

Floristic diversity and economic importance of wild relatives of cultivated plants in Uzbekistan (Central Asia)

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Abstract. *Abduraimov OS, Maxmudov AV, Kovalenko I, Allamurotov AL, Mavlanov BJ, Shakhnoza SU, Mamatkasimov OT. 2023. Floristic diversity and economic importance of wild relatives of cultivated plants in Uzbekistan (Central Asia). Biodiversitas 24: 1668-1675.* The countries of Central Asia are considered one of the Centers of origin of cultivated plants and their wild relatives. Indigenous people have used these plants for several centuries. Our study was carried out in 2020-2022 in different biogeographical regions of Uzbekistan. Data from field studies and literature showed that in the flora of Uzbekistan, there are 24 families, including 202 species belonging to 102 genera. In the current investigation, an attempt has been made to document the floristic diversity and economic importance of wild relatives of cultivated plants in Uzbekistan. Wild Relatives of Cultivated Plants (WRCP) and cultivated species form an integral part of the genetic resources of plants that determine the food security of the assessment and are subject to conservation at the international level. The WRCP includes species of natural flora that are evolutionarily close to cultivated plants, are included in the same genus, and are potentially suitable for introducing into culture for creating or improving cultivated plant varieties. Most wild relatives of crop plants worldwide need to be addressed and utilized, recognizing their real potential. Humans have been using these plants for several centuries. In recent years, the demand for food has been increasing. Our study suggests making them possible to use these varieties of plants regularly.

Keywords: Central Asia, economical, endemic, taxon, Uzbekistan, wild relative

INTRODUCTION

Wild Relative Cultural Plants (WRCP) have the potential to contribute to food security. They include some crop ancestors and other species which more or less closely related to crops. A wider spectrum of diversity can be found in the genomes of wild plant species (Dostatny et al. 2021). Following Vavilov's study (1992) on CWRs, Iran is categorized in the higher ranks of conservation priorities. However, the species in this area are severely exposed to threats, so it is essential to protect them (Hosseini et al. 2021).

The first study on CWR dates back to a book by De Candolle (1855) entitled *Origin of Cultivated Plants* (Sayadi et al. 2022). Meeting the food and nutritional security of the current and future generations to ensure a good quality of life and human well-being is one of the immediate priorities of the global community for attaining the UN Sustainable Development Goals (UN-SDGs) by 2030 (Dubey et al. 2016; Foyer et al. 2016; Singh 2018). However, sustainable, equitable, and cleaner food production in times of global environmental changes, including climate change, increasing environmental pollution, and soil quality deterioration, are the major challenge for humanity in this 21st century (Gregory et al. 2005; Beddington 2010; Godfray et al. 2010; Godfray and Garnett 2014; Singh et al. 2018). Moreover, changing climatic conditions have been reported to affect agricultural

production worldwide negatively (Dubey et al. 2016). Therefore, sustainable agricultural production practices rely on resilient and climate-smart crop varieties are imperative for ensuring the food demand of the growing population (Shanmugasundaram and Kole 2012; Lipper et al. 2014; Redden et al. 2015).

The first study in Central Asia on the wild relative of cultivated plants is listed in the works of Vavilov (1926). Much work has been done to study the wild ancestors of cultivated plants worldwide. Much work has been done in Iran on species diversity and protection (Liu et al. 2019; Sayadi et al. 2022).

In Uzbekistan, too, many studies have been carried out on the wild relative of cultivated plants. It should be noted that most of the study is devoted to the study of plants widely used in agriculture. Questions about their natural population and current assessment remain open. Vavilov (1960) believes Central Asia is considered one of the largest and most important genetic centers of origin, with many cultural plants, especially fruit plants. Popov (1929) assessed the genetic resources of fruit plants and grapes of Central Asia: "...here, in the wild, there are forms that give rise to modern fruit plants, morphologically and geographically widely separated (Sitpayeva et al. 2020). This genotypic wealth has not yet been considered entirety, and even gene wealth has not been determined". At least three factors determine the genetic variety of fruit plants in Central Asia (Xia et al. 2017). First, the contact border of

the two floras passes here, i.e., the Mediterranean and East Asia, which served to form independent groups of fruit plants. Various representatives of both floras are observed in the contact zone of the Chatkol and Fergana ridges. That is associated with the division of recessives on and off the edges area, the population stability's weakness, and the widespread development of hybridization processes. Many European studies have also been done (Dempewolf et al. 2017; Labokas et al. 2018). In addition, studies in this direction are Hummer and Hancock (2015), Khoury et al. (2013, 2016), Johannes (2016), Vincent et al. (2019), and Sitpayeva et al. (2020). In recent years, cultural plants scattered and their wild relative in Uzbekistan have been studied by Rakhimova et al. (2020), Saribaeva et al. (2022), and Abduraimov et al. (2022). A scientific study has also been done toward popularization (Abduraimov et al. 2022). The floristic composition and economic importance of the species must be studied.

