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Phytodiversity and Morpho-Ecological Features of the Plants of the Tirah Valley, Khyber District, Pakistan

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Abstract: The first phytodiversity ever analyzed during 2015-2016 revealed 330 species (sp) and 230 genera (G) of seventy-eight families in the Tirah Valley, Khyber District, Pakistan. The dicots had 277 species, 188 genera, and sixty-one families. Monocots shared thirty-five species with twenty-five genera of nine families. Bryophytes, pteridophytes and gymnosperms, respectively contributed two, ten and six species. The leading families were Asteraceae (30 sp; 24 G), Lamiaceae (28 sp; 19 G), Rosaceae (27 sp; 13 G), Poaceae (19 sp; 15 G), Brassicaceae (15 sp; 10 G), Solanaceae (13 sp; 7 G), Cucurbitaceae (12 sp; 7 G), and Papilionaceae (11 sp; 8 G). The remaining families had fewer than ten species. *Orobanche aegyptiaca* was the only root parasitic plant. The average number of species per genus was 1.43. The average number of species per family was 4.23, and the average number of genera was 2.95. The life form spectra were dominated by therophytes (128 sp; 38.89 %), followed by hemicryptophytes (56 sp; 16.97%), geophytes (41 sp; 12.42) and megaphanerophytes (40 sp; 12.12 %). Leaf size spectra revealed that nanophylls and microphylls (each with 108 sp; 32.73 %) were leading groups. The dominant species were annual herbs (128 sp; 38.795), perennial herbs (122 sp; 36.79%), deciduous plants (280 sp; 84.85%), heliophytes (253 sp; 76.67%), mesic (198 sp; 60%), non-spiny (305 sp; 92.42%) and wild (267 sp; 80.91%) species. The investigated area is under severe degradation due to deforestation and overgrazing which necessitates a proper ecological management for its maintenance. Further investigation to explore the conservation status of important plants is required.

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Key words: Phytodiversity; Tirah Valley; Morpho-ecological features; Leaf and life form spectra; Pakistan.

Introduction

Phytodiversity varies across different geographical regions that impart characteristic physiognomic contrasts between vegetation types. Th identification of plants is an essential pre-requisite for initiating any plant-related scientific work. Detailed national, regional, and local floras are required to achieve this purpose. A short version of the flora is listing or the floristic composition of the desired plants of an area in a specific season. For this reason, various floristic studies have been conducted in different parts of Pakistan. Badshah *et al.* (2013, 2016), respectively, recorded 205 species from the District of Tank and 283 species from Parachinar, Kurram District. Shah *et al.* (2013) documented 319 species among eighty-nine families, 215 genera from Chakesar, Shangla District. Poaceae and Asteraceae were the leading families. Therophytes were the dominant life form. Hussain *et al*. (2015) listed 571 plant species along with their ecological features from the Mastuj Valley, Chitral District.

Ali *et al.* (2016) collected 463 species of 104 families from the Chail Valley, Swat District. Sultan-ud-Din *et al*. (2016) reported 515 plant species from the District of Shangla, which were distributed in 101 families with the dominance of herbaceous elements. Asteraceae, Lamiaceae and Rosaceae had a high number of species. Therophytes and phanerophytes were the dominant life forms. Ilyas *et al.* (2018) enumerated 229 species, 181 genera and seventy families from Kabal Swat. The diverse flora of the Shigar Valley, Baltistan consisted of 345 species distributed among 206 genera and sixty-three families. It included 338 angiosperms (Abbas *et al.* 2019). Hayat *et al.* (2019) listed 167 species among sixty-five families and 139 genera from Tehsil Razar, the Swabi District. Bibi *et al.* (2019) recorded 286 species among eight-six families from the Tanawal Valley Mansehra District. Herbaceous species (187 species), Asteraceae and therophytes dominated the flora. Raza and Shah (2020) identified 336 plant species belonging to 229 genera and seventy-nine families from Mir Ali, N. Waziristan. There were 269 dicots, sixty monocots, four gymnosperms and three pteridophyte species. Anjum *et al.* (2020) listed 154 plant species of thirty-nine families from Karkhasa dry rangelands of Quetta. Das and Desai (2020) identified 226 species of flowering plants of 173 genera and sixty-six families from the Dharampur Hill ranges, Western Ghats, Gujarat**.** Yeshitila and Awas (2020) recorded 129 plant species representing 106 genera and fifty-five families from the Sidama Zone, Southern Ethiopia. Reena and Samuel (2020) identified 161 **s**pecies of 125 genera and forty-six families from Coconut Plantations in the Kanyakumari District. These included thirty-one dicots, fourteen monocots and three Pteridophyte families. Recently, Hussain *et al.* (2020) reported 654 species distributed within 401 genera, and 116 families with Poaceae, Asteraceae, Rosaceae, Lamiaceae, Papilionaceae, Brassicaceae, Ranunculaceae and Apiaceae as the topmost families from the Koh-e-Sufaid Range Pakistan. Salama *et al*. (2021) reported eighty-five macrophytic species along with their life forms' classification from the river channel in Egypt. Al-Sghair and Mahklouf (2021) recorded 110 plant species from the Tripoli University Camp with ninety-five genera and thirty-five families. They also classified the flora into life form classes including therophytes (52.73%), Hemicryptophytes (14.54) and a low number of phanerophytes. Rafiqullah *et al.* (2021) recorded 270 species of plants including sixty-five families, sixty-two Genera, and 219 dicot species from Pishin, Baluchistan. The families Asteraceae, Papilionaceae, and Brassicaceae were well represented.

