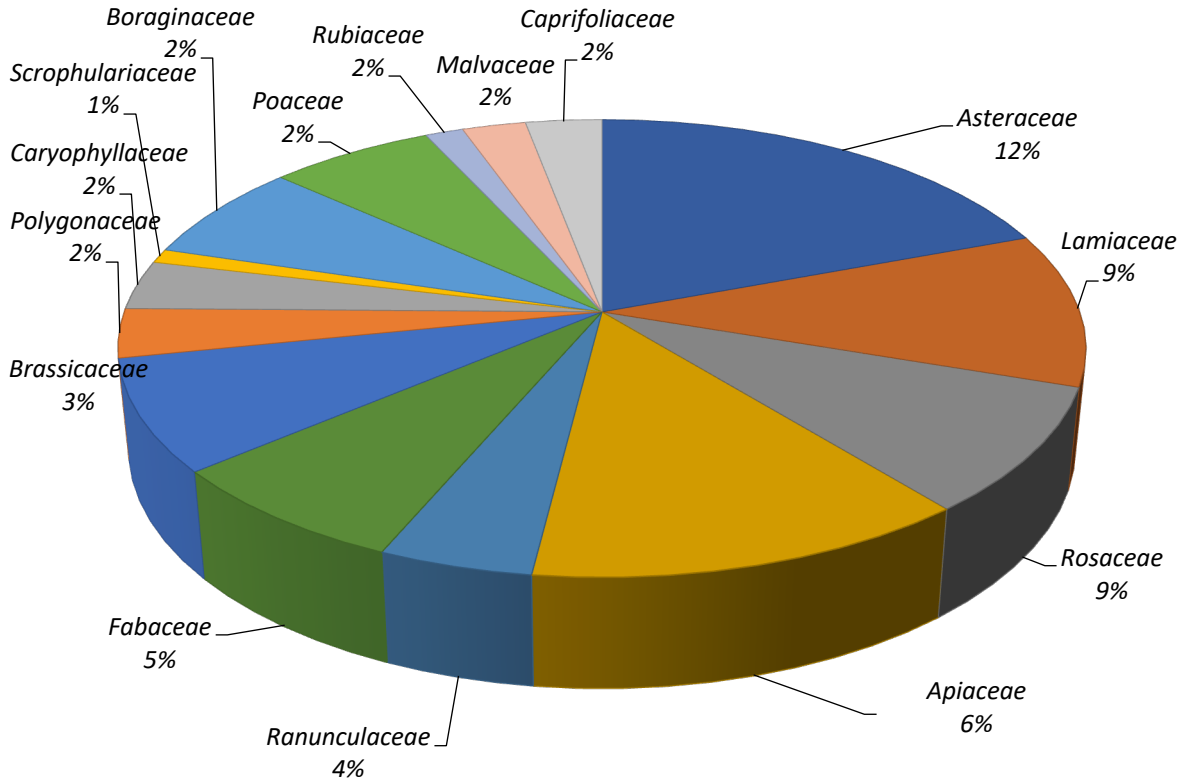

Figure 2. The largest families of medicinal plants in the Tashkent region

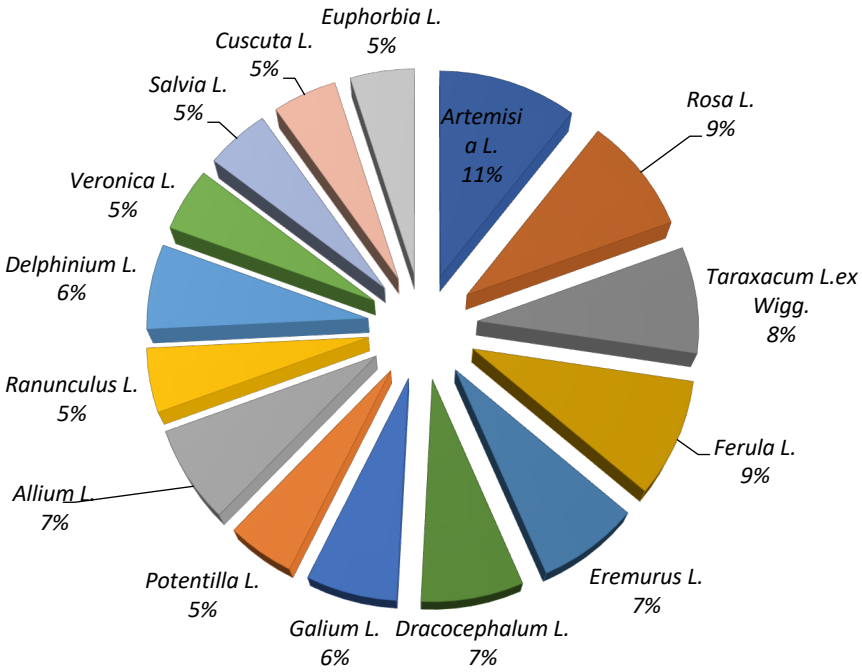

Figure 3. Species composition of 15 leading genera of medicinal plants in the Tashkent region

Table 1. Plant resources of the Tashkent region and their use

Scientific name	Local name	Part used	Forms of preparation	Traditional uses	Remarks	Herbarium samples voucher
Arum korolkowii Regel	It kuchala	Tuber	Extract	Stomach disorders	T	Vouch. №. O. Khojimatov, 19.07.2009. №245
Allium stipitatum Regel	Anzur	Onion	Salat, Canning	Cardiovascular, stomach disorders	F	Vouch. №. O. Khojimatov, 15.07.2008. №241
Persicaria hydropiper (L.) Delarbre	Suv qalampiri	Aerial part	Decoction	Bleeding	🕮	Vouch. №. A. Khujanov, 15.07.2018. №241
Berberis oblonga (Regel) C.K.Schneid.	Qora zirk, qoraqand	Fruits, roots	Decoction	Gallbladder diseases	🕮 F	Vouch. №. Z. Kasimov, 15.07.2019. №241
Capparis spinosa L.	Kovul, kovar	Whole plants	Salat, broth, decoction	Liver diseases	🕮 F	Vouch. №. I. Maltsev, 15.07.2019. №241
Crataegus pontica K.Koch	Do'lana	Flower, fruits	Decoction	Cardiovascular	F	Vouch. №. A. Khujanov, 15.07.2018. №241
Rosa canina L.	Itburun	Fruits	Decoction	Fever, stomach disorders	🕮	Vouch. №. O. Khojimatov, 19.07.2009. №245
Alhagi pseudalhagi subsp. *canescens* (Regel) Yakovl.	Yantoq	Aerial part	Decoction	Stomach disorders, diuretic, cough	F	Vouch. №. I. Malsev, 15.07.2018. №241