MATERIALS AND METHODS

Study area

The study was conducted in 2020-2023 in different botanical-geographical regions of Uzbekistan (Figure 1). The main part of Uzbekistan consists of arid regions. Arid regions account for 60-65% of the total area. This situation is a characteristic feature of the countries of Central Asia. The flora of Uzbekistan consists of more than 4350 species of plants (Sennikov et al. 2016). The endemic species are about 7-9 % of the total flora. A large part of them grows in the mountains. At the same time, the flora of steppes and deserts consists of unique bushes. On the lowland, trees, shrubs, and herbaceous vegetation grow well. For example, Tugai forests are characterized by thickets of cane and Candiria (Tojibaev et al. 2017).

Data collection and analysis

The object of study was the wild relative of cultivated plants documented in the flora of Uzbekistan. Floristic and geobotanic techniques were used in the field study. In addition, we used routing and semi-stationary techniques. Cultural plants and their relative wild species were determined in the National Herbarium. The 10-volume "The determinant of plants of Central Asia (1968-2016)" was used to identify species and their life forms. Scientific names of plants follow <http://www.plantsoftheworldonline.org/>, <http://www.theplantlist.org/>, and <http://www.ipni.org>. Information collected in the field and voucher specimens were stored in the herbarium and descriptively analyzed using the literature to determine the species.

RESULTS AND DISCUSSION

Data from field studies and literature on the flora of Uzbekistan showed that 24 families belong to 102 genera and 202 species. The urgency of the problems of the wild flora of Uzbekistan related to endemic, rare, endangered, and economically useful wild species is increasing due to the declining genetic diversity due to anthropogenic impact and climate change. During the studies, a list of wild relatives of cultivated plants in the flora of Uzbekistan was formed. According to Abduraimov et al. (2022), in the flora composition, we found 24 families of the wild relative of cultivated plants and 202 species belonging to 102 genera. Table 1 shows that the largest number of species falls on the Poaceae family (63 species), Fabaceae (32 species), Rosaceae (24 species), and Amaranthaceae (18 species). These three families include about 55% of the WRCP species of Uzbekistan. The people of Central Asia have been using the plant species from those families for several centuries. Currently, in the study of modern genetic selection, cultural plants are used on a large scale from several constellations of their wild relative.

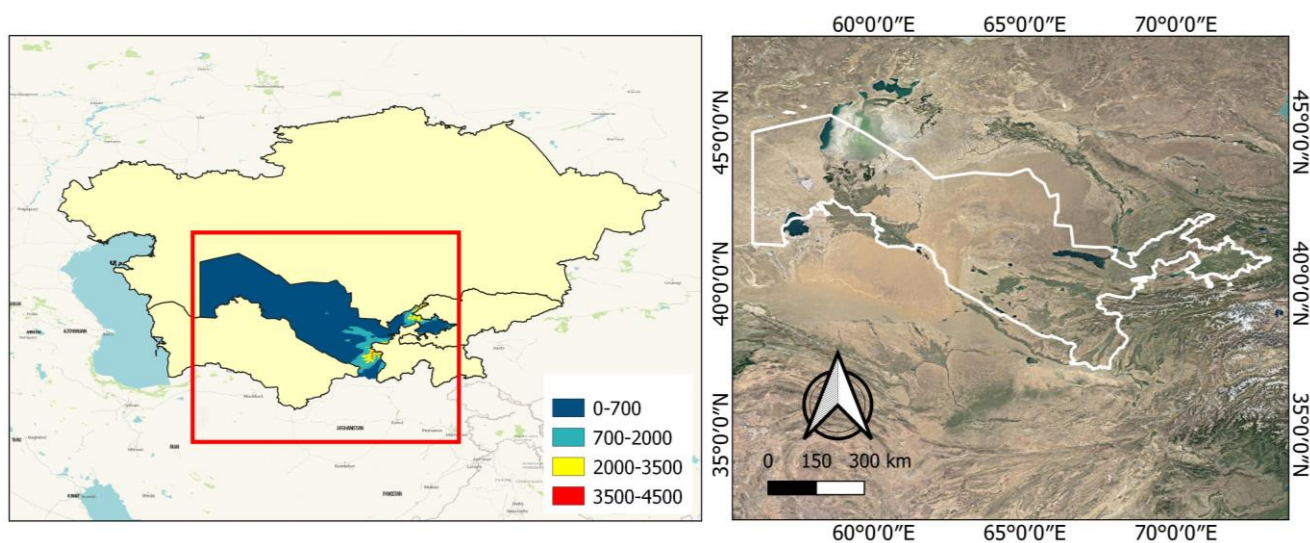


Figure 1. Study area in Uzbekistan (Central Asia)

