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FLORISTIC COMPOSITION AND ECOLOGICAL CHARACTERISTICS (LIFE FORM, LEAF SIZE AND PLANT HABIT) OF THE VASCULAR FLORA OF GOKAND VALLEY, DISTRICT BUNER, KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

The present research has explored the floristic composition and ecological characteristics (life form, leaf size and plant habit) of the previously unexplored vascular flora of Gokand Valley District Buner. The present research revealed that a total of 344 vascular species belonging to 106 families are growing in the valley. These include 12 pteridophytes, 3 gymnosperms and 329 angiosperms. The dicotyledons were represented by 81 families with 283 species while monocotyledons by 15 families and 46 species. Based on the number of species Poaceae with 25 species was the dominant family followed by Asteraceae with 24, Lamiaceae with 19, Papilionaceae and Rosaceae with 15 each, Brassicaceae with 13, Amaranthaceae with 11, Solanaceae with 10, Polygonaceae and Plantaginaceae with 8 each, Moraceae with 7, Cucurbitaceae and Euphorbiaceae with 6 each, Apiaceae, Malvaceae, Nyctaginaceae, Ranunculaceae, Rhamnaceae, Urticaceae with 5 species each were the major families. Remaining families either included 4 or less than 4 species. There were 224 (65.11%) species of herbs, 58 (16.86%) of trees and 46 (13.37%) of shrubs while climbers were represented by 16 species (4.65%). Life form showed that Therophytes with (146 species) was the dominant class followed by Megaphanerophyte (56 spp.), Nanophanerophyte (56 spp.), Geophyte (36 spp.), Hemicryptophyte (25 spp.), Chamaephyte (16 spp.) and Microphanerophyte (6 spp.) respectively. The dominant leaf size class was Microphyll (146 spp.) followed by Nanophyll (91 spp.), Mesophyll (59 spp.), Leptophyll (29 spp.) and Macrophyll (12 spp.) respectively. *Psilotum nudum* (L.) P. Beauv., *Cuscuta reflexa* Roxb., *Equisetum arvense* L. and *Opuntia dillenii* Haw. were aphyllous species. The findings of the present research will provide baseline information for future research endeavors in the field of plant taxonomy, ecology and conservation studies.

Keywords: Floristic composition, ecological characteristics, unexplored, vascular flora, Gokand Valley, Buner, Khyber Pakhtunkhwa, Pakistan.



INTRODUCTION

Gokand is a lush green valley dominated by lofty mountains from all sides apart from extreme south. It is 19 km away from Daggar (head quarter of district Buner). It is located on $34^{\circ} 33'$ to $34^{\circ} 41'$ north latitudes and $72^{\circ} 30'$ to $72^{\circ} 34'$ east longitudes on the globe. The valley is bounded by Pir baba and Qadir Nagar on the west, Jambail Kokarai on the north, Alpuri on the northeast and Chgarzai on the east. The climate is sub tropical type in the lower part and temperate in the upper regions. Summer monsoon is common throughout the area which is followed by dry months of September and October. The winter months extend from November to February. In winter snowfall starts at the end of November and continues till end of February. Lower limit of snowfall is 1212 meter altitude. Below 1818 meters it does not stay long and melts away rapidly, except on cool northern aspects in sheltered places. It melts almost completely from most of the hill sides at the end of April. March and April are the most pleasant months. The weather is hot in June and July but at the onset of monsoon rains in July and August diminishes the hot spell and once again weather becomes cool and refreshing till the end of October. The rocks of Gokand valley include garnet bearing calcareous schist and calcite marble. The composition of these rocks is impure limestone and sandstone. Soil has fine texture which is fed by springs and rain water drainage is generally dendritic. The area possesses different topographic conditions including barren hillside, steep, narrow rocks called terraces clinging to the slopes surrounding the scattered villages. Loe Sar is the highest point in the area with of 2334 meter and Hissar is the lowest place with 1200 meters altitude. Although most of the area is hilly but level of ground is variable. Cold winters, mild summers, short springs and autumn seasons are characteristic of the area. The maximum rain fall occurs in the month of February, March and April while December and January are the driest months. Winter rains generally have a low intensity but of long durations. During the monsoon season, rains are of high intensity but of short durations. 28.01% of the year precipitations fall in February to March and 54% of the yearly precipitations fall in July to September. During the winter months, precipitation occurs in the form of snow which may stay on mountain top for several weeks but in the valley it disappears within one day (Khan *et al.*, 2003).

PROBLEM STATEMENT AND NOVELTY

The valley selected for the present research is situated in northern part of the country and it is evident from the literature review and Flora of Pakistan that many areas in the country are not yet thoroughly explored and intensive studies are required for further exploration of many species which are not yet documented. Pakistan has a great altitudinal and topographic variation ranging from 0 meter at sea level to 8611 meters at the second highest peak of the world K-2 and the three famous mountain series of the world i.e. Karakoram, Hindukush and Himalaya met within the northern part of the country. This variation has provided diversified habitat conditions, which are supporting more than 6000 plant species with around 428 endemic and more than 500 medicinal species. Majority of the endemic species are distributed in the northern part of the country and came under the unique Sino Japanese floristic/phytogeographic region. Since this area is situated in northern part of the country and it is completely



unexplored therefore, this research was conducted to document the vascular flora of the valley and its ecological characteristics which will provide baseline information for future research endeavors in the field of plant taxonomy, ecology, restoration, conservation and documentation of indigenous and indicator species growing in the valley. Further, in the present scenario of the changing environmental conditions and global climate change this data may be used for creating Carbon sink centres in future to play a vital role in the Carbon mitigation and sequestration at local level to cope with the global climate change.

MATERIALS AND METHODS

Regular field visits were arranged to Gokand valley for plant collection along with field data in all four seasons during 2018-2019. Plants were collected, dried, preserved and mounted on herbarium sheets. The identification was carried out with the help of Flora of Pakistan (Nasir & Ali, 1970-1989; Ali & Nasir, 1989-1991; Ali & Qaiser, 1993-2019). A complete floristic list of the vascular plant species growing in the valley was prepared. Plant species were classified into leaf size and life form classes according to Raunkiaer (1934) and Hussain (1989). Biological spectrum was determined following the standard procedures of Raunkiaer (1934); Hussain (1989) and Badshah *et al.* (2013). Proper voucher specimens were prepared and deposited in the herbarium of Department of Botany, University of Peshawar (PUP).

RESULTS AND DISCUSSION

The following results were acquired in light of the intensive floristic study and study of the ecological characteristics (life form, leaf size and plant habit) during the present research. The results obtained are enumerated and discussed as under.

