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A study of Angiosperm diversity and their ecological attributes from eroded areas along the River Kurram, Khyber Pakhtunkhwa, Pakistan

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Abstract

This study, conducted from 2017 to 2022, assessed and annotated a checklist of angiosperm species and their ecological attributes from the eroded areas along the River Kurram across an altitudinal gradient. The annotated list comprises 425 species belonging to 91 families, including 342 dicotyledonous species (80.47%) and 83 monocotyledonous species (19.52%). Among the families, Poaceae was dominant, comprising 42 species (9.88%), followed by Asteraceae with 37 species (8.70%). Fabaceae and Amaranthaceae each had 32 species (7.52%), with an additional 23 species (5.41%) for Amaranthaceae. Solanaceae also had 32 species (7.52%), followed by Brassicaceae with 15 species (3.52%), and Euphorbiaceae and Polygonaceae each with 13 species (3.05%). The remaining families had 12 species (2.82%) or fewer. The biological spectrum showed that therophytes were the most prevalent life form, with 228 species (53.64%), followed by hemicryptophytes with 44 species (10.35%), nanophanerophytes with 39 species (9.17%), and geophytes with 32 species (7.52%). The leaf size spectrum revealed that nanophylls accounted for 138 species (32.47%), followed by microphylls with 119 species (28.00%), while 10 species were aphyllous. Additionally, 286 species (67.29%) had a simple leaf lamina, and 24 species (5.64%) had a spiny leaf lamina. The habitats in the study area are severely affected by continuous landslides and soil erosion, primarily due to overflowing and other natural disasters.

Keywords: Angiosperm, Conservation status, Life form, Soil erosion, River Kurram

Introduction

Vegetation coverage is important for the ecological environment and can indicate climate, edaphic conditions, and elevation (Zhou et al., 2006; Hussain et al., 2020). The River Kurram is a biodiversity hotspot with unique species diversity due to altitudinal variation (Gilani et al., 2003; Badshah et al., 2016). It passes through the Kurram district, originating from small streams and meeting with Kirman downstream. The river receives occasional float torrents from Koh-e-Safaid and rain drainage from the hills at Parachinar. It enters North Waziristan after passing through Parachinar and crosses into Bannu district before joining the river Indus near Isa Khel. The river flattens out in the Bannu district and flows into the Indus in the Mianwali district (Sajida et al., 2013; Yousaf et al., 2018).

Soil erosion is a major issue that decreases agricultural productivity, water capacity, and soil fertility, leading to vegetation degradation (Wu et al., 1994). The vegetation in these eroded areas is highly disturbed due to overflowing during the monsoon rainfall season, which is often linked to anthropogenic activities such as the construction of bridges, roads, and buildings. The areas adjacent to the river are at high risk of landslides and soil erosion due to overflowing during the monsoon rains, leading to ecological problems.

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Therefore, the terrain varies from mountainous to plain slopes. The climate of the area, based on the elevation gradient, ranges from dry temperate (Koh-e-Safaid) to tropical areas (River Indus at Mianwali). The majority of the area lies along the banks of the River Kurram, consisting of agricultural fields, and most of the region is now covered by the Billion Tree Tsunami project, which aims to protect against landslides and soil erosion along the riverbank. Consequently, most of the investigated area contains various water bodies along the riverbanks, such as ponds, marshy areas, streams, canals, drainage ditches, and small ponds. Many irrigation canals and civil channels branch off from the River Kurram, irrigating around 32,000 hectares (80,000 acres) of land (Khair et al., 2021).

Abbas et al., (2020) collected and studied an annotated list of angiosperms from eroded regions along the river Kurram, focusing on phytoecological characteristics. However, it is important to also consider human livelihoods in relation to vegetation patterns in mountain regions, as people rely on diverse vegetation for their livelihoods (Byers & Sainju, 1994). Incorporating local ethnobotanical knowledge into plant ecological research can help validate diversity patterns and promote collaboration with local communities in biodiversity assessment and conservation management (Shrestha & Medley, 2017; Sop et al., 2012)

Floristic assessment is essential for the exploration, sustainable utilization and conservation of plant biodiversity and their ecological management, providing the basis for further comprehensive research (Noor et al., 2020). The diversity and ecological characteristics of the angiosperms of a particular area depend upon environmental conditions, including climate, edaphic condition and elevation (Khan et al., 2013a). Thus ecological characteristics, such as life form, leaf spectra and phenological patterns, can be used as indicators of prevailing environmental conditions (Khan et al., 2012). The study of floristic composition is a common taxonomic practice as it provides the baseline information for subsequent, more detailed ecological investigation as well as planning for conservation and sustainable management of the resources of the area. The concept of life form was first introduced by Humboldt with the term vegetative form (Nicolson, 2013). It ranked next to floristic composition in ecological studies and is the outcome of the adaptation of plants to certain climatic conditions. Amber et al., (2019), the life form of a plant reflects the climate of the area and is also useful in comparing the geographical distribution of plant communities.

However, the objectives of the current investigation are to assess the angiospermic checklist and their phytoecological characteristics from the eroded areas lying at the bank of river Kurram. Further, the impact of land sliding and soil erosion on vegetation degradation which is due to over flooding during the moon soon rainfall at that high altitude region of the investigated area. Moreover, the study also focused on whether vegetation type is linked with environmental conditions of the areas that predict the climate and edaphic conditions at different altitudinal gradients. In addition to this *Alternanthera philoxeroides* was recorded among the angiospermic checklist for the first to Flora of Pakistan. Hence, the land sliding and soil erosion due to over flooding in the studied area causes land as well as vegetation degradation for which we should plant deep rooted tree covers along both sides river to protect the land and conserve vegetation from this natural disaster.

Materials and Methods

Study area and data collections

This study was carried out on vegetation of eroded areas lying on the bank of river Kurram, Khyber Pakhtunkhwa, Pakistan along with an elevational gradient (Figure 1). For this study, only angiospermic species were collected from the different hotspots from 2017 to 2022 (Table 1). The area varies from mountainous to plane slopes so, based on elevation gradient the area lies in between temperate to tropical zones which show variation in their climate. The temperature was recorded at their temperate zone (Koh-e-safaid) in summer maximum of 25.43 °C while, in winter reached to -1.0 °C. But, in their tropical region (river Indus near Isa Khel, district Mianwali) maximum temperature in summer is 46.12 °C whereas, in winter reaches 10.81 °C was recorded in the month of July. Similarly, rainfall and relative humidity vary from area to area because the investigated lie with an altitudinal gradient. Each plant specimens were properly photographed by camera in the field (Plates 1 – 3). Therefore, the collected specimens were properly preserved, dried and pressed with blotting paper, tagged with and then passed through the poisoning process. Further, the plants were mounted on standard herbarium sheets with field information. Further, the preserved specimens were properly identified from Flora of Pakistan (<https://www.tropicos.org/Project/Pakistan>), and from the previously published data (Ali, 2008; Ali & Nasir, 1989; Ali & Qaiser, 1986). For, the valid scientific names of plants were followed by plants of the world online (<https://powo.science.kew.org/>), and confirmed from international plant names index (<https://www.ipni.org/>). After, identification the plant specimens were deposited to the Herbarium of the Botany Department University of Peshawar (HUP).



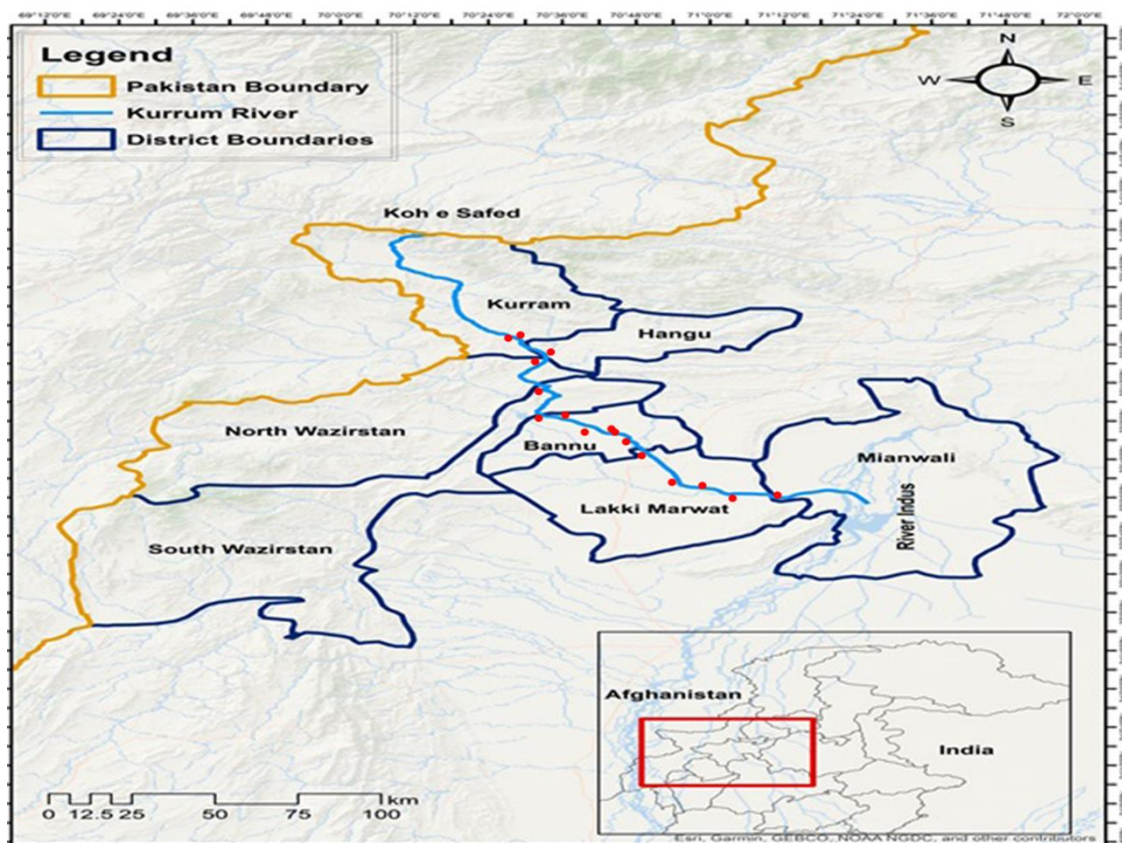


Figure 1. Red dot showing the collection sites in study area (River Kurram).

Ecological characteristics

In this study, angiosperm species were classified based on the biological spectrum classes such as life form, leaf size, leaf lamina and habit as well as habitats according to Raunkiaer (1934), Hussain (1989) and Hussain et al., (2020). Further, the percentage of each class was determined by following Badshah et al., (2013), Hussain et al., (2015), and Zaman & Badshah (2021).

Results and Discussion

Angiosperm configuration

The present study was the first time attempt to enlist the angiospermic diversity and their phytoecological characteristics from the eroded areas at the river Kurram (Table 1). The current study comprised 425 species of angiosperms belonging to 89 families (Table 2). It included 342 (80.47%) dicotyledonous (Eudicots) and 83 (19.52%) monocotyledonous (Monocots) species belonging to 70 (78.65%) and 19 (21.35%) families respectively (Table 1 - 3). The leading family was Poaceae with 42 species (21%), followed by Asteraceae with 37 species (19%), Fabaceae with 32 species (16%), Amaranthaceae with 23 species (5.41%), Solanaceae with 20 species (10%), Brassicaceae with 15 species (8%), Euphorbiaceae and Polygonaceae each with 13 species (6.77%), Apiaceae 12 species (6%) and the remaining family like Cyperaceae and Rosaceae each with 11 species (2.58%), Lamiaceae with 10 species (2.35%), Apocyanaceae, Boraginaceae, Cucurbitaceae, Malvaceae and Scrophulariaceae each with 8 species (1.88%), Mimosaceae, Myrtaceae and Plantaginaceae each with 6 species (1.41%), Zygophyllaceae with 5 species (1.17%), Arecaceae, Juncaceae, Caryophyllaceae and Convolvulaceae each with 4 species (0.94%). However, the remaining families with three species or less than three are represented in (Table 1). For each species, all the preliminary data like local name, common name, life form, leaf size, leaf lamina, habit, habitat and family were provided in (Table 1). From this annotated checklist one species for the first time recorded in viz., *Alternanthera philoxeroides*. In addition, a few species were investigated as invasive namely, *Alternanthera philoxeroides*, *Broussonetia papyrifera*, *Parthenium hysterophorus*, *Solanum elaeagnifolium*, *Verbesina encelioides* and *Tagetes minuta* from the studied area which is considered as an agricultures threats.

Table 1. Angiospermic flora and ecological characteristics from eroded regions along River Kurram, Khyber Pakhtunkhwa, Pakistan. G: Geophytes, Th: Therophytes, H: Hemocryptophytes, Hydro: Hydrophytes, Ch: Chamaephytes, Np: Nanophanerophytes, MicP: Microphanerophytes, Mesp: Mesophanerophytes, Megp: Megaphanerophytes, AP: Aphyllous, L: Leptophyll, Na: Nanophyll, Mic: Microphyll, Mes: Mesophyll, Mac: Microphyll, Meg: Megaphyll, S: Simple, Sp: Spiny, Com: Compound, Dis: Dissected, Abs: absent, H: Herb, S: Shrub, T: Tree, C: Climber, L: Liana, Af: Agricultural fields, D: Dry slopes, W: Wet places, Cu: Cultivated, Gy: Graveyards, F: Forest, M: Moist places, W: Wet, I: Introduced, Epi: Epiphyte.