The Rosaceae family's representatives are considered widely and evenly distributed species worldwide. This family's species are very common in tropical countries and countries with temperate climates. The world's inhabitants have used them for several thousand centuries in different farm sectors. Cereals are also widely used as fodder plants, especially by local residents. The taxonomic status of the family species is quite perfect, and now they contain 5-6 small families. Polymorphic characteristics of family representatives are very high, and we can also observe a number of their variations. Plants that accumulate many spare protein substances in seeds or embryos are a family of Fabaceae. The symbiosis of the plant root explains this accumulation with soil nitrogen-fixing nodule bacteria belonging to many genera. The protein and fatty oil embryo accumulation distinguishes such cultivated legumes as soybeans and other species.

The national economic importance of natural fruit plantations and the place of berry (Rosaceae) growth are very large, and they provide many fruits that can be eaten fresh and processed. In addition, the species of the Rosaceae family play an invaluable role as source material for breeding to obtain new varieties of fruit and berry-selected plants. A breeder selects the best forms for cultivation from wild fruit and berry plants, then crosses them among themselves, creating various excellent varieties, including many wild species (apple, pear, apricot, cherry, almond, etc.). Consequently, interest in wild-growing species has been recovered at present, as they carry valuable germplasm and are an excellent material for obtaining and renewing fruit and berry varieties.

The species of the Amaranthaceae family are common, mainly in desert regions. They are mainly fodder plants. Many will be resistant to salt and grow well on land without water. The next family is the Asteraceae, with 12 species. The vast family, up to 1000 genera and apparently, more than 2000 species are widely distributed around the globe. Its also represented in all continents and all climatic zones. The seeds of their wild relatives contain fatty oil. Many species are used in cultural salad.

The species of the Brassicaceae family, the leafy part, are very much eaten by humans. Therefore, the selection of cabbage species is of great importance for developing the taxonomy of the genus, and the ways of its evolution, as well as of great and practical importance. Much attention is paid to the mobilization and use of wild species. Therefore, preserving the gene pool of rare relatives of cultivated cabbage is necessary since some species valuable for breeding are rare.

The Polygonaceae family, including 40 genera and 900 species, is widely distributed globally but mainly in the northern temperate zone. There are nine species of wild relatives growing in Uzbekistan. The people of Central Asia regularly eat them. However, they are also widely used in the treatment of certain diseases.

There are not only edible but also ornamental or decorative plants. These plants are considered to be the Liliaceae family. A huge number of hybrid forms were obtained from this family. Even today, many studies are being carried out on this subject (Table 1).

Despite more than 100 century-old histories of plant cultivation, according to several scientists, humans use no more than 10% of the total species richness of flora in economic activity. Furthermore, Kamelin (2005) estimates the species richness of cultivated plants (not counting higher spores and all ornamental plants or any useful plants grown only in botanical gardens) at about 3000 species of seed plants, about 1% of the world's flora. That was considered the fundamental report on cultivated plants published in the second half of the 20th century. Even fewer than 150-200 species are forming the circle of the main life-supporting crops that have become widespread. A small part, 15-20 species, of cultivated plants such as wheat, rice, barley, oats, corn, soybeans, cotton, sugar cane, sugar beet, potatoes, and several others have acquired global importance and provide 90% of agricultural production.

The urgency of the problems of collecting, studying, preserving the population and rational use of plant genetic resources of the wild flora of Uzbekistan, i.e., endemic, rare, endangered, and economically useful wild species, is increasing due to the declining genetic diversity due to anthropogenic impact, and climate change. We categorized the plants according to their life forms, i.e., tree (15 species), shrub (17 species), semi-shrub (7 species), perennial 90 (species), biennial (9 species), and annual (64 species). We agree that plants do not spread evenly in the composition of the flora. They are determined to be extremely rare, infrequent, rare, abundant, and common (Figure 2).

Central Asia is famous as a center of diversity of apples, pears, onions, spinach, carrot, and other crops. On the territory of Uzbekistan, a unique gene pool of various ecological groups with a valuable reserve of fodder, medicine, food, and other useful plants is concentrated. Those can be used to create a variety of useful plant varieties of WRCP, which are resistant to frost, heat, drought, and salinity. Plant genetic resources include collecting, maintaining, evaluating, preserving, and researching their variability. Nevertheless, most of the work in this area has been focused on cultivated plants, their landraces, and cultivars until today.

We have analyzed economically valuable groups of plants. Thus, they were determined among the WRCP. The largest number refers to forage plants (130 species), followed by food plants (59 species) and honey plants (34 species) (Table 1). In addition, 25 species represent medicinal plants, plants of technical importance (11 species), vitamins (7 species), and decorative (6 species). Even today, these plants are used extensively in ethnobotany (Figure 3).

