PLANT SCIENCE TODAY
Vol x(x): xx-xx
https://doi.org/10.14719/pst.9800

eISSN 2348-1900

RESEARCH ARTICLE

Ethnobotanical study on traditional medicinal plants of Gelon village, Kashkadarya, Uzbekistan

Ulugbek Niyozov[1], Begali Alikulov[1]*, Ilhom Mukumov[2], Zebo Rasulova[2], Murtoza Hasanov[2], Sirojiddin Urokov[3], Karamatullo Sharifmurodov[4] & Askar Kholliev[5]

[1]Department of Biotechnology, Samarkand State University Named after Sharof Rashidov, University Boulevard 15, Samarkand 140 104, Uzbekistan
[2]Department of Botanica, Samarkand State University Named after Sharof Rashidov, Samarkand 140 104, Uzbekistan
[3]Department of Plant Physiology and Microbiology, Institute of Biochemistry of Samarkand State University named after Sharof Rashidov, University Boulevard 15, Samarkand 140 104, Uzbekistan
[4]Department of Biology, Uzbek Finnish Pedagogical Institute, Street Spitamen, 16, Samarkand 140 100, Uzbekistan
[5]Department of Biology, Bukhara State University, Bukhara, Uzbekistan

*Correspondence email - balikulov87@gmail.com

Received: 03 June 2025; Accepted: 23 September 2025; Available online: Version 1.0: 10 October 2025

Cite this article: Ulugbek N, Begali A, Ilhom M, Zebo R, Murtoza H, Sirojiddin U, Karamatullo S, Askar K. Ethnobotanical study on traditional medicinal plants of Gelon village, Kashkadarya, Uzbekistan. Plant Science Today (Early Access). https:/doi.org/10.14719/pst.9800

Abstract

The utilization of plants as traditional medicine has been a long-standing practice among the inhabitants of Gelon village, Shahrisabz district, Kashkadarya region, Uzbekistan. This study aims to identify the diversity of such medicinal plant species including the plant parts, processing methods and their application as traditional remedies in selected geographical boundary. The research employs qualitative, quantitative and descriptive approaches via direct interviews with purposefully selected traditional medicine practitioners. Relevant information on plant species, regional names, Latin names, utilized parts, application methods and the diseases treated were collected from 41 informants, including traditional healers, farmers, teachers and medicinal plant users. The study resulted to identify 95 species of medicinal plants belonging to 43 families in Gelon village. The most used plant families by traditional medicine practitioners were Asteraceae (14.74 %), Rosaceae (10.52 %), Apiaceae (9.47 %), Lamiaceae (7.36 %), Polygonaceae (6.31 %) and Fabaceae (5.26 %). In most cases, leaves, stems and roots were the most frequently used parts, followed by fruits, bark and flowers. The main preparation methods were boiling and crushing, which were the most common techniques. Medicinal plants were primarily used to treat respiratory diseases (cough, bronchitis, asthma, tonsillitis), hypertension, stomatitis, liver diseases (hepatitis, cholecystitis), gallbladder disorders, rheumatism and as haemostatic agents.

Keywords: medicinal plants; traditional medicine; Uzbekistan

Introduction

Throughout history, humanity has derived considerable benefit from a wide variety of plant species. The focus of scientific research on these plants has been on understanding how local communities utilize resources, especially for therapeutic and medicinal purposes (1). Indeed, ethnobotany has played a pivotal role in the identification of both synthetic and natural drugs (2). In recent years, numerous drug development initiatives have been successfully grounded using ethnobotanical knowledge (3). It is estimated that approximately 80 % of the global population continues to rely on traditional medicine, particularly in rural areas of developing countries (4).

The term "ethnobotany" was first coined in 1895 by the North American botanist John Harshberger, who defined it as a scientific discipline that studies the use of plants within communities (5). Ethnobotany is an interdisciplinary field that examines all interactions between humans and plants (6) and over time, these interactions have strengthened, leading to the accumulation of knowledge and experience in using plants for medicinal purposes (7). Local knowledge of medicinal plants in the environment has helped communities survive and develop (8). The primary goal of ethnobotany is to understand how humans use, manage and benefit from plants (9). Additionally, ethnobotany reflects a community's understanding of ecological resources, which can contribute to the preservation of cultural values (10).

Local knowledge, embedded within traditions and customs that have been handed down through generations, constitutes the cornerstone of traditional plant use (11). However, there is an observed decline in the utilization of traditional knowledge concerning medicinal plants, a phenomenon that can be attributed to the competitive nature of modern pharmaceuticals. This shift is further compounded by the effects of modernization on society (12). Consequently, there is a pressing need to research the use of medicinal plants, given that these plants are subject to various pressures and threats and face a paucity of scientific data and publications (13).

Central Asia is renowned for its remarkably rich flora, which includes over 9800 species of vascular plants (14). Uzbekistan, a country of significant botanical interest, is distinguished by its over 4500 plant species, occupying a central position within the region. The southern border of Central Asia is shared with three neighbouring countries: Iran, Afghanistan and China. Approximately 600 plant species are currently employed in traditional medicine, of which only 200 have undergone phytochemical study and approximately 150 have been incorporated into the Uzbekistan Pharmacopoeia (15, 16). The history of traditional medicine in Central Asia spans several centuries, with its most significant development occurring between the 10th and 11th centuries. During this period, numerous early scholars endeavoured to unravel the intricacies of folk medicine. Notable among these figures were Abu Rayhan Beruni (973-1048) and Abu Ali Ibn Sina (Avicenna) (980-1037), who made substantial contributions to the initial codification of plant-based medicines (17). Contemporary ethnobotanical research emphasizes the preservation of knowledge maintained by local communities. This knowledge plays a vital role in developing new pharmaceuticals, addressing the biodiversity crisis for future generations and ensuring the survival of valuable and rich plant genetic resources (18).

Despite the findings of earlier studies, including those by T. Aromov (2023) in smaller areas of the Western Hissar, on the utilization of medicinal plants in the Shahrisabz district, there remains a considerable lacuna in our understanding concerning the use of medicinal plants in the Gelon microregion. Consequently, there is imperative to study the local expertise of communities in Gelon regarding the utilization of natural resources, particularly medicinal plants, to prevent the loss of traditional knowledge. This study aims to address this need. The research focuses on the diversity of medicinal plants, the plant parts used, their processing methods and their use in traditional medicine in Gelon village (Western Hissar region, Shahrisabz district). The study is expected to serve as a valuable resource for future ethnobotanical research. Documenting this knowledge will contribute to a comprehensive understanding of the use of medicinal plants and encourage further studies in this area

Materials and Methods

Study area

The study area was selected as a relatively remote area from urbanization, where traditional folk medicine traditions are well preserved (Fig. 1). Gelon village was selected as the primary study site for this research due to its unique ecological, geographical and cultural characteristics, which make it particularly significant for the investigation of medicinal plant diversity and traditional knowledge. The village is in the high-altitude zone of the Kashkadarya botanical-geographical region, situated at approximately 2000 to 3000 m above sea level, within the foothills and mountainous areas of the Hissar Range. The high-altitude location of Gelon village creates distinctive environmental conditions, including diverse microclimates, varied soil types and rich floristic diversity. These conditions contribute to the presence of a wide range of medicinal plant species, many of which are adapted to harsh mountain environments and are known for their high concentrations of biologically active compounds.

In addition to its ecological uniqueness, Gelon village has a rich cultural and ethnobotanical heritage. The local population, primarily consisting of indigenous communities with strong ties to traditional lifestyles, possesses extensive knowledge of the medicinal uses of native plants. The remoteness of the area and limited access to modern healthcare have preserved traditional practices of herbal medicine, making the village an ideal location for ethnobotanical research.