Cullen drupaceum (Bunge) C.H.Stirt.	Oqqurai	Leaves, roots	Powder	Eczema, prolapsed	🕮	Vouch. №. A.Kuziev, 15.06.2016. №52
Trifolium pratense L.	O'tloq sebargasi	Whole plants	Decoction, fresh	Bleeding, diuretic, cough		Vouch. №. I. Malsev, 15.07.2018. №241
Peganum harmala L.	Issiriq	Aerial part	Smoke, bath, decoction	Influenza, malaria, as bath for itching	T	Vouch. №. A. Khujanov, 06.2019. №512
Rhamnus cathartica L.	Togjumrut	Fruits, bark	Extract	Cancer, skin and stomach diseases	F	Vouch. №. Z. Kasimov, 25.06.2020. №37
Melissa officinalis L.	Limon-ut	Aerial part	Extract	Anemia, asthma	🕮 F	Vouch. №. U. Kadirov, 25.06.2020. №37
Mentha longifolia (L.) L.	Yalpiz	Aerial part	Decoction	Against nausea, cough	🕮 F	Vouch. №. O. Khojimatov, 19.07.2009. №512
Thymus seravschanicus Klokov	Kakliko't	Aerial part	Decoction	Hypertension		Vouch. №. A. Khujanov, 15.07.2018. №241
Codonopsis clematidea (Schrenk) C.B.Clarke	Dugboy	Aerial part	Decoction	Liver diseases, nausea, skin rash	🕮	Vouch. №. Z. Kasimov, 11.06.2019. №56
Arctium tomentosum Mill.	Qarikiz	Whole plants	Decoction	Rheumatism, external skin diseases	🕮	Vouch. №. Z. Kasimov, 15.07.2018. №241
Artemisia absinthium L.	Erman	Aerial part	Extract	Liver diseases, kidney, sleeplessness	🕮	Vouch. №. A. Khujanov, 23.07.1918. №530
Inula grandis Schrenk ex Fisch. & C.A.Mey.	Sariqandiz	Roots	Extract	Intestinal diseases, laxative	🕮	Vouch. №. O. Khojimatov, 15.07.2008. №56
Taraxacum sect. *Taraxacum* F.H.Wigg.	Qoqi	Whole plants	Extract	Diuretic, laxative, liver diseases	🕮	Vouch. №. Z. Kasimov, 11.06.2019. №56