S. No	Botanical Name	Local Name	English Name	Voucher Specimen	Life Form	Leaf Size	Leaf Lamina	Habit	Habitat
(Monocotyledonous flora): Alismataceae									
1.	<i>Alisma plantago-aquatica</i> Linn.	Abay-beta	Mad-dog weed	A200027-PUH	Hydro	Mac	S	H	W
2.	<i>Sagittaria trifolia</i> Linn.	Abay-gull	Chinese Arrowroot	A200028-PUH	Hydro	Mes	Com	H	W
Amaryllidaceae									
3.	<i>Allium cepa</i> Linn.	Piyaz	Onion	A200029-PUH	G	Mes	S	H	Af
4.	<i>Allium sativum</i> Linn.	Yeezha	Garlic	A200030-PUH	G	Mes	S	H	Af
Araceae									
5.	<i>Colocasia esculenta</i> (Linn.) Schott	Kurchali	Taro	A200031-PUH	G	Meg	S	H	Af
6.	<i>Pistia stratiotes</i> Linn.	Abay-beta	Water lettuce	A200032-PUH	Hydro	Na	S	H	W
Arecaceae									
7.	<i>Livistona chinensis</i> (Jacq.) R.Br. ex Mart.	Mazuri-hajera	Chinese fan palm	A200033-PUH	Np	Mes	Com	S	I
8.	<i>Nannorrhops ritchieana</i> (Griff.) Aitch.	Mazra	Mazari palm	A199610-PUH	Np	Meg	Com	S	D
9.	<i>Phoenix dactylifera</i> Linn.	Hajera	Date palm	A200035-PUH	Megp	Mes	Com	T	D
10.	<i>Phoenix loureiroi</i> Kunth	Zhangli Hajera	Mountain date palm	A200034-PUH	Megp	Mes	Com	T	D
Asparagaceae									
11.	<i>Asparagus monophyllus</i> Baker	Kabra-beta	Sparrow grass	A199611-PUH	Ch	L	Abs	S	Gy
Asphodelaceae									
12.	<i>Asphodelus tenuifolius</i> Cav.	Piozikai	Weed of fields	A199612-PUH	G	Na	S	H	D
Canaceae									
13.	<i>Canna indica</i> Linn.	Valla-gorha gull	Purple arrowroot	A199613-PUH	Ch	Meg	S	H	M
Ceratophyllaceae									
14.	<i>Ceratophyllum demersum</i> Linn.	Unknown	Coontail	A199615-PUH	Hydro	Mes	S	H	W
Cyperaceae									
15.	<i>Bolboschoenus affinis</i> (Roth) Drobow	Dilliye	Sea clubrush	A199614-PUH	G	Na	S	H	M
16.	<i>Cyperus alopecuroides</i> Rottb.	Diloka	Smooth flatsedge.	A199619-PUH	G	Mic	S	H	M
17.	<i>Cyperus difformis</i> Linn.	Diloka	Rice sedge	A199617-PUH	G	Na	S	H	M
18.	<i>Cyperus flavidus</i> Retz.	Unknown	Unknown	A199625-PUH	G	Na	S	H	W
19.	<i>Cyperus michelianus</i> subsp. <i>pygmaeus</i> (Rottb.) Asch. & Graebn.	Unknown	Dwarf flat sedge	A199616-PUH	G	Na	S	H	W
20.	<i>Cyperus rotundus</i> Linn.	Diloka	Purple nut sedge	A199618-PUH	G	Na	S	H	M
21.	<i>Eleocharis geniculata</i> (Linn.) Roem. & Schult.	Howar	Spikerush	A199620-PUH	G	Na	S	H	W
22.	<i>Eleocharis palustris</i> (Linn.) Roem. & Schult.	Unknown	Marsh spike-rush	A199621-PUH	G	Na	S	H	W
23.	<i>Fimbristylis dichotoma</i> (Linn.) Vahl	Abay-beta	Forked fimbry	A199622-PUH	G	Mic	S	H	W
24.	<i>Schoenoplectus litoralis</i> (Schrad.) Palla	Abay-beta	Club-rush	A199623-PUH	G	Na	S	H	M
25.	<i>Schoenoplectus triquetar</i> (Linn.) Palla	Abay-Rabuz	Bulrush	A199624-PUH	G	AP	S	H	M



Hydrocharitaceae									
26.	<i>Hydrilla verticillata</i> (Linn.f.) Royle	Abay-beta	Waterhyme /Hydrilla	A199626-PUH	Hydro	Mes	S	H	W
27.	<i>Vallisneria spiralis</i> Linn.	Abay-beta	Eel grass	A199627-PUH	Hydro	Mes	S	H	W
Iridaceae									
28.	<i>Iris aitchisonii</i> (Baker) Boiss.	Gull-nargus	Lilly	A199628-PUH	G	Mes	S	H	D
29.	<i>Moraea sisyrinchium</i> (Linn.) Ker Gawl.	Diliyee	Barbary Nut	A199629-PUH	G	Mes	S	H	D
Juncaceae									
30.	<i>Juncus articulatus</i> Linn.	Warha-Rabuz	Jointed rush	A199633-PUH	G	Na	S	H	M
31.	<i>Juncus bufonius</i> Linn.	Abay- khwar	Toad rush	A199630-PUH	G	Na	S	H	M
32.	<i>Juncus inflexus</i> Linn.	Rabuz	Soft rush	A199632-PUH	G	Na	S	H	M
33.	<i>Juncus maritimus</i> Lam.	Ghta -Rabuz	Sea rush	A199631-PUH	G	Na	S	H	M
Lemnaceae									
34.	<i>Lemna minor</i> Linn.	Abay rush	Common Duckweed	A199634-PUH	Hydro	L	Abs	H	W
Musaceae									
35.	<i>Musa × paradisiaca</i> Linn.	Kela	Banana	A199635-PUH	H	Meg	S	H	Cu
Orchidaceae									
36.	<i>Zeuxine strateumatica</i> (Linn.) Schltr.	Speen-beta	Lawn orchid	A199637-PUH	H	Mic	S	H	D
Poaceae									
37.	<i>Alopecurus myosuroides</i> Huds.	Khowar	Black-grass	A199639-PUH	H	Na	S	H	D
38.	<i>Apluda mutica</i> Linn.	Khawar	Para grass	A199638-PUH	H	Na	S	H	D
39.	<i>Aristida cyanantha</i> Steud.	Speen lummi	Wire grass	A199640-PUH	H	Na	S	H	D
40.	<i>Arundo donax</i> Linn.	Nall	Giant reed	A199641-PUH	Ch	Mic	S	H	M
41.	<i>Avena fatua</i> Linn.	Karyarha	Wild oat	A199642-PUH	Th	Mic	S	H	M
42.	<i>Avena sativa</i> Linn.	Karyana	Oat	A199644-PUH	Th	Mic	S	H	M
43.	<i>Bambusa arundinacea</i> (Retz.) Willd.	Bosh	Bamboo	A199643-PUH	Th	Na	S	H	Cu
44.	<i>Bromus catharticus</i> Vahl.	Khowar	Prairie grass	A199647-PUH	Th	Mic	S	H	D
45.	<i>Bromus japonicus</i> Thunb.	Khowar	Brome grass	A199646-PUH	Th	Mic	S	H	M
46.	<i>Cenchrus biflorus</i> Roxb.	Kapray aghzay	Indian sandbur	A199648-PUH	H	L	S	H	D
47.	<i>Cenchrus ciliaris</i> Linn.	Qarashkai	African foxtail grass	A199650-PUH	H	Na	S	H	D
48.	<i>Cymbopogon citratus</i> (DC.) Stapf	Limon-grass	Lemon grass	A199652-PUH	H	Mes	S	H	Cu
49.	<i>Cymbopogon jwarancusa</i> (Jones ex Roxb.) Schult.	Sargurha	Jwarancusa Grass	A199651-PUH	H	Mic	S	H	D
50.	<i>Cynodon dactylon</i> (Linn.) Pers.	Baruwa	Bermuda grass	A199653-PUH	H	Mic	S	H	M
51.	<i>Dactyloctenium aegyptium</i> (Linn.) Willd.	Khwar	Egyptian crowfoot grass	A199655-PUH	Th	Na	S	H	D
52.	<i>Dactyloctenium scindicum</i> Boiss.	Unknown	Crowfoot grass	A199654-PUH	Th	Na	S	H	D
53.	<i>Desmostachya bipinnata</i> (Linn.) Stapf	Surmul	Halfa grass	A199656-PUH	H	Na	S	H	Gy
54.	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Khwar	Marvel grass	A199657-PUH	H	Na	S	H	M
55.	<i>Dinebra panicea</i> (Retz.) P.M.Peterson & N.Snow	Samyaka khowar	Mucronate Sprangletop	A199661-PUH	Th	Na	S	H	M
56.	<i>Echinochloa crus-galli</i> (Linn.) P. Beauv.	Khwar	Cockspur grass	A199658-PUH	Th	Na	S	H	M
57.	<i>Hordeum vulgare</i> Linn.	Arbushay	Naked barley	A199660-PUH	Th	Na	S	H	Af

58.	<i>Imperata cylindrica</i> (Linn.) Raesch.	Khowar	Kunai grass	A199659- PUH	Th	Na	S	H	D
59.	<i>Lolium temulentum</i> Linn.	Jawdar	Darnel ryegrass	A199663- PUH	Th	Na	S	H	M
60.	<i>Oryza sativa</i> Linn.	Shelley	Rice	A199662- PUH	Th	Na	S	H	Af
61.	<i>Paspalum distichum</i> Linn.	Darga-beta	Crown grass	A199664- PUH	Th	Na	S	H	M
62.	<i>Phalaris minor</i> Retz.	Khowar	Lesser-canary grass	A199665- PUH	Th	Na	S	H	M
63.	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Karhka	Common Reed	A199666- PUH	Ch	Na	S	H	M
64.	<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Karhka-nall	Tall Reed grass	A199668- PUH	Ch	Mes	S	H	M
65.	<i>Poa annua</i> Linn.	Khowar	Meadow grass	A199667- PUH	H	L	S	H	M
66.	<i>Poa bulbosa</i> Linn.	Khowar	Blue grass	A199670- PUH	Th	L	S	H	M
67.	<i>Polypogon monspeliensis</i> (Linn.) Desf.	Khowar	Beard-grass	A199669- PUH	Th	Na	S	H	M
68.	<i>Polypogon viridis</i> (Gouan) Breistr.	Khowar	Water bent	A199636- PUH	H	Na	S	H	M
69.	<i>Saccharum officinarum</i> Linn.	Gaana	Sugar cane	A199672- PUH	H	Mes	S	H	Af
70.	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Sherakai	Pigeon grass	A199673- PUH	Th	L	S	H	D
71.	<i>Sorghum bicolor</i> (Linn.) Moench	Khwor -jiwor	Great millet	A199675- PUH	H	Mic	S	H	Af
72.	<i>Sorghum halepense</i> (Linn.) Pers	Didam	Johnson grass	A199676- PUH	H	Mic	S	H	D
73.	<i>Tripsidium bengalense</i> (Retz.) H.Scholz	Omaxha	Kans grass	A199674- PUH	H	Mes	S	H	D
74.	<i>Tripsidium ravennae</i> (Linn.) H.Scholz	Mushkuni	hardy sugar cane	A199671- PUH	H	Mes	S	H	D
75.	<i>Triticum aestivum</i> Linn.	Ghanam	Wheat	A199677- PUH	Th	Mes	S	H	Af
76.	<i>Urochloa ramosa</i> (Linn.) T.Q.Nguyen	Ghozahwar	Signal grass	A199645- PUH	Th	Mic	S	H	Af
77.	<i>Urochloa reptans</i> (Linn.) Stapf	Angrazi ghozahwar	Running grass	A199649- PUH	Th	Mic	S	H	D
78.	<i>Zea mays</i> Linn.	Jiwor	Maize	A199678- PUH	Th	Mac	S	H	Af
Potamogetonaceae									
79.	<i>Potamogeton pusillus</i> Linn.	Abay-beta	Lesser pondweed	A199680- PUH	Hydro	Na	S	H	W
80.	<i>Potamogeton nodosus</i> Poir.	Unknown	Long-leaf pondweed	A199679- PUH	Hydro	L	S	H	W
Typhaceae									
81.	<i>Typha domingensis</i> Pers	Abay-Deela	Southern cattail	A199681- PUH	Hydro	Mes	S	H	W
82.	<i>Typha latifolia</i> Linn.	Deela	Broadleaf cattail	A199683- PUH	Hydro	Mes	S	H	W
Zingiberaceae									
83.	<i>Curcuma longa</i> Linn.	Kurkaman	Turmerite	A199682- PUH	G	Mes	S	H	Af
(Dicotyledonous flora): Acanthaceae									
84.	<i>Dicliptera bupleuroides</i> Nees	Unknown	Thorowax Foldwing	A199685- PUH	Th	L	S	H	D
85.	<i>Justicia adhatoda</i> Linn.	Kurma khas	Malabar nut	A199684- PUH	Th	Na	S	S	D
86.	<i>Rostellularia peploides</i> (Nees) Nees	Ganda-beta	Unknown	A199686- PUH	Th	Na	S	H	M
Aizoaceae									
87.	<i>Zaleya pentandra</i> (Linn.) C.Jeffrey	Unknown	African purslane	A199687- PUH	Ch	Na	S	H	D
Amaranthaceae									
88.	<i>Achyranthes aspera</i> Linn.	Shpazhoka	Devil's horsewhip	A199688- PUH	Th	Mic	S	H	M