Special attention has been paid to strengthening the livestock food base and attracting promising fodder species to develop a livestock network in Uzbekistan. Therefore, while analyzing WRCP, the most fodder plant group was recorded. As a result, it has been found that most of the WRCP produced for livestock and other animals correspond to the families of Poaceae (59 species), Fabaceae (29 species), and Amaranthaceae (18 species).

Table 1. Floristic diversity and life form analysis of the WRCP of Uzbekistan

Botanical name	Family	Life form	Occurrence
<i>Anabasis salsa</i> (Ledeb.) Benth. ex Volkens	Amaranthaceae	Semi-shrub	Abundant
<i>Atriplex tatarica</i> L.	Amaranthaceae	Annual	Common
<i>Bassia odontoptera</i> (Schrenk) Freitag & G. Kadereit	Amaranthaceae	Annual	Abundant
<i>Bassia prostrata</i> (L.) Beck	Amaranthaceae	Perennial	Common
<i>Bassia scoparia</i> (L.) A.J. Scott	Amaranthaceae	Annual	Common
<i>Dysphania botrys</i> (L.) Mosyakin & Clemants	Amaranthaceae	Annual	Common
<i>Oxybasis glauca</i> (L.) S.Fuentes, Uotila & Borsch	Amaranthaceae	Annual	Common
<i>Salsola foliosa</i> (L.) Schrad.Ex Schult.	Amaranthaceae	Annual	Abundant
<i>Salsola paulsenii</i> Litv.	Amaranthaceae	Annual	Common
<i>Spinacia turkestanica</i> Iljin	Amaranthaceae	Annual	Common
<i>Caroxylon dendroides</i> (Pall.) Tzvelev	Amaranthaceae	Semi-shrub	Common
<i>Caroxylon gemmascens</i> (Pall.) Tzvelev	Amaranthaceae	Semi-shrub	Common
<i>Caroxylon nitrarium</i> (Pall.) Akhani & Roalson	Amaranthaceae	Annual	Abundant
<i>Caroxylon incanescens</i> (C.A.Mey.) Akhani & Roalson	Amaranthaceae	Annual	Abundant
<i>Chenopodium album</i> L.	Amaranthaceae	Annual	Common
<i>Ceratocarpus arenarius</i> L.	Amaranthaceae	Annual	Infrequent
<i>Krascheninnikovia ceratoides</i> (L.) Gueldenst.	Amaranthaceae	Semi-shrub	Common
<i>Xylosalsola arbuscula</i> (Pall.) Tzvelev	Amaranthaceae	Shrub	Abundant
<i>Allium altissimum</i> Regel	Amaryllidaceae	Perennial	Abundant
<i>Allium ampeloprasum</i> L.	Amaryllidaceae	Perennial	Rare
<i>Allium caspium</i> (Pall.) M.Bieb.	Amaryllidaceae	Perennial	Common
<i>Allium giganteum</i> Regel	Amaryllidaceae	Perennial	Abundant
<i>Allium karataviense</i> Regel	Amaryllidaceae	Perennial	Abundant
<i>Allium oschaninii</i> O.Fedtsch.	Amaryllidaceae	Perennial	Rare
<i>Allium praemixtum</i> Vved.	Amaryllidaceae	Perennial	Infrequent
<i>Allium pskemense</i> B.Fedtsch.	Amaryllidaceae	Perennial	Rare
<i>Allium sabulosum</i> Steven ex Bunge	Amaryllidaceae	Perennial	Abundant
<i>Allium sativum</i> L.	Amaryllidaceae	Perennial	Abundant