Legend: 🕮 - Pharmacopeia of Uzbekistan**,** F—Food, T—Toxic

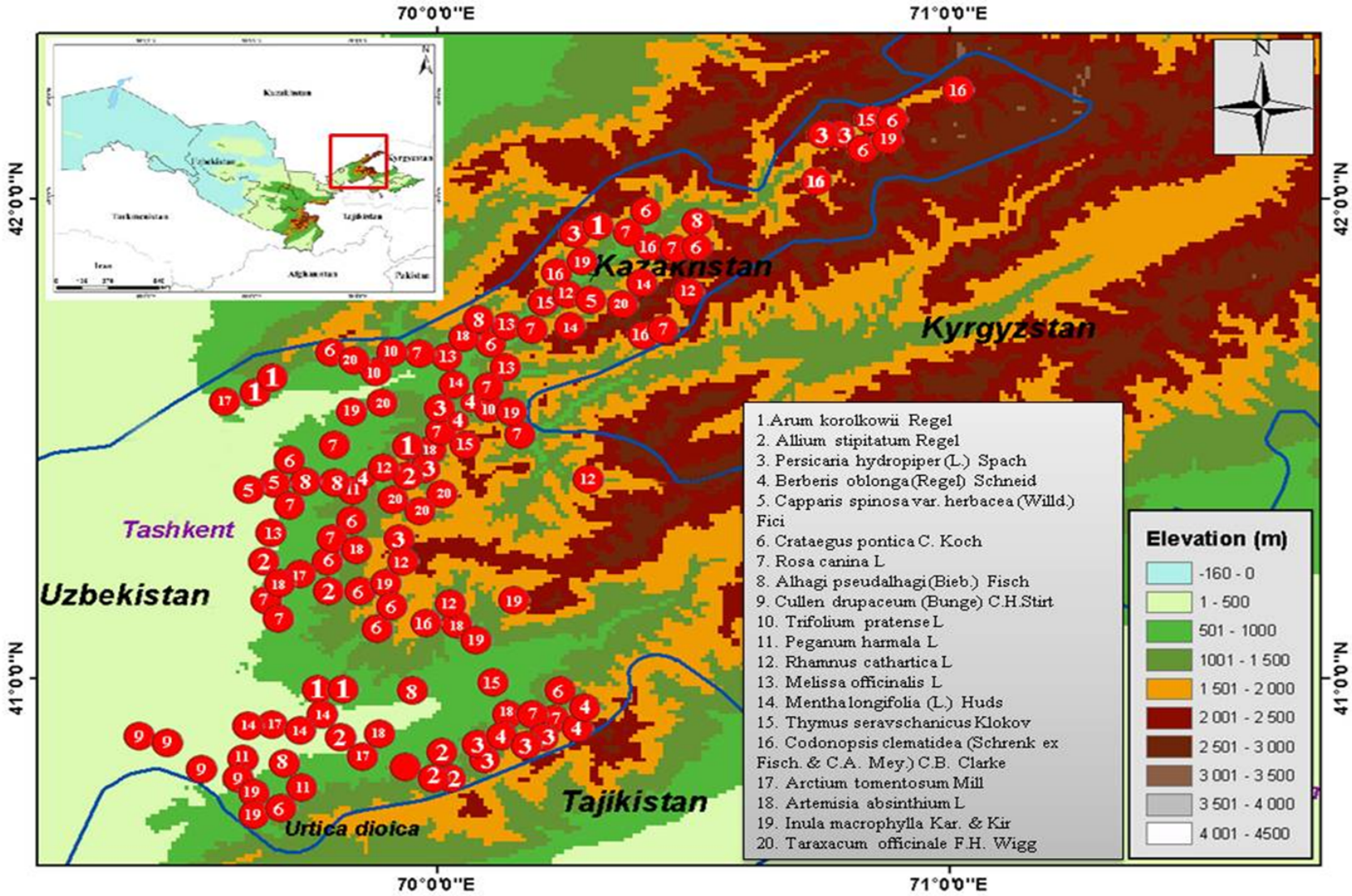

Figure 4. Map of Distribution areas of 20 species of plants of folk and scientific medicine