89.	<i>Aerva javanica</i> (Burm.f.) Juss. ex Schult.	Sperai-e-beta	Desert cotton	A199690- PUH	H	Na	S	H	D
90.	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Abay beta	Alligator weed	A199689- PUH	H	L	S	H	W
91.	<i>Alternanthera pungens</i> Kunth	Ganda-beta	Khaki weed	A199691- PUH	H	Mic	S	H	M
92.	<i>Alternanthera sessilis</i> (Linn.) R.Br. ex DC.	Unknown	Sessile joyweed	A199692- PUH	H	Mic	S	H	W
93.	<i>Amaranthus viridis</i> Linn.	Ranzuka	Slender amaranth	A199693- PUH	Th	Mic	S	H	M
94.	<i>Atriplex griffithii</i> Moq.	Unknown	Turkestanian spinach	A199802- PUH	Th	Mic	S	H	Af
95.	<i>Atriplex tatarica</i> Linn.	Unknown	Saltbush	A199791- PUH	Th	Mic	S	S	Gy
96.	<i>Bassia indica</i> (Wight) A.J.Scott	Khass	Desert bush	A199694- PUH	H	L	S	H	D
97.	<i>Bassia indica</i> (Wight) A.J.Scott	Unknown	Bassia	A199798- PUH	Th	Mic	S	S	D
98.	<i>Beta vulgaris</i> subsp. <i>maritima</i> (Linn.) Arcang.	Patawar	Sea beet	A199792- PUH	Th	Na	S	H	D
99.	<i>Caroxylon imbricatum</i> (Forssk.) Moq.	Unknown	Saltwort	A199799- PUH	Th	Mic	S	H	D
100.	<i>Celosia argentea</i> Linn.	Palash gull	Plumed cockscomb	A199695- PUH	Th	Mes	S	H	D
101.	<i>Chenopodiastrum murale</i> (Linn.) S.Fuentes, Uotila & Borsch	Sohebu	Nettle-leaved goose foot	A199796- PUH	Th	Mes	S	H	M
102.	<i>Chenopodium album</i> Linn.	Surma	Lamb's quarters	A199794- PUH	Th	Mes	S	H	M
103.	<i>Digera muricata</i> (Linn.) Mart.	Ranzuka	Smooth pigweed	A199696- PUH	Th	Mic	S	H	M
104.	<i>Dysphania ambrosioides</i> (Linn.) Mosyakin & Clemants	Jangli surma	Worm seed	A199793- PUH	Th	Mes	S	H	M
105.	<i>Dysphania botrys</i> (Linn.) Mosyakin & Clemants	Kso-surma	Jerusalem-oak	A199795- PUH	Th	Mic	Dis	H	D
106.	<i>Gomphrena celosoides</i> Mart.	Unknown	Gomphrena Weed	A199697- PUH	Th	Mic	S	H	M
107.	<i>Salsola tragus</i> Linn.	Unknown	Prickly Russian thistle	A199800- PUH	H	L	Sp	H	D
108.	<i>Spinacia oleracea</i> subsp. <i>turkestanica</i> (Iljin) Del Guacchio & P.Caputo	Maghli-sobu	Spinach	A199803- PUH	Th	Mic	S	H	Af
109.	<i>Suaeda fruticosa</i> Forssk. ex J.F.Gmel.	Zumaye	Sby seablight	A199801- PUH	Th	L	S	S	Gy
110.	<i>Tecticornia indica</i> (Willd.) K.A.Sheph. & Paul G.Wilson	Unknown	Haloxylon	A199797- PUH	Th	AP	Abs	H	M
Anacardiaceae									
111.	<i>Mangifera indica</i> Linn.	Amm	Mango	A199699- PUH	Megp	Mes	S	T	Cu
Apiaceae									
112.	<i>Apium graveolens</i> Linn.	Soya	Celery	A199698- PUH	Th	Na	Com	H	D
113.	<i>Bowlesia incana</i> Ruiz & Pav.	Kso-bota	Hoary bowlesia	A199701- PUH	Th	Mic	Dis	H	M
114.	<i>Centella asiatica</i> (Linn.) Urb.	Gurhmar	Gotu Kola	A199700- PUH	Hydro	Mic	S	H	W
115.	<i>Coriandrum sativum</i> Linn.	Danrhya	Coriander	A199702- PUH	Th	Na	Com	H	Af
116.	<i>Daucus carota</i> Linn.	Gajara	Carrot	A199703- PUH	Th	Na	Dis	H	Af
117.	<i>Eryngium caeruleum</i> M.Bieb.	Unknown	Sea holly	A199704- PUH	Th	Mic	Dic	H	D
118.	<i>Foeniculum vulgare</i> Mill.	Sop	Fennel	A199705- PUH	Th	Na	Dis	H	Af
119.	<i>Oenanthe javanica</i> (Blume) DC.	Abay-beta	Japanese parsley	A199706- PUH	Hydro	Na	Com	H	W
120.	<i>Psammogeton biternatus</i> Edgew.	Unknown	Unknown	A199707- PUH	Th	L	Dis	H	D

121.	<i>Scandix pecten-veneris</i> Linn.	Unknown	Stork's needle	A199708- PUH	Th	Mic	Dis	H	D
122.	<i>Torilis leptophylla</i> (Linn.) Rchb.f.	Unknown	Hedge-parsley	A199709- PUH	Th	Na	Dis	H	D
123.	<i>Trachyspermum ammi</i> (Linn.) Sprague	Sperkuye	Ajwain	A199710- PUH	Th	Na	Dis	H	D
Apocyanaceae									
124.	<i>Calotropis procera</i> (Aiton) W.T.Aiton	Spalmaka	Sodom apple	A199714- PUH	Np	Mes	S	S	D
125.	<i>Catharanthus roseus</i> (Linn.) G.Don	Gull –e-bahar	Rose periwinkle	A199711- PUH	Ch	Mic	S	H	Cu
126.	<i>Leptadenia pyrotechnica</i> (Forssk.) Decne.	Unknown	Leptadenia	A199715- PUH	Th	Ap	Abs	S	D
127.	<i>Nerium oleander</i> Linn.	Ser -gandarii	Oleander	A199712- PUH	Np	Na	S	S	Cu
128.	<i>Oxystelma esculentum</i> (Linn. f.) Sm.	Pervithiyee	Rosy Milkweed Vine	A199716- PUH	H	Mes	S	C	M
129.	<i>Periploca aphylla</i> Decne.	Unknown	Periploca	A199718- PUH	Np	Ap	Abs	S	D
130.	<i>Rhazya stricta</i> Decne.	Nakrizi- beta	Eshvarak	A199713- PUH	Np	Mic	S	S	D
131.	<i>Vincetoxicum spirale</i> (Forssk.) D.Z.Li	Film pervithiyee	Dog-strangling vine	A199717- PUH	H	Mes	S	C	Gy
Asteraceae									
132.	<i>Artemisia vulgaris</i> Linn.	Unknown	Mugwort	A199719- PUH	Th	Na	Dis	H	D
133.	<i>Bidens pilosa</i> Linn.	Unknown	Black-jack	A199720- PUH	Th	Na	Com	H	M
134.	<i>Calendula arvensis</i> Linn.	Zarhi-gull	Field marigold	A199721- PUH	Th	Mic	S	H	D
135.	<i>Centaurea iberica</i> Trevir. ex Spreng.	Kso beta	Iberian star-thistle	A199722- PUH	Th	Mic	Dis	H	D
136.	<i>Carduus edelbergii</i> Rech.f.	Unknown	Silver thistle	A199723- PUH	Th	Mic	Sp	H	D
137.	<i>Carthamus oxyacanthus</i> M.Bieb.	Konzulla	Wild Safflower	A199724- PUH	Th	Mic	Sp	H	D
138.	<i>Phonus lanatus</i> (Linn.) Hill	Unknown	Unknown	A199725- PUH	Th	Mic	Sp	H	D
139.	<i>Carthamus tinctorius</i> Linn.	Konzulla	Safflower	A199726- PUH	Th	Mic	Sp	H	D
140.	<i>Cichorium intybus</i> Linn.	Tarizha	Common chicory	A199727- PUH	Th	Na	S	H	M
141.	<i>Cirsium arvense</i> (Linn.) Scop.	Aghzaai	Creeping thistle	A199728- PUH	Th	Mes	Sp	H	M
142.	<i>Erigeron bonariensis</i> Linn.	Shpelay	Argentine fleabane	A199729- PUH	Th	Mic	S	H	M
143.	<i>Echinops echinatus</i> Roxb.	Aghziki gull	Globe thistle	A199730- PUH	Ch	Mic	Sp	H	D
144.	<i>Eclipta prostrata</i> (Linn.) Linn.	Warhi-beta	False daisy	A199731- PUH	Th	Na	S	H	M
145.	<i>Filago pyramidata</i> Linn.	Gabray bota	Broadleaf cottonrose	A199732- PUH	Th	Mic	S	H	Gy
146.	<i>Galinsoga amboensis</i> D.L.Schulz	Unknown	Gallant soldier	A199733- PUH	Th	Mic	S	H	M
147.	<i>Helianthus annuus</i> Linn.	Suraj-makhi	Sun flower	A199734- PUH	Th	Mes	S	H	Af
148.	<i>Hertia intermedia</i> (Boiss.) Kuntze	Gonga	Hertia	A199735- PUH	Th	Mic	S	S	D
149.	<i>Ifloga spicata</i> (Forssk.) Sch. Bip.	Unknown	Ifloga	A199736- PUH	Th	L	S	H	D
150.	<i>Iphiona grantioides</i> (Boiss.) Anderb.	Unknown	Iphiona	A199737- PUH	Th	Mic	S	S	D
151.	<i>Lactuca serriola</i> Linn.	Kso-beta	Prickly lettuce	A199738- PUH	Th	Mes	Sp	H	M
152.	<i>Launaea secunda</i> Hook.f.	Kso-beta	Unknown	A199739- PUH	Th	Mes	Dis	H	D
153.	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	Piawrie	Creeping Launea	A199740- PUH	H	L	Dic	H	D



154.	<i>Lactuca sativa</i> Linn.	Salad	Lettuce	A199741-PUH	Th	Mes	S	H	Af
155.	<i>Parthenium hysterophorus</i> Linn.	Kherh-beta	Santa-Maria	A199742-PUH	Th	Mic	Dis	H	D
156.	<i>Pluchea lanceolata</i> (DC.) C.B.Clarke	Kabra-beta	Rasna	A199743-PUH	Th	Mic	S	H	Gy
157.	<i>Pulicaria boissieri</i> Hook.f.	Unknown	Unknown	A199744-PUH	Th	Mic	S	H	D
158.	<i>Pulicaria vulgaris</i> Gaertn.	Zyarhu gul	False fleabane	A199745-PUH	Th	Na	Sp	H	M
159.	<i>Reichardia tingitana</i> (Linn.) Roth	Unknown	False sowthistle	A199746-PUH	G	Na	Dis	H	D
160.	<i>Silybum marianum</i> (Linn.) Gaertn.	Pas - Aghuzikai	Mary thistle	A199747-PUH	Th	Mes	Sp	H	M
161.	<i>Sonchus asper</i> (Linn.) Hill	Aghuzikai	Rough milk thistle	A199748-PUH	Th	Mic	Sp	H	M
162.	<i>Sonchus oleraceus</i> Linn.	Aghuzikai	Sow-thistle	A199749-PUH	Th	Mic	Sp	H	M
163.	<i>Symphotrichum subulatum</i> (Michx.) G.L.Nesom	Kso-beta	California aster	A199750-PUH	H	Mic	S	H	M
164.	<i>Tagetes minuta</i> Linn.	Ganda-gull	Southern Cone Marigold	A199751-PUH	Th	Na	Com	H	D
165.	<i>Taraxacum officinale</i> F.H.Wigg.	Tarekha	Dandelion	A199752-PUH	Th	Mic	S	H	M
166.	<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.f. ex A.Gray	Kurma -Gull	Cowpen daisy	A199753-PUH	Th	Mic	S	H	D
167.	<i>Xanthium spinosum</i> Linn.	Aghzikai	Spiny cocklebur	A199754-PUH	Th	Mic	S	H	D
168.	<i>Xanthium strumarium</i> Linn.	Katasora	Rough Cocklebur	A199755-PUH	Th	Mes	S	H	D
Bignoniaceae									
169.	<i>Tecomella undulata</i> (Sm.) Seem.	Zangli gull	Tecomella	A199756-PUH	Megp	Mic	S	T	D
Boraginaceae									
170.	<i>Arnebia guttata</i> subsp. <i>griffithii</i> (Boiss.) Sadat	Zeeiarh gull	Arnebia borage	A199757-PUH	Th	L	S	H	D
171.	<i>Cordia myxa</i> Linn.	Ghata Losurha	Lasura	A199758-PUH	Megp	Mes	S	T	Cu
172.	<i>Ehretia obtusifolia</i> Hochst. ex A.DC.	Ghatabotai	Lunsa	A199759-PUH	Np	Mic	S	T	D
173.	<i>Euploca strigosa</i> (Willd.) Diane & Hilger	Unknown	Heliotropes	A199763-PUH	Th	L	S	H	D
174.	<i>Heliotropium bacciferum</i> Forssk.	Ganda bota	Ghareir	A199760-PUH	Th	Mic	S	H	D
175.	<i>Heliotropium curassavicum</i> Linn.	Lashti bota	Salt heliotrope	A199761-PUH	Th	Mic	S	H	D
176.	<i>Heliotropium europaeum</i> Linn.	Unknown	European turn-sole	A199762-PUH	Th	Mic	S	H	D
177.	<i>Nonea caspica</i> (Willd.) G.Don	Unknown	Monkswort	A199764-PUH	Th	Mic	S	H	D
Brassicaceae									
178.	<i>Diplotaxis griffithii</i> (Hook.f. & Thomson) Boiss.	Woerii	Field mustard	A199765-PUH	Th	Mac	S	H	Af
179.	<i>Brassica deflexa</i> Boiss.	Ter –woerii	Mustard	A199766-PUH	Th	Mac	S	H	M
180.	<i>Coincya tournefortii</i> (Gouan) Alcaraz, T.E.Díaz, Rivas Mart. & Sánchez-Gómez	Woerii	Brown mustard	A199767-PUH	Th	Mic	S	H	M
181.	<i>Brassica rapa</i> Linn.	Tapar	turnip rape	A199768-PUH	Th	Mic	S	H	Af
182.	<i>Lepidium draba</i> Linn.	Bushta	Hoary cress	A199769-PUH	Th	Mic	S	H	M
183.	<i>Chorispora tenella</i> (Pall.) DC.	Unknown	Blue mustard	A199770-PUH	Th	Mic	S	H	D
184.	<i>Lepidium didymum</i> Linn.	Murghiyepal	Lesser swine cress	A199771-PUH	Th	Mic	Dis	H	M