The above endeavors suggest that no scientific information on the floristic composition of Tirah, Khyber District is available. Although, the *Flora of Pakistan* is a comprehensive document (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2020 continued) of the plants of Pakistan, the local and regional flora, or the floristic composition of a specific area are always advantageous for an easy handling of locations and for a quick identification of the plant species. With this approach in mind, the present investigation was initiated to list the most common plants of the Tirah Valley as a first record. The present study, therefore, provides the first-hand information on the rapidly declining flora due to socioeconomic pressures on the forest plant resources. This base line data will be a commencing point for future workers involved in the management of forest biodiversity in this remote, neglected, and unexplored area.

Materials and Methods

Study area

The Tirah Vally is located in the Khyber, Kurram, and Orakzai districts between 33.73N 71.01E having an altitudinal range between 2500 and 3000 m (Figure 1). The present study was confined to the Tirah Valley within the District of Khyber. Four sites viz. Dwa seray, Angori Sar, Kovono Sar, and Landawar were selected on the basis of

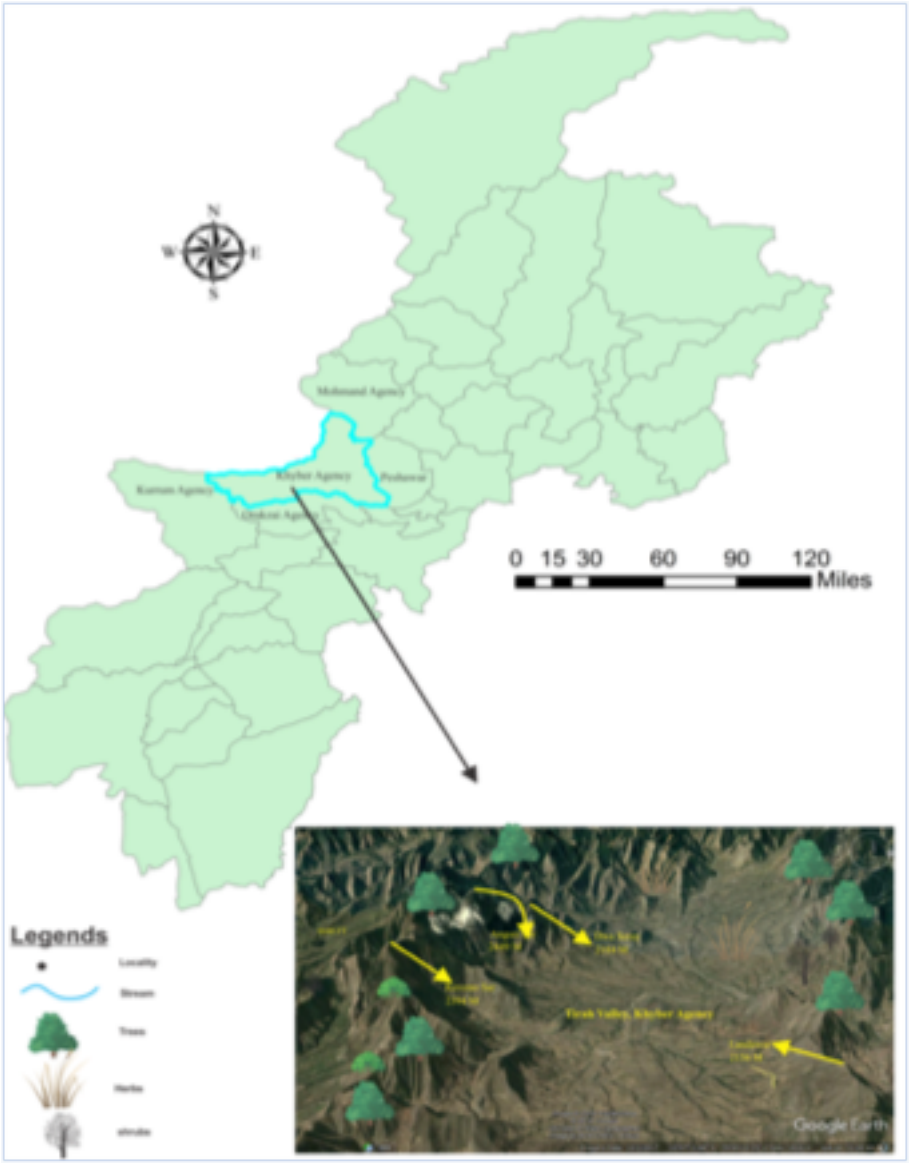

Figure 1. Map of Khyber Pakhtunkhwa showing the location of Tirah Valley. The research sites are shown in the inset with yellow arrows.

floristic, physiographic, and physiognomic variation. The climate of the Tirah Valley is pleasant in summer and severely cold in winter with temperature dropping to –7°C.

Floristic composition

Plants were collected during 2015-2016 with frequent visits to the selected area. Dried preserved specimens were mounted on standard herbarium sheets. Identification was done following the *Flora of Pakistan* (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2020 continued). Plants were alphabetically arranged into major groups, families, genera, and species. Life form and leaf size spectra were prepared after Hussain (1989) and Raunkiaer (1934). The voucher specimens were submitted to the Herbarium, Department of Botany, University of Peshawar, Pakistan.

Results

Floristic composition

The investigation revealed 330 species scattered among 230 genera and seventy-eight families (Tables 1, 3). Of these, angiosperms had seventy families, 213 genera, and 312 species. Further synthesis showed that 277 (84.24%) and thirty-five species (10.61%) were, respectively dicots and monocots. Bryophytes had two families

(2.56%) with two genera (0.87%),and two species (0.61%). Pteridophytes contributed four families (5.13%) with ten genera (4.35%),and ten species (3.0%) . Gymnosperms had two families (2.56%), five genera (2.17%) and six species (1.82%). The average number of species/ genus was 1.43, and the average number of species/family was 4.23. The average number of genera/family was 2.95. The richest families with respect to the number of species (Tables 2, 3) were respectively; Asteraceae (30 sp; 9.09%), Lamiaceae (28 sp; 8.48) and Rosaceae (27 sp; 8.18%), Poaceae (19 sp; 5.76%), Brassicaceae (15 sp; 4.55%), Solanaceae (13 sp; 3.94%), Cucurbitaceae (12 sp; 3.64%), Papilionaceae (11 sp; 3.33%), and Caryophyllaceae & Ranunculaceae (each with 10 sp; 3.0%). Pteridaceae had seven species. All the other remaining families had less than ten species. One species representation was made by forty-three families (Tables 2, 3).