<i>Allium stipitatum</i> Regel	Amaryllidaceae	Perennial	Common
<i>Allium suworowii</i> Regel	Amaryllidaceae	Perennial	Common
<i>Pistacia vera</i> L.	Anacardiaceae	Tree	Abundant
<i>Apium graveolens</i> L.	Apiaceae	Perennial	Common
<i>Carum carvi</i> L.	Apiaceae	Biennial	Common
<i>Daucus carota</i> L.	Apiaceae	Biennial	Common
<i>Ferula karelinii</i> Bunge	Apiaceae	Perennial	Abundant
<i>Foeniculum vulgare</i> Mill.	Apiaceae	Perennial	Rare
<i>Artemisia dracunculus</i> L.	Asteraceae	Perennial	Common
<i>Artemisia terrae-albae</i> Krasch.	Asteraceae	Semi-shrub	Abundant
<i>Carthamus oxyacantha</i> M. Bieb.	Asteraceae	Annual	Common
<i>Carthamus gypsicola</i> Iljin	Asteraceae	Annual	Rare
<i>Cichorium intybus</i> L.	Asteraceae	Perennial	Common
<i>Pentanema caspicum</i> (F.K.Blum ex Ledeb.) G.V. Boiko, Korniy. & Mosyakin	Asteraceae	Perennial	Common
<i>Pentanema britannicum</i> (L.) D. Gut.Larr.	Asteraceae	Perennial	Abundant
<i>Inula helenium</i> L.	Asteraceae	Perennial	Abundant
<i>Lactuca serriola</i> L.	Asteraceae	Perennial	Common
<i>Lactuca tatarica</i> (L.) C.A. Mey	Asteraceae	Perennial	Common
<i>Tragopogon capitatus</i> S.A.Nikitin	Asteraceae	Biennial	Abundant
<i>Scorzonera songorica</i> (Kar. & Kir.) Lipsch. & Vassilcz.	Asteraceae	Perennial	Abundant
<i>Asparagus breslerianus</i> Schult. & Schult.f.	Asparagaceae	Perennial	Common
<i>Asparagus persicus</i> Baker	Asparagaceae	Perennial	Abundant
<i>Berberis integerrima</i> Bunge	Berberidaceae	Shrub	Abundant
<i>Berberis oblonga</i> (Regel) C.K.Schneid.	Berberidaceae	Shrub	Abundant
<i>Brassica juncea</i> (L.) Czern.	Brassicaceae	Biennial	Common
<i>Crambe edentula</i> Fisch. & C.A.Mey. ex Korsh.	Brassicaceae	Perennial	Abundant
<i>Isatis minima</i> Bunge	Brassicaceae	Annual	Common
<i>Eruca vesicaria</i> (L.) Cav.	Brassicaceae	Annual	Common
<i>Lepidium latifolium</i> L.	Brassicaceae	Perennial	Common
<i>Lepidium perfoliatum</i> L.	Brassicaceae	Biennial	Common
<i>Raphanus raphanistrum</i> L.	Brassicaceae	Annual	Rare
<i>Sinapis alba</i> L.	Brassicaceae	Annual	Abundant
<i>Sinapis arvensis</i> L.	Brassicaceae	Annual	Abundant
<i>Erucastrum armoracioides</i> (Czern. ex Turcz.) Cruchet	Brassicaceae	Perennial	Abundant
<i>Cannabis sativa</i> L.	Cannabaceae	Annual	Rare
<i>Celtis caucasica</i> Willd.	Cannabaceae	Tree	Abundant
<i>Lonicera microphylla</i> Willd.Ex Schult.	Caprifoliaceae	Shrub	Abundant
<i>Elaeagnus angustifolia</i> L.	Elaeagnaceae	Tree	Common
<i>Glycyrrhiza glabra</i> L.	Fabaceae	Perennial	Common