Moreover, previous botanical explorations in the region have indicated that high-altitude zones such as Gelon village often harbor endemic, rare and ecologically significant plant species, many of which are under-documented in scientific literature.

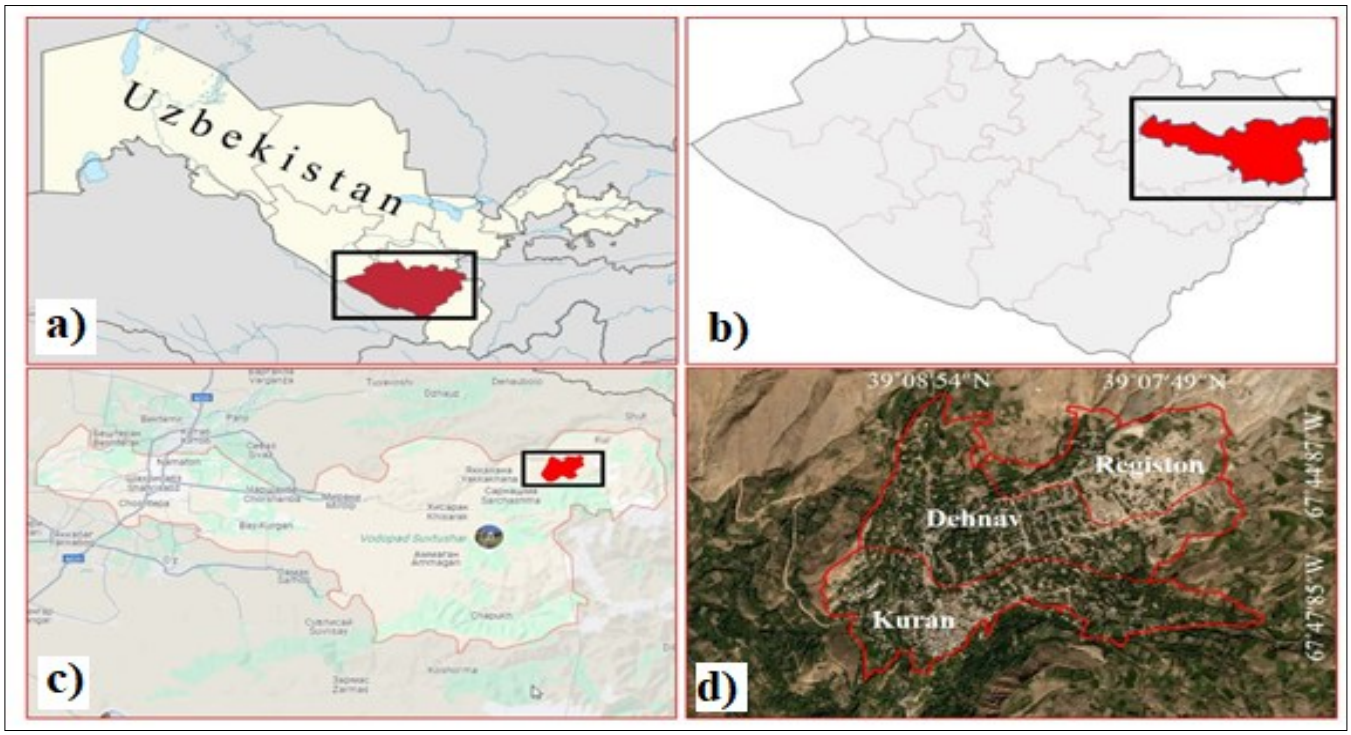

Fig. 1. Map of the study area: a) Administrative boundaries of Kashkadarya region, Republic of Uzbekistan; b) Shahrisabz district, Kashkadarya region; c) Gelon village, Shahrisabz district; d) Administrative boundaries of Gelon village.

Information about informants

Informants were selected using purposive and chain-referral sampling methods. They were identified based on referrals from residents who identified individuals with extensive knowledge or experience in traditional medicine. Community leaders, village heads and other trusted sources were also involved in the selection process. Table 1 shows the demographic and socio-economic characteristics of the informants. Currently, about 5000 people live in the village of Gelon. Given the relatively small and close-knit population of Gelon Village and considering that the study specifically targeted individuals with relevant ethnobotanical knowledge rather than employing random sampling of the general population, the selected sample size of 41 informants is considered statistically and representatively sufficient for the objectives of this study. Of the 41 informants in Gelon village, 32 (78 %) were male and 9 (22 %) were female, ranging in age from 45 to 88 years. The average age of the male informants was 69 years. Their educational background was as follows: 58 % had completed primary school, 22 % had completed secondary school and 20 % had completed higher education. In terms of occupations: The majority (73 %) were farmers, 22 % were retired teachers and 5 % were medical professionals. Income levels: 34 % earned more than UZS 2 million per month, 29 % earned between UZS 3-4 million, 20 % had an average income of UZS 5-5.9 million, 17 % earned more than UZS 6 million per month.

Collection of ethnobotanical data

Data was collected through observation, direct interviews and group discussions. Interviews were conducted in the tajik language, which is the native language of the local population, ensuring clear communication and accurate documentation of traditional knowledge. In some cases, local dialects and folk names of plants were also recorded to capture the full range of indigenous terminology. Prior informed consent was obtained, necessary permissions were formalized and semi-structured interviews, focus group discussions, field observations and collection of plant specimens were conducted. Interviews with informants were conducted using semi-structured questionnaires to collect additional information on medicinal plants used to treat diseases, their preparation methods and application techniques. In addition, data on the local names of plants, their ethnomedical uses, plant parts used, preparation techniques and methods of administration were collected to enrich the ethnopharmacological knowledge.

Table 1. Demographic and socioeconomic characteristics of informants

Category	Sub-category	Number of Informants	Percentage %
Gender	Male	32	78
	Female	9	22
Location\ (Gelon)	Neighborhood Kuran	28	68
	Neighborhood Dehnav	11	27
	Neighborhood Registon	2	5
Age	≤49	1	3
	50-59	3	7
	60-69	21	51
	≥70	16	39
Education	Primary	24	58
	Secondary	9	22
	Higher Education	8	20
Occupation	Farming	30	73
	Health Workers	2	5
	Teaching (Retired)	9	22
Monthly Income (UZS)	< 2 mln	14	34
	3 - 4	12	29
	5 - 5,9	8	20
	> 6 mln	7	17

Data analysis

Data collected from interviews with each informant were entered into Microsoft Excel (Microsoft, USA) in tabular form and later analyzed using qualitative and quantitative descriptive methods. The efficacy of the medicinal plants and their preparation methods were described in detail. Quantitative analysis was done based on the following parameters: Utility value (UV), plant family, plant parts used, types of diseases treated and preparation methods. The scientific names of the plant species collected were verified by cross-referencing with the PlantList.org database (www.scienceopen.com), while local names were recorded based on information provided by the informants.

The UV equation is as follows:

$$UV = \sum Ui/N$$

Where: UV: utility value index, Ui: number of uses reported by informants for specific plant, N: total number of respondents.