Morpho-ecological characteristics

The habit form (Tables 1, 3) revealed 128 (38.79%) annual herbs, 122 (36.97%) perennial herbs, 41 (12.42%) shrubs and 39 (11.82%) tree species. The habitat form included sixty-three (19.09%) dry habitat species, 198 (60%) mesic species, and sixty-nine (20.91%) species of moist/aquatic habitats. The kind and population of species are generally more diverse under the most favorable optimum part of any ecological factor. Mesic habitats favor mesophytes. The majority of the species, *i.e.*, 76.67% in the present investigation were heliophytes. The spiny nature of the plants is an adaptation to the dry arid conditions to conserve the plant moisture. The climatic conditions of Tirah vary from humid subtropical conditions to the temperate type. Therefore, in the present study, 305 (92.42%) species were non-spiny. Deciduous species dominated (280 sp; 84.85%) the flora compared to only fifty (15.15%) evergreen species. The morphology, shape, and arrangement of leaves also reflect the local climatic conditions. The classification of leaf types showed that the leaves were simple-entire in 224 (67.88%) species (Tables 1, 3); and simple-incised leaves with various degrees of incisions or segmentations in thirty (9.1%) species. Six (1.82%) species of gymnosperms had simple needle-like leaves. Pinnate, palmate, and trifoliate compound leaves were present respectively in thirty-three (10%), fifteen (4.55%), and fourteen (4.24%) species (Tables 1, 3). *Marsilia quadrifolia* (1sp; 0.3%) was the only palmate four-foliate species. Scale leaves and cladodes were, respectively present in five (1.52%) and two (0.6%) species.

Biological spectra

Physiognomic attributes including life form and leaf size spectra indicate habitat deterioration, biotic interaction, and the climate of an area. Physiognomic contrast primarily depends on a dominating life form. It was evident that therophytes (128 sp; 38.79%), followed by hemicryptophytes (56 sp; 16.97%) and geophytes (41 sp; 12.42 %) were the major life forms in the envisaged flora. Megaphanerophytes (40 sp; 12.12%), nanophanerophytes (33 sp; 10%) and chamaephytes (31 sp; 9.39%) (Table 2) were the next important groups. Tree canopy is generally open due to the low number of tree species in the area. Tree species were mostly bushy due to continuous cutting and overgrazing. *Orobanche aegyptiaca* was the only root parasite in the area.

Leaf size spectra

Leaf sizes reflect environmental and climatic conditions. Small leaves dominate in hot or cold deserts with extreme temperature conditions. The current study revealed the dominance of nanophylls and microphylls, both categories collectively had 108 species, each sharing 32.73% cover (Tables 1, 3). Next were leptophylls with fifty-eight species (17.58%) and mesophylls (47 sp; 14.24 %). Macrophyllous (6 sp; 1.82 %) and aphyllous (3 sp; 0.91%) were rare in the area.

Discussion

Floristic composition

The richness of the flora of any area depends upon ecological, climatic, edaphic, and biotic factors. Generally, high floristic diversity is a sign of favorable habitat features. The present study revealed 330 species among 230 genera and seventy-eight families. In a similar study, Hussain *et al.* (2020) recorded four families of gymnosperms and pteridophytes and ninety-two dicot families with 318 genera from Koh-e-Sufaid. The later study covers a larger area with a temperate climate compared to Anjum *et al.* (2020), who listed 154 plant species of thirty-nine families from Karkhasa, the dry temperate rangelands of Quetta. The present findings also agree with Hayat *et al.* (2019), who also reported 134 dicots and thirty-one monocot species. *Cypresses sempervirens* was the only gymnosperm and *Adiantum caudatum* was the only pteridophyte from Razar Tehsil, Swabi District. The richest families in the envisaged area with a high number of species included: Asteraceae, Lamiaceae, Rosaceae, Poaceae, Brassicaceae, Solanaceae, Cucurbitaceae, Papilionaceae, Caryophyllaceae, and Ranunculaceae. These families are also leading families in the *Flora of Pakistan* (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2020 continued). The findings regarding the major families in terms of species and genera agree with many workers (Shah *et al*., 2013; Sultan-u-Din *et al*., 2016; Bibi *et al*., 2019; Rafiqullah *et al*., 2021; Al-Saghair and Mahklouf, 2021; Salama *et al*., 2021) who also identified the same families as the major families in their investigated areas. Yeshitila and Awas (2020) regarded Fabaceae (17 sp; 13.2 %), Asteraceae (9 sp; 7.00%), and Lamiaceae (5 sp; 3.9%) as the diverse families in their study site. Anjum *et al.* (2020) also stated that Asteraceae (26 sp.) and Poaceae (21 sp.) were the richest families in Karkhasa, which supports the findings in the present study. Hussain *et al*. (2015) also stated that the same families had the highest number of species in the Flora of Mastuj. Similarly, Poaceae (20 sp.), Asteraceae (16 sp.) and Papilionaceae (9 sp.) were the leading families in the flora of Razar (Hayat *et al*., 2019). Poaceae (44 sp., 13.09 %) and Asteraceae (28 sp., 8.33 %) were the major families in the flora of Mir Ali S. Waziristan (Raza and Shah, 2020). Similarly, some other floristic studies (Ali *et al*., 2016; Das and Desai, 2020; Reena and Samuel, 2020; Hussain *et al.,* 2020) also valued the same families as the topmost families in their explored localities. Species richness depends on the suitability of optimum habitat conditions for the members of a particular family (Figure 2 A). The same family may have a different status in various environmental conditions. Deforestation and overgrazing also reduce the richness and diversity of species.