1. Floristic composition

Floristic composition of a region is the total of the plant species within its boundaries, whether wild or cultivated, which is a reflection of vegetation, plant resources of the region, prevailing climatic conditions, edaphic characteristics, anthropogenic pressure and other natural stresses Badshah *et al.* (2013). The floristic composition of Gokand valley, District Buner comprised of 344 species related to 106 families including 12 species of pteridophytes, 3 gymnosperms, 46 monocots and 283 dicots (Table 1 & Figure 1). Poaceae with (25 spp.), Asteraceae (24 spp.), Lamiaceae (19 spp.), Papilionaceae and Rosaceae (15 spp. each), Brassicaceae (13 spp.), Amaranthaceae (11 spp.), Solanaceae (10 spp.), Polygonaceae and Plantaginaceae (8 spp. each), Moraceae (7 spp.), Cucurbitaceae and Euphorbiaceae, (6 spp. each), Apiaceae, Malvaceae, Nyctaginaceae, Ranunculaceae, Rhamnaceae, Urticaceae (5 spp. each) were the major families while some families either included 4 or less than 4 species (Table 1.2). In the present work Poaceae with (25 spp.), Asteraceae (24 spp.), Lamiaceae (19 spp.) and Papilionaceae with (15 spp.) as reported by other researchers from other areas i.e., Saand *et al.* (2019); Ali *et al.* (2018); Amjad *et al.* (2016); Khan *et al.* (2017); Badshah *et al.* (2016); Saleem *et al.* (2013); Sher *et al.* (2011); Sher *et al.* (2014); Ali *et al.* (2016); Shaheen *et al.* (2016); Sultan-Ud-Din *et al.* (2016).

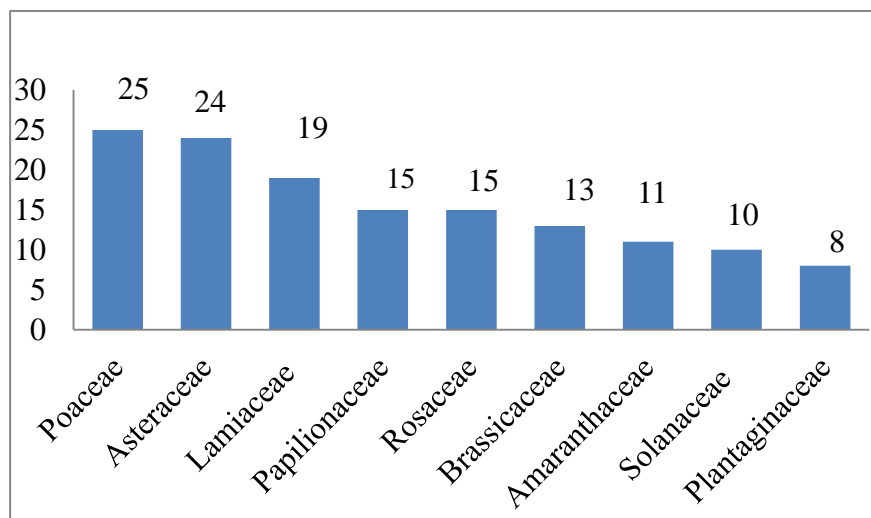


Fig. 1: Leading families showing number of species

2. Ecological Characteristics

A) Life form classes

The life form reproduces physiognomy of the flora and vegetation depends upon all life processes in combination with environment. It helps in the recognition of ecological elucidation of vegetation (Zeb *et al.*, 2017). Life form classification of Raunkiaer (1934) is more reliable, which is based on position of perennating structures during unfavorable conditions. Using Raunkiaerian classification, it was found that most abundant life form was Therophytes with (146 species) followed by Nanophanerophyte (56 species), Megaphanerophyte (56 species), Geophyte (36 species), Hemicryptophyte (25 species), Chamaephyte (16 species) and Microphanerophyte (6 species) respectively (Table 1 & Figure 2). Similar trend regarding prevalence of therophytes and Megaphanerophyte was described by Khan *et al.* (2011) in Coal Mine area of Darra Adam Khel. Current findings are describing therophytes and nanophanerophyte as the abundant life forms (Ahmad *et al.*, 2019; Shaheen *et al.*, 2016; Badshah *et al.*, 2016; Shah *et al.*, 2014). The dominance of Therophytic life form shows that the study area is under heavy anthropogenic pressure due to unsustainable use, over grazing and deforestation (Badshah *et al.*, 2016).

B) Leaf size classes

Leaf classes were checked according to Raunkiaer's diagram having six types of leaf classes. First class is the lowest having 25 sq. mm in size and then every next class is greater than the previous class nine times. Leaf size spectra are important keys in exploring the flora



of an area during the floristic survey as they are considered as symbol or direction of shallow or deep climate. Therefore, study of leaf size is an important tool for vegetation description.

Leaf size spectra of Gokand valley District Buner showed that microphyll were dominant class (146 species) followed by nanophyll (91 species), mesophyll (59 species), leptophyll (29 species) and macrophyll (12 species) aphyllous (4 species viz; *Psilotum nudum*, *Cuscuta reflexa*, *Equisetum arvense* and *Opuntia dillenii* (Ali *et al.*, 2018; Ali *et al.*, 2016) respectively (Table 1 & Figure 3). The dominance of microphylls Shah *et al.* (2014) and Khan *et al.* (2016) and with nanophylls Iqbal *et al.* (2018); Sher *et al.* (2011); Ali *et al.* (2015); Khan *et al.* (2014) was prevalent in the area. Microphylls and nanophylls are the major leaf size classes as reported by Al-Yemeni and Sher (2010); Shaheen *et al.* (2016); Khan *et al.* (2011); Badshah *et al.* (2013); Hussain *et al.* (2015) in various studies.

C) Plant Habit

Based on the plant habit 224 (65.11%) species were herbs, 58 (16.86%) species of trees and 46 (13.37%) species of shrubs while climbers (4.65%) shared 16 species (Table 1 & Figure 4) Our findings are comparable with those of Ali *et al.* (2018) also investigated herb as the most diverse group while studying hazar Nao hills.

Conclusion

It was concluded that the valley is rich in vascular diversity and 344 species distributed among 106 families including 12 pteridophytes, 3 gymnosperms and 329 angiosperms were reported and documented. It is noteworthy to mention that the findings of the present research will provide baseline information for future research endeavors in the field of plant taxonomy, ecology, restoration and conservation studies in the valley and surrounding areas with similar climatic and ecological conditions. It was observed during the present research that therophytic life form is dominant which shows that the study area is under heavy anthropogenic pressure and some direct and indirect reasons including unsustainable use of natural resources, over grazing, habitat loss, soil erosion, natural areas conversion, terrace farming and deforestation are changing the natural composition of the flora growing in the area. The research will be extremely helpful in identification of indicator species and establishment of Carbon sink centres in future to cope with the global climate change and play a role in Carbon mitigation.