185.	<i>Eruca sativa</i> Mill.	Shashum	Garden rocket	A199772-PUH	Th	Mic	S	H	M
186.	<i>Farsetia jacquemontii</i> Hook.f. & Thomson	Unknown	Farsetia	A199773-PUH	Np	L	S	H	D
187.	<i>Lepidium sativum</i> Linn.	Bushta	Garden cress	A199774-PUH	Th	Mic	S	H	M
188.	<i>Strigosella africana</i> (Linn.) Botsch.	Kurma-beta	African mustard	A199775-PUH	Th	Na	S	H	M
189.	<i>Nasturtium officinale</i> W.T.Aiton	Abay -beta	Watercress	A199776-PUH	G	Mic	Com	H	W
190.	<i>Raphanus raphanistrum</i> Linn.	Zangli - mileiay	Willd Radish	A199777-PUH	Th	Mes	Com	H	M
191.	<i>Raphanus sativus</i> Linn.	Mileiay	Radish	A199778-PUH	Th	Mes	Com	H	Af
192.	<i>Sisymbrium irio</i> Linn.	Woerii	London rocket	A199779-PUH	Th	Na	Dis	H	M
Cactaceae									
193.	<i>Opuntia monacanthos</i> (Willd.) Haw.	Thohar	Prickly pear	A199780-PUH	Np	Ap	Abs	S	D
Caesalpinioideae									
194.	<i>Senna occidentalis</i> (Linn.) Link	Unknown	Coffee Senna	A199781-PUH	Th	Mic	Com	S	D
195.	<i>Senna italica</i> Mill.	Unknown	Italian senna	A199782-PUH	Th	Mes	Com	H	D
Canabaceae									
196.	<i>Cannabis sativa</i> Linn.	Banga-beta	Marijuana	A199783-PUH	Th	Mic	Com	H	M
Capparidaceae									
197.	<i>Capparis decidua</i> (Forssk.) Edgew.	Krerhaa	Karira	A199784-PUH	Np	Ap	Abs	T	Gy
198.	<i>Cleome brachycarpa</i> Vahl ex DC.	Unknown	Rabran	A199785-PUH	Th	Mic	Com	H	D
199.	<i>Cleome viscosa</i> Linn.	Gari-gull	Tick weed	A199786-PUH	Th	Na	Com	H	D
Caryophyllaceae									
200.	<i>Herniaria hirsuta</i> Linn.	Unknown	Hairy rupturewort	A199787-PUH	Np	Ap	Sp	H	M
201.	<i>Silene conoidea</i> Linn.	Ser -gullai	Large sand catchfly	A199788-PUH	Th	Mic	S	H	D
202.	<i>Spergula arvensis</i> Linn.	Unknown	Corn spurry,	A199789-PUH	Th	Na	S	H	M
203.	<i>Stellaria media</i> (Linn.) Vill.	Speengullai	Chickweed	A199790-PUH	Th	Na	S	H	M
Convolvulaceae									
204.	<i>Convolvulus arvensis</i> Linn.	Parwathiye	Field bindweed	A199804-PUH	Th	Mes	S	C	D
205.	<i>Convolvulus prostratus</i> Forssk.	Parwathiye	Creeping jenny	A199805-PUH	Th	Na	S	H	D
206.	<i>Ipomoea carnea</i> subsp. <i>fistulosa</i> (Mart. ex Choisy) D.F.Austin	Darga -gull	Pink morning glory	A199806-PUH	Th	Mes	S	C	M
207.	<i>Distimake aegyptius</i> (Linn.) A.R.Simões & Staples	Parwathiye	Woodroses	A199807-PUH	Th	Mes	Com	C	M
Cucurbitaceae									
208.	<i>Citrullus colocynthis</i> (Linn.) Schrad.	Maraghunye	Bitter cucumber	A199808-PUH	Th	Mes	Dis	H	D
209.	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Khendwana	Watermelons	A199809-PUH	Th	Mic	Dis	H	D
210.	<i>Cucumis melo</i> subsp. <i>agrestis</i> (Naudin) Pangalo	Kurhkundai	Wild Melon	A199810-PUH	Th	Mes	S	C	D
211.	<i>Cucurbita maxima</i> Duchesne	Penta kado	Squash	A199811-PUH	Th	Mac	S	H	Af
212.	<i>Lagenaria siceraria</i> (Molina) Standl.	Shen kado	Calabash	A199812-PUH	Th	Mes	S	C	Af
213.	<i>Luffa acutangula</i> (Linn.) Roxb.	Babra -tori	Dish cloth gourd	A199813-PUH	Th	Mes	S	C	Af



214.	<i>Luffa cylindrica</i> (Linn.) Roem.	Tori	Egyptian luffa	A199815-PUH	Th	Mac	S	C	Af
215.	<i>Momordica charantia</i> Linn.	Karella	Bitter gourd	A199814-PUH	Th	Mes	Dis	C	Af
Cuscutaceae									
216.	<i>Cuscuta reflexa</i> Roxb.	Bera parvatkiy	Giant dodder	A199816-PUH	Th	Mic	Abs	C	Ep
Dipsacaceae									
217.	<i>Lomelosia olivieri</i> (Coul.) Greuter & Burdet	Post botay	Pincushion	A199817-PUH	H	Mes	S	H	D
Elaeagnaceae									
218.	<i>Elaeagnus angustifolia</i> Linn.	Kharwurha	Russian olive	A199818-PUH	Np	Mes	S	T	D
Euphorbiaceae									
219.	<i>Chrozophora plicata</i> (Vahl) A. Juss. ex Spreng.	Ganda-beta	Dyer's croton	A199820-PUH	Th	Mic	S	H	D
220.	<i>Croton bonplandianus</i> Baill.	Muchakaii	Croton	A199821-PUH	Th	Na	S	H	D
221.	<i>Euphorbia dracunculoides</i> Lam.	Unknown	Dragon spurge	A199825-PUH	Th	L	S	H	D
222.	<i>Euphorbia falcata</i> Linn.	Unknown	Sickle-leaved spurge	A199826-PUH	Th	L	S	H	D
223.	<i>Euphorbia granulata</i> Forssk.	Unknown	Unknown	A199827-PUH	Th	Na	S	H	D
224.	<i>Euphorbia helioscopia</i> Linn.	Purporai	Sun spurge	A199822-PUH	Th	Na	S	H	M
225.	<i>Euphorbia heterophylla</i> Linn.	Unknown	Dwarf poinsettia	A199824-PUH	Th	Mes	S	S	M
226.	<i>Euphorbia hirta</i> Linn.	Ser-beta	Asthma-plant	A199823-PUH	Th	Na	S	H	M
227.	<i>Euphorbia hypericifolia</i> Linn.	Perpurai	Indian spurge	A199828-PUH	Th	Na	S	H	D
228.	<i>Euphorbia prostrata</i> Ait.	Piye-beta	Prostrate spurge	A199829-PUH	Th	L	S	H	M
229.	<i>Jatropha curcas</i> Linn.	Jatropha	English-physic	A199830-PUH	Np	Mac	S	S	D
230.	<i>Leptopus cordifolius</i> Decne.	Unknown	Unknown	A199819-PUH	Np	Mic	S	H	D
231.	<i>Ricinus communis</i> Linn.	Rund	Castor bean	A199831-PUH	Np	Mac	S	T	D
Fabaceae									
232.	<i>Alhagi maurorum</i> Medik.	Thundoon	Camelthorn	A199832-PUH	H	L	S	H	D
233.	<i>Arachis hypogaea</i> Linn.	Mongpali	Groundnut	A199833-PUH	Ch	Mes	Com	H	D
234.	<i>Argyrolobium roseum</i> (Cambess.) Jaub. & Spach	Makhni Boti	Unknown	A199834-PUH	H	Na	Com	H	D
235.	<i>Astragalus ophiocarpus</i> Benth. ex Bunge	Unknown	European milkvetch	A199835-PUH	H	Na	Com	H	D
236.	<i>Astragalus psilocentros</i> Fisch.	Unknown	Locoweed	A199836-PUH	Np	Na	Com	S	D
237.	<i>Astragalus scorpiurus</i> Bunge	Unknown	Pakistani milkvetch	A199837-PUH	H	Na	Com	H	D
238.	<i>Astragalus tribuloides</i> Delile.	Unknown	Milkvetch	A199838-PUH	H	Na	Com	H	D
239.	<i>Caragana brevispina</i> Benth.	Unknown	Long-Stalked Pea-S	A199839-PUH	Np	L	Com	S	M
240.	<i>Dalbergia sissoo</i> Roxb. ex DC.	Shuwa	North Indian rosewood,	A199840-PUH	Megp	Mes	Com	T	Cu
241.	<i>Indigofera heterantha</i> Wall. ex Brandis	Unkown	Himalayan indigo	A199841-PUH	Np	L	Com	S	M
242.	<i>Lathyrus aphaca</i> Linn.	Jungli matar	Yellow pea	A199842-PUH	Th	Mic	Com	H	M
243.	<i>Lathyrus odoratus</i> Linn.	Matar	Sweet Pea	A199843-PUH	Th	Mic	Com	H	M
244.	<i>Leobordea platycarpa</i> (Viv.) B.-E. van Wyk & Boatwr.	Unkown	Lotononis	A199845-PUH	Th	Mic	Com	H	D

245.	<i>Lespedeza cuneata</i> var. <i>cuneata</i> (Dum.Cours.) G.Don	Unkown	Unkown	A199844-PUH	Ch	Mic	Com	H	D
246.	<i>Lotus corniculatus</i> Linn.	Mattarai	Common vetch	A199863-PUH	Th	Na	Com	H	M
247.	<i>Medicago laciniata</i> (Linn.) Mill.	Malkindiye	Cutleaf medick	A199846-PUH	Th	Na	Com	H	D
248.	<i>Medicago lupulina</i> Linn.	Malkindiye	Black medick	A199847-PUH	Th	Na	Com	H	D
249.	<i>Medicago monantha</i> (C.A.Mey.) Trautv.	Unknown	Wild Fenugreek	A199860-PUH	H	Na	Com	H	D
250.	<i>Medicago sativa</i> Linn.	Malkindiye	Alfalfa	A199848-PUH	Th	Na	Com	H	W
251.	<i>Melilotus albus</i> Medik.	Shunzai	Honey clover	A199849-PUH	Th	Na	Com	H	M
252.	<i>Melilotus indicus</i> (Linn.) All.	Shunzai	Sweet clover	A199850-PUH	Th	Na	Com	H	M
253.	<i>Onobrychis stewartii</i> Baker	Unknown	Unknown	A199851-PUH	G	Na	Com	H	D
254.	<i>Phaseolus vulgaris</i> Linn.	Mung	Green bean	A199852-PUH	Ch	Mes	Com	H	M
255.	<i>Pisum sativum</i> Linn.	Mattar	Pea	A199853-PUH	Th	Na	Com	H	Af
256.	<i>Pongamia pinnata</i> (Linn.) Pierre	karajata	Pongam oilT	A199854-PUH	Megp	Mes	Com	T	Cu
257.	<i>Sesbania sesban</i> (Linn.) Merr.	Jatoon	Sesban	A199855-PUH	Th	Na	Com	T	D
258.	<i>Taverniera cuneifolia</i> (Roth) Arn.	Warha shuwa	Taverniera	A199856-PUH	Th	Na	Com	S	D
259.	<i>Trifolium alexandrinum</i> Linn.	Angrazi-Shfthala	Egyptian clover	A199857-PUH	Th	Na	Com	H	Af
260.	<i>Trifolium repens</i> Linn.	Bannuwulashafthala	White clover	A199858-PUH	Th	Na	Com	H	D
261.	<i>Trigonella foenum-graecum</i> Linn.	Shambrhitha	Fenugreek	A199859-PUH	Th	Na	Com	H	Af
262.	<i>Vicia hirsuta</i> (Linn.) S.F.Gray	Mattarai	Hairy tare	A199861-PUH	Th	Na	Com	H	M
263.	<i>Vicia monantha</i> Retz.	Matarai	Hard Vetch	A199862-PUH	Th	L	Com	C	M
Fumariaceae									
264.	<i>Fumaria indica</i> (Hausskn.) Pugsley	Sewa	Fumewort	A199864-PUH	Th	Na	Dis	H	M
265.	<i>Hypecoum pendulum</i> Linn.	Unknown	Nodding hypecoum	A199865-PUH	Th	Na	Dis	H	D
Gentianaceae									
266.	<i>Centaurium pulchellum</i> (Sw.) Hayek ex Hand.-Mazz., Stadlm., Janch. & Faltis	Unknown	Lesser centaury	A199866-PUH	Th	L	Dis	H	D
Geraniaceae									
267.	<i>Erodium cicutarium</i> (Linn.) L'Hér.	Unknown	Stork's	A199867-PUH	Th	L	Com	H	D
268.	<i>Erodium malacoides</i> (Linn.) L'Hér.	Unknown	Soft stork's-bill	A199868-PUH	Th	L	S	H	D
269.	<i>Geranium ocellatum</i> Jacquem. ex Cambess.	Unknown	Black Eyed Geranium	A199869-PUH	Th	Mic	Dis	H	D
Lamiaceae									
270.	<i>Mentha longifolia</i> (Linn.) Linn.	Valina	Horse mint	A199871-PUH	G	Na	S	H	M
271.	<i>Mentha royleana</i> Wall. ex Benth.	Podina	Royle's mint	A199872-PUH	G	Na	S	H	M
272.	<i>Mentha spicata</i> Linn.	Podina	Spearmint	A199870-PUH	G	Na	S	H	M
273.	<i>Ocimum basilicum</i> Linn.	Bobarai	Sweet basil	A199873-PUH	Ch	Na	S	H	Gy
274.	<i>Ocimum tenuiflorum</i> Linn.	Lauvang bobarai	Holy basil	A199874-PUH	Ch	Na	S	H	Gy
275.	<i>Salvia aegyptiaca</i> Linn.	Zangli-tukhmalang	Egyptian sage	A199875-PUH	H	Mes	S	H	D