Results

Diversity of medicinal plant species

The study found that the community uses 95 species of medicinal plants belonging to 43 different families for medicinal purposes. The most dominant plant families and their respective proportions are Asteraceae (14.74 %), Rosaceae (10.52 %), Apiaceae (9.47 %), Lamiaceae (7.36 %), Polygonaceae (6.31 %) and Fabaceae (5.26 %). Other families, including Brassicaceae, Elaeagnaceae, Linaceae, Malvaceae, Poaceae, Rhamnaceae and Schisandraceae, each contributed 2.1 %. The remaining families, accounting for 1.05 %, have been used to treat a total of 29 different diseases. Nine different plant parts were used in traditional medicinal preparations, mainly for the treatment of respiratory diseases (cough, bronchitis, asthma, tonsillitis), hypertension, stomatitis and biliary disorders. In terms of processing methods, medicinal plants are prepared using nine different processing techniques and used in six different ways, which are commonly practiced by the inhabitants of the village of Gelon (Table 2). According to a survey based on interviews with several traditional healers, it was found that medicinal plants from 43 plant families are used to treat various diseases. The distribution and proportion of each plant family is shown in Fig. 2. The major plant families with medicinal importance are as follows Asteraceae family - 14 species, Rosaceae family - 10 species, Apiaceae family - 9 species, Lamiaceae family - 7 species, Polygonaceae family - 6 species, Fabaceae family - 5 species, the following families are represented by 2 species each: Brassicaceae, Elaeagnaceae, Linaceae, Malvaceae, Poaceae, Rhamnaceae, Schisandraceae, these findings highlight the diversity of medicinal plants used in traditional medicine and their importance in treating various health conditions.

The parts of medicinal plants used are classified as leaves, flowers, roots, seeds, fruits, grains, bark, stems and oils. Overall, in Gelon, the most frequently used parts of plants for the treatment of diseases are leaves - 42.1 %, roots - 21.05 %, fruits - 12.63 %, seeds - 8.42 %, flowers - 6.31 %, stems - 5.26 %, grains, bark and oils - 1.05 % each (Fig. 3).

Table 2. Biomass components of medicinal plants used in traditional medicine and methods of their use (based on informant data)

Family	Scientific name	Local name	Plant part	Methods of application	Types of diseases treated	Utility Value (UV)
Amaranthaceae	*Beta vulgaris* L.	Lavlav	Root	Boiled root	Prostatitis	0,39
Anacardiaceae	*Pistacia vera* L.	Pista	Seeds	Seeds	Avitaminosis	0,29
Apiaceae	*Prangos pabularia* Lindl.	Yigna	Leaves	Extract	Stomatitis	0,39
	Mediasia macrophylla (Regel & Schmalh.) Pimenov	Xunich	Leaves	Extract	For liver diseases	0,46
	Daucus carota L.	Savzi yovvoyi	Seeds	Extract	Anemia	0,07
	Carum carvi L.	Zirai siyoh	Seeds	Infusion	Gastritis	0,65
	Anethum graveolens L.	Shibit	Leaves	Tincture	Hypertension	0,58
	Ferula sumbul (Kauffm.) Hook. f.	Sumbul	Root	Extract	Prostatitis	0,85
	F. assa-foetida L.	Kumot	Oil	Oil	Against wounds	0,41
	Foeniculum vulgare Mill.	Chulingon	Leaves	Extract	Cataract	0,04
	Petroselinum crispum (Mill.) Fuss.	Petrushka	Leaves	Extract	Malaria	0,39
Araceae	*Arum korolkowii* Regel	Kuchala	Root	Tincture	For broken bones	0,43
Asphodelaceae	*Eremurus olgae* Regel	Shirach	Root	Tincture	In case of lumbar hernia	0,17
Asteraceae	*Rhaponticum repens* (L.) Hidalgo	Talxa	Leaves	Extract	Against wounds	0,39
	Helichrysum maracandicum M. Pop. ex Kirp.	Gozi choy	Flower	Infusion	Cholecystitis	0,63
	Cichorium intybus L.	Sachratqi	Root	Infusion	Diuretic	0,26
	Achillea millefolium L.	Buyi modaron	Stem	Infusion	Gout	0,48
	Arctium lappa L.	Talbus	Root	Extract	Rheumatism	0,36
	Artemisia absinthium L.	Shuvoq	Leaves	Tea	Bronchitis	0,34
	A. scoparia Waldst. et Kit.	Yerbosdi	Leaves	Tincture	Epilepsy	0,17
	Dahlia variabilis L.	Kartoshkagul	Root	Decoction	Diabetes mellitus	0,24
	Xanthum strumarium L.	Guzaxor	Leaves	Syrup	Against asthma	0,31
	Onopordum acanthium L.	Lattaxor	Seeds	Infusion	Furuncle	0,43
	Tussilago farfara L.	Kuka	Leaves	Infusion	Against cough	0,51
	Calendula officinalis L.	Tirnoqgul	Flower	Infusion	Diuretic	0,53
	Inula macrophylla Kar. et Kir.	Andoz	Root	Extract	Stomatitis	0,51
	Taraxacum officinale (L.) Webb ex F.H.Wigg.	Qoqu	Leaves	Syrup	Anemia	0,24
Berberidaceae	*Berberis vulgaris* L.	Zirk	Fruit	Infusion	Hepatitis - cholecystitis	0,56
Brassicaceae	*Capsella bursa-pastoris* (L.) Medik.	Jag - jag	Leaves	Infusion	Dysentery	0,24
	Armoracia rusticana Gaertn., Mey. et Scherb.	Qalampir (Xren)	Root	Tincture	Tonsillitis	0,19
Campanulaceae	*Codonopsis clematidea* (Schrenk ex Fisch. & C.A. Mey.) C.B. Clarke	Dugboyi	Leaves	Extract	Hepatitis	0,80
Caryophyllaceae	*Dianthus tetralepis* (Nevski) Rech. fil.	Maxlas	Leaves	Extract	Diarrhea	0,82
Convolvulaceae	*Convolvulus subhirsutus* Regel et Schmalh	Pechak	Leaves	Infusion	Against asthma	0,26
Crassulaceae	*Rhodiola rosea* L.	Zarchub	Root	Tincture	Neurosis	0,82
Cupressaceae	*Juniperus seravschanica* Kom.	Burs	Seeds	Tincture	Rheumatism	0,53
Elaeagnaceae	*Hippophae rhamnoides* L.	Chakanda	Fruit	Oil	For stomach and intestinal ulcers	0,46
	Elaeagnus angustifolia L.	Jigda	Flower	Tincture	Hypertension	0,29
Ephedraceae	*Ephedra equisetina* Bunge	Xuma	Leaves	Infusion	Malaria	0,29
Equisetaceae	*Equisetum arvense* L.	Chilbugum	Stem	Extract	Dysentery	0,63
Euphorbiaceae	*Euphorbia antiquorum* L.	Ixroch	Leaves	Infusion	Laxative	0,53
Fabaceae	*Glycyrrhiza glabra* L.	Bexak	Root	Infusion	Bronchitis	0,31
	Medicago sativa L.	Yurushqa	Leaves	Infusion	Hemostatic	0,36
	Lathyrus pratensis L.	Sidirga	Flower	Infusion	Gastritis	0,17
	Melilotus officinalis (L.) Pall.	Xarbeda	Stem	Infusion	Rheumatism	0,26
	Trifolium pratense L.	Sebarga	Leaves	Tea	Hypertension	0,09
Gentianaceae	*Gentiana olivieri* Griseb.	Poyi zog	Root	Infusion	Against cough	0,21
Grossulariaceae	*Ribes nigrum* L.	Smorodina	Fruit	Decoction	Avitaminosis	0,43
Hypericaceae	*Hypericum perforatum* L.	Dalachoy	Stem	Tea	Hypertension	0,41
Iridaceae	*Crocus sativus* L.	Guli buzgola	Flower	Infusion	Bronchitis	0,26
Juglandaceae	*Juglans regia* L.	Chormagz	Fruit	Extract	Avitaminosis	0,75