For two years, we have identified distribution areas and resources of 30 quota species growing in the Tashkent region. *Crataegus turkestanica* Pojark., *Ephedra equisetina* Bunge, *Ferula tenuisecta* Korovin, and other species belong to the plants with an annual maximum growth volume exceeding 30 tons. *Dactylorhiza incarnata* subsp. *cilicia* (Klinge) H.Sund., *Helichrysum maracandicum* Popov ex Kirp, and *Tussilago farfara* L. are among the limited resources plant species with an annual maximum growth volume not exceeding 1 ton. In the flat part, *Phragmites australis* (Cav.) Trin. ex Steud. can be collected from the technical vegetation of the Chirchik River delta, collectors, canals, and ditches. Very large massifs of this plant were recorded in the Bekabad area (Beshko 2023). Table 2 shows the dynamics of the reduction of medicinal plant resources in the Tashkent region in recent years.

Table 2. The dynamics of the reduction of medicinal plant resources in the Tashkent region

Plant name	**According to Pulatova, 1980 (t)**	**According to Khojimatov, 2008 (t)**	**According to Khojimatov, 2023 (t)**
Achillea millefolium L.	13,9	22,62 ± 1,81	5,1±1,3
Codonopsis clematidea (Schrenk ex Fisch. & C.A. Mey.) C.B. Clarke	1,2	1,12 ± 0,09	0,5±0,1
Helichrysum maracandicum Popov ex Kirp.	-	4,08 ± 0,33	0,8±0,2
Urtica dioica L.	0,8	12,00 ± 0,80	4,1±0,1

Based on the conducted research, it is possible to recommend only the mountainous part of the Tashkent region for the production of plants on an industrial scale because the foothills and plains are heavily exposed to anthropogenic pressure – large settlements, industrial enterprises, agricultural lands, etc. (Fig. 5, 6).

Figure 5. A brick factory in the Yuqorichirchik district of the Tashkent region

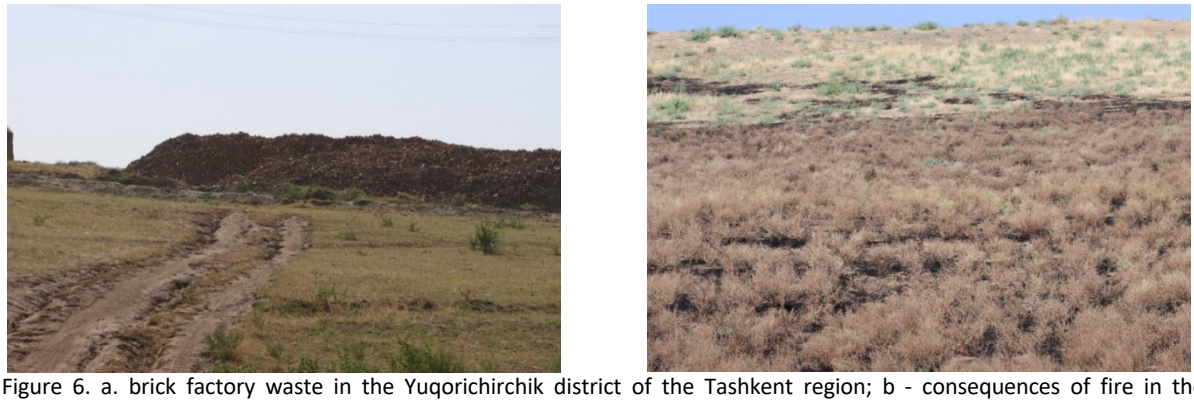

Figure 6. a. brick factory waste in the Yuqorichirchik district of the Tashkent region; b - consequences of fire in the Yuqorichirchik district of the Tashkent region