Morpho-ecological characteristics

The morphological and ecological adaptations of the flora closely follow the habitat conditions. In addition to physiological adaptation, plants depend on morphological features such as their habit, growth, and habitat forms. The structure, texture, the arrangement of leaves, the shape and size of the lamina and deciduousness play an important role in the plant survival. In the present work, the majority of the species were annual and perennial herbs with few tree species. The leaves were generally small, simple, and variously dissected. Most of the species belonged to mesic habitats. Similar results were achieved by Anjum *et al.* (2020) for the flora of Karkhasa, who documented 130 herbs and twenty-four shrubs. The results are supported by Hussain *et al.* (2020) and Das and Desai (2020), who also observed the dominance of herbaceous flora in their investigated area. Bibi *et al.* (2021) also recorded a high percentage of the annual flora in Tanawal Valley. The present findings in this respect are in line with Sultan-u-Din *et al*. (2016). Hayat *et al.* (2019) found 62.9% species in terrestrial habitats. Raza and Shah (2020) listed the majority of the species

(82.14%) in terrestrial habitats. Hussain *et al*. (2020) also recorded more than 66% species in dry habitats. All these references support the results of the present study.

Light availability and tolerance also cause variation in the occurrence and distribution of plant species. The majority of the species, i.e., 76.67% in the present investigation were heliophytes. This also agrees with Hayat *et al*. (2019), who reported that the bulk of species (130 spies) were heliophytes in the Flora of Razar Tehsil. Shade-loving species are generally understory plants of moist habitats. It was observed that few scattered tree species enabled (Figure 2 B) the light to reach the soil surface in the investigated areas of the Tirah Valley. Such habitats are more suitable for sun-loving plants and that is why 76.77% of the species were heliophytes. Spiny or prickly nature is an adaptation against grazing and the loss of water in dry regions. Since the Tirah Valley has a humid and tropical to a temperate climate which the non-spiny species favors, it was found that 92% of the species were non-spiny. The findings agree with some other similar studies reporting the dominance of non-spiny plants (Badshah *et al.,* 2016; Raza and Shah, 2020; Husain *et al.*, 2020). The deciduous habit of plants is an adaptive feature to climatic conditions. In the present research, 84.85% of the species were deciduous because plants are exposed to the direct heat in summers and the snow-cold weather in winters. On the contrary, Badshah *et al.* (2016) reported that the majority of the perennial species were evergreen. The current study's findings are close to the findings of Raza and Shah (2020), who confirmed that 93.15% of the investigated species in their study area were deciduous. Like other studies (Hayat *et al*., 2019; Hussain *et al.,* 2015), the wild flora (80.91%) was dominant compared to the cultivated species (8.79%). Some thirty-four species (10.30%) grew in both wild and cultivated areas . The morphology, shape, and arrangement of leaves are dependent upon climatic conditions. Investigations of the leaf types revealed that the simple-entire leaves were seen in 67.88% of the species. These findings are in line with Badshah *et al.* (2016) who reported the dominance of the simple leaf lamina (81.27%) and the compound leaves (17.66%) in the flora of Parachinar. Likewise, Hussain *et al.* (2015) stated that more than 70% of the species had a simple leaf lamina. The present study is also consistent with Raza and Shah (2020) who listed simple leaves in 69.35% of the species and compound leaves in 15.48% of the species in the Flora of Mir Ali, N. Waziristan.