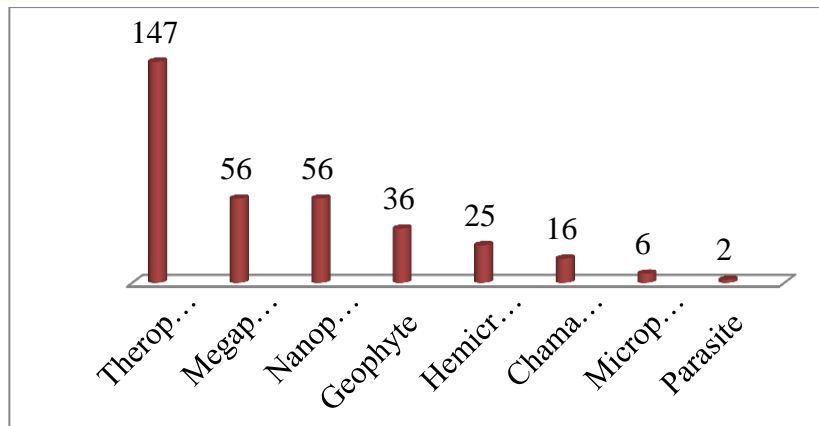


Fig: 2 Life form classes showing their number of species.

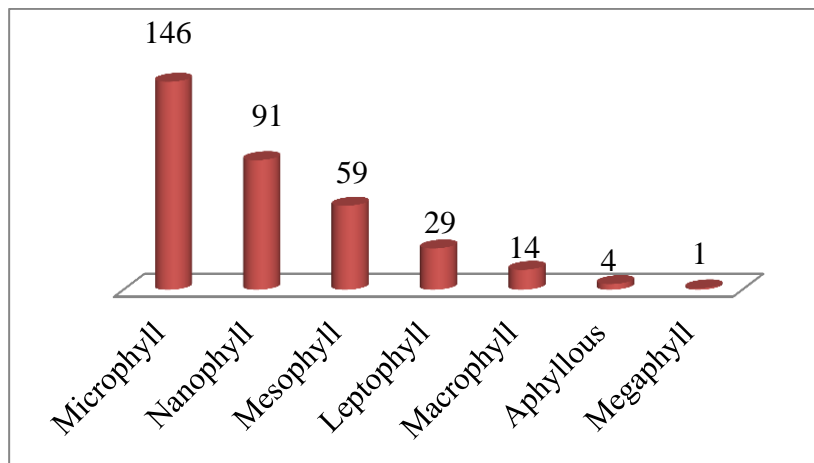


Fig: 3 Different leaf size classes showing number of species.

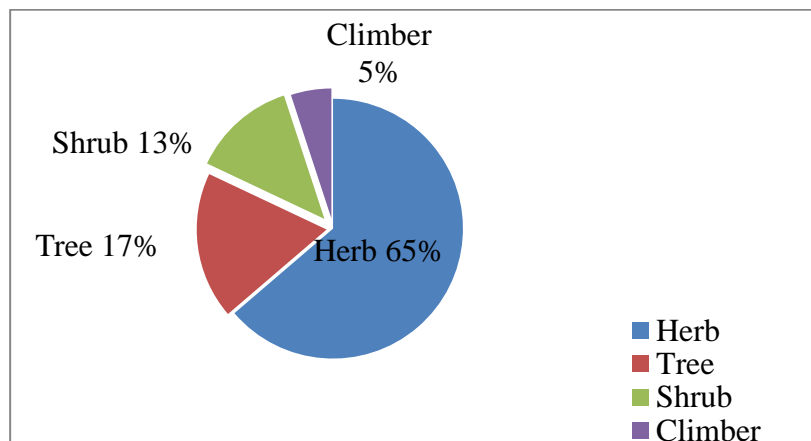


Fig. 4: Sowing number species of various plant habits.

Table 1: Florist list and ecological characteristics showing family, botanical and local name, life form, leaf size and habit of the species growing in the valley.

Family	No.	Botanical name	Local name	Life form	Leaf size	Habit
Pteridophytes						
Adiantaceae	1.	<i>Adiantum caudatum</i> L.	Sumbal	Hem	Na	Herb
	2.	<i>Adiantum capillus-veneris</i> L.	Sumbal	G	Na	Herb
Athyriaceae	3.	<i>Athyrium filix-femina</i> (L.) Roth	Lewny konjae	G	Mic	Herb
Dryopteridaceae	4.	<i>Dryopteris filix-mas</i> L.Schott.	Konjae	G	Mic	Herb
	5.	<i>Dryopteris jaxtaposta</i> Christ.	Konjae	G	Mic	Herb
Equisetaceae	6.	<i>Equisetum arvense</i> L.	Bandakai	G	Aph	Herb
Marsileaceae	7.	<i>Marsilea quadrifolia</i> L.	Salorpana	G	Na	Herb
	8.	<i>Cheilanthes acrostica</i> (Balb.) Tod.	Shenboty	G	Mic	Herb
Psilotaceae	9.	<i>Psilotum nudum</i> (L.) P. Beauv.	Kamrdaky	G	Aph	Herb
Pteridaceae	10.	<i>Pteris cretica</i> L.	Shenbotay	Hem	Mic	Herb
	11.	<i>Pteris vittata</i> L.	Shenbotay	Hem	Mic	Herb
Selaginellaceae	12.	<i>Selaginella sp.</i> P. Beau	-	G	Lep	Herb
Gymnosperms						
Cupressaceae	13.	<i>Cupressus sempervirens</i> L.	Sarwa	Micp	Lep	Tree
Pinaceae	14.	<i>Pinus roxburghii</i> Sargent.	Nahtar	Megp	Na	Tree
	15.	<i>Pinus wallichiana</i> AB. Jackson	Paiwoch	Megp	Na	Tree
Monocotyledon						
Araliaceae	16.	<i>Hedera nepalensis</i> K Koch.	Palol	Np	Mes	Climber
Alliaceae	17.	<i>Allium cepa</i> L.	Piaz	G	Mic	Herb
	18.	<i>Allium sativum</i> L.	Oga	G	Mic	Herb
Amaryllidaceae	19.	<i>Narcissus tazetta</i> L.	Gule nargis	G	Mic	Herb
Araceae	20.	<i>Acorus calamus</i> L.	Skha waja	G	Mes	Herb
	21.	<i>Arisaema jacquemonti</i> . Blume.	Marjary	G	Mes	Herb
	22.	<i>Calocasia esculentua</i> L.	Kachalo	G	Mac	Herb
Arecaceae	23.	<i>Phoenix dactylifera</i> L.	Kajora	Megp	Mes	Tree
Asphodelaceae	24.	<i>Asphodelus tenuifolius</i> Cav.	Shela	G	Mes	Herb
Canaceae	25.	<i>Canna indica</i> L.	Kelaboty	Ch	Meg	Herb
Colchicaceae	26.	<i>Colchicum luteum</i> Bake.	Qyamat guly	G	Na	Herb
Commelinaceae	27.	<i>Commelina benghalensis</i> L.	Narhe	Th	Mic	Herb
Cypraceae	28.	<i>Cyperus rotundus</i> L.	Dela	G	Na	Herb
	29.	<i>Pycurus flavidus</i> (Retz.)	Gaya	G	Na	Herb
Hyacinthaceae	30.	<i>Scilla griffithii</i> Hochr. In Bull.	-	G	Lep	Herb



