

## THE FLORA of UZBEKISTAN

The Republic of Uzbekistan is located in the center of the Eurasian continent, between the European, Middle Eastern, and Asian biogeographically regions. The country covers approximately 447,400 km<sup>2</sup> and is bordered by Kazakhstan to the north, Turkmenistan and Afghanistan to the south and Kyrgyzstan and Tajikistan to the west.

The vast area, wide amplitude of height above sea level, various natural conditions of Uzbekistan are the cause of high diversity of the local flora, vegetation cover and landscapes. The major part of Uzbekistan is plain areas. Almost 85% of the territory is occupied by deserts and semi-deserts, including the largest desert in Central Asia, the Kyzylkum, and the Ustyurt plateau. River valleys is amount 2% of country. In the east and south-east of Uzbekistan is situated Tien-Shan and Pamir-Alai mountain systems which occupy 13% of the territory. There are presented 5 types of terrestrial ecosystems - deserts, piedmont semi-deserts and steppes, riparian ecosystems of main rivers, wetlands, mountain ecosystems.

Desert ecosystems are divided into sand deserts, saline deserts, clay and stony (gypsum) deserts. Sand deserts take about 27 % of total plain territory of Uzbekistan. There are about 320 plant species. Vegetation cover of sand desert is very various and depends on the relief. Saxaul forests and shrubs (*Ammodendron conollyi*, *Salsola richteri*, *S.arbuscula*, various species of *Calligonum*) prefer hilly and hilly-ridge sands (so named barkhans). White saxaul stands take up the most sandy areas of Kyzylkum. Ephemeral-ephemeroid and semishrub vegetation is confined to the fixed thin sands and to clay deserts with plain or wavy relief.

Stony (gypsum) desert this is a main landscape of the Ustyurt plateau and considerable part of the Kyzylkum. Flora of gypsum deserts of Uzbekistan counts more than 400 species. Vegetation cover of this deserts form semishrub communities with domination of *Salsola orientalis*, *S.arbuscula*, *S.arbusculiformis*, *Anabasis salsa*, *Convolvulus hamadae* and different species of *Artemisia* – *A.diffusa*, *A.turanica*, *A.terrae-albae* etc.).

Riparian ecosystems include valleys of the Amudarya, Syrdarya and Zeravschan rivers. Main vegetation types there is reed-bed, tamarisk and oleaster-poplar gallery forests (so named tugai).

The lower belt in vegetation cover of mountain regions of Uzbekistan is formed by ephemeroid-sagebrush piedmont deserts (with domination of *Carex pachystylis*, *Poa bulbosa* and different species of *Artemisia* – *A.diffusa*, *A.sogdiana*, etc.). Ephemeroid-sagebrush and low herb ephemeral communities with xerophytic perennial forbs (species of genera *Phlomis*, *Cousinia*, *Phlomoides*, etc.) occupy foothills. On the slopes of low mountains they are replaced by tall grass (*Elytrigia trichophora*, *Hordeum bulbosum*) and sagebrush (*Artemisia tenuisecta*) communities with xerophytic open woodlands and shrubs (*Amygdalus spinosissima*, *Amygdalus bucharica*, *Pistacia vera*, *Crataegus pontica*, different species of *Rosa*). There are juniper woodlands with mesophytic herb cover in middle mountains; broad-leaved (walnut, maple, apple-tree) forests are situated on the wettest sites of slopes, but they don't form large stands. Mountain steppes, communities of tall umbellates (*Prangos*, *Ferula*), prickly herbs (different species of *Cousinia*), prickly cushion-like semishrubs (different species of *Acantholimon*) and also *Juniperus turkestanica* are common for the lower (sub-alpine) level of high mountains. Cryophytic meadows and prickly cushion-like semishrubs are situated in the upper level of high mountains. The altitude limit of vegetation in Uzbekistan's mountains is 4200 m a.s.l.

Uzbekistan is a forest poor country, forests cover 7,7% of the land area. Junipers constitute the principal mountain forests, white and black saxaul are typical for deserts and poplars are typical for riparian forests. More than 25% of all national forests are planted.