Biological spectra

Physiognomic attributes including life forms and leaf size spectra are indicators of habitat deterioration, biotic interaction, and the climatic conditions of an area. Dominating life forms produce a physiognomic contrast between vegetation types. In many contemporary studies (Shah *et al*., 2013; Sultan-u-Din *et al.,* 2016; Bibi *et al*., 2019; Salama *et al.,* 2021; Al-Sghair and Mahklouf, 2021; Rafiqullah *et al*., 2021), therophytes (38.79%), hemicryptophytes (16.97%) and geophytes (12.42 %) were the major life forms in the investigated flora. Megaphanerophytes (12.12%), nanophanerophytes (10%) and chamaephytes (9.39%) were uncommon in the investigated part of the Tirah Valley. The vegetation was open owing to the poor woody cover (Figure 2 C). The dominance of therophytes and hemicryptophytes indicates unfavorable habitat conditions. The soils of the Tirah Vally are generally shallow and stony (Figure 2 B) which suits shallow-rooted plants such ase annuals and hemicryptophytes. Overgrazing along with heavy deforestation have stressed the shrubby and tree species to assume a cushion-like habit. Therophytes dominate by virtue of their short life span, and strong capability to resist unfavorable conditions. Therophytes (50.9%), nanophanerophytes (12.79%) and megaphaneropyhtes (11.01%) were the dominant life forms in the arid area Mir Ali, N. Waziristan (Raza and Shah, 2020); and this agrees with the present findings. Furthermore, Badshah *et al*.