<i>Lathyrus annuus</i> L.	Fabaceae	Annual	Rare
<i>Lathyrus aphaca</i> L.	Fabaceae	Annual	Common
<i>Lathyrus cicera</i> L.	Fabaceae	Annual	Abundant
<i>Lathyrus hirsutus</i> L.	Fabaceae	Annual	Abundant
<i>Lathyrus mulkak</i> Lipsky	Fabaceae	Perennial	Rare
<i>Lathyrus pratensis</i> L.	Fabaceae	Perennial	Abundant
<i>Lathyrus tuberosus</i> L.	Fabaceae	Perennial	Rare
<i>Medicago falcata</i> L.	Fabaceae	Perennial	Rare
<i>Medicago orthoceras</i> (Kar. & Kir.) Trautv.	Fabaceae	Annual	Abundant
<i>Medicago orbicularis</i> (L.) Bartal.	Fabaceae	Annual	Abundant
<i>Medicago sativa</i> L.	Fabaceae	Perennial	Common
<i>Melilotus albus</i> Medik.	Fabaceae	Biennial	Common
<i>Melilotus officinalis</i> (L.) Pall.	Fabaceae	Biennial	Common
<i>Melilotus dentatus</i> (Waldst. & Kit.) Desf.	Fabaceae	Biennial	Abundant
<i>Melilotus indicus</i> (L.) All.	Fabaceae	Annual	Abundant
<i>Trifolium fragiferum</i> L.	Fabaceae	Perennial	Common
<i>Trifolium pratense</i> L.	Fabaceae	Perennial	Common
<i>Trifolium repens</i> L.	Fabaceae	Perennial	Common
<i>Vicia ervilia</i> (L.) Willd.	Fabaceae	Annual	Common
<i>Vicia hyrcanica</i> Fisch. & C.A. Mey.	Fabaceae	Annual	Common
<i>Vicia kokanica</i> Regel & Schmalh.	Fabaceae	Perennial	Abundant
<i>Vicia narbonensis</i> L.	Fabaceae	Biennial	Rare
<i>Vicia orientalis</i> (Boiss.) Bég. & Diratz.	Fabaceae	Annual	Rare
<i>Vicia peregrina</i> L.	Fabaceae	Annual	Abundant
<i>Vicia sativa</i> L.	Fabaceae	Annual	Abundant
<i>Vicia tenuifolia</i> Roth	Fabaceae	Perennial	Abundant
<i>Vicia tetrasperma</i> (L.) Schreb.	Fabaceae	Annual	Rare
<i>Vicia villosa</i> Roth	Fabaceae	Annual	Common
<i>Ribes janczewskii</i> Pojark.	Grossulariaceae	Shrub	Abundant
<i>Ribes meyeri</i> Maxim.	Grossulariaceae	Shrub	Common
<i>Juglans regia</i> L.	Juglandaceae	Tree	Abundant
<i>Lallemantia royleana</i> (Benth.) Benth.	Lamiaceae	Annual	Common
<i>Mentha longifolia</i> (L.) L.	Lamiaceae	Perennial	Abundant
<i>Tulipa fosteriana</i> W.Irving	Liliaceae	Perennial	Extremely rare
<i>Tulipa greigii</i> Regel	Liliaceae	Perennial	Infrequent
<i>Tulipa kaufmanniana</i> Regel	Liliaceae	Perennial	Rare
<i>Tulipa tubergeniana</i> Hoog	Liliaceae	Perennial	Rare
<i>Abutilon theophrasti</i> Medik.	Malvaceae	Annual	Common
<i>Althaea officinalis</i> L.	Malvaceae	Perennial	Common
<i>Malva pusilla</i> Sm.	Malvaceae	Annual	Rare
<i>Malva neglecta</i> Wallr.	Malvaceae	Perennial	Common
<i>Nitraria sibirica</i> Pall.	Nitrariaceae	Shrub	Abundant
<i>Malacocarpu crithmifolius</i> (Retz.) Fisch. & C.A.Mey.	Nitrariaceae	Semi-shrub	Infrequent
<i>Aegilops crassa</i> Boiss. ex Hohen.	Poaceae	Annual	Abundant
<i>Aegilops cylindrica</i> Host	Poaceae	Annual	Abundant
<i>Aegilops juvenalis</i> (Thell.) Eig	Poaceae	Annual	Abundant
<i>Aegilops tauschii</i> Coss.	Poaceae	Annual	Abundant
<i>Aegilops triuncialis</i> L.	Poaceae	Annual	Common
<i>Agropyron cristatum</i> (L.) Gaertn.	Poaceae	Perennial	Abundant
<i>Agropyron fragile</i> (Roth) P.Candargy	Poaceae	Perennial	Rare
<i>Alopecurus arundinaceus</i> Poir.	Poaceae	Perennial	Common
<i>Alopecurus pratensis</i> L.	Poaceae	Perennial	Common
<i>Arundo donax</i> L.	Poaceae	Perennial	Abundant
<i>Avena barbata</i> Pott ex Link	Poaceae	Annual	Abundant
<i>Avena fatua</i> L.	Poaceae	Annual	Abundant
<i>Beckmannia eruciformis</i> (L.) Host	Poaceae	Perennial	Abundant
<i>Bromus inermis</i> Leyss.	Poaceae	Perennial	Abundant
<i>Bromus oxyodon</i> Schrenk	Poaceae	Annual	Common
<i>Bromus tectorum</i> L.	Poaceae	Annual	Common
<i>Bromus japonicus</i> Houtt.	Poaceae	Annual	Common
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Perennial	Common
<i>Dactylis glomerata</i> L.	Poaceae	Perennial	Common
<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	Annual	Common
<i>Echinochloa crus-galli</i> (L.) P.Beauv.	Poaceae	Annual	Common
<i>Echinochloa oryzoides</i> (Ard.) Fritsch	Poaceae	Annual	Abundant
<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Annual	Rare
<i>Elymus caninus</i> (L.) L.	Poaceae	Perennial	Abundant
<i>Elymus dahuricus</i> Turcz. ex Griseb.	Poaceae	Perennial	Abundant
<i>Elymus repens</i> (L.) Gould	Poaceae	Perennial	Common
<i>Eremopyrum orientale</i> (L.) Jaub. & Spach	Poaceae	Annual	Common
<i>Eremopyrum triticeum</i> (Gaertn.) Nevski	Poaceae	Annual	Common