Iridaceae	31.	<i>Iris ensata</i> Thunb.	Oogakai	G	Mes	Herb
Liliaceae	32.	<i>Aloe barbadensis</i> Mill.	Manzrepanra	Ch	Mac	Herb
	33.	<i>Asparagus officinalis</i> L.	Tindoray	Ch	Lep	Herb
	34.	<i>Asparagus spp.</i>	Jokay	Ch	Lep	Herb
	35.	<i>Tulipa stellata</i> Hk.f.	Ghantol	G	Lep	Herb
Musaceae	36.	<i>Musa × paradisiaca</i> L.	Keela	Meg	Mac	Herb
Poaceae	37.	<i>Agrotis viridis</i> Gouan.	Waha	Hem	Na	Herb
	38.	<i>Apluda mutica</i> L.	Tala	Hem	Lep	Herb
	39.	<i>Arthraxon hispidus</i> Thunb.	Nare gia	Th	Na	Herb
	40.	<i>Arundo donax</i> L.	Nal	NP	Mac	Herb
	41.	<i>Avena sativa</i> L.	Jamdar	Th	Na	Herb
	42.	<i>Brachiaria reptans</i> L.	Waha	Th	Na	Herb
	43.	<i>Chrysopogon aucheri</i> (Bioss.) Stapf.	Barwoza	Hem	Lep	Herb
	44.	<i>Cenchrus ciliaris</i> L.	Pisholum	Th	Na	Herb
	45.	<i>Cymbopogon distans</i> (Nees ex Steud.) Watson.	Sargary	Hem	Na	Herb
	46.	<i>Cynodon dactylon</i> L.	Kabal	Hem	Na	Herb
	47.	<i>Eleusine indica</i> L.	Dela	G	Na	Herb
	48.	<i>Echinochloa colona</i> (L.) Link	Waha	Th	Na	Herb
	49.	<i>Dactyloctenium aegyptium</i> L.	Ghat waha	Th	Na	Herb
	50.	<i>Dichanthium annulatum</i> Forssk.	Naram wakha	Hem	Na	Herb
	51.	<i>Hordeum vulgare</i> L.	Verbashy	Th	Na	Herb
	52.	<i>Imperata cylindrica</i> L.	Pesholakai	Th	Lep	Herb
	53.	<i>Oryza sativa</i> L.	Sholy	Th	Mic	Herb
	54.	<i>Phalaris minor</i> Retz	Spin wage	Th	Na	Herb
	55.	<i>Poa infirma</i> H.b.k.	Shamoha	Th	Na	Herb
	56.	<i>Polypogon monspeliensis</i> L. Desf.	Pesholam	Th	Mic	Herb
	57.	<i>Saccharum bengalense</i> Retz.	Kahay	Hem	Mes	Herb
58.	<i>Saccharum spontaneum</i> L.	Shur ghashay	Hem	Mic	Herb	
59.	<i>Sorghum halepense</i> L.	Dadum	Hem	Mic	Herb	
60.	<i>Triticum aestivum</i> L.	Ghanam	Th	Mic	Herb	
61.	<i>Zea mays</i> L.	Jowar	Th	Mes	Herb	



Dicotyledon						
Acanthaceae	62.	<i>Barleria cristata</i> L.	Toor boty	Ch	Lep	Herb
	63.	<i>Catharantus roseus</i> L.	Sadabahar	Ch	Na	Herb
	64.	<i>Justicia adhatoda</i> L.	Baikar	Np	Mic	Shrub
Aceraceae	65.	<i>Acer cappadocicum</i> Gled.	Spinkay	Megp	Mac	Shrub
Amaranthaceae	66.	<i>Achyranthes aspera</i> L.	Ghishkay	Th	Na	Herb
	67.	<i>Amaranthus caudatus</i> L.	Chalwairay	Th	Mic	Herb
	68.	<i>Amaranthus spinosa</i> L.	Chalwairay	Th	Mic	Herb
	69.	<i>Amaranthus viridis</i> L.	Gunhar	Th	Mic	Herb
	70.	<i>Alternanthera pungens</i> Forssk.	Sqaboty	Th	Lep	Herb
	71.	<i>Aerva javanica</i> . Burm.	Splenzar	Ch	Lep	Herb
	72.	<i>Aerva sanguinolenta</i> L.	Splenzar	Ch	Lep	Herb
	73.	<i>Celosia argentea</i> L.	Surguly	Th	Na	Herb
	74.	<i>Celosia argentea</i> var. <i>cristata</i> L.	Palsh gul	Th	Na	Herb
	75.	<i>Digera muricata</i> L.	Bambly	Th	Na	Herb
	76.	<i>Pupalia lappacea</i> (L.) Juss.	Ghety	Th	Na	Herb
Anacardiaceae	77.	<i>Mangifera indica</i> L.	Amm	Megp	Mic	Herb
	78.	<i>Pistacia chinensis</i> Bunge.	Shnai	Np	Mic	Tree
Apiaceae	79.	<i>Ammi visnaga</i> L.	Ghra gazra	Th	Lep	Herb
	80.	<i>Coriandrum sativum</i> L.	Dhanyal	Th	Lep	Herb
	81.	<i>Foeniculum vulgare</i> Miler.	Kaga	Th	Na	Herb
	82.	<i>Scandix pecten-Veneris</i> L.	Ghanghaia	Th	Mic	Herb
	83.	<i>Trachyspermum ammi</i> L. Sprague.	Sperkai	Th	Lep	Herb
Apocynaceae	84.	<i>Caralluma tuberculata</i> N.E. Brown.	Pamunkay	Hem	Na	Herb
	85.	<i>Nerium indicum</i> Mill.	Gundairay	Np	Mes	Tree
	86.	<i>Calotropis procera</i> Aiton.	Spalmay	Ch	Mes	Shrub
	87.	<i>Tylophora hersuta</i> L.	Gilo	Th	Mic	Herb
Asteraceae	88.	<i>Achillea millifolium</i> L.	Jarai	Hem	Lep	Herb
	89.	<i>Artemisia maritima</i> L.	Juakay	Ch	Lep	Herb
	90.	<i>Artemisia scoparia</i> Walds & Kit.	Tarkha	Th	Na	Herb
	91.	<i>Artemisia vulgaris</i> L.	Tarkha	Ch	Mic	Herb
	92.	<i>Bidens cernua</i> L.	-	Th	Mic	Herb
	93.	<i>Calendula arvensis</i> (Vaill.) L.	Zair gulae	Th	Mic	Herb
	94.	<i>Calendula officinalis</i> L.	Zair gulae	Th	Mic	Herb