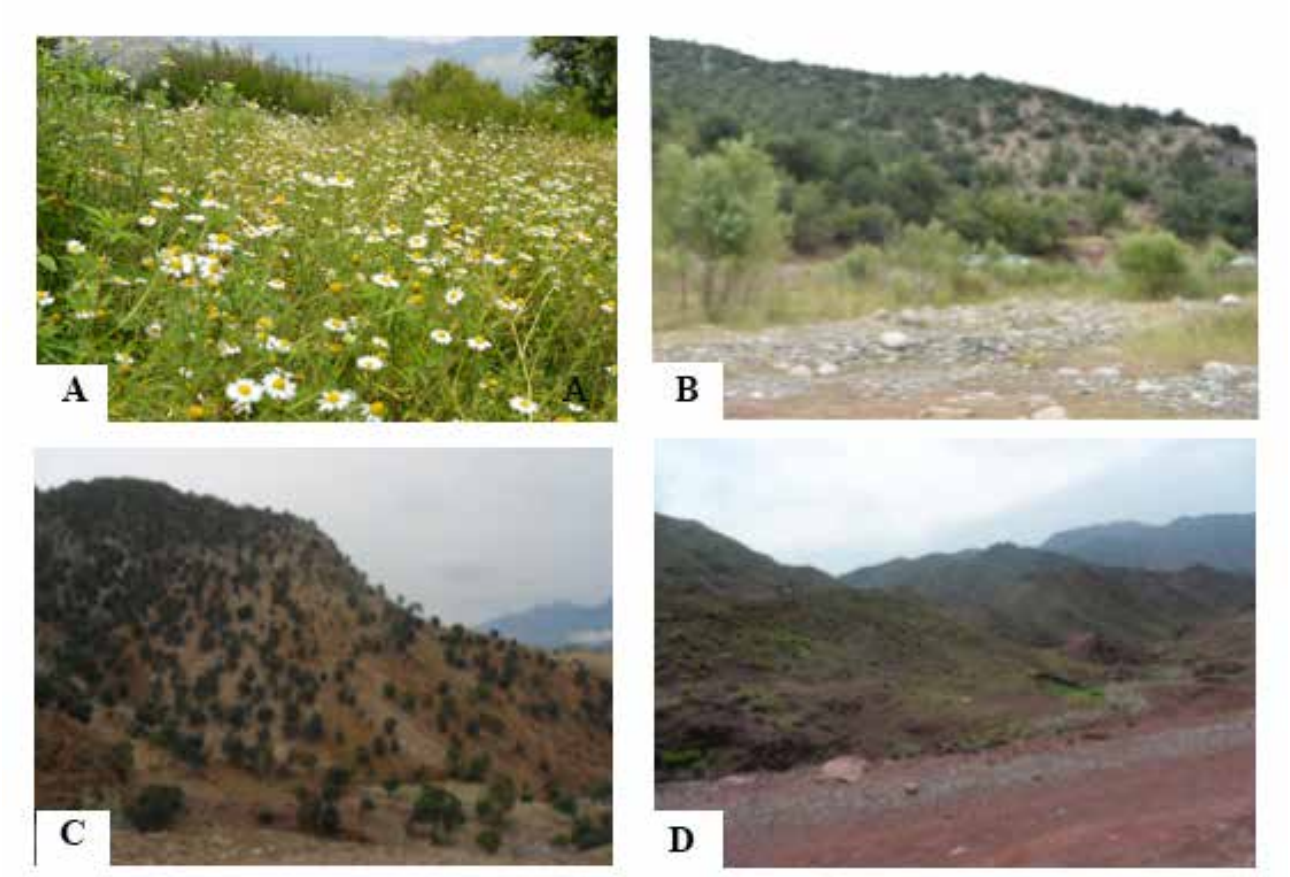

Figure 2. Different habitats of Flora of Tirah Valley.
A. A spring community of *Matricaria* along field borders and roadsides with moist habitat. **B**. A low hill with open forest canopy and dry ravine at the foot-hill showing erosion and degradation. **C**. Deformed bushy *Olea* forest with open canopy resulting from deforestation and overgrazing. See the exposed bare soil with no or poor plant growth. **D**.A degraded eroded and barren hill with dry water course at the foot-hill. See the poor overgrazed vegetation.

(2016) recorded therophytes (37.80%) and nanophanerophytes (16.7%) as the leading life forms in the flora of Parachinar.

Leaf size spectra

Leaf sizes are related to the severity of climate. Small leaves are generally common in hot dry or cold deserts with extreme temperature conditions. The current study divulged the supremacy of nanophylls and microphylls; both collectively had 108 species. Leptophylls (17.58%) and mesophylls (14.24 %), macrophyllous (1.82 %) and aphyllous (0.91%) were next in the order of occurrence in the area. The presence of aphyllous and scale-leaved species in the flora indicates a dry climate. Hussain *et al.* (2020) reported eleven aphyllous species from the Koh-e-Sufaid range, Pakistan. The findings are parallel with those of Anjum *et al*. (2020) who also recorded nanophylls followed by microphylls and leptophylls as the important leaf sizes in the flora of Karkhasa. Badshah *et al.* (2016) similarly revealed that nanophylls (42.75%) and leptophylls (31.44%) were the topmost leaf form classes in the flora of Parachinar. Raza and Shah (2020) listed the nanophylls (41.4%), microphylls (19.34%) and leptophylls (15.5%) as the major leaf sizes in the flora of Mir Ali. N. Waziristan.

Environmental Change in the area

No metrological station nor internet services are available in the Tirah Valley; therefore, reliance is made on the interviews and discussion with local elders above fifty years of age. These elderly people stated that some fifty to sixty years back, there were thick forests of blue pine in the upper parts above 2000 meters; and thick *Olea*