Lamiaceae	*Ocimum basilicum* L.	Rayhon	Leaves	Infusion	Against cough and respiratory diseases	0,48
	Salvia officinalis L.	Marmarak	Leaves	Infusion	Stomatitis	0,12
	S. sclarea L.	Kampirgul	Leaves	Tincture	Against cough and respiratory diseases	0,29
	Mentha piperita L.	Halbu	Leaves	Infusion	Hepatitis - cholecystitis	0,46
	Melissa officinalis L.	Rayhoni kohi	Leaves	Tincture	Gastritis	0,29
	Origanum tyttahanthum Gontsch.	Pudinai ko'hi	Stem	Infusion	Stone-dissolving for the kidney and urinary tract	0,41
	Ziziphora persica Bunge	Kukuti	Leaves	Infusion	Hypertension	0,70
Linaceae	*Linaria popovii* Kuprian.	Zagirak	Leaves	Tea	Diuretic	0,14
	Linum usitatissimum L.	Zagir	Seeds	Oil	Avitaminosis	0,14
Malvaceae	*Malva sylvestris* L.	Tugmachagul	Leaves	Infusion	Stomatitis	0,09
	Althaea officinalis L.	Gulxayri	Root	Infusion	Against cough	0,58
Onagraceae	*Chamerion angustifolium* (L.) Holub	Ivanchoy	Leaves	Infusion	Neurosis	0,46
Papaveraceae	*Glaucium fimbrilli gerum* Boiss.	Qaymoqinak	Fruit	Decoction	Hemostatic	0,12
Plantaginaceae	*Plantago lanceolata* L.	Zulfi yatimak	Leaves	Tincture	Bronchitis	0,14
Poaceae	*Zea mays* L.	Makka	Grain	Tincture	Prostatitis	0,36
	Elytrigia repens (L.) Desv.	Ajriqgandum	Root	Extract	Diuretic	0,31
Polygonaceae	*Rumex confertus* Willd.	Qav	Leaves	Infusion	Diarrhea	0,14
	R. crispus L.	Shilxa	Leaves	Tincture	Gastritis	0,41
	Rheum officinale Baill..	Chukri	Leaves	Extract	Hypertension	0,78
	Polygonum hydropiper (L.) Delarbre	Qalampiri obi	Leaves	Tincture	Dysentery	0,21
	P. aviculare L.	Rohdavak	Leaves	Tincture	Hemostatic	0,19
	P. nitans (Fisch. et Mey.)	Toron	Root	Infusion	Stomatitis	0,60
Ranunculaceae	*Nigella sativa* L.	Sedana	Seeds	Oil	Lithotriptic	0,51
Rhamnaceae	*Rhamnus cathartica* L.	Xirsak	Root	Extract	Stomatitis	0,31
	Ziziphus jujuba Mill.	Chilonjiyda	Fruit	Infusion	Anemia	0,41
Rosaceae	*Sanguisorba officinalis* L.	Tutak	Leaves	Extract	Diarrhea	0,19
	Crataegus songorica C. Koch.	Dulona surx	Flower	Tea	Hypertension	0,46
	C. altaica Lange	Dulona	Fruit	Infusion	Hypertension	0,58
	Rubus idaeus L.	Malina	Fruit	Infusion	Against cough	0,34
	R. vulgaris Weihe & Nees	Maymunjon	Fruit	Decoction	Hypovitaminosis	0,31
	Cotoneaster racemiflorus var. *hissaricus* (Poj ark.) Kitam.	Irgay	Seeds	Infusion	Neurosis	0,24
	Rosa canina L.	Hulul	Fruit	Infusion	Hypertension	0,78
	Orthurus kokanicus (Regel & Schmalh.) Juz.	Shirchoy	Root	Infusion	Appetite stimulant	0,68
	Amygdalus communis L.	Bodom	Fruit	Oil	Antibacterial	0,73
	Prunus armeniaca L.	Zardolu	Fruit	Oil	Against wounds	0,48
Rubiaceae	*Rubia tinctorum* L.	Ruyan	Root	Extract	Rheumatism	0,70
Salicaceae	*Salix alba* L.	Zaxarbed	Stem bark	Decoction	Dysentery	0,29
Salvadoraceae	*Salvadora persica* L.	Misvok	Root	Extract	Stomatitis	0,56
Schisandraceae	*Illicium verum* Hook.f.	Bodiyon	Leaves	Extract	Appetite stimulant	0,43
	Schisandra chinensis (Turcz.) Baill.	Limonnik	Leaves	Tea	Against flu	0,34
Scrophulariaceae	*Verbascum soongoricum* Schrenk.	Dumi gov	Leaves	Infusion	Diuretic	0,14
Solanaceae	*Datura stramonium* L.	Bahgidevona	Leaves	Infusion	Neurosis	0,46
Urticaceae	*Urtica dioica* L.	Gazanda	Root	Infusion	Hemostatic	0,65
Vitaceae	*Vitis vinifera* L.	Angurg'ura	Leaves	Infusion	Rheumatism	0,17
Zygophyllaceae	*Peganum harmala* L.	Isiriq	Seeds	Extract	Against flu	0,56

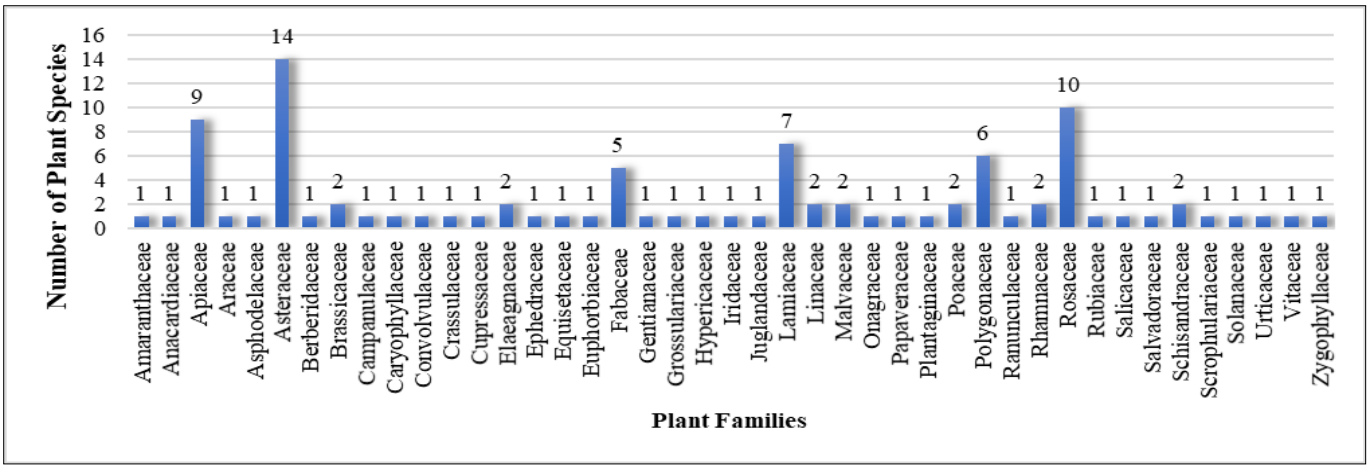

Fig. 2. Distribution of medicinal plant species used in treating various diseases and in traditional medicine in Gelon by plant family.

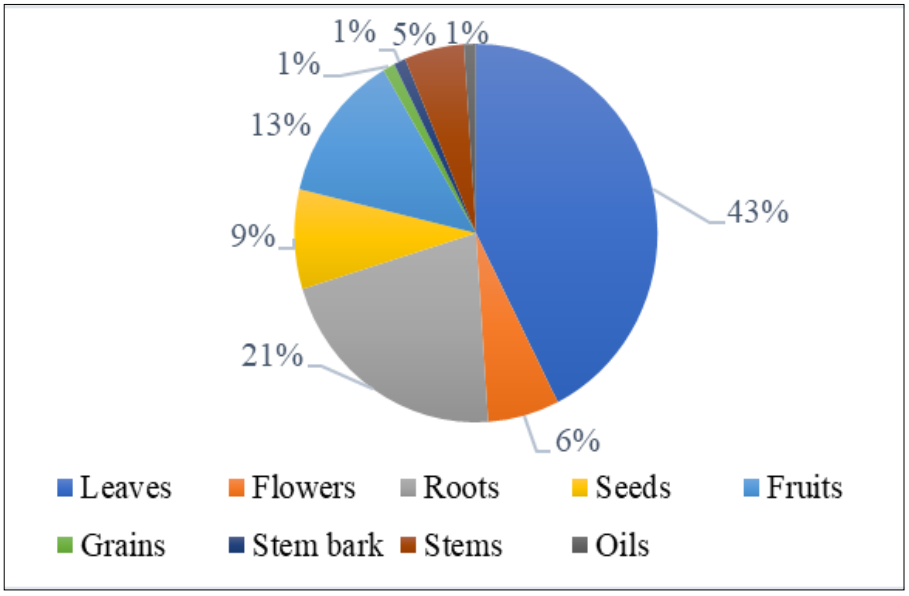

Fig. 3. Plant parts used in traditional medicine in Gelon.