Mountain forests are characterized by their patchiness and irregularity. These forests are various in their composition. More than 120 species of trees and bushes can be found in

mountain forests of Uzbekistan. The composition of mountain forests can be divided into juniper forests, pistachio forests, almond forests, walnut forests, apple forests, hawthorn forests and mixed forests, and also thickets of shrubs (barberry, dog rose, cherry plum, etc.). The main forest forming tree in the mountains is *Juniperus polycarpus* var. *seravschanica*, juniper stands account for 70% of mountain forests in Uzbekistan. Deciduous forests in the mountain zone are mostly pistachio and almonds, and also walnut, wild apple, maples, hawthorn, cherry plum, cherry and diverse bushes. Pistachio forests are most widespread of all deciduous forests. Pistachio grows on the slopes of mountains and at the foothills at heights from 600 up to 1,800 m. Almond forests (*Amygdalus bucharica*, *A. spinosissima*) are located in the lower mountain belt at heights between 800 and 1,600 m. Walnut forests in Uzbekistan are located only in three isolated areas – in the Western Tien Shan, in southern slopes of the Gissar range and in the Nuratau ridge. A type of walnut-fruit forest is unique to Central Asia. This ancient forest type contains ancestors of domestic fruit varieties and is an important storehouse of wild genetic diversity. Wild apple (*Malus sieversii*) and hawthorn (diverse species of *Crataegus* – *C. pontica*, *C. turkestanica*, etc.) can be found in almost all mountain areas of Uzbekistan. These forests are basically mixed.

In accordance with current botanical data, there are over 4,500 species of vascular plants in Uzbekistan belonging to 650 genera and 115 families and an endemism rate of 9%. Three genus and about 100 species of plants have been described over the last 20 years. In wild-growing flora the following families are presented by greatest numbers of species: *Asteraceae* (820), *Fabaceae* (635), *Poaceae* (350), *Lamiaceae* (372), *Brassicaceae* (255), *Apiaceae* (312), *Chenopodiaceae* (208), *Liliaceae* (245), *Polygonaceae* (182). The flora of Uzbekistan is related with the flora of the Mediterranean, Caucasus and South-Western Asia, particularly Iran and Pakistan. The floristic research is still under way (including preparation of the new revised edition of «Flora of Uzbekistan» monograph and making an electronic data base). The six-volume «Flora of Uzbekistan» was published between 1941 and 1961, it containing all possible floristic data of that time (4,148 plant species total with 3663 wild-growing species). Approximately 500 cultivated species are various origin.

The territory of Uzbekistan is dividing between two floristic regions: Turan province includes the plain part of Uzbekistan, Turkestan (or Mountain Middle Asian) province – the mountains with foothills. Main floristic districts of Turan province in the territory of Uzbekistan are Ustyurt, Aral region with Amu Darya delta, Kyzylkum, Middle Syr Darya (Mirzachul and Golodnaya steppes), Ferghana valley, dry delta of Kashka Darya river (Karshi and Karnabchul steppes). Main floristic districts of Mountain Middle Asian province in Uzbekistan is Western Tien-Shan, Ferghana range, Alai range, western part of Turkestan and Zeravschan ranges (so named Kuhistan), Nuratau mountains, South-western Gissar (with Kughitang, Baysuntau and Chulbair mountains), Gissaro-Darvaz (in Uzbekistan there are Sangardak and Tupalang river basins) and the Babatag range. All of this floristic regions are divided by structure of flora (especially by composition of endemics), by characteristics of vegetation cover and landscapes, and by common history of genesis of flora. The specific geographical position of Uzbekistan within the Central Asian region, on the border of two biogeographical provinces, determined the richness of its natural habitats and high diversity of plant species.

Some of plant species have wide ecological amplitude – from sand and saline to rocky highland flanks. Those are represented by many species of families *Asteraceae*, *Apiaceae*, *Poaceae*, *Brassicaceae*, *Fabaceae*, *Bosaceae*, *Polygonaceae*, etc. However there are more specialized species, which are grows only in particular zones and types of substrate. For example, species of genera *Calligonum*, *Ammodendron*, *Salsola* are typical for sands; species *Halocnemum strobilaceum*, *Salicornia europaea* – for salines; particular species of families *Lamiaceae*, *Apiaceae*, *Asteraceae* – for rocks; some species of genera *Anabasis*, *Otostegia*, *Eremostachys*, *Salsola*, *Salvia* – for earth stratum.

The greatest species diversity are concentrated in mountain part of Uzbekistan, especially for subhumid mountain system of Western Tien-Shan. For Uzbekistan part of Western Tien-

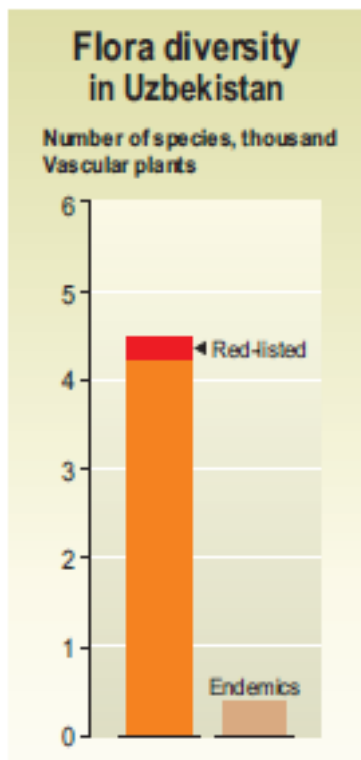
Shan are registered 2056 plant species, it includes two endemic genera (*Kamelinia* and *Kuramosciadium*, *Apiaceae*) and over the 200 endemic species (*Acantholimon margaritae*, *Acantholimon pskemense*, *Acantholimon ekatherinae*, *Astragalus baranovii*, *Astragalus pskemensis*, *Bergenia ugamica*, *Draba lipskyi*, *Erysimum aksaricum*, *Juno pseudocapnoides*, *Jurinea mariae*, *Oxytropis anaulgensis*, *Nanophyton botschancevii*, *Phlomoides tschimganica*, *Potentilla tschimganica*, *Salvia korolkowii*, *Tulipa vvedenskyi*, etc.). Many endemic plants of Western Tien-Shan is belonging to families *Alliaceae* (24) and *Liliaceae* (16).