<i>Festuca rubra</i> L.	Poaceae	Perennial	Abundant
<i>Festuca orientalis</i> (Boiss.) B.Fedtsch.	Poaceae	Perennial	Abundant
<i>Hordeum bogdanii</i> Wilensky	Poaceae	Perennial	Abundant
<i>Hordeum brevisubulatum</i> (Trin.) Link	Poaceae	Perennial	Common
<i>Hordeum bulbosum</i> L.	Poaceae	Perennial	Common
<i>Hordeum jubatum</i> L.	Poaceae	Perennial	Abundant
<i>Hordeum spontaneum</i> K.Koch	Poaceae	Annual	Common
<i>Koeleria macrantha</i> subsp. <i>Macrantha</i>	Poaceae	Perennial	Abundant
<i>Leymus racemosus</i> (Lam.) Tzvelev	Poaceae	Perennial	Abundant
<i>Leymus multicaulis</i> (Kar. & Kir.) Tzvelev	Poaceae	Perennial	Abundant
<i>Lolium arundinaceum</i> (Schreb.) Darbysh.	Poaceae	Perennial	Abundant
<i>Lolium giganteum</i> (L.) Darbysh.	Poaceae	Perennial	Abundant
<i>Lolium pratense</i> (Huds.) Darbysh.	Poaceae	Perennial	Abundant
<i>Melica altissima</i> L.	Poaceae	Perennial	Abundant
<i>Phalaris arundinacea</i> L.	Poaceae	Perennial	Abundant
<i>Phleum alpinum</i> L.	Poaceae	Perennial	Abundant
<i>Phleum phleoides</i> (L.) H.Karst.	Poaceae	Perennial	Common
<i>Phleum pratense</i> L.	Poaceae	Perennial	Common
<i>Poa angustifolia</i> L.	Poaceae	Perennial	Common
<i>Poa annua</i> L.	Poaceae	Annual	Common
<i>Poa bulbosa</i> L.	Poaceae	Perennial	Common
<i>Poa nemoralis</i> L.	Poaceae	Perennial	Abundant
<i>Poa pratensis</i> L.	Poaceae	Perennial	Common
<i>Poa palustris</i> L.	Poaceae	Perennial	Common
<i>Poa trivialis</i> L.	Poaceae	Perennial	Common
<i>Saccharum spontaneum</i> L.	Poaceae	Perennial	Common
<i>Secale segetale</i> (Zhuk.) Roshev.	Poaceae	Annual	Abundant
<i>Secale sylvestre</i> Host	Poaceae	Annual	Abundant
<i>Setaria viridis</i> (L.) P.Beauv.	Poaceae	Annual	Common
<i>Sorghum halepense</i> (L.) Pers.	Poaceae	Perennial	Abundant
<i>Thinopyrum intermedium</i> (Host) Barkworth & D.R.Dewey	Poaceae	Perennial	Abundant
<i>Fallopia convolvulus</i> (L.) Á.Löve	Polygonaceae	Annual	Common
<i>Polygonum acetosum</i> M.Bieb.	Polygonaceae	Annual	Abundant
<i>Polygonum aviculare</i> L.	Polygonaceae	Annual	Common
<i>Polygonum patulum</i> M.Bieb.	Polygonaceae	Annual	Common
<i>Rheum tataricum</i> L.f.	Polygonaceae	Perennial	Abundant
<i>Rumex acetosa</i> L.	Polygonaceae	Perennial	Rare
<i>Rumex confertus</i> Willd.	Polygonaceae	Perennial	Rare
<i>Rumex crispus</i> L.	Polygonaceae	Perennial	Common
<i>Rumex marschallianus</i> Rchb	Polygonaceae	Annual	Common
<i>Cerasus tianshanica</i> Pojark.	Rosaceae	Shrub	Rare
<i>Cotoneaster multiflorus</i> Bunge	Rosaceae	Shrub	Abundant
<i>Crataegus chlorocarpa</i> Lenné & K.Koch	Rosaceae	Tree	Abundant
<i>Crataegus pontica</i> K.Koch	Rosaceae	Tree	Abundant
<i>Crataegus songarica</i> K.Koch	Rosaceae	Tree	Abundant
<i>Crataegus turkestanica</i> Pojark.	Rosaceae	Tree	Common
<i>Cydonia oblonga</i> Mill.	Rosaceae	Tree	Rare
<i>Hedlundia turkestanica</i> (Hedl.) Mezhenkyj	Rosaceae	Shrub	Abundant
<i>Malus domestica</i> (Suckow) Borkh.	Rosaceae	Tree	Abundant
<i>Prunus armeniaca</i> L.	Rosaceae	Tree	Abundant
<i>Prunus bucharica</i> (Korsh.) Hand-Mazz.	Rosaceae	Tree	Common
<i>Prunus cerasifera</i> Ehrh.	Rosaceae	Tree	Common
<i>Prunus mahaleb</i> L.	Rosaceae	Tree	Common
<i>Prunus petunnikowii</i> (Litv.) Rehder	Rosaceae	Shrub	Rare
<i>Prunus spinosissima</i> (Bunge) Franch.	Rosaceae	Shrub	Common
<i>Prunus erythrocarpa</i> (Nevski) Gilli	Rosaceae	Shrub	Common
<i>Prunus verrucosa</i> Franch.	Rosaceae	Shrub	Common
<i>Pyrus korshinskyi</i> Litv.	Rosaceae	Tree	Abundant
<i>Rosa canina</i> L.	Rosaceae	Shrub	Common
<i>Rubus caesius</i> L.	Rosaceae	Shrub	Common
<i>Solanum dulcamara</i> L.	Solanaceae	Semi-shrub	Abundant
<i>Solanum nigrum</i> L.	Solanaceae	Annual	Common
<i>Urtica dioica</i> L.	Urticaceae	Perennial	Common
<i>Vitis vinifera</i> L.	Vitaceae	Shrub	Rare