Diseases treated with different medicinal plant species are shown in Fig. 4. The most commonly treated diseases are respiratory diseases (such as cough, bronchitis, asthma and tonsillitis) treated with 16 plant species. The next most treated diseases are: hypertension - treated with 9 plant species; stomatitis - treated with 6 plant species; liver diseases (hepatitis, cholecystitis), choleretic and rheumatism - treated with 5 plant species each; avitaminosis, gastritis, dysentery and haemostatic - treated with 4 plant species each; prostatitis, anaemia, anti-wound and diarrhea - treated with 3 plant species each. Other diseases were treated with 2 or 1 plant species.

Utility Value (UV)

The analysis of the relative importance of the use of medicinal plants is based on the total number of informants who specifically use certain plant species. The UV value for medicinal plants in the village ranges from 0.00 to 1.00. Based on the number of plant species with a UV value up to 1.00 in the village, 10 plant species with a UV value up to 1.00 were identified in Gelon (Table 2).

The results of this study showed that the highest UV values in the village of Gelon were recorded for the following plant species *Ferula sumbul* (0.85), *Dianthus caryophyllus* and *Rhodiola rosea* (0.82), *Codonopsis clematidea* (0.80). They are followed by *Rheum officinale* and *Rosa canina* (0.78), *Juglans regia* (0.75), *Amygdalus communis* (0.73), *Ziziphora persica* and *Rubia tinctorum* (0.70 each). The remaining 85 plant species had UV values between 0.04 and 0.68 (Fig. 5).

The most commonly used methods for preparing medicinal plants were as follows (Fig. 6): Infusion - 38 plants, Extraction - 21 plants, Tincture preparation - 15 plants, Tea and oil preparation - 6 plants, Decoction - 5 plants, Juice preparation - 2 plants, Boiled root and seed - 1 plant. These methods are based on the experience and traditional knowledge of the local people about the use of medicinal plants.

In this study, 17 % of medicinal plants were effectively used to treat respiratory diseases (such as cough, bronchitis, asthma and tonsillitis), while 9 % were found to relieve hypertension. These include the following: Wormwood (*Artemisia absinthium*), Cocklebur (*Xanthum strumarium*), Coltsfoot (*Tussilago farfara*), Horseradish (*Armoracia rusticana*), Bindweed (*Convolvulus subhirsutus*), Licorice (*Glycyrrhiza glabra*), Saffron (*Crocus sativus*), Basil (*Ocimum basilicum*), Clary sage (*Salvia sclarea*), Marshmallow (*Althaea officinalis*), Plantain (*Plantago lanceolata*), Oleaster (*Elaeagnus angustifolia*), Red clover (*Trifolium pratense*), St. John's wort (*Hypericum perforatum*), Persian thyme (*Ziziphora persica*), Rhubarb (*Rheum officinale*), Hawthorn (*Crataegus altaica*), Dog rose (*Rosa canina*) and others. Fig. 7 shows images of medicinal plants used in traditional medicine for treatment.

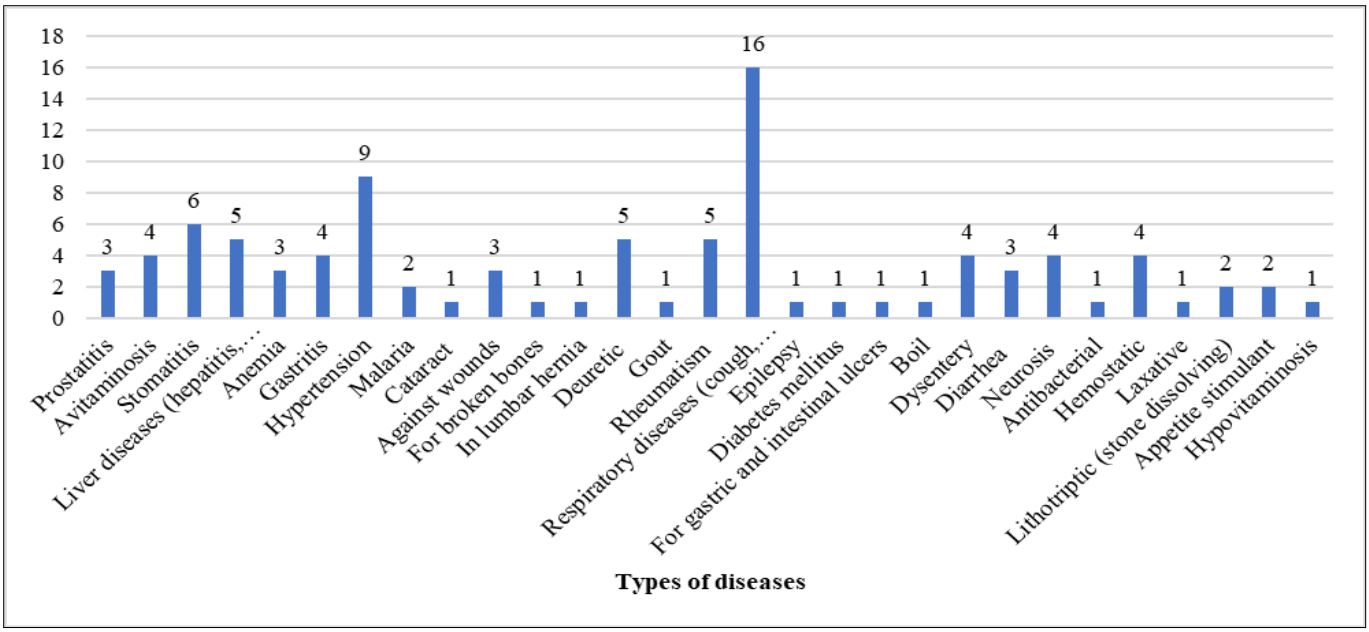

Fig. 4. Distribution of plant species used in traditional medicine in Gelon by disease type.