Overgrazing of large and small livestock is another major environmental problem. It leads to the degradation of pastures, soil erosion and desertification, as well as a reduction in biodiversity and land productivity (Fig. 7). According to our unpublished data (2004), the pasture capacity in the Parkent district of the Tashkent region is 30,000 cattle, but in fact there

were about 60,000 heads on the pasture. Overgrazing alters the structure of plant communities, increases competition with wild herbivores, and ultimately can undermine regional food security. The main consequences of overgrazing include:

- Soil degradation. The destruction of vegetation cover exposes the soil, making it highly vulnerable to wind and water erosion.
- Changes in vegetation cover. Productive forage species are replaced by more stress-tolerant, low-palatable, or unpalatable plant species.
- Desertification. Severe pasture degradation initiates desertification processes, rendering the land unsuitable for use.
- Loss of biodiversity. Overgrazing reduces plant species richness and deteriorates habitat conditions for wild animals.
- Decline in livestock productivity. Poorer forage conditions result in lower animal productivity and negatively affect livestock health.
- Long-term risks to food security. If these processes continue, they can lead to decreased agricultural resilience and threaten human food security in the long run.

From a scientific standpoint, a gradual transition from traditional transhumant grazing to stall-based livestock management represents one of the most effective approaches for conserving plant biodiversity in Uzbekistan.

Figure 7. A flock of sheep on the Karzhantau range

In recent years, unregulated recreational activities have become a significant environmental concern (Fig. 8). The influx of visitors is especially pronounced on weekends, when large numbers of people travel to mountain areas. Such uncontrolled recreational pressure causes substantial damage to natural ecosystems. Visitors collect rare, often endemic plant species for bouquets, including numerous species of *Tulipa* spp. and *Eremurus* spp. In addition, unregulated tourists frequently damage woody vegetation when collecting firewood and conduct uncontrolled harvesting of medicinal plants, both for personal use and for sale in local markets.

In this regard, the following measures are proposed to reduce anthropogenic impacts on natural habitats:

a) the development and implementation of strictly regulated tourist routes.
b) the establishment of designated areas for organized and environmentally safe recreation.
c) the creation and installation of informational and educational materials (posters, boards, and displays) illustrating rare and protected plant species and explaining their ecological and socio-economic value, aimed at fostering environmental awareness and responsible attitudes toward nature.

Figure 8. Consequences of Sunday vacations for the urban population

In order to preserve the plant biodiversity of valuable medicinal and essential oil species, as well as to enrich the collection, seeds and live specimens were collected for propagation and conservation under the conditions of the experimental plot of the Laboratory of Introduction and Agroecology of Raw Plants at the Tashkent Botanical Garden named after Academician F.N. Rusanov of Academy of Sciences Republic Uzbekistan. Among the collected species are *Arum korolkowii* Regel*, Ferula tadshikorum* Pimenov, *Helichrysum maracandicum* Popov ex Kirp., *Origanum vulgare* subsp. *gracile* (K. Koch) Ietsw., *Tussilago farfara* L., *Ziziphora pedicellata* Pazij & Vved., and others.

Figure 9. *Helichrysum maracandicum* Popov ex Kirp.

Figure 10. *Ziziphora pedicellata* Pazij & Vved.

Figure 11. Experimental plot for the introduction of native flora species of the botanical garden

Conclusion

Thus, large areas of natural stands of *Alhagi pseudalhagi* (M. Bieb.) Fisch. in the Parkent district have been converted into vineyards. A major population of *Inula grandis* Schrenk ex Fisch. & C.A. Mey. in the Yukori-Chirchik district was completely destroyed as a result of the removal of the fertile topsoil to supply numerous brick factories. Such cases demonstrate the substantial negative impact of anthropogenic transformations not only on the state of plant resources but also on the functioning of natural ecosystems as a whole.

Only the consolidated efforts of the scientific community, local administrative authorities, environmental protection institutions, and citizens committed to preserving natural plant diversity can fundamentally change the current situation, ensuring the conservation and restoration of the region's natural ecosystems for future generations.

Declarations

Ethics approval and consent to participate: All participants involved in the interview process gave their prior informed oral consent.
Consent for publication: Not applicable.
Competing interests: The authors declare that they have no competing interests.
Funding: Not applicable.
Availability of data and materials: The data was not deposited in public repositories but is available from the corresponding author upon request.
Author contributions: O.K. Khojimatov, Alisher N. Khujanov, Rainer W. Bussmann, Gulnara J. Abdiniyazova, D.T. Khamraeva collected and analyzed the data, drafted, and developed the manuscript. All authors contributed to the research, data collection, and approved the final manuscript.