276.	<i>Salvia moorcroftiana</i> Wall. ex Benth.	Khushbo- beta	Kashmir Salvia	A199876- PUH	Th	Na	S	H	D
277.	<i>Salvia nubicola</i> Wall. ex Sweet	Unkonwn	Himalayan Yellow Sage	A199877- PUH	Th	Mes	S	H	D
278.	<i>Scutellaria linearis</i> Benth.	Unkonwn	Narrow-Leaved Skullcap	A199878- PUH	Th	Mic	S	H	D
279.	<i>Thymus linearis</i> var. <i>linearis</i> Benth.	Khushbo- beta	Himalayan Thyme	A199879- PUH	H	L	S	H	M
Linaceae									
280.	<i>Linum corymbulosum</i> Rchb.	Unkonwn	Unkonwn	A199880- PUH	Th	L	S	H	D
Lythraceae									
281.	<i>Ammannia auriculata</i> Willd.	Unkonwn	Eared redstem	A199881- PUH	Th	Mic	S	H	M
Malvaceae									
282.	<i>Abelmoschus esculentus</i> (Linn.) Moench.	Bhindi	Lady finger	A199882- PUH	Th	Mes	Sp	H	Af
283.	<i>Abutilon indicum</i> (Linn.) Sweet	Koso beta	Indian mallow	A199883- PUH	Th	Mes	S	H	Gy
284.	<i>Hibiscus cannabinus</i> Linn.	Sunrhu	Kenaf	A199884- PUH	Th	Mes	Dis	H	Af
285.	<i>Hibiscus trionum</i> Linn.	Unknown	Bladder weed	A199885- PUH	Th	Mes	Sp	H	M
286.	<i>Malva neglecta</i> Wallr.	Pathway	Common mallow	A199886- PUH	Th	Mes	S	H	M
287.	<i>Malva parviflora</i> Linn.	Pathway	Cheeseweed	A199887- PUH	Th	Mic	S	H	M
288.	<i>Malvastrum</i> <i>coromandelianum</i> (Linn.) Garcke	Koso-beta	Prickly malvastrum	A199888- PUH	Th	Na	S	H	D
289.	<i>Sida cordifolia</i> Linn.	Khoso –beta	Country mallow	A199889- PUH	Th	Mic	S	H	Gy
Meliaceae									
290.	<i>Azadirachta indica</i> A.Juss.	Angrazi Bakarha	Neem	A199890- PUH	Megp	Na	Com	T	I
291.	<i>Melia azedarach</i> Linn.	Bakarha	China berry T	A199891- PUH	Megp	Na	Com	T	Cu
Menispermaceae									
292.	<i>Cebatha pendula</i> (J.R.Forst. & G.Forst.) Kuntze	Unknown	Unknown	A199892- PUH	Th	Na	S	S	D
293.	<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Purvutye	Heart-leaved moonseed	A199893- PUH	Np	Mes	S	C	Cu
Mimosaceae									
294.	<i>Albizia lebeck</i> (Linn.) Benth.	Srin	Lebeck T	A199896- PUH	Megp	L	Com	T	D
295.	<i>Leucaena leucocephala</i> (Lam.) de Wit	Spin srin	River tamarind	A199897- PUH	Megp	L	Com	T	M
296.	<i>Neltuma glandulosa</i> (Torr.) Britton & Rose	Kikar	Screw-bean	A199898- PUH	Np	L	Com	S	D
297.	<i>Neltuma juliflora</i> (Sw.) Raf.	Kikar	Aippia	A199899- PUH	Np	L	Com	S	D
298.	<i>Senegalia modesta</i> (Wall.) P.J.H.Hurter	Palosa	Phulai	A199894- PUH	Megp	L	Com	T	D
299.	<i>Vachellia nilotica</i> (Linn.) P.J.H.Hurter & Mabb.	Ter-Kikar	Thorn mimosa	A199895- PUH	Megp	L	Com	T	D
Moraceae									
300.	<i>Broussonetia papyrifera</i> (Linn.) L'Hér. ex Vent.	Gull-toot	Paper mulberry	A199900- PUH	Megp	Mes	S	T	Cu
301.	<i>Ficus benghalensis</i> Linn.	Burh	Banyan	A199901- PUH	Megp	Mes	S	T	Cu
302.	<i>Ficus carica</i> Linn.	Toghu	Fig	A199902- PUH	Megp	Mes	S	S	Cu
303.	<i>Ficus palmata</i> Forssk.	Zangli toghu	Punjab fig	A199903- PUH	Megp	Mes	S	T	M
304.	<i>Ficus religiosa</i> Linn.	Pipal	Peepul T	A199904- PUH	Megp	Mes	S	T	Cu
305.	<i>Morus alba</i> Linn.	Spin –tot	White Mulberry	A199905- PUH	Megp	Mes	S	T	Cu

306.	<i>Morus macroura</i> Miq.	Shahtut	Mulberry	A199906-PUH	Megp	Mes	S	T	Cu
307.	<i>Morus nigra</i> Linn.	Ter-tot	Black Mulberry	A199907-PUH	Megp	Mes	S	T	Cu
Morinaceae									
308.	<i>Morina persica</i> Linn.	Aghzay-beta	Persisk Morina	A199908-PUH	Th	Na	Sp	H	D
Myrtaceae									
309.	<i>Corymbia torelliana</i> (F.Muell.) K.D.Hill & L.A.S.Johnson	Speen lochai	Cadaghi	A199909-PUH	Megp	Mic	S	T	I
310.	<i>Eucalyptus camaldulensis</i> Dehnh.	Speen Lochai	River red gum	A199910-PUH	Megp	Mic	S	T	F
311.	<i>Eucalyptus globulus</i> Labill.	Ghat-lochai	Tasmanian bluegum	A199911-PUH	Megp	Mic	S	T	F
312.	<i>Melaleuca citrina</i> (Curtis) Dum.Cours.	Botle-brush gull	Red Bottle Brush	A199912-PUH	Np	Mic	S	T	Cu
313.	<i>Psidium guajava</i> Linn.	Amrod	Common guava	A199913-PUH	Np	Mes	S	T	Cu
314.	<i>Syzygium cumini</i> (Linn.) Skeels.	Jamoon	Jambolan	A199914-PUH	Megp	Mes	S	T	Cu
Neuradaceae									
315.	<i>Neurada procumbens</i> Linn.	Aghuzikna-maraghunye	Sand button	A199915-PUH	Th	Mes	Dis	H	D
Nyctaginaceae									
316.	<i>Boerhavia procumbens</i> Banks ex. Roxb.	Padrawash	Punarnava	A199916-PUH	Th	Na	S	H	D
317.	<i>Bougainvillea glabra</i> Choisy	Aezi perwathiey	Paperflower	A199917-PUH	Np	Mic	S	C	Cu
318.	<i>Bougainvillea spectabilis</i> Willd.	Perwathiey	Great bougainvillea	A199918-PUH	Np	Mic	S	C	Cu
Oleaceae									
319.	<i>Chrysojasminum humile</i> (Linn.) Banfi	Ziarh Rambell	Yellow jasmine	A199919-PUH	Np	Mic	Com	S	D
320.	<i>Jasminum officinale</i> Linn.	Spin rambell	Summer jasmine	A199920-PUH	Np	Mic	Com	S	M
321.	<i>Jasminum sambac</i> (Linn.) Aiton	Rambell	Sambac jasmine	A199921-PUH	Np	Mes	S	S	D
Onagraceae									
322.	<i>Ludwigia perennis</i> Linn.	Unknown	Perennial Water Primrose	A199922-PUH	Th	Mic	S	H	D
323.	<i>Oenothera rosea</i> L'Hér. ex Aiton	Surh gulai	Rose evening primrose	A199923-PUH	H	Mic	S	H	D
Orobanchaceae									
324.	<i>Cistanche tubulosa</i> (Schenk) Wight ex Hook.f.	Khar ghurh-beta	Desert Hyacinth	A199924-PUH	H	Ap	Abs	H	D
Oxalidaceae									
325.	<i>Oxalis corniculata</i> Linn.	Terwa-marhiyee	Creeping woodsorrel	A199925-PUH	Th	Na	Com	H	M
326.	<i>Oxalis pes-caprae</i> Linn.	Terwa-marhiyee	Bermuda sorrel	A199926-PUH	Th	Na	Com	H	M
Papaveraceae									
327.	<i>Argemone mexicana</i> Linn.	Aghuzai	Mexican poppy	A199927-PUH	Th	Mes	Sp	H	D
328.	<i>Papaver somniferum</i> Linn.	Afun-doda	Opium poppy	A199928-PUH	Th	Mes	S	H	Cu
Phyllanthaceae									
329.	<i>Bischofia javanica</i> Blume	Unknown	Bishop wood	A199929-PUH	Megp	Mes	Com	T	I
Plantaginaceae									
330.	<i>Phyla nodiflora</i> (Linn.) Greene	Unknown	Sawtooth fogfruit	A199930-PUH	Th	Mic	S	H	M
331.	<i>Plantago amplexicaulis</i> subsp. <i>bauphula</i> (Edgew.) Rech.f.	Unknown	Ispaghula	A199931-PUH	Th	Na	S	H	D
332.	<i>Plantago ciliata</i> Desf.	Unknown	Ripsiratamo	A199932-PUH	Th	Na	S	H	D



333.	<i>Plantago lanceolata</i> Linn.	Kura-kat	Ribwort plantain	A199933-PUH	Th	Na	S	H	M
334.	<i>Plantago major</i> Linn.	Aba-beta	Broadleaf plantain	A199934-PUH	Th	Mes	S	H	M
335.	<i>Plantago ovata</i> Forssk.	Ispaghool	Desert Indianwheat	A199935-PUH	Th	Na	S	H	D
Polygalaceae									
336.	<i>Polygala sibirica</i> Linn.	Unknown	Ethiopian Milkwort	A199936-PUH	Ch	Na	S	H	D
Polygonaceae									
337.	<i>Calligonum polygonoides</i> Linn.	Unknown	Phog	A199937-PUH	Np	Ap	Abs	S	D
338.	<i>Oxyria digyna</i> (Linn.) Hill	Kurma torvika	Alpine sorrel	A199939-PUH	Ch	L	S	H	M
339.	<i>Persicaria hydropiper</i> (Linn.) Delarbre	Abay-beta	Denseflower knotweed	A199940-PUH	Ch	Mic	S	H	M
340.	<i>Polygonum afghanicum</i> Meisn.	Unknown	Joint Weed	A199943-PUH	Ch	Mic	S	H	M
341.	<i>Polygonum aviculare</i> Linn.	Kso -beta	Common knotgrass	A199941-PUH	Th	L	S	H	M
342.	<i>Polygonum biaristatum</i> Aitch. & Hemsl.	Unknown	Knotweed	A199942-PUH	Ch	Na	S	H	M
343.	<i>Polygonum paronychioides</i> C.A.Mey.	Unknown	Fuzzy Knotweed	A199944-PUH	Th	Na	S	H	M
344.	<i>Polygonum plebeium</i> R.Br.	Unknown	Spotted ladythumb	A199945-PUH	Th	Na	S	H	M
345.	<i>Rumex dentatus</i> Linn.	Torvika	Toothed dock	A199946-PUH	Ch	Na	S	H	M
346.	<i>Rumex hastatus</i> D. Don	Zangli torvika	Aegean dock	A199947-PUH	Ch	Mes	S	H	D
347.	<i>Rumex nepalensis</i> Spreng.	Torvika	Nepal dock	A199948-PUH	Ch	Mes	S	H	M
348.	<i>Rumex spinosus</i> Linn.	Sobehu	Doublegee	A199938-PUH	Th	Mic	S	H	M
349.	<i>Rumex vesicarius</i> Linn.	Thuvika	Israel flower	A199949-PUH	Ch	Na	S	H	D
Portulacaceae									
350.	<i>Portulaca oleracea</i> Linn.	Woorkhorha	Hogweed	A199950-PUH	Th	Na	S	H	D
Primulaceae									
351.	<i>Lysimachia arvensis</i> (Linn.) U.Manns & Anderb.	Shafthawla shupzhoki	Scarlet pimpernel	A199951-PUH	Th	Na	S	H	M
Punicaceae									
352.	<i>Punica granatum</i> Linn.	Olung	Pome granate	A199952-PUH	Micp	Mic	S	S	Cu
Ranunculaceae									
353.	<i>Ranunculus arvensis</i> Linn.	Shafthala-wal-Ziarhi-gull	Corn buttercup	A199953-PUH	G	Na	Dis	H	M
354.	<i>Ranunculus muricatus</i> Linn.	Ziarhi-gull	Spinyfruit buttercup	A199954-PUH	G	Na	Dis	H	M
355.	<i>Ranunculus sceleratus</i> Linn.	Abay-Ziarhi-gull	Cursed buttercup	A199955-PUH	G	Na	Dis	H	M
Resedaceae									
356.	<i>Oligomeris linifolia</i> (Vahl ex Hornem.) J.F.Macbr.	Kso-beta	Whitepuff.	A199956-PUH	Th	Na	S	H	D
357.	<i>Reseda luteola</i> Linn.	Unknown	Dyer's weed	A199957-PUH	Th	Na	S	H	D
Rhamnaceae									
358.	<i>Ziziphus mauritiana</i> Lam.	Kurkurha-Bera	Jharber	A199959-PUH	Micp	Na	S	T	D
359.	<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Bera	Indian jujube	A199958-PUH	Micp	Na	S	T	D
Rosaceae									
360.	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Lokat	Loquat fruit	A199960-PUH	Micp	Mes	S	T	Cu
361.	<i>Malus domestica</i> (Suckow) Borkh.	Marha	Apple	A199961-PUH	Micp	Mes	S	T	Cu