	95.	<i>Cichorium intybus</i> L.	Kasni	Th	Mic	Herb
	96.	<i>Conyza bonariensis</i> L.	Nenzak boti	Th	Na	Herb
	97.	<i>Conyza canadensis</i> (L.) Gonquist.	Nenzak boti	Th	Mic	Herb
	98.	<i>Cirsium vulgare</i> (Savi) Ten.	Jhara	Th	Na	Herb
	99.	<i>Filago hurdwarica</i> (Wall. ex DC.)	Kamarboty	Hem	Na	Herb
	100.	<i>Helianthus annuus</i> L.	Norparas	Th	Mac	Herb
	101.	<i>Lactuca serriola</i> L.	-	Th	Mic	Herb
	102.	<i>Launea procumbens</i> Roxb.	Shodapai	Hem	Mic	Herb
	103.	<i>Parthenium hysterophorus</i> L.	Ghandaboty	Th	Mic	Herb
	104.	<i>Sonchus arvensis</i> L.	Shodapai	Th	Mic	Herb
	105.	<i>Sonchus asper</i> L.	Shodapai	Th	Mic	Herb
	106.	<i>Sonchus oleraceus</i> L.	Shodapai	Th	Mic	Herb
	107.	<i>Tagetes erecta</i> L.	Hamisha	Th	Na	Herb
	108.	<i>Tagetes minuta</i> L.	Lewany hamisha	Th	Na	Herb
	109.	<i>Taraxacum officinale</i> Weber.	Bezo laky	Th	Mic	Herb
	110.	<i>Tagetes patula</i> L.	Hamisha	Th	Na	Herb
	111.	<i>Xanthium strumarium</i> L.	Ghishkay	Th	Mes	Shrub
Balsaminaceae	112.	<i>Impatiens balsamina</i> L.	Gule mehandi	Th	Mes	Herb
Berberidaceae	113.	<i>Berberis lyceum</i> . Royle.	Kowaray	NP	Na	Shrub
Betulaceae	114.	<i>Alnus nitida</i> (Spach)	Gairay	Megp	Mes	Tree
	115.	<i>Betula utilis</i> D.Done.	Birch	Megp	Mes	Tree
Boraginaceae	116.	<i>Buglossoides arvensis</i> L.	Bashka	Th	Na	Herb
	117.	<i>Cynoglossum lanceolatum</i> Forssk.	Geshy	Hem	Na	Herb
	118.	<i>Ehretia obtusifolia</i> H.ex Dc.	Tasa	Np	Mic	Tree
	119.	<i>Lithospermum arvense</i> L.	Torabashka	Th	Na	Herb
Brassicaceae	120.	<i>Alliaria petiolata</i> M. Bieb.	Sagoogakai	Th	Na	Herb
	121.	<i>Brassica campestris</i> . L.	Sharsham	Th	Mic	Herb
	122.	<i>Brassica napus</i> L.	Taepar	Th	Mes	Herb
	123.	<i>Capsella bursa-pastoris</i> (L.) Medik.	Bambaisa	Th	Mic	Herb
	124.	<i>Cardamine hirsuta</i> L.	Spinguly	Th	Na	Herb
	125.	<i>Coronopus didymus</i> L.	Sqaboti	Th	Na	Herb
	126.	<i>Eruca sativa</i> L.	Jamama	Th	Mic	Herb



	127.	<i>Lepidium sativum</i> L.	Alam	Th	Na	Herb
	128.	<i>Nasturtium officinale</i> W. T Alton	Talmeera	G	Na	Herb
	129.	<i>Neslia paniculata</i> (L) Desv	Bashka	Th	Lep	Herb
	130.	<i>Raphanus raphanistrum</i> L.	Sharshm boty	Th	Mic	Herb
	131.	<i>Raphanus sativis.</i> L.	Moli	Th	Mic	Herb
	132.	<i>Sisymbrium officinale</i> (Linn.)	Pinsawara	Th	Na	Herb
Buddlejaceae	133.	<i>Buddleja crispa</i> Benth	Dasky	NP	Mic	Shrub
Buxaceae	134.	<i>Sarcococa saligna</i> (Dcne) Duel.	Alatar	NP	Mic	Shrub
Cactaceae	135.	<i>Opuntia dilleni</i> Haw.	Towar	Np	Aph	Herb
Caesalpinaceae	136.	<i>Bauhinia variegata</i> L.	Kulyar	Megp	Mes	Tree
	137.	<i>Caesalpinia decapitata</i> (Roth) Alston.	Jara	Np	Mic	Tree
	138.	<i>Senna occidentalis</i> (L.) Link.	Ziar guly	Th	Mic	Herb
Canabanaceae	139.	<i>Cannabis sativa</i> L.	Bhang	Th	Mic	Herb
Caprifoliaceae	140.	<i>Viburnum cotinifolium</i> D. Don.	Chamyarai	Np	Mic	Shrub
Caryophyllaceae	141.	<i>Sielene conoidea</i> L.	Mangotay	Th	Na	Herb
	142.	<i>Stellaria media</i> L.Gy.	Olalai	Th	Lep	Herb
Celastraceae	143.	<i>Gymnosporia royleana</i> Wall ex Lawson.	Soor Azghay	NP	Mic	Shrub
Chenopodiaceae	144.	<i>Chenopodium album</i> L.	Sarmai	Th	Mic	Herb
	145.	<i>Chenopodium ambrosioides</i> L.	Kharawa	Th	Mic	Herb
	146.	<i>Chenopodium botrys</i> L.	Skha Kharawa	Hem	Na	Herb
	147.	<i>Chenopodium murale</i> L.	Chalwairay	Th	Mic	Herb
Convulvuaceae	148.	<i>Convovulus arvensis</i> L.	Prewati	Th	Mic	Climber
	149.	<i>Ipomoea hederacea</i> Jacq.	Marazboty	Th	Mes	Climber
Cucurbitaceae	150.	<i>Citrullus lanatus</i> Thumb.	Hendwana	Th	Mes	Climber
	151.	<i>Cucurbita pepo</i> L.	Kado	Th	Mic	Climber
	152.	<i>Cucumis sativus</i> L.	Dengora	Th	Mac	Climber
	153.	<i>Luffa cylindrica</i> (L.) Roem.	Torai	Th	Mac	Climber
	154.	<i>Momordica charantia.</i> L.	Karela	Th	Mes	Climber
	155.	<i>Solena amplexicaulis</i> (Lam.) Gandhi.	Kakora	Th	Mic	Climber
Casuarinaceae	156.	<i>Casuarina equisetifolia</i> L.	-	Megp	Lep	Tree
Cuscutaceae	157.	<i>Cuscuta reflexa</i> Roxb.	Marazboty	Th	Aph	Climber
Ebenaceae	158.	<i>Diospyrus kaki</i> L.	Tor amluk	Megp	Mic	Tree