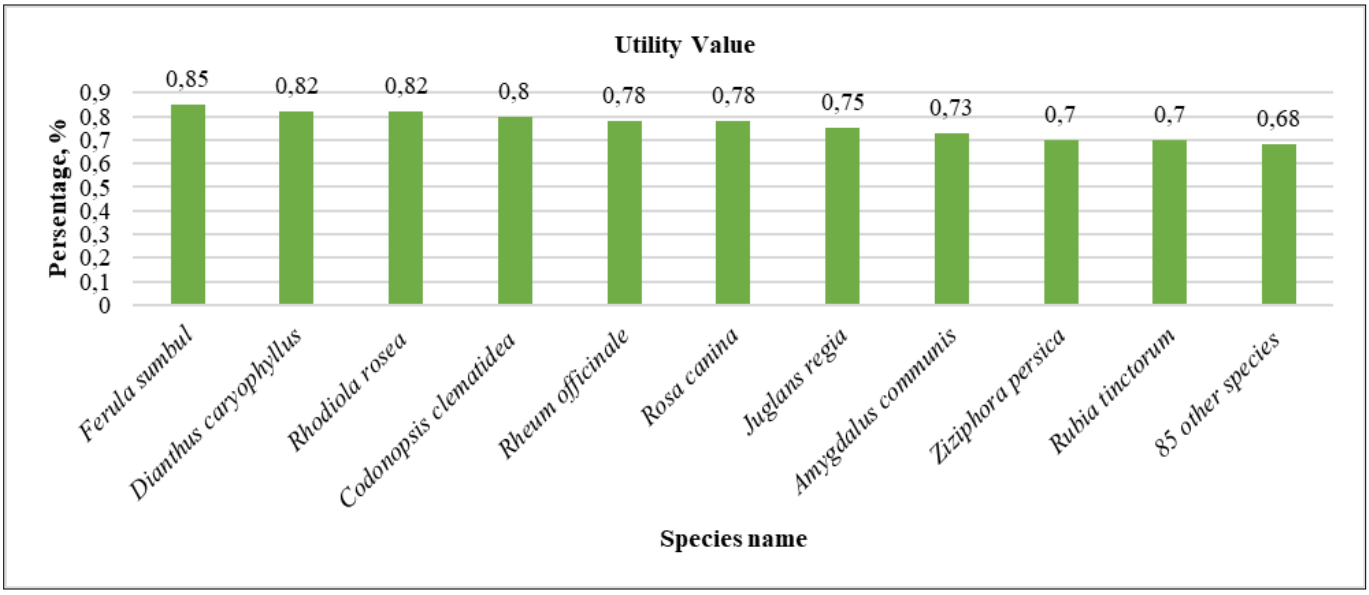

Fig. 5. Plant species with the highest utility value in Gelon village, Shahrisabz district, Kashkadarya region, Uzbekistan.

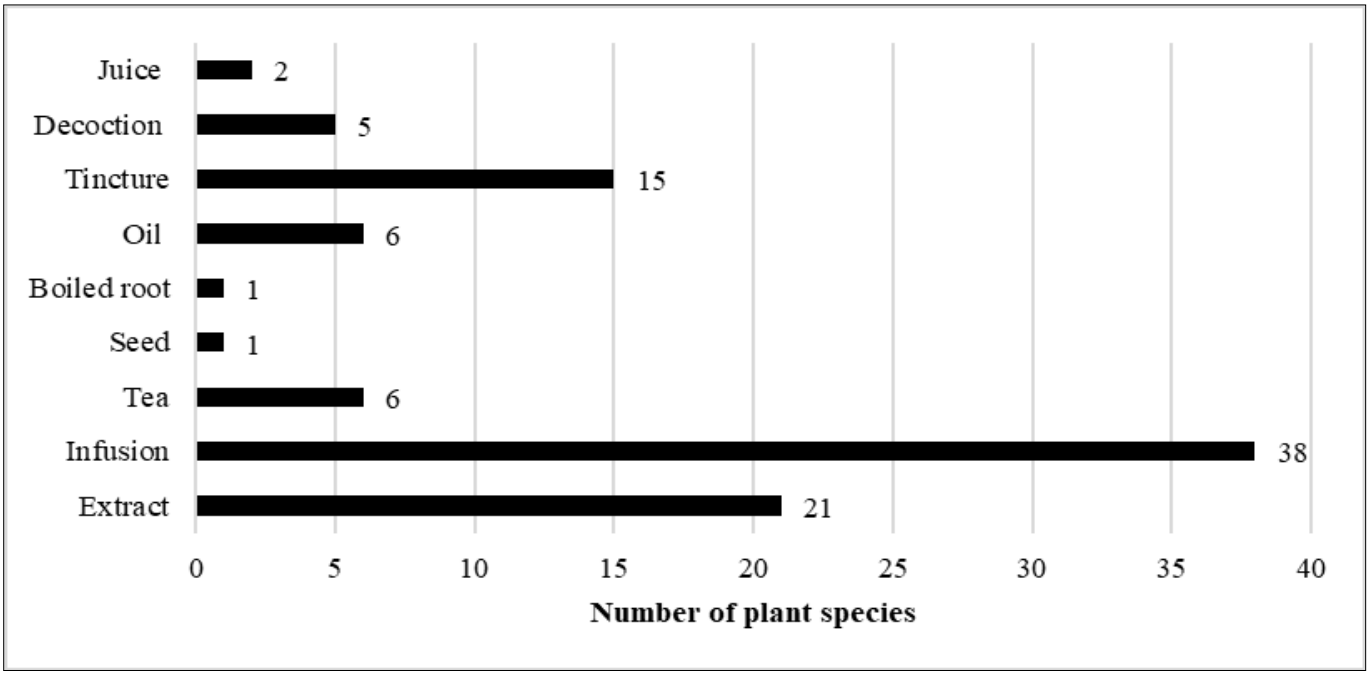

Fig. 6. Distribution of medicinal plant species by methods of use.

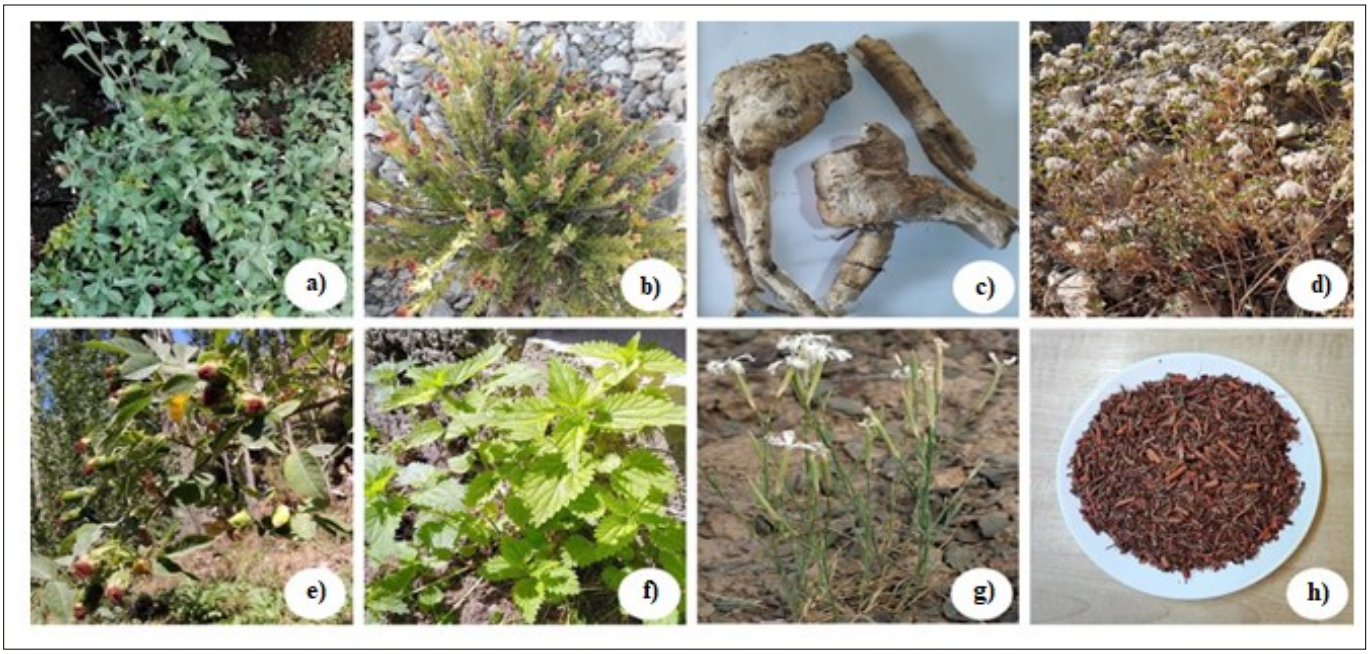

Fig. 7. Appearance of medicinal plants (photos credited to the authors): a) Dugboyi (*Codonopsis clematidea*); b) Zarchub (*Rhodiola rosea*); c) Sumbul (*Ferula sumbul*); d) Kukuti (*Ziziphora persica*); e) Hulul (*Rosa canina*); f) Gazanda (*Urtica dioica*); g) Maxlas (*Dianthus tetralepis*); h) Ruyan (*Rubia tinctorum*).