362.	<i>Potentilla supina</i> Linn.	Unknown	Potentilla	A199962-PUH	H	Na	Com	T	M
363.	<i>Prunus amygdalus</i> Batsch.	Badom	Almond	A199964-PUH	Micp	Mes	S	T	Cu
364.	<i>Prunus armeniaca</i> Linn.	Mandotha	Apricot	A199965-PUH	Micp	Mes	S	T	Cu
365.	<i>Prunus domestica</i> Linn.	Alocha	European plum	A199963-PUH	Micp	Mes	S	T	Cu
366.	<i>Prunus persica</i> (Linn.)Batsch	Shafthalu	Peach	A199966-PUH	Micp	Mic	S	T	Cu
367.	<i>Pyrus communis</i> Linn.	Nashpathi	Pear	A199967-PUH	Micp	Mes	S	T	Cu
368.	<i>Rosa banksiae</i> W. T. Aiton	Spanger	Japanese rose	A199970-PUH	Np	Na	Com	S	Cu
369.	<i>Rosa brunonii</i> Lindl.	Spin- gulab	White rose	A199968-PUH	Np	Na	Com	S	M
370.	<i>Rosa ecae</i> Aitch.	Gulab	Rose	A199969-PUH	Np	Na	Com	S	M
Rubiaceae									
371.	<i>Galium aparine</i> Linn.	Shahavina	Catchweed	A199971-PUH	Th	Na	S	H	M
372.	<i>Galium tricornutum</i> Dandy	Shahavina	Corn cleavers.	A199972-PUH	Th	Na	S	H	D
Rutaceae									
373.	<i>Skimmia laureola</i> (DC.) Decne.	Nazar Panra	Skimmia	A199973-PUH	Np	Mic	S	T	Cu
Salicaceae									
374.	<i>Populus nigra</i> Linn.	Nashthar	Charab poplar	A199974-PUH	Mesp	Mes	S	T	Cu
375.	<i>Salix babylonica</i> Linn.	Wala	Weeping willow	A199975-PUH	Mesp	Mes	S	T	M
376.	<i>Salix tetrasperma</i> Roxb.	Wala	Indian willow	A199976-PUH	Mesp	Mic	S	T	M
Salvadoraceae									
377.	<i>Salvadora oleoides</i> Decne.	Palimo	Bada peelu	A199977-PUH	Mesp	Mic	S	T	Gy
Sapindaceae									
378.	<i>Dodonaea viscosa</i> Jacq.	Sanatha	Giant hopbush	A199978-PUH	Np	Na	S	S	D
Sapotaceae									
379.	<i>Sideroxylon mascatense</i> (A.DC.) T.D.Penn.	Gurgura	Gargole	A199979-PUH	Micp	Mic	S	S	D
Scrophulariaceae									
380.	<i>Bacopa monnieri</i> (Linn.) Pennell.	Abay-beta	Waterhyssop	A199980-PUH	Hydro	L	S	H	W
381.	<i>Nanorrhinum ramosissimum</i> (Wall.) Betsche	Kso-beta	Cancerworts	A199981-PUH	Th	Mes	S	H	D
382.	<i>Schweinfurthia papilionacea</i> (Linn.) Boiss.	Kso-beta	Unknown	A199982-PUH	H	Na	S	H	D
383.	<i>Scrophularia striata</i> Boiss.	Unknown	Figwort	A199983-PUH	Th	Na	S	H	D
384.	<i>Verbascum thapsus</i> Linn.	Unknown	Common mullein	A199984-PUH	Th	Mes	S	H	D
385.	<i>Veronica anagallis-aquatica</i> Linn.	Khwar	Water speedwell	A199985-PUH	Th	Na	S	H	W
386.	<i>Veronica arvensis</i> Linn.	Kso-beta	Wall speedwell	A199986-PUH	Th	Na	S	H	D
387.	<i>Veronica biloba</i> Schreb. ex Linn.	Shupozhoki	Two-lobed speedwell	A199987-PUH	Th	Na	S	H	M
Simaroubaceae									
388.	<i>Ailanthus altissima</i> (Mill.) Swingle	Angrazi barana	T of heaven	A199988-PUH	Megp	Mic	Comp	T	I
Solanaceae									
389.	<i>Capsicum frutescens</i> Linn.	Marchakii	Tabasco pepper	A199989-PUH	Np	Mic	S	H	Cu
390.	<i>Cestrum nocturnum</i> Linn.	Rat-k – rani	Night-blooming jasmine	A199990-PUH	Th	Mic	S	S	Cu



391.	<i>Datura innoxia</i> Mill.	Barhbaka	Devil's trumpet	A199991-PUH	Th	Mes	S	H	D
392.	<i>Datura stramonium</i> Linn.	Barhbaka	Jimsonweed	A199992-PUH	Th	Mes	Dis	H	D
393.	<i>Hyoscyamus insanus</i> Stocks	Khurasani	Black henbane	A199993-PUH	Th	Mes	Dis	H	M
394.	<i>Solanum lycopersicum</i> Linn.	Tamatar	Tomato	A199994-PUH	Th	Na	Dis	H	Cu
395.	<i>Lycium ruthenicum</i> Murray	Unknown	Unknown	A199995-PUH	Np	Mic	S	S	D
396.	<i>Nicotiana plumbaginifolia</i> Viv.	Lawanii tamakai	Tex-Mex tobacco	A199996-PUH	Th	Mac	S	H	M
397.	<i>Nicotiana tabacum</i> Linn.	Tammakai	Tobacco	A199997-PUH	Th	Mac	S	H	Cu
398.	<i>Physalis halicacabum</i> Crantz	Kothilala	Cape gooseberry	A199998-PUH	Th	Mic	S	H	M
399.	<i>Solanum cordatum</i> Forssk.	Unknown	Unknown	A199999-PUH	Th	Mic	S	H	D
400.	<i>Solanum elaeagnifolium</i> Cav.	Kso beta	Silverleaf nightshade	A200000-PUH	Th	Mic	S	H	D
401.	<i>Solanum incanum</i> Linn.	Unknown	Bitter tomato	A200001-PUH	Th	Mes	Sp	H	D
402.	<i>Solanum melongena</i> Linn.	Bengarh	Egg plant	A200002-PUH	Th	Mes	S	H	Cu
403.	<i>Solanum nigrum</i> Linn.	Kun-se-bai	Nightshade	A200004-PUH	Th	Mic	S	H	Gy
404.	<i>Solanum rostratum</i> Dunal	Aghuzai	Buffalo bur	A200005-PUH	Th	Mes	Sp	H	D
405.	<i>Solanum virginianum</i> Linn.	Wara-mara-ghinrhye	Yellow-fruit nightshade	A200006-PUH	Th	Mic	Sp	H	D
406.	<i>Solanum tuberosum</i> Linn.	Alug	Potato	A200007-PUH	Th	Mes	S	H	Cu
407.	<i>Withania coagulans</i> (Stocks) Dunal	Shapyanga	Ashwagandha	A200008-PUH	Ch	Mic	S	S	D
408.	<i>Withania somnifera</i> (Linn.) Dunal	Kothilal	Rennet	A200009-PUH	Ch	Mac	S	S	D
Tamaricaceae									
409.	<i>Tamarix aphylla</i> (Linn.) H.Karst.	Ghat-Ghaz	Athel pine	A200010-PUH	Megp	L	S	T	Gy
410.	<i>Tamarix dioica</i> Roxb. ex Roth	Warhika-ghaz	Khagal	A200011-PUH	Megp	L	S	T	D
Thymelaeaceae									
411.	<i>Thymelaea passerina</i> (Linn.) Coss. & Germ.	Unknown	Spurge flax.	A200012-PUH	Th	Na	S	H	Gy
Tiliaceae									
412.	<i>Corchorus depressus</i> (Linn.) Peterm.	Koso -beta	Mudhiri	A200013-PUH	Th	Mic	S	H	M
Urticaceae									
413.	<i>Forsskaolea tenacissima</i> Linn.	Zahrila-beta	Forskaolea	A200014-PUH	H	Na	Sp	H	D
414.	<i>Urtica pilulifera</i> Linn.	Sezunkai	Common nettle	A200015-PUH	Th	Mic	Sp	H	M
Verbenaceae									
415.	<i>Lantana camara</i> Linn.	Unknown	Spanish flag	A200016-PUH	Np	Mes	Sp	S	D
416.	<i>Verbena officinalis</i> Linn.	Kso-beta	Common verbena	A200017-PUH	Th	Mic	Dis	H	M
417.	<i>Vitex negundo</i> Linn.	Marmandiye	Chinese chasteT	A200018-PUH	Np	Mic	Com	S	D
Violaceae									
418.	<i>Viola canescens</i> Wall.	Unknown	Himalayan White Violet	A200019-PUH	G	Mic	S	H	M
419.	<i>Viola stocksii</i> Boiss.	Banafsa	Zinko Banapsha	A200020-PUH	Th	Na	S	H	D
Vitaceae									
420.	<i>Vitis vinifera</i> Linn.	Angoor	Grapes	A200021-PUH	Np	Mes	S	L*	Cu
Zygophyllaceae									
421.	<i>Peganum harmala</i> Linn.	Spelanii	Harmel	A200023-PUH	H	L	S	H	D
422.	<i>Tetradiclis tenella</i> (Ehrenb.) Litv.	Unknown	Unknown	A200024-PUH	Th	L	S	H	D
423.	<i>Tribulus pentandrus</i> Forssk.	Sehray azhzay	Unknown	A200025-PUH	Th	L	Com	H	D
424.	<i>Tribulus terrestris</i> Linn.	Markundai	Puncture vine	A200026-PUH	Th	L	Com	H	D
425.	<i>Zygophyllum indicum</i> (Burm.f.) Christenh. & Byng	Spalaghzai	Fagonbushes	A200022-PUH	Th	Na	Sp	H	D

Table 2. Showing the percentage of different groups.

S. No	Family	No. Species	Percentage	S. No	Family
Taxonomic group	No of species	%age	Taxonomic distribution	Number	%age
Dicotyledonous flora	342	80.47%	Dicotyledonous family	70	78.65%
Monocotyledonous flora	83	19.52%	Monocotyledonous family	19	21.35%
Total	425	100%	-	89	100%

Table 3. Family-wise distribution of flora occurring at the River Kurram.

S. No	Family	No. species	Percentage	S. No	Family	No. species	Percentage
1	Poaceae	42	9.88%	46	Onagraceae	2	0.47%
2	Asteraceae	37	8.70%	47	Oxalidaceae	2	0.47%
3	Fabaceae	32	7.52%	48	Papaveraceae	2	0.47%
4	Amaranthaceae	23	5.41%	49	Resedaceae	2	0.47%
5	Solanaceae	20	4.70%	50	Rhamnaceae	2	0.47%
6	Brassicaceae	15	3.52%	51	Rubiaceae	2	0.47%
7	Euphorbiaceae	13	3.05%	52	Tamaricaceae	2	0.47%
8	Polygonaceae	13	3.05%	53	Urticaceae	2	0.47%
9	Apiaceae	12	2.82%	54	Violaceae	2	0.47%
10	Cyperaceae	11	2.58%	55	Asparagaceae	1	0.23%
11	Rosaceae	11	2.58%	56	Asphodelaceae	1	0.23%
12	Lamiaceae	10	2.35%	57	Canaceae	1	0.23%
13	Apocyanaceae	8	1.88%	58	Cactaceae	1	0.23%
14	Boraginaceae	8	1.88%	59	Ceratophyllaceae	1	0.23%
15	Cucurbitaceae	8	1.88%	60	Lemnaceae	1	0.23%
16	Malvaceae	8	1.88%	61	Musaceae	1	0.23%
17	Moraceae	8	1.88%	62	Orchidaceae	1	0.23%
18	Scrophulariaceae	8	1.88%	63	Aizoaceae	1	0.23%
19	Mimosaceae	6	1.41%	64	Anacardiaceae	1	0.23%
20	Myrtaceae	6	1.41%	65	Bignoniaceae	1	0.23%
21	Plantaginaceae	6	1.41%	66	Canabaceae	1	0.23%
22	Zygophyllaceae	5	1.17%	67	Cuscutaceae	1	0.23%
23	Arecaceae	4	0.94%	68	Dipsacaceae	1	0.23%
24	Juncaceae	4	0.94%	69	Elaeagnaceae	1	0.23%
25	Caryophyllaceae	4	0.94%	70	Gentianaceae	1	0.23%
26	Convolvulaceae	4	0.94%	71	Linaceae	1	0.23%
27	Acanthaceae	3	0.70%	72	Lythraceae	1	0.23%
28	Capparidaceae	3	0.70%	73	Morinaceae	1	0.23%
29	Geraniaceae	3	0.70%	74	Neuradaceae	1	0.23%
30	Nyctaginaceae	3	0.70%	75	Orobanchaceae	1	0.23%
31	Oleaceae	3	0.70%	76	Phyllanthaceae	1	0.23%
32	Ranunculaceae	3	0.70%	77	Polygalaceae	1	0.23%
33	Salicaceae	3	0.70%	78	Portulacaceae	1	0.23%
34	Verbenaceae	3	0.70%	79	Primulaceae	1	0.23%
35	Alismataceae	2	0.47%	80	Punicaceae	1	0.23%
36	Alliaceae	2	0.47%	81	Rutaceae	1	0.23%
37	Araceae	2	0.47%	82	Salvadoraceae	1	0.23%
38	Hydrocharitaceae	2	0.47%	83	Sapindaceae	1	0.23%
39	Iridaceae	2	0.47%	84	Sapotaceae	1	0.23%
40	Potamogetonaceae	2	0.47%	85	Simaroubaceae	1	0.23%
41	Typhaceae	2	0.47%	86	Thymelaeaceae	1	0.23%
42	Caesalpinioideae	2	0.47%	87	Tiliaceae	1	0.23%
43	Fumariaceae	2	0.47%	88	Vitaceae	1	0.23%
44	Meliaceae	2	0.47%	89	Zingiberaceae	1	0.23%
45	Menispermaceae	2	0.47%				