	159.	<i>Diospyrus lotus</i> L.	Ziar amluk	Megp	Mes	Tree
Elaeagnaceae	160.	<i>Elaeagnus angustifolia</i> L.	Ghanam ranga	Np	Mic	Herb
	161.	<i>Elaeagnus umbellata</i> Thunb.	Ghanam Ranga	Np	Mic	Herb
Ericaceae	162.	<i>Rhododenron arborium</i> Smith.	Gul e nameer	Megp	Mes	Shrub
Euphorbiaceae	163.	<i>Andrachne cordifolia</i> (Dene) Muell.	Spin krachi	NP	Mic	Herb
	164.	<i>Euphorbia cyathophora</i> Murray.	Zahr boty	Th	Mes	Herb
	165.	<i>Euphorbia helioscopia</i> Mewski.	Piryano doolai	Th	Na	Herb
	166.	<i>Euphorbia prostrate</i> Aiton.	Warmagha	Th	Na	Herb
	167.	<i>Mallotus philippensis</i> Muell.	Kambela	Megp	Mes	Tree
	168.	<i>Riccinis communis</i> L.	Randa	NP	Mes	Shrub
Fagaceae	169.	<i>Quercus baloot</i> Griffith.	Banj	Megp	Mic	Tree
	170.	<i>Quercus dilatata</i> Lindley.	Spin Banj	Megp	Mic	Tree
	171.	<i>Quercus incana</i> Roxb.	Toor Banj	Megp	Mic	Tree
Fumariaceae	172.	<i>Fumaria indica</i> Hausskn.	Papra	Th	Lep	Herb
	173.	<i>Fumaria officinalis</i> L.	Papra	Th	Lep	Herb
Gentianaceae	174.	<i>Swertia ciliata</i> (G. Don) B. L.	Spin guly	Th	Mes	Herb
Geranaceae	175.	<i>Geranium wallichianum</i> Oliv.	Sra zaila	Th	Mic	Herb
	176.	<i>Geranium collinum</i> Steph	Badersat	Th	Mes	Herb
	177.	<i>Geranium rotundifolium</i> L.	Srakasa	Th	Mic	Herb
Hemameledaceae	178.	<i>Parrotiopsis jacquemontiana</i> Decne. Rehde.	Beeranj	Np	Mes	Tree
Hippocastinaceae	179.	<i>Aesculus indica</i> (Wall ex Camb) H.K.F.	Jawaz	Megp	Mes	Tree
Juglandaceae	180.	<i>Juglans regia</i> L.	Chaghzai	Megp	Mes	Tree
Lamiaceae	181.	<i>Ajuga bractiosa</i> Wall.Benth.	Khwaga bootei	Th	Mic	Herb
	182.	<i>Ajuga parviflora</i> Benth.	Tarha botei	Th	Mic	Herb
	183.	<i>Anisomeles indica</i> L.kuntze.	Gada boty	Ch	Mic	Herb
	184.	<i>Lycopus europaeus</i> L.	Dise Podina	G	Mic	Herb
	185.	<i>Mentha longifolia</i> L. Huds	Velanai	G	Mic	Herb
	186.	<i>Mentha arvensis</i> L.	Desy velani	G	Mic	Herb
	187.	<i>Mentha spicata</i> L.	Poodina	G	Mic	Herb



	188.	<i>Clinopodium nepeta</i> L.	Hwar boty	Th	Mic	Herb
	189.	<i>Colebrookea oppositifolia</i> L.	Barpna	NP	Mic	Shrub
	190.	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd.	Krachi	Np	Na	Herb
	191.	<i>Micromeria biflora</i> (Buch.-Ham. ex D. Don) Benth	Varkoti Shamakay	Ch	Lep	Herb
	192.	<i>Ocimum basilicum</i> L.	Kashmalu	Ch	Na	Herb
	193.	<i>Origanum vulgare</i> L.	Shamakay	Ch	Mic	Herb
	194.	<i>Otostegia limbata</i> (Benth.) Bioss.	Pishkanar	Np	Mic	Shrub
	195.	<i>Otostegia persica</i> L.	Pishkanar	Np	Mic	Shrub
	196.	<i>Salvia lanata</i> Roxb.	Kiann	Th	Mic	Herb
	197.	<i>Salvia mcroftiana</i> Wall.	Khar dug	Ch	Mes	Herb
	198.	<i>Salvia nubicola</i> Wall. ex Sweet.	Shinky	Th	Mic	Herb
	199.	<i>Teucrium royleanum</i> Wall. ex Benth.	Krachai	Np	Na	Herb
Linaceae	200.	<i>Reinwardtia indica</i> Dumort.	Merangy	Np	Mic	Shrub
Lythraceae	201.	<i>Ammannia auriculata</i> Willd.	Ghra boty	Th	Na	Herb
	202.	<i>Woodfordia fruticosa</i> (L.) Kurz.	Btenzer	NP	Mic	Herb
Malvaceae	203.	<i>Abelmoschus esculentus</i> (L.) Moench.	Bandi	Th	Mic	Herb
	204.	<i>Alcea rosea</i> L.	Papeta	Th	Mic	Herb
	205.	<i>Malva neglecta</i> Waller.	Panerak	Th	Mic	Herb
	206.	<i>Malva officinalis</i> (L.) Schimp. & Spenn.	Panerak	Th	Mic	Herb
	207.	<i>Malvastrum coromandelianum</i> L.	Ziarguly	Th	Na	Herb
Meliaceae	208.	<i>Cedrela serrata</i> Royle.	Meem	Megp	Mic	Tree
	209.	<i>Melia azedarach</i> L.	Tor baknra	Megp	Mic	Tree
Menispermaceae	210.	<i>Tinospora cordifolia</i> (Thunb.) Miers.	Gilo	Mes	Lep	Herb
Mimosaceae	211.	<i>Acacia modesta</i> Wall.	Palosa	Megp	Lep	Tree
	212.	<i>Acacia nilotica</i> (L.) Delile	Kikar	Megp	Lep	Tree
	213.	<i>Mimosa himalayana</i> Gamble.	Kikaray	Np	Lep	Shrub
	214.	<i>Leucaena leucocephala</i> (Lam.)	Srikh	Megp	Mic	Tree