Discussion

A total of 95 species of medicinal plants belonging to 43 families (Table 2) were reported to be used in Gelon village (Shahrisabz district). The highest number of medicinal plant species was recorded in the south-eastern part of Gelon village (73 species), followed by the western part with 22 medicinal plant species identified. Many informants mentioned the use of different plant parts for medicinal purposes, including leaves, fruits, roots, stems, bark, flowers and seeds. Sometimes mixtures of different plant parts were prepared to increase the therapeutic effect.

Medicinal plants represent a significant alternative treatment for a wide range of diseases (19, 20). Humankind has utilised plants for healthcare purposes since time immemorial, with this knowledge being transmitted across generations (21). On a global scale, medicinal plants are extensively employed in primary healthcare due to their affordability, safety and effectiveness (22). In numerous communities, medicinal plants constitute the basis of healthcare systems. It is estimated that approximately 85 % of drugs used in primary healthcare globally are derived from plants (23). The importance of medicinal plants in treating and preventing diseases, especially in remote areas with limited access to healthcare services, cannot be overstated (24). A substantial proportion of modern medical studies is ethnobotanical, relying on traditional knowledge and practices. The significance of plant-derived compounds in pharmaceuticals is underscored by the fact that 25 % of all prescribed medications worldwide originate from plants, with 121 active compounds currently in use being plant-derived (25).

Plants of the Asteraceae family are widely used in ethnomedicine for the treatment of wounds, cholecystitis, gallstones, gout, rheumatism, bronchitis, diabetes, furunculosis, stomatitis and anaemia (26). Phytochemicals such as polyphenols, flavonoids and diterpenoids found in this family have been shown to have antibacterial, anti-inflammatory, anticancer and antifungal effects (27, 28).

The use of herbal medicines by the people of Gelon is mainly for the treatment of respiratory diseases (such as cough, bronchitis, asthma and tonsillitis) and hypertension. Consequently, herbal medicines are widely used by middle-aged and elderly people. The informants noted that since the winter season is long, coughs are common among middle-aged and elderly people. In such cases, they quickly drink juice prepared from *X. strumarium*. Some people consume infusions prepared from *T. farfara*, *C. subhirsutus*, *G. glabra* and *G. olivieri*. Others consume tinctures made from *P. lanceolata*, *S. sclarea* and *A. rusticana* to treat cough. In addition, informants reported that hypertension is particularly prevalent among older adults. To treat it quickly, they consume infusions prepared from *R. canina*, *Z. persica* and *C. altaica*. Others prefer to drink tea made from *C. songorica*, *T. pratense* and *H. perforatum*. Some also use *E. angustifolia* as a tincture and *Rh. officinale* as an extract. As to dosage, the informants explained that plant sources are safe and natural, so there are no limitations on the frequency of administration.

According to the Utility Value (UV) analysis, the most used medicinal plants in traditional medicine have been evaluated as follows in Gelon village: *F. sumbul* (0.85), *D. caryophyllus* and *Rh. rosea* (0.82), *C. clematidea* (0.80), *Rh. officinale* and *R. canina* (0.78), *J. regia* (0.75), *A. communis* (0.73), *Z. persica* and *R. tinctorum* (0.70) (Fig. 5). Traditional healers typically use these 10 medicinal plants to treat respiratory diseases (cough, bronchitis, asthma and tonsillitis) and hypertension. In addition, they are also widely used for treating middle-aged and elderly patients. According to the interview results, these plants usually grow wild or are purchased directly from local markets.

The present ethnobotanical study conducted in Gelon village of the Qashqadaryo region revealed several unique outcomes that distinguish it from previous research. Firstly, this is one of the few systematic studies documenting the traditional use of medicinal plants among the local population of this remote mountain area. Due to the geographical isolation and specific climatic conditions of Gelon village, the community has preserved a rich reservoir of indigenous knowledge related to medicinal plants, which has been transmitted orally for generations.

One of the most remarkable findings is the identification of several plant species that are extensively used in local folk medicine but have been rarely or never reported in previous ethnobotanical studies from other parts of Uzbekistan. This includes both endemic species and wild-growing plants specific to the mountainous ecosystems of the region. Moreover, the study revealed novel or little-known applications of some widely distributed medicinal plants, indicating a unique adaptation of traditional healing practices to local health needs.

Importantly, the research highlights the cultural significance of plant-based medicine in the daily life of the Gelon community, which is often the only accessible healthcare option due to limited medical infrastructure. This emphasizes the need for further documentation and potential pharmacological studies of the identified species to validate their therapeutic efficacy and ensure their sustainable use.

In order to standardize the available ethnobotanical information, the Institute of Biochemistry (Samarkand) has developed a database containing detailed information for each plant, e.g. scientific names (accepted name and, when necessary, main synonyms), common name used in literature and any other names commonly in use, geographical distribution, morphological description, healing properties, traditional medicinal usage and known adverse effects, information on scientifically proven and medicinally approved data and information received from sources related to traditional medicine, including associated remedies and recipes.

Conclusion

This is the first quantitative ethnobotanical study of the medicinal plants used by the people of Gelon village, Shahrisabz district, Kashkadarya region, Uzbekistan. The study identified a total of 95 plant species belonging to 43 families, which were reportedly used to treat 29 diseases and conditions in the community. The Asteraceae, Rosaceae and Apiaceae families were found to be the most widely used medicinal plants in traditional medicine. The most used plant part by village healers is the leaves, followed by roots, fruits, seeds, flowers, stems and tubers. The most common ailments among middle-aged and elderly people are respiratory diseases (cough, bronchitis, asthma and tonsillitis) and hypertension. According to the Utility Value (UV) data, the 10 medicinal plants with the highest use value were identified as *F. sumbul*, *D. caryophyllus*, *R. rosea*, *C. clematidea*, *R. officinale*, *R. canina*, *J. regia*, *A. communis*, *Z. persica* and *R. tinctorum*. Although this study successfully documented the use of medicinal plants in traditional medicine, additional research is needed to fully understand their bioactive effects against respiratory diseases (cough, bronchitis, asthma and tonsillitis) and hypertension. This approach ensured accurate matching local folk names to scientific botanical names, contributing to a reliable record of the region's medicinal flora. The study documented both well-known and previously unreported species with medicinal value. Future research should emphasize phytochemical analysis, ecological assessment and the development of conservation measures, particularly for rare or overexploited species identified in this study. These medicinal plants have significant potential for the development of standardized herbal medicines.

Acknowledgements

The authors express their deep gratitude to the local authorities of Gelon village for their continuous support and cooperation in the successful completion of the data collection process.