ferrugnea forests in the lower reaches. The forest canopies were generally complete. The rainfall and snowfall were quite high and regular, but have now decreased due to deforestation, over-exploitation, and overgrazing problems. The mountain slopes have been converted into agricultural fields that further aggravated the situation. Wildlife has declined owing to overhunting and habitat degradation. The data retrieved from the internet (*WWW*, 2021) for the years 2010-2020 shows a slight increase in the temperature of the hot months of May through July. Similarly, the monthly rainfall during July and August is less than 240 mm with an average of twenty rainy days. The rainfall is 25-35 mm with an average of ten to fifteen rainy days from February to April. Although we did not collect quantified data on plant population, but open bare spaces and the decline in woody species speak of degradation, erosion, and habitat loss (Figure 2 D).

Conclusion

Rich floral diversity is a sign of a healthy and friendly environmental condition. Flora as producers is an important component of any ecosystem developed under a particular set of environmental and habitat condition. Floristic diversity simply refers to the plant richness of a community or a geographical area. The study concludes that the area is rich in humid subtropical and temperate species. It requires further extensive surveys round the year to enlist the complete floristic variability. The local inhabitants depend upon forest resources for fodder, medicinal plants, fuelwood, and many other varied needs. This puts a tremendous pressure on the regeneration, growth, conservation, and the survival of plant resources. The overharvesting of fuelwood and medicinal species and overgrazing are some of the major ecological threats hindering the regeneration of forest resources. An ecological approach with the participation of local community can maintain the original plant resources. More investigations are recommended to assess the present conservation status of the important plant resources of this remote and unexplored valley.

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Declaration of competing interests

The authors have no competing interests.

Contribution by authors

All the authors have equally contributed to this paper.