The flora of South-western Gissar region also are rich and includes 1850 species with 1 endemic (*Calispepla*, *Fabaceae*), 4 sub-endemic genera (*Vvedenskya*, *Spirostegia*, *Lipskya*, *Kuhitangia*) and 124 endemic species (*Phlomoides gypsacea*, *Phlomoides baburi*, *Heliotropium bucharicum*, *Stroganovia minor*, *Astragalus exilis*, *Astragalus butkovii*, *Calispepla aegacanthoides*, *Calophaca reticulata*, *Cousinia campyloraphis*, *Cousinia rosea*, *Cousinia allolepis*, *Cousinia subcandicans*, etc.).

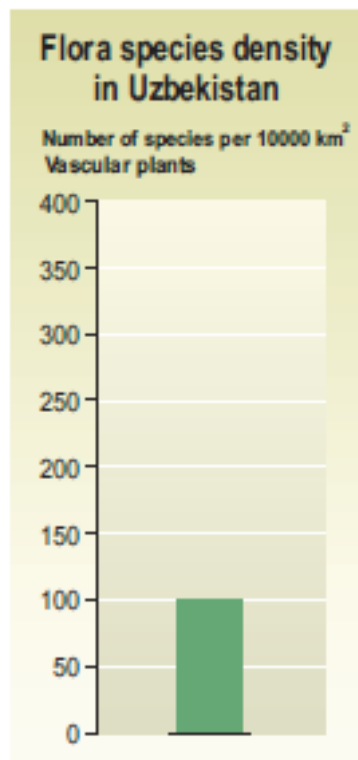
The flora of peripheral semiarid middle-altitude mountain ridges is relatively poor, but distinguish by considerable endemism rate. For example, the flora of Nuratau mountains includes over 1200 species with one endemic (*Anura*, *Asteraceae*), one sub-endemic genera (*Autumnalia*, *Apiaceae*) and 64 endemic species (*Acantholimon nuratavicum*, *Acantholimon subavenaceum*, *Allium svetlanae*, *Allium aktauense*, *Anura pallidivirens*, *Astragalus nuratensis*, *Autumnalia innopinata*, *Cousinia botschantzevii*, *Cousinia pseudolanata*, *Eremurus nuratavicus*, *Ferula helenae*, *Jurinea zakirovii*, *Helichrysum nuratavicum*, *Lappula nuratavica*, *Lagochilus olgae*, *Lagochilus proskorjakovii*, *Oxytropis pseudorosea*, *Paraeremostachys anisochila*, *Phlomis nubilans*, *Salvia submutica*, *Stubbendorffia olgae*, etc.).

Mountain areas are rich in numerous species of ornamental plants - tulips, desert-candle, etc. These are the most impressive of all diversity of wild flora of Uzbekistan. Most splendid blooming tulips of Uzbekistan are *Tulipa kaufmanniana*, *T.greigii*, *T.affinis*, *T.fosteriana*, *T.ingens*, *T.lanata*, *T.tubergeniana*, *T.micheliana*, *T.korolkowii* and *T.lehmanniana*.

Many plant species of Uzbekistan are threatened. The current Red Book of Uzbekistan (2009) includes 321 plant species, greatest numbers of them are growing in Gissar range (106). In Chatkal range are registered 56 rare plant species, in Kughitang range – 50, in Nuratau mountains – 42, in Pskem range – 31, in Turkestan range – 21, in Kyzylkum desert – 14, in Kyzylkum relic low mountains – 17, in Ustyurt plateau - 4.



Source: Uzbekistan's National Report for the UN Convention Biodiversity (2008)



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The White Saxaul forest (South-Eastern Kyzylkum)



Psammophytic shrubs formed by *Calligonum* (Western Kyzylkum)



Riparian forest (tugai) (valley of Zeravschan river)



Juniper forests (Turkestan range)





Walnut forest (Nuratau range)



Ephemeral-ephemeroid vegetation in the South-eastern Kyzylkum  
Photos and text by Natalia Beshko