Moraceae	215.	<i>Broussonetia papyrifera</i> (L.) L'Herit.	Gultoot	Megp	Mes	Tree
	216.	<i>Ficus carica</i> L.	Inzar	Megp	Mac	Tree
	217.	<i>Ficus palmata</i> Forssk.	Baghi Inzar	Megp	Mes	Tree
	218.	<i>Ficus recemosa</i> L.	Oormal	Megp	Mac	Tree
	219.	<i>Ficus religiosa</i> Roxb.	Peepal	Megp	Mes	Tree
	220.	<i>Morus alba</i> L.	Spin Toot	Megp	Mes	Tree
	221.	<i>Morus indica</i> L.	Toor Toot	Megp	Mes	Tree
Myrsinaceae	222.	<i>Myrsine africana</i> L.	Marorang	NP	Na	Herb
Myrtaceae	223.	<i>Eucalyptus camaldulensis</i> Dehnh.	Lachii	Megp	Mic	Tree
	224.	<i>Myrtus communis</i> L.	Manoo	Megp	Lep	Tree
	225.	<i>Psidium guajava</i> L.	Amrod	Megp	Mic	Tree
Nyctaginaceae	226.	<i>Bougainvillea glabra</i> Choisy.	Ghany botay	Np	Mes	SHrub
	227.	<i>Bougainvillea spectabilis</i> Willd.	Ghany botay	Np	Mes	Shrub
	228.	<i>Boerhavia diffusa</i> L.	Ensuat	Th	Mic	Climber
	229.	<i>Boerhaavia procumbens</i> L.	Ensuat	Th	Mic	Climber
	230.	<i>Mirabilis jalapa</i> L.	Gul-e-Nazak	Np	Mes	Shrub
Oleaceae	231.	<i>Jasminum humile</i> L.	Rambail chambail	Np	Mic	Shrub
	232.	<i>Jasminum officinale</i> L.	Rambail chambail	Np	Mic	Shrub
	233.	<i>Olea ferruginea</i> Royle.	Khoona	Megp	Mic	Tree
Onagraceae	234.	<i>Epilobium hirsutum</i> L.	Gadabotay	Np	Na	Herb
	235.	<i>Oenothera rosea</i> L'Hér. ex Ait	Surguly	Hem	Mic	Herb
Oxalidaceae	236.	<i>Oxalis corniculata</i> L.	Tarookay	Th	Na	Herb
	237.	<i>Oxalis pes-caprae</i> L.	Tarookay	Th	Na	Herb
Paeoniaceae	238.	<i>Paeonia emodi</i> Wall. Hkf.	Mamaekh	G	Mes	Herb
Papaveraceae	239.	<i>Argemone mexicana</i> L.	Kareza	Th	Na	Shrub
	240.	<i>Papaver nudicaule</i> L.	Zangali kashkash	Th	Mic	Herb
	241.	<i>Papaver rhoeas</i> L.	Surgulai	Th	Mic	Herb
Papilionaceae	242.	<i>Dalbergia sisso</i> Roxb.	Shawa	Megp	Mic	Tree
	243.	<i>Desmodium elegans</i> DC.	Krachay	Np	Mes	Shrub
	244.	<i>Indigofera heterantha</i> L.	Ghoureja	Np	Lep	Shrub
	245.	<i>Lathyrus aphaca</i> L.	Kurkamany	Th	Na	Herb



	246.	<i>Lathyrus cicera</i> L.	Mrgy hpa	Th	Na	Herb
	247.	<i>Lathyrus pratensis</i> L.	Chilo	Th	Na	Herb
	248.	<i>Lathyrus sativus</i> L.	Ghatachilo	Hem	Mic	Herb
	249.	<i>Lespedeza juncea</i> (L. f.) Pers.	Ghanam Ranga	Np	Mic	Herb
	250.	<i>Medicago minima</i> (L.) Grub.	Grub Shpishty	Hem	Na	Herb
	251.	<i>Medicago polymorpha</i> L.	Shpaishtay	Th	Na	Herb
	252.	<i>Robinia pseudoacacia</i> L.	Dag ghouraja	Megp	Mic	Shrub
	253.	<i>Vicia bakeri</i> Ali.	Chilo	Th	Na	Herb
	254.	<i>Vicia sativa</i> L.	Marghyhpa	Th	Na	Herb
	255.	<i>Trifolium alexandrinum</i> L.	Shautal	Hem	Na	Herb
	256.	<i>Trifolium repens</i> L.	Shautal	Hem	Na	Herb
Plumbaginaceae	257.	<i>Plumbago zeylanica</i> L.	Jawlanak	Np	Mac	Shrub
Plantaginaceae	258.	<i>Kickxia ramosissima</i> (Wall.) Janchen	Ziar guly	Th	Mes	Herb
	259.	<i>Kickxia spuria</i> (L.) Dumort.	Ziar guly	Th	Mes	Herb
	260.	<i>Plantago lanceolata</i> L.	Jabai	Th	Mic	Herb
	261.	<i>Plantago major</i> L. (forss.k)	Sat	Th	Mes	Herb
	262.	<i>Plantago ovata</i> Forssk.	Jabi	Th	Mes	Herb
	263.	<i>Veronica anagallis-aquatica</i> L.	Hwar boty	Mip	Mic	Herb
	264.	<i>Veronica biloba</i> . Linn	Shen boty	Th	Na	Herb
	265.	<i>Veronica polita</i> Fr.	Chergkolma	Th	Na	Herb
Plantanaceae	266.	<i>Platanus orientalis</i> L.	Chinar	Megp	Mac	Tree
Polygonaceae	267.	<i>Bistorta amplexicaulis</i> (D. Don) Green.	Tarva panra	Hem	Mic	Herb
	268.	<i>Fagopyrum esculentum</i> Moench.	Spinguly	Th	Na	Herb
	269.	<i>Persicaria capitata</i> (Willd.) M. Gome.	Sorbotai	Th	Mes	Herb
	270.	<i>Polygonum aviculare</i> L.	Bandakai	Th	Mic	Herb
	271.	<i>Polygonum barbatum</i> L.	Polpulak	Th	Mic	Herb
	272.	<i>Polygonum serrulatum</i> L.	Polpulak	Th	Mic	Herb
	273.	<i>Rumex dentatus</i> L.	Shulkhay	Th	Mic	Herb
	274.	<i>Rumex hastatus</i> L.	Da dako Tarookay	Th	Mic	Herb
Portulacaceae	275.	<i>Portulaca olearacea</i> L.	Warkharay	Th	Na	Herb
Primulaceae	276.	<i>Anagallis arvensis</i> L.	Gulbotay	Th	Na	Herb