According to Dar et al., (2018), many factors like bridges, road and building construction, browsing, overgrazing, trampling, land sliding and soil erosion lead to ecological problems in the degradation of land as well as vegetation and also decrease agriculture productivity. Vegetation coverage plays a key role in the protection and recovery rate assessment of land sliding and soil erosion (Lin et al., 2006). Therefore our findings agree with Hussain et al., (2016) in assessing angiosperm diversity from Rawalakot district, Azad and Jammu Kashmir here which 381 species belong to 78 families whereas; Asteraceae is dominant with 38 species followed by Poaceae comprising with 37 species. Similarly, some semi-aquatic angiosperm was investigated from the marshland areas of the Dera-Ismael Khan district, here Cyperaceae 16 (40%) was the leading family followed by Poaceae 6 (15%) species (Marwat et al., 2013). An extensive field study was conducted on Astore Valley, Gilgit-Baltistan from which 558 species of angiosperm were investigated here Asteraceae comprising with 95 species, Brassicaceae 40 and Papilionaceae with 30 species these are the leading families among



the investigated dicotyledonous families (Noor et al., 2020). Khatun et al., (2022) studied a total 194 species of angiosperm belong 72 families from Puthia Upazila, district Rajshahi, Bangladesh, here amaranthaceae, asteraceae and apocyanaceae were the dominant families. Haque et al., (2018) reported 549 angiosperms belong to 123 families of which 316 species of dicotyledonous followed by monocotyledonous flora comprising 132 species from Rajkandi Reserve Forest of Moulvibazar. Rahman and Jamila (2016) who investigated 151 angiospermic species from Jamtala village in Nawabganj district, Bangladesh, in which Amaranthaceae, Acanthaceae, Asteraceae were the leading families among the annotated checklist. Ara et al., (2021) who was document 210 angiosperm from Chaar Khidirpur, Rajshahi district, Bangladesh, it belonging to 177 genera and 71 families. Rahman (2021) assessed 223 angiosperms from Rajshahi metropolitan city, Bangladesh, here it belongs to 176 genera and 74 families, where Asteraceae in dicotyledonous was the dominant family with 27 species while Poaceae is leading with 9 taxa among monocotyledonous flora families. Islam et al., (2009) studied the qualitative assessment of angiospermic flora with leading dicotyledonous represented by 192 species while monocotyledonous flora with 51 species from Ramgarh Upazila of Khagrachhari and Police Academy of Bangladesh. Similar studies were conducted on the angiospermic configuration at the village Sabgram, Bogra District, Bangladesh in which dicotyledonous with 172 species were the leading class followed by monocotyledonous flora with 24 species (Rahman et al., 2014). Sarker & Rahman (2019) enlisted the angiosperm here the dicotyledonous is represented by 261 species but, monocotyledonous flora was recorded with 34 species from Gobindaganj Upazila of Gaibandhna district, Bangladesh. Our finding is strongly supported by Dar et al., (2018) here Poaceae comprising 11 species is the largest family in eroded and non-eroded areas of the Kashmir Himalayas.

Life form

Life form in the ecophysiology of flora and vegetation type is very important phytoecological characteristics depend upon the environmental conditions. It serves as an indicator of environmental conditions in which climatic and edaphic factors are used to determine the life form. However, it is influenced by many biotic and abiotic factors, such as overgrazing, browsing, deforestation, agriculture practices, floods and phytoclimatic changes etc. for this investigation using Raunkiaerean (1934), classification it was noted that Therophytes was the dominant class with 228 species (53.64%) followed by Hemocryptophytes with 44 species (10.35%), Nanophanerophytes with 39 species (9.17%), geophytes with 32 species (7.52%), Megaphanerophytes with 29 species (6.82%), Chamaephytes with 24 species (5.64%), Hydrophytes with 14 species (3.29%), Microphanerophytes with 11 species (2.58%) and Mesophanerophytes with 4 species (0.94%), (Figure 2). However, only two species namely *Cuscuta reflexa* and *Cistanche tubulosa* showed parasitic life form (Table 4).

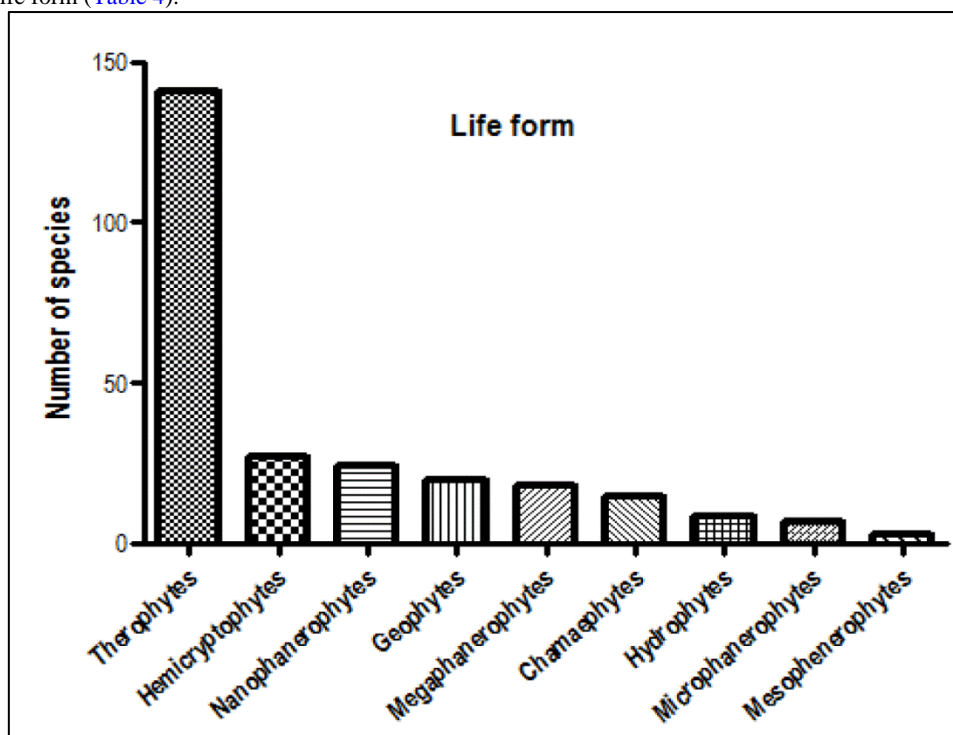


Figure 2. Number of different life form groups.

Table 4. Showing percentage of the different life form groups.

Life form	Key for life form	No. of species	%age
Therophytes	Th	228	53.64%
Hemicryptophytes	H	44	10.35%
Nanophanerophytes	Np	39	9.17%
Geophytes	G	32	7.52%
Megaphanerophytes	MegP	29	6.82%
Chamaephytes	Ch	24	5.64%
Hydrophytes	Hydro	14	3.29%
Microphanerophytes	MicP	11	2.58%
Mesophenerophytes	MesP	4	0.94%
Total	-	425	100%

Among the biological spectra life form is the important key in the exploring area and can be considered as phyto-symbol for climate. Chapman and Crow (1981) investigated the therophytes prevailing desert climate, geophytes indicated the Mediterranean climate, while Hemocryptophytes indicated the temperate zone. Therophytes were reported by Ali et al., (2016) as a dominant class of life forms of the floristic list of Chail Valley, Swat. In the floristic study of district Peshawar therophytes contributed 30 (37.5%) and microphanerophytes 16 (20%) species have relative abundance (Samad et al., 2018). Ali et al., (2019) therophytes with 110 (50.1%) species were noted as the dominant life form followed by microphanerophytes comprising 24 (10.58%) from district Nowshera. The vegetation analysis revealed that the therophytes represent 49.20% while chamaephytes comprising 29.00% of species are dominant classes among the life form from Hail region Saudi Arabia (El-Ghanim et al., 2010). Therophytes were the leading class among the life form in the floristic studies of Aghberg Rangelands, and Harboi rangelands, Kalat, Balochistan (Durrani & Hussain, 2005; Durrani et al., 2010). Life form modified by natural disasters as well as anthropogenic activities such as agriculture, overgrazing and browsing which display diverse picture of vegetation variation.

Leaf Size

The leaf size spectra of the study area revealed that here Nanophyll was the dominant class comprising 138 species (32.47%) followed by Microphyll with 119 species (28.00%), mesophylls with 99 species (23.29%), Leptophyll with 45 species (10.58%), macrophylls with 11 species (2.58%) and megaphylls with 4 species (0.94%). Some species (2.11%), were reported as aphyllous i.e., *Leptadenia pyrotechnica*, *Periploca aphylla* and *Calligonum polygonoides* etc. (Table 5 and Figure 3).

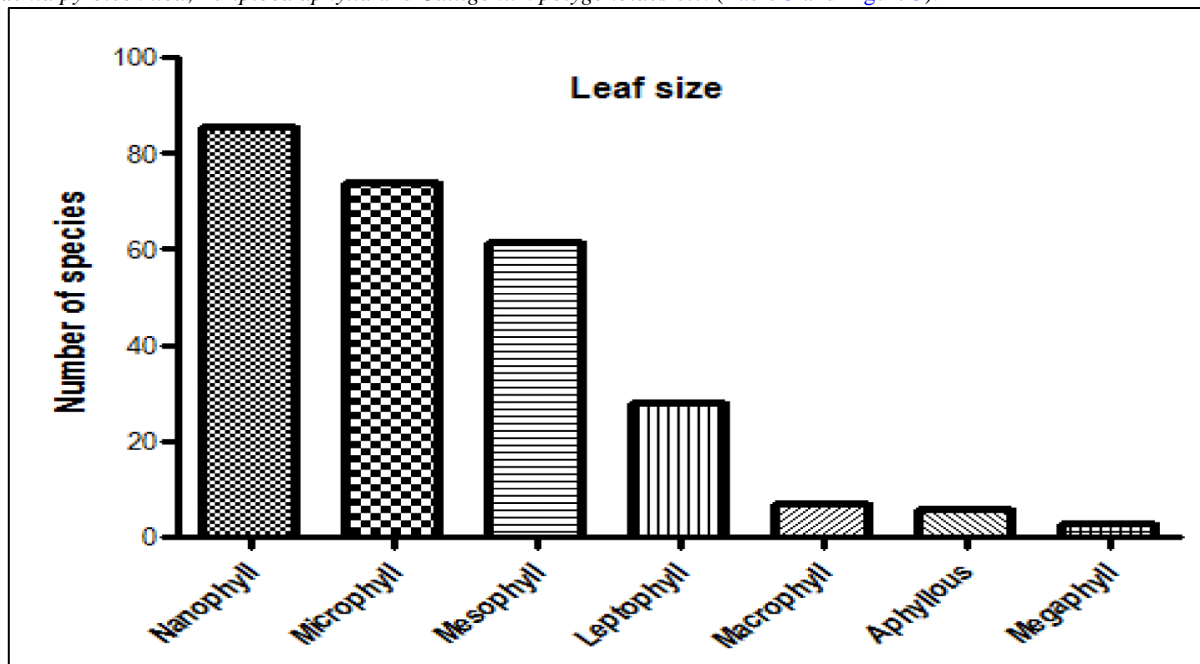
**Figure 3.** Number of different life size groups.

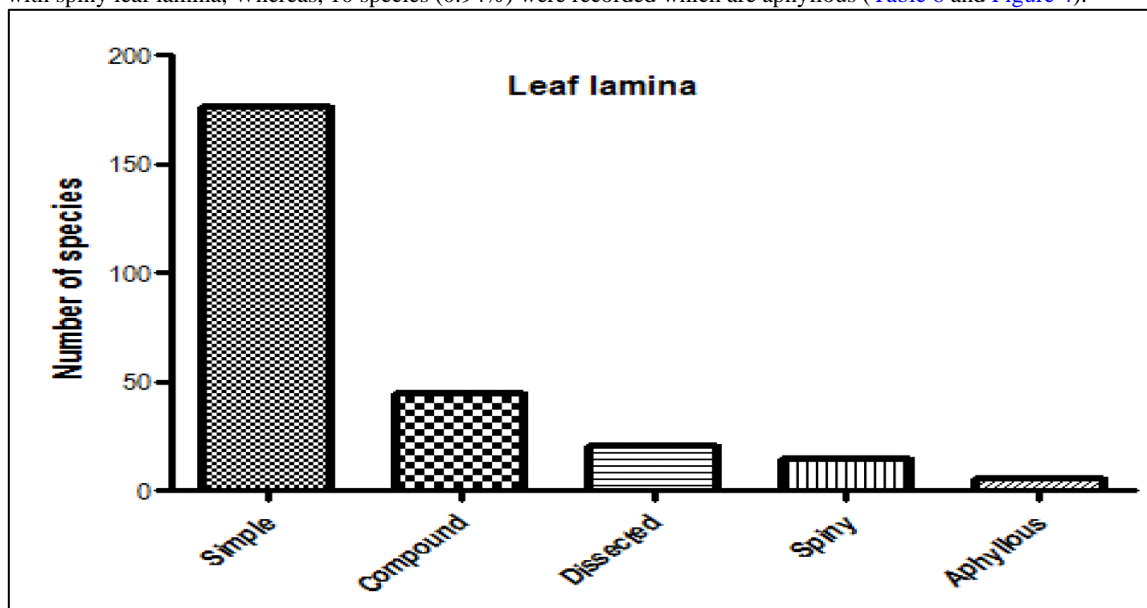
Table 5. Showing percentage of the different leaf size groups.