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Literature Cited

Beshko NYu, Gaziev AD, Maltsev II, Khojiimatov OK, Kosimov ZZ, Madaminov FM, Kodirov UK, Nazarov BI, Amindzhonova GK, Adygezalova ZP. 2023.//Flora Dalverzin State Forestry//KarDU KHABARLARI 1/1 (57): 71-85.

Borisova NA, Schroeter AI. 1966.To the methodology of determining resources and mapping resources of medicinal plant raw materials // Rast. Resources. Leningrad: Nauka 2 (2): 271-277. (in Russian)

https://ethnobotany.uz/ru/plant/trifolium-pratense-l/

https://planta-medica.uz/

https://powo.science.kew.org/

https://stat.uz/

Khamraeva DT, Khojimatov OK, Fakhriddinova DK, Khujanov AN, Valiyev ShA. 2025. Data on the Preliminary Introduction of New Plant Species in the Tashkent Botany Park// Innovations in Sustainable Agricultural Systems, Agriculture 4.0 and Precision Agriculture 2(ISAS 2024, LNNS 1534): 1-5. doi: 10.1007/978-3-031-98127-2_14

Khamraeva DT, Khojimatov OK, Mustafaev I, Bussmann RW, Sharipov AE, Khalkuzieva MA, Rakhimova NK. 2025. Results of the introduction of the promising ethnomedicinal plant *Ferula tadshikorumin* the Tashkent Botanical Garden and technology of resin production under different conditions. Ethnobotany Research and Applications 31:14. doi: 10.32859/era.31.14.1-15

Khamraeva DT, Khozhimatov OK. 2025. Ecobiological features of growing *Ferula tadshikorumin* Pimenov under the conditions of introduction Lavita Press Tashkent 111. (in Russian)

Khassanov FO, Turginov O, Khudzhanazarov U, Tirkasheva M. 2022. The vegetation of the Pamir-Alay mountainous system in Middle Asia // Biodiversity, Conservation and Sustainability in Asia. Volume 2: Prospects and Challenges in South and Middle Asia: 53-65.

Khojimatov OK, Kosimov ZZ. 2021. Identifier of the main wild-growing medicinal, food and technical flora of Uzbekistan. Tashkent. Matrix: 183-447. (in Uzbek & Russian)

Khojimatov OK, Shagiakhmetova G., Shulgina N. 2018. Sixth National Report of the Republic of Uzbekistan on the conservation of biological diversity. Tashkent: GEF, UNDP: 263.

Khojimatov OK. 2008. Medicinal plants of the Western Tien Shan (within the Republic of Uzbekistan). Author's abstract. Doctoral Dissertation in Biological Sciences Tashkent 40. (in Russian)

Khojimatov OK. 2019. Project Report No. 15/2019. Fund for Ecology, Environmental Protection and Waste Management Department. Tashkent: 127. (in Russian)

Khojimatov OK. 2021. Methodological guidelines for the introduction of state accounting and monitoring of raw species of wild plants of the Republic of Uzbekistan: 115-279. (in Uzbek & Russian)

Kilpatrick AM, Salkeld DJ, Titcomb G, Hahn MB. 2017. Conservation of biodiversity as a strategy for improving human health and well-being. Philosophical Transacrions of the Royal Society, Botany 372: 20160131. doi: 10.1098/rstb.2016.0131.

Kodirov UKh. Flora of the Urgut botanical and geographical area. 2020.Abstract of the dissertation... Doctor of Philosophy (PhD) in Biological Sciences. Tashkent: 43. (in Uzbek)

Myaskov AV. 2009. The relevance of biodiversity conservation as the basis of natural ecosystems. GIAB 12: 260-265. (in Russian)

Pavlov VN. 1980. Vegetation cover of the Western Tien Shan. Moscow: Moscow State University: 246. (in Russian)

Pulatova TP, Khalmatov HH, Juraev IN. 1980. Medicinal plants of the Tashkent region. Tashkent: Medicine: 136. (in Russian)