Punicaceae	277.	<i>Punica granatum</i> L.	Anar	Megp	Na	Tree
Ranunculaceae	278.	<i>Aconitum violaceum</i> Jacque. Staff.	Zahar mora	G	Na	Herb
	279.	<i>Clematis grata</i> Wall.	Ghrazelay	NP	Mic	Shrub
	280.	<i>Clematis oreintalis</i> L.	Zelay	G	Mic	Shrub
	281.	<i>Ranunculus muricatus</i> L.	Ziar guly	G	Na	Herb
	282.	<i>Ranunculus sceleratus</i> L.	Jaghagha	G	Na	Herb
Rhamnaceae	283.	<i>Rhamnus triquetra</i> L.	Zir lakhty	Megp	Mic	Tree
	284.	<i>Sageretia thea</i> L.	Mamana	NP	Na	Shrub
	285.	<i>Ziziphus jujuba</i> Mill.	Baira	Megp	Na	Tree
	286.	<i>Zizyphus nummularia</i> (Burm. f.)Wight.	Karkanda	NP	Na	Shrub
	287.	<i>Zizyphus oxyphylla</i> Edgew.	Elanai	Megp	Na	Shrub
Rosaceae	288.	<i>Cotoneaster nummularia</i> Fischer & C.A.Meyer.	Kharawa	NP	Mic	Shrub
	289.	<i>Eriobotrya japonica</i> Thunb. Lindl.	Alookat	Megp	Mes	Tree
	290.	<i>Fragaria indica</i> Andrew.	Da zmakay tot	Th	Mic	Herb
	291.	<i>Potentilla nepalensis</i> Hook.	Daghar shalkhay	Th	Mic	Herb
	292.	<i>Prunus cornuta</i> (Wall. ex Royle) Steud.	Harango	Micp	Mic	Tree
	293.	<i>Prunus armeniaca</i> L.	Hobani	Micp	Mes	Tree
	294.	<i>Prunus domestica</i> L.	Alocha	Micp	Mes	Tree
	295.	<i>Prunus persica</i> (L.) Batch.	Shaltalu	Micp	Mic	Tree
	296.	<i>Pyrus pashia</i> Ham Ex. D. Done.	Tangai	Megp	Mic	Tree
	297.	<i>Rosa webbiana</i> Wall. Ex.Royle.	Spin gulab	NP	Mic	Shrub
	298.	<i>Rosa moschata</i> J.Herm	Zangali gulab	NP	Mic	Shrub
	299.	<i>Rubus ellipticus</i> Smith.	Karwara	NP	Mic	Shrub
	300.	<i>Rubus fruticosus</i> L.	Karwara	NP	Mic	Shrub
	301.	<i>Rubus ulmifolius</i> Schott.	Goraj	NP	Mic	Shrub
302.	<i>Rubus irritans</i> L.	Goraj	NP	Mic	Shrub	
Rubiaceae	303.	<i>Gallium aparine</i> L.	Jawlank	Th	Na	Herb
	304.	<i>Galium tetraphyllum</i> Nazim. & Ehrend.	Ghat Jawlank	Th	Na	Herb

	305.	<i>Rubia cordifolia</i> L.	Jawlank	Th	Na	Herb
Rutaceae	306.	<i>Citrus aurantium</i> L.	Malta	Megp	Mes	Tree
	307.	<i>Citrus lemon.</i> L.	Nembo	Np	Mic	Shrub
	308.	<i>Skimmia laureola</i> (DC.) Steph.	Nazar panra	Np	Mes	Herb
	309.	<i>Zanthoxylum armatum</i> DC.	Dambara	NP	Mic	Shrub
	310.	<i>Populus alba</i> L.	Spairdar	Megp	Mes	Tree
Salicaceae	311.	<i>Populus caspica</i> Bornm.	Spairdar	Megp	Mes	Tree
	312.	<i>Salix babylonica</i> L.	Wala	Megp	Mic	Tree
	313.	<i>Salix tetrasperma</i> Roxb.	Wala	Megp	Mic	Tree
	314.	<i>Dodonea viscosa</i> (L.) Jacq.	Ghwarskay	Np	Mic	Shrub
Sapindaceae	314.	<i>Dodonea viscosa</i> (L.) Jacq.	Ghwarskay	Np	Mic	Shrub
Saxifragaceae	315.	<i>Bergenia ciliata</i> (Haw) Sternb.	Kamar panra	G	Mes	Herb
Scrophulariaceae	316.	<i>Verbascum thapsus</i> L.	Kharghwug	Th	Mes	Herb
Simarubaceae	317.	<i>Ailanthus altissima</i> Mill.	Asli bhikyana	Megp	Mic	Tree
Solanaceae	318.	<i>Atropa accuminata</i> Royle ex Mier k.	Barghak	Micp	Mic	Shrub
	319.	<i>Capsicum annum</i> L.	Marchaky	Th	Mic	Herb
	320.	<i>Capsicum frutescens</i> L.	Ghat marchaky	Np	Mes	Herb
	321.	<i>Datura innoxia</i> Mill.	Batora	Th	Mes	Herb
	322.	<i>Lycopersicon esculentum</i> Miller.	Tamatar	Th	Na	Herb
	323.	<i>Physalis divaricata</i> D. Don. Prodr.	Zahr boty	Th	Mic	Herb
	324.	<i>Solanum melongena</i> L.	Batengan	Th	Mic	Herb
	325.	<i>Solanum nigrum</i> L.	Kamachoo	Th	Mic	Herb
	326.	<i>Solanum surratense</i> Burm.f.	Maraghony	Th	Mic	Herb
	327.	<i>Withania somnifera</i> (L.) Dunal.	Kutilal	Ch	Mes	Herb
Thymeleaeceae	328.	<i>Wikstroemia canescens</i> Meisn.	Zair gulai	Np	Na	Shrub
Tiliaceae	329.	<i>Grewia optiva</i> Drum.ex.Burret.	Pastawoone	Megp	Mic	Tree
Ulmaceae	330.	<i>Celtis caucasica</i> Willd.	Tagha	Megp	Mic	Tree
	331.	<i>Celtis tetrandra</i> Roxb.	Sor krachy	Megp	Mic	Shrub
Urticaceae	332.	<i>Debrrgesia salicifolia</i> D.Done.	Ajalai	Megp	Mic	Tree
	333.	<i>Girardinia palmata</i> (Forssk. Gaudich	Sezonky	Hem	Mes	Shrub
	334.	<i>Lecanthus peduncularis</i> (Royle) Wedd	Jalbhang	Hem	Mes	Herb
	335.	<i>Pilea umbrosa</i> Blume.	-	Th	Na	Herb



	336.	<i>Urtica dioica</i> L.	Jalbhang	Th	Mic	Herb
Valerianaceae	337.	<i>Valeriana jatamansii</i> Jones.	MushkBala	G	Mic	Herb
Verbenaceae	338.	<i>Lantana camara</i> L.	Amrduguly	Np	Mic	Shrub
	339.	<i>Vitex negundo</i> L.	Marwandai	Np	Mic	Shrub
Violaceae	340.	<i>Viola odorata</i> L.	Banafsha	Hem	Mic	Herb
	341.	<i>Viola canescens</i> Wall.ex.Roxb.	Banafsha	Hem	Mic	Herb
Vitaceae	342.	<i>Vitis jacquemontii</i> R. Parker.	Gedarkwar	Megp	Mes	Climber
	343.	<i>Vitis vinifera</i> L.	Angor	Megp	Mes	Climber
Zygophyllaceae	344.	<i>Tribulus terrestris</i> L.	Markundai	Th	Na	Herb

Life form: Th= Therophytes, G= Geophytes, Ch= Chamaephytes, Hem= Hemicryptophytes, Np= Nanophanerophytes, Micp= Microphanerophytes, Mes= Mesophanerophytes, MP= Megaphanerophytes, P= Parasite.

Leaf size: Lep= Leptophylls, Na= Nanophylls, Mic= Microphylls, Mes= Mesophylls, Meg= Megaphylls, Mac= Macrophylls

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