Leaf size	Key for leaf size	No. of species	%age
Nanophyll	Na	138	32.47%
Microphyll	Mic	119	28.00%
Mesophyll	Mes	99	23.29%
Leptophyll	L	45	10.58%
Macrophyll	Mac	11	2.58%
Aphyllous	Ap	9	2.11%
Megaphyll	Meg	4	0.94%
Total	-	425	100%

Although, leaf size has shown variation in the majority of annual plant species due to lose of seasonal buds while, perennial and evergreen have retained their leaf size status (Ali et al., 2018). Among the leaf size spectra nanophyll comprising (40.98%) species was the dominant class in the annotated list of Mastuj Valley, Chitral (Hussain et al., 2015). Nanophylls (36.14%), leptophylls (26.73%) and microphylls (26.24%) are the dominant leaf size classes in the vegetation of subtropical forest of district Kotli, Azad and Jammu Kashmir (Amjad et al., 2017). The dominant classes of leaf size were microphyll (146) species followed by Nanophyll (91) species from the Gokand Valley, district Buner (Muhammad et al., 2020). However, the leaf form of vegetation indicates the prevailing climatic and edaphic conditions of a particular area.

Leaf Lamina

Due to seasonal variation, the reported vegetation indicated that the 286 species (67.29%) possess the highest number of simple leaf lamina followed by compound leaves comprising with 72 species (16.94%), dissected leaves 33 species (7.76%) and 24 species (5.64%) with spiny leaf lamina, Whereas, 10 species (0.94%) were recorded which are aphyllous (Table 6 and Figure 4).

**Figure 4.** Number of different leaf lamina groups.**Table 6.** Showing percentage of the different groups of leaf lamina.

Leaf lamina	Key for lamina class	No. of species	%age
Simple	S	286	67.29%
Compound	Com	72	16.94%
Dissected	Dis	33	7.76%
Spiny	Sp	24	5.64%
Aphyllous	Abs	10	0.94%
Total	-	425	100%

Similar findings were recorded here, 191 (67.87%) species have simple lamina followed by compound leaves with 76 (16.41%) and four species (Rahman et al., 2021). Ali et al., (2016) reported the largest number of species 305 (65.87%) possessing simple lamina followed by compound leaf 76 (16.41%) species and incised leaf with 62 (13.39%) species and eight species are spiny leaf lamina and three species are aphyllous. Leaf lamina shape indicated that simple lamina has a high value of 155 (62%) and compound lamina comprising 63 (25.2%) were the leading classes in Jelar valley; district upper Dir (Ullah & Badshah, 2017). Similar findings were also reported by Samreen et al., (2018) from Darazinda Dera-ismail Khan and Haq et al., (2019) from Keran-a remote valley of North Western Himalaya.

Habit

Based on habit local flora included 317 herb species (75%), 50 tree species (12%), 42 shrub species (10%), 15 climber species (3%) and only one species (0.1%) of woody liana i.e., *Vitis vinifera* were reported from the study area (Table 7 and Figure 5).

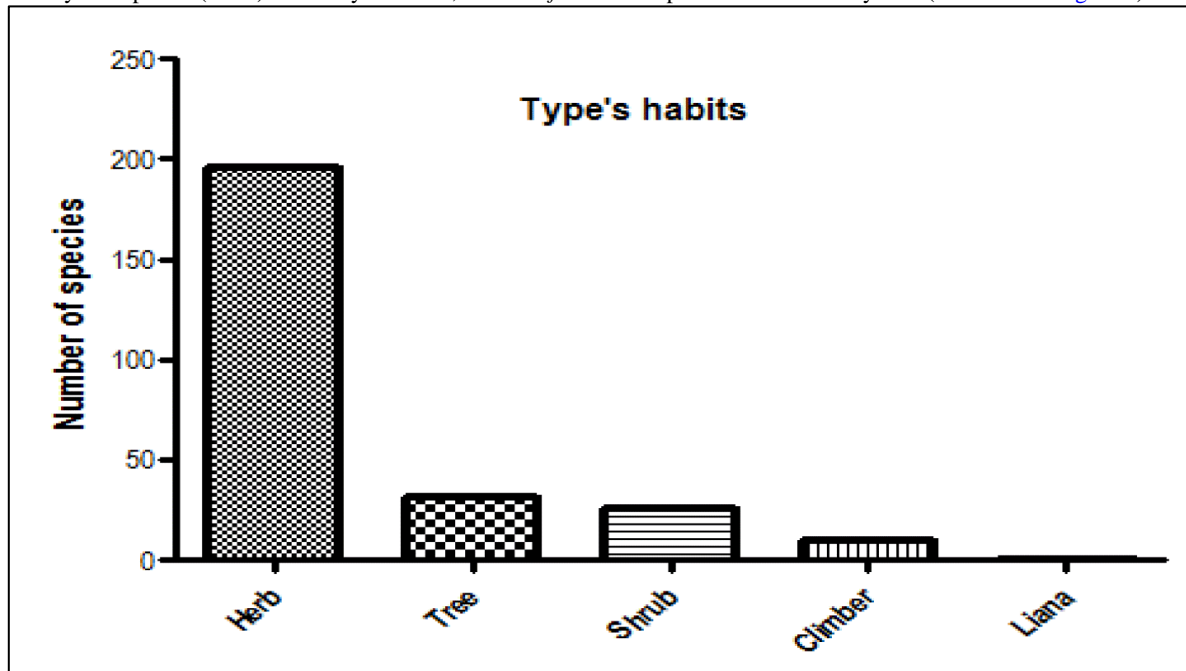


Figure 5. Number of different plant habits groups.

Table 7. Showing percentage of the different type's habits.

Plant habit	Key for habit class	No. of species	%age
Herb	H	317	74.58%
Tree	T	50	11.76%
Shrub	S	42	9.88%
Climber	C	15	3.52%
Liana	L	1	0.23%
Total	-	425	100%

Arefin et al., (2011) studied angiospermic diversity from Satchari National Park, Bangladesh including 86 species of herbs followed by 73 trees, 46 shrubs and 37 species of climbers were recorded. A similar study was also conducted in the Malghazar valley, Swat from which herbs 161 (52.27%) species were followed by tree line with 46 (14.98%) and 45 (14.61%) and only 10 climbers were found (Khan et al., 2022). Similar studies were carried out by Uddin and Hassan (2010) from Lawachara National Park, Rahman (2013) from Rajshahi City, Uddin et al., (2013) from Teknaf Wildlife Sanctuary, Keya and Rahman (2017) from Sabgram village of Bogra, Bangladesh.

Habitat

From the study highest number of species were recorded from dry slopes 177 species (41.64%), followed by moist places 127 species (29.88%), cultivated 42 species (9.88%), agriculture fields 31 species (7.29%) wet places 24 species (5.64%), graveyard 16 species (3.76%), introduced 5 species (1.17%), forest 2 species (0.47%) and only 1 species (0.23%) is epiphytes i.e., *Cuscuta reflexa* (Table 8 and Figure 6).



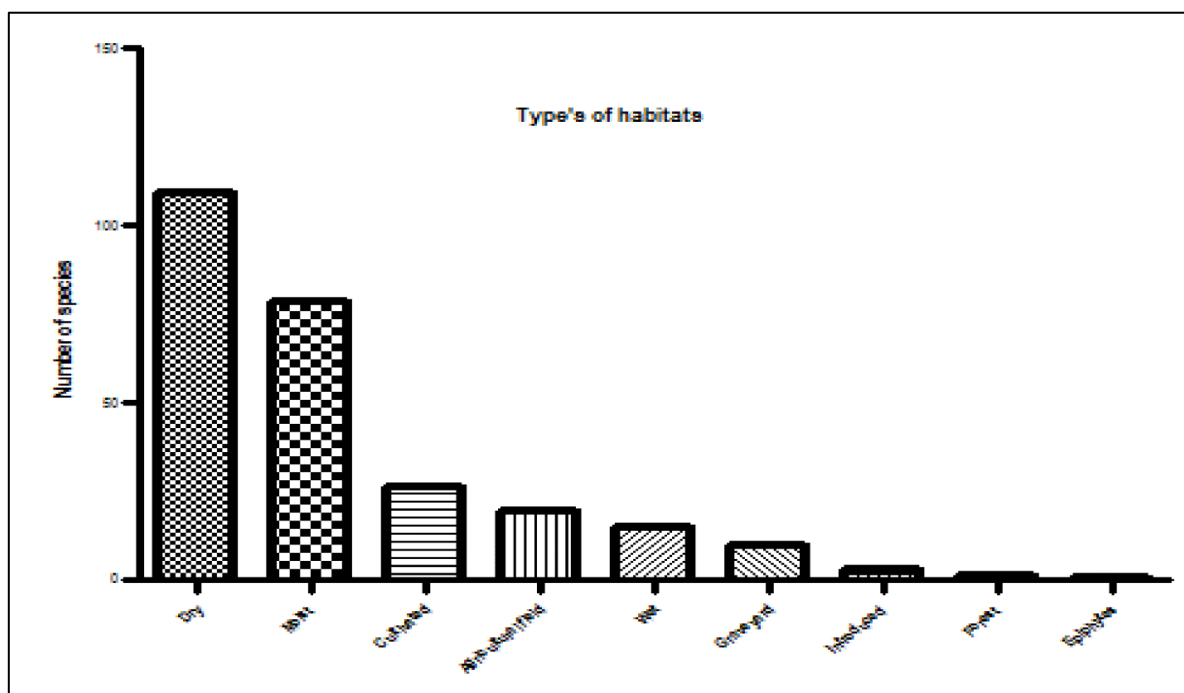


Figure 6. Number of different plant habitats types.

Table 8. Showing percentage of different habitat types.

Habitat types	Key for habitat class	No. of species	%age
Dry	D	177	41.64%
Moist	M	127	29.88%
Cultivated	Cu	42	9.88%
Agricultural field	Af	31	7.29%
Wet	W	24	5.64%
Graveyard	Gy	16	3.76%
Introduced	I	5	1.17%
Forest	F	2	0.47%
Epiphytes	Ep	1	0.23%
Total	-	425	100%

Although, the study area witness's threats for many trees, herbs and shrubs due to the lose it habitats due to soil erosion as well as other natural disasters. Some species are reported invasive from the studied area such as *Alternanthera philoxeroides*, *Broussonetia papyrifera*, *Parthenium hysterophorus*, *Solanum elaeagnifolium*, *Verbesina encelioides* and *Tagetes minuta*. were considered as a threat to the agricultural fields. Rahman et al., (2013) studied habitats for 240 taxa of angiosperm from Sadar upazila, district Munshiganj Bangladesh. A similar study was also conducted by Hussain et al., (2020) who reported the majority of species from the wild habitats of plants from the annotated checklist of Koh-e-Safaïd range district Kurram. Ullah and Badshah (2017) recorded the maximum species from the dry slopes of mountains in the Jelar Valley district of upper Dir. The results of the current finding agree with the results of Khan et al., (2013b) from the Western Himalayas, Badshah et al., (2016) from Parachinar, Kurram, and Haq et al., (2019) from the Northwestern Himalayas. Therefore, different habitats were degraded due to a huge loss of soil that reduced vegetation cover. Many plant species adapted deep root systems to resist or rather than stop soil erosion (Campo & Martí, 2000).



Plate 1. Field photographs of plant species in natural habitats: (1) *Alternanthera philoxeroides*, 2) *Aerva javanica*, 3) *Alhagi maurorum*, 4) *Argemone mexicana*, 5) *Argyrolobium roseum*, 6) *Astragalus ophiocarpus*, 7) *Caragana brevispina* var. *brevispina*, 8) *Chrozophora plicata*, 9) *Cistanche tubulosa*, 10) *Cleome brachycarpa*, 11) *C. viscosa*, 12) *Convolvulus prostratus*, 13) *Corchorus depressus*, 14) *Croton bonplandianus*, 15) *Cucumis melo* subsp. *agrestis*, 16) *Cyperus pygmaeus*, 17) *Dactyloctenium aegyptium*, 18) *D. scindicum*.





Plate 2. Field photographs of plant species in natural habitats: (19) *Euphorbia falcata*, (20) *E. hirta*, (21) *E. indica*, (22) *Filago pyramidata*, (23) *Heliotropium curassavicum*, (24) *H. europaeum*, (25) *Hertia intermedia*, (26) *Hyoscyamus insanus*, (27) *Iphiona grantioides*, (28) *Launaea procumbens*, (29) *Lotus corniculatus*, (30) *Medicago sativa*, (31) *Mentha royleana*, (32) *Oenanthe javanica*, (33) *Physalis minima*, (34) *Plantago ovata*, (35) *P. ciliata*, (36) *Pluchea lanceolata*.



Plate 3. Field photographs of plant species in natural habitats: (37) *Polygala abyssinica*, (38) *Polygonum plebejum*, (39) *Potentilla supina* (40) *Cyperus difformis*, (41) *Reichardia tingitana*, (42) *Salvia aegyptiaca*, (43) *S. nubicola*, (44) *Schoenoplectus litoralis*, (45) *Scutellaria linearis*, (46) *Solanum rostratum*, (47) *Sonchus oleraceus*, (48) *Symphyotrichum subulatum*, (49) *Tagetes minuta*, (50) *Thymus linearis*, (51) *Viola stocksii*, (52) *Xanthium spinosum*, (53) *X. stramonium*, (54) *Zeuxine strataumatica*.



Conclusion

The angiosperm list from the study area was assessed for the first time, highlighting the region's significance in terms of plant diversity and their phytoecological characteristics, as well as the prevailing climate, edaphic features, and the impact of natural disasters. The findings indicate that the investigated area is affected by various ecological challenges, including overgrazing, browsing, trampling, soil erosion, and landslides caused by overflowing during the monsoon season, which hinder plant regeneration. A feasible approach for vegetation recovery involves correlating physiognomic features with floristic composition under human influence. Consequently, there is an urgent need for the protection and conservation of the Billion Tree Tsunami plantation project, initiated by the government of Khyber Pakhtunkhwa, Pakistan, particularly in the most eroded and landslide-prone areas along the sides of the River Kurram. Moreover, the assessment of tree plantations in these areas is crucial for the recovery of the phyto-climate, land, and vegetation. The habitats are severely impacted by continuous landslides and soil erosion due to overflowing and other natural disasters. Therefore, this study provides essential baseline information for developing conservation strategies to protect threatened species from overgrazing, landslides, and soil erosion.

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Disclosure statement

The authors declare that they have no potential conflict of interest.

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