Authors' contributions

UN, BA, IM and MH performed the experiments. UN, BA, ZR, SU and AK analyzed data. UN and KS statistically analyzed results. All authors wrote the draft of the manuscript. UN and BA conducted critical revision of the manuscript. SU worked out the concept and design, supervised and funded the experiments. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

References

1. Albuquerque U, Monteiro J, Ramos M, Amorim E. Medicinal and magic plants from a public market in Northeastern Brazil. J Ethnopharmacol. 2007;110:76-91. https://doi.org/10.1016/j.jep.2006.09.010
2. Fabricant DS, Farnsworth NR. The value of plants used in traditional medicine for drug discovery. Environ Health Perspect. 2001;109:69-75. https://doi.org/10.1289/ehp.01109s169
3. Heinrich M, Bremner P. Ethnobotany and ethnopharmacy-their role for anti-cancer drug development. Curr Drug Targets. 2006;7 (3):239-45. https://doi.org/10.2174/138945006776054988
4. Islam R. Role of plant medicine in health care and improving nutritional standard in rural area of Bangladesh. Proc Natl Semin Diversity Med Plants Their Sustain Util Health Care Improving Nutritional Standard Rural Areas, Kolkota. 2006:1-30.
5. Darmastuti SA, Nazar IA, Setyawan AD. Plant diversity and its use in Javanese urban home garden: An ethnobotanical study in Central Java, Indonesia. Asian J Ethnobiol. 2024;7(1):32-42. https://doi.org/10.13057/asianjethnobiol/y070104
6. Awan AA, Akhtar T, Ahmed MJ, Murtaza G. Quantitative ethnobotany of medicinal plants uses in the Jhelum Valley, Azad Kashmir, Pakistan. Acta Ecol Sin. 2021;41(2):88-96. https://doi.org/10.1016/j.chnaes.2020.09.002
7. Mela YJA, Bria EJ, Tnunay IMY. Ethnobotany of semi-arid medicinal plants used by Bunaq Tribe in Lamaknen, Belu District, East Nusa Tenggara, Indonesia. Int J Trop Drylands. 2022;6(1):16-25. https://doi.org/10.13057/tropdrylands/t060103
8. Xiong Y, Sui X, Ahmed S, Wang Z, Long C. Ethnobotany and diversity of medicinal plants used by the Buyi in eastern Yunnan, China. Plant Divers. 2020;42(6):401-14. https://doi.org/10.1016/j.pld.2020.09.004
9. Nahdi MS, Kurniawan AP. Study on the ethnobotany of medicinal plants by people in Gunung Kidul, Yogyakarta, Indonesia. Nusantara Biosci. 2019;11(2):133-41. https://doi.org/10.13057/nusbiosci/n110204
10. Sutraningsih NKA, Sukenti K, Sukiman S, Aryanti E. Ethnobotanical study on Daksina constituent plants on Lombok Island, West Nusa Tenggara, Indonesia. Asian J Ethnobiol. 2020;2 (2):78-83. https://doi.org/10.13057/asianjethnobiol/y020202
11. Arasti. Studi Etnobotani Tumbuhan Obat pada Masyarakat Lokal

Kabupaten Bima sebagai Sumber Belajar Hayati [Thesis]. Malang: Universitas Muhammadiyah Malang; 2021. Indonesian.

12. Husaini IPA, Maulany RI, Nasri N, Ngakan PO. Diversity and use of traditional medicinal plant species in Bantimurung-Bulusaraung National Park, Indonesia. Biodiversitas. 2022;23(11):5539-50. https://doi.org/10.13057/biodiv/d231101
13. Azmin N, Rahmawati A, Hidayatullah ME. Uji kandungan fitokimia dan etnobotani tumbuhan obat tradisional berbasis pengetahuan lokal di Kecematan Lambitu, Kabupaten Bima. Florea J Biol. 2019;6 (2):101-13. Indonesian. https://doi.org/10.25273/florea.v6i2.4678
14. Khassanov F. Conspectus Florae Asiae Mediae. Vol.11. Tashkent: Fan; 2015.
15. Khojimatov K, Iuldoshev K, Shogulomov U, Khojimatov O. Shifobahsh giyohlar qand hastaliga malham. Tashkent: Semashko Institution Press; 1993. Uzbek.
16. Khojakulov D, Khaydarov Kh, Rabbimov A, Mukimov T, Matkarimova G, Davronkulova F, et al. Biological, physiological and economic characteristics of Onobrychis chorasanica Bunge ex Bois. (Sainfoin) under sowing conditions. Plant Sci Today. 2024;11 (3):14-21. https://doi.org/10.14719/pst.3180
17. Khojimatov K, Khamraeva D, Khujanov A, Bussmann R. An overview of ethnomedicinal plants of Uzbekistan. Ethnobot Res Appl. 2020;20(8):1-19. https://doi.org/10.32859/era.20.08.1-19
18. Mesfin K, Tekle G, Tesfay T. Ethnobotanical study of traditional medicinal plants used by indigenous people of Gemad district, Northern Ethiopia. J Med Plants Stud. 2013;1(4):32-7.
19. Adam M, Ahmed AA, Yagi A, Yagi S. Ethnobotanical investigation on medicinal plants used against human ailments in Erkowit and Sinkat Areas, Eastern Sudan. Biodiversitas. 2020;21(7):3255-62. https://doi.org/10.13057/biodiv/d210748
20. Rayimova F, Dushanova G, Alikulov B, Kamalov Z, Ruzibakieva M, Nabiyeva F, et al. The role of VDR and TNF gene polymorphism in cytokine regulation in type I diabetes mellitus of the Uzbek population, Samarkand, Uzbekistan. Biodiversitas. 2024;25:1329-36. https://doi.org/10.13057/biodiv/d250349
21. Rastogi S, Pandey DN, Singh RH. COVID-19 pandemic: A pragmatic plan for Ayurveda intervention. J Ayurveda Integr Med. 2022;13 (1):100312. https://doi.org/10.1016/j.jaim.2020.04.002
22. Cordero CS, Meve U, Alejandro GJD. Ethnobotany and diversity of medicinal plants used among rural communities in Mina, Iloilo, Philippines. J Asia Pac Biodivers. 2023;16(1):96-117. https://doi.org/10.1016/j.japb.2022.12.003
23. Jhariya BL, Pawar M. Ethnomedicinal knowledge of Baiga and Gond Tribe and plant diversity in Jagmandal Forest, Mandla, India, with phytosociological diversity and utilization strategies. Asian J Ethnobiol. 2024;7(1):13-21. https://doi.org/10.13057/asianjethnobiol/y070102
24. Pikulthong V, Bhirompan S, Dechkla M, Mokkapan K, Boonman N, Wanna C, et al. Local herbs for pain relief in the area of Tumbon Khao Hin Son, Chachoengsao, Thailand. Biodiversitas. 2022;23 (10):5012-9. https://doi.org/10.13057/biodiv/d231007
25. Abadi BRH, Neinhuis C, Safaeian R, Lautenschläger T. Ethnobotanical studies of plant resources of Taftan Mountain, Sistan and Baluchestan in southeastern region of Iran. Asian J Ethnobiol. 2023;6(2):75-117. https://doi.org/10.13057/asianjethnobiol/y060201
26. Gou J, Lu Y, Xie M, Tang X, Chen L, Zhao J, et al. Antimicrobial activity in Asterceae: The selected genera characterization and against multidrug resistance bacteria. Heliyon. 2023;9(4):1-24. https://doi.org/10.1016/j.heliyon.2023.e14985
27. Koc S, Isgor BS, Isgor YG, Moghaddam NS, Yildirim O. The potential medicinal value of plants from Asteraceae family with antioxidant defence enzymes as biological targets. Pharm Biol. 2015;53(5):746-51. https://doi.org/10.3109/13880209.2014.942788
28. Mukhtorova S, Alikulov B, Yuldosheva M, Maxammadieva D, Khidirova U, Kabulova F, et al. Diversity of endophytic bacteria isolated from Peganum harmala distributed in arid regions in Uzbekistan. Regul Mech Biosyst. 2024;15(2):286-91. https://doi.org/10.15421/022441

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

Reprints & permissions information is available at https://horizonepublishing.com/journals/index.php/PST/open_access_policy

Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS, UGC Care, etc
See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

Copyright: © The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited (https://creativecommons.org/licenses/by/4.0/)

Publisher information: Plant Science Today is published by HORIZON e-Publishing Group with support from Empirion Publishers Private Limited, Thiruvananthapuram, India.