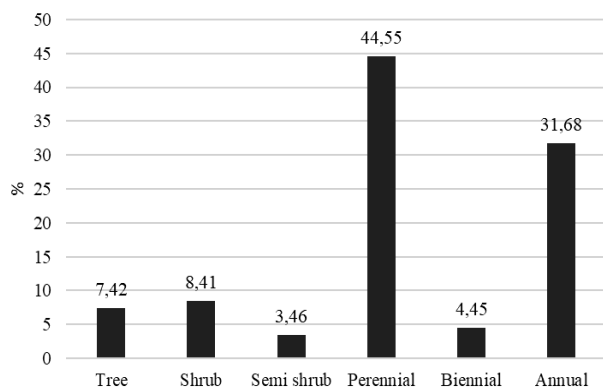


Figure 2. Distribution of species by life forms

In addition, we analyzed the degree of priority of the types of WRCP. There are 25 species, including *Cichorium intybus*, *Sinaps arvensis*, *Elaeagnus angustifolia*, and *Mentha longifolia*, which are included in the first group of WRCP that are introduced into the culture and have varieties. For example, group 1 of species introduced into a culture and having varieties; group 2 of species used as sources of genes in breeding; group 3 of species closely related to culture; group 4 of useful species of the genus used in gathering and folk medicine; group 5 of all other species of this genus in the second group of species involved in crossing, one species assigned is *Glycyrrhiza glabra*. The third group includes three species of *Asparagus persicus*, *Capparis herbacea*, and *Lactuca serriola*. Twenty-six plants, including *Berberis integerrima*, *Melilotus dentatus*, *Malva neglecta*, and others, were assigned to the fourth group, useful species of genera containing WRCP. The fifth group, which includes all other types of useful genera, includes the largest number of plants (150 species).

Our study showed that 202 species of WRCP from 102 genera and 24 families grow in the flora of Uzbekistan. The Rosaceae, Poaceae, and Fabaceae families are the richest. The genera of *Poa*, *Vicia*, *Medicago*, *Prunus*, *Lathyrus*, and *Allium* are characterized by a high species diversity of the WRCP. It should be noted that the figures given for the composition of wild relatives of cultivated plants of the flora of Uzbekistan are not yet final. Further detailed study of the flora of certain regions of the country should undoubtedly lead to clarification of the number of genera and species of flora of Uzbekistan that have economic value. According to economically valuable groups, WRCP with forage, food, honey-bearing and medicinal properties predominate.

In conclusion, in recent years, as a result of climate change as well as the increasing scale of anthropogenic factors, it is important to study the WRCP and strengthen their natural reserves. Furthermore, it is used in the manufacture of new varieties that are to manufacture new varieties resistant to disease, drought, and other abiotic factors using WRCP. These varieties could reduce economic costs with quality signs of drought, disease, and resistance to abiotic factors.

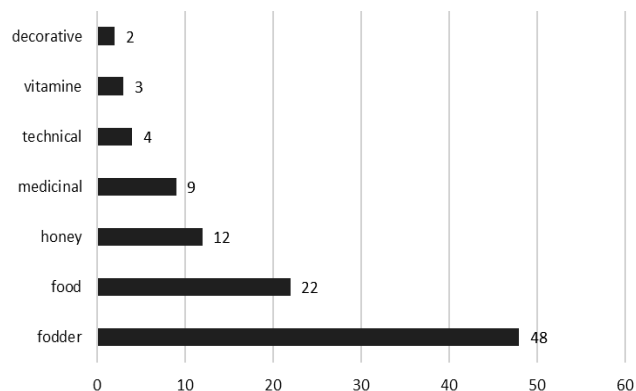


Figure 3. Distribution of species of economically valuable features (%)

The information about the composition and economic significance of the WRCP flora of Uzbekistan is still being determined. Therefore, further detailed studies should supplement information on these species' distribution and economic significance. The analysis of the distribution of WRCP by life forms showed that the vast majority were herbaceous plants. The preliminary taxonomic results showed the wide biological diversity of the WRCP of Uzbekistan flora and the prospects for their widespread use and introduction into culture. In turn, there is no doubt that comprehensive research on WRCP, analysis of the current estimation of natural populations, and development of a system of protection and rational uses are necessary. Currently, the collection area of cultural plants is being created on the site of the Tashkent Botanical Garden and the Kyzylkum Desert station.

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