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References

Abbas, Z, Alam, J, Khan, SM, Hussain, M and Abbasi, AM. 2019. Diversity, ecological feature and conservation of a high Montane flora of the Shigar Valley (Karakorum range) Baltistan region, Northern Pakistan, *Pak. J. Bot.,* **51(3)**:985-1000

Ali, A, Badshah, L, Hussain, F and Shinwari, ZK. 2016. Floristic composition and ecological characteristics of plants of Chail Valley, District Swat, Pakistan. *Pak. J. Bot*., **48(3)**:1013-1026

Ali, SI and Nasir, YJ (Eds.). 1989-1991. **Flora of Pakistan**, Family Nos. 191-193. PARC, Islamabad, Karachi,

Ali, SI and Qaiser, M (Eds.).1993-2020. **Flora of Pakistan**, Families 194-223. Department of Botany, University of Karachi, Pakistan.

Al-Sghair, FG and Mahklouf, MH. 2021. Vegetation survey for vascular plants of protected area of the University of Tripoli-Libya. *Species*, **22(69)**:1-9

Anjum, S, Hussain, F, Durrani, MJ, Masood, A, Mushtaq, Rizwan, S. Jabeen, U. Bashir, F and Behlil, F. 2020. Floristic composition, ecological characteristics and ethnobotanical profile of protected and open grazing land of Karkhasa, Balochistan, Pakistan. *The J. Anim. Plant Sci.,* **30(2)**:420-430. *https://doi.org/10.36899/JAPS.2020.2.0036*

Badshah, L, Hussain, F and Sher, Z. 2013. Floristic inventory, ecological characteristics and biological spectrum of rangeland, District Tank. *Pak. J. Bot.,* **45(4)**:1159-1168

Badshah, L, Hussain, F and Sher, Z. 2016. Floristic inventory, ecological characteristics and biological spectrum of plants of Parachinar, Kurram Agency, Pakistan, *Pak. J. Bot.,* **48(4)**:1547-1558.

Bibi, A, Iqbal, Z, Shah, GM, Hussain, M and Rahman, IU. 2019. Floristic diversity, biological spectrum of lower Tanawal, KP, Pakistan. *Ukrainian Journal of Ecology,* **9(4)**: 505-514

Das, A and Desai, J. 2020. Floristic diversity and composition of Dharampur Hills in Western Ghat, Gujarat. *Intern. J. Bot. Studies,* **5(2)**:175-182

Hayat, SA, Hussain, F, Zhu, H and Asad, F. 2019. Floristic composition and ecological characteristics of plants of Tehsil Razar, Swabi District, Pakistan, *Silva Balcanica,* **20(2)**:95-108. *DOI: 10.6084/m9.figshare.9929138*

Hussain, F, Shah, SM, Badshah, L and Durrani, MJ. 2015. Diversity and ecological characteristics of flora of Mastuj Valley, District Chitral, Hindukush Range, Pakistan, *Pak. J. Bot*., **47(2)**:495-510.

Hussain, F. 1989. **Field and Laboratory Manual of Plant Ecology**. UGC (Now HEC) Islamabad, Pakistan.

Hussain, W, Badshah, L, Hussain, F and Ali, A. 2020. Floristic configuration and ecological characteristics of plants of Koh-e-Safaid Range, Northern Pakistani-afghan borders. *Acta Ecologica Sinica*, **40(3)**: 221-236. *https://doi.org/10.1016/j.chnaes.2020.04.006*

Ilyas, M, Qureshi, R and. Akhtar, N. 2018. Floristic diversity and vegetation structure of the remnant subtropical broad leaved forests from Kabal Valley, Swat, Pakistan. *Pak. J. Bot.,* **50(1)**:217-230.

Nasir, E and Ali, SI. 1970-189. **Flora of Pakistan**. No. 1-190. Pakistan Agriculture Research Council, Islamabad.

Rafiqullah, Siddiqui, MF, Sirajudin, Jelani, G and Riaz, S. 2021. Floristic leaf-size and life form spectra of District Pishin, Balochistan, Pakistan. *Pure and Applied Biology,* **10(4)**:1014-1027.http://dx.doi.org/10.19045/bspab.2021.100106

Raunkiær, C. 1934. **The Life Forms of Plants and Statistical Plants Geography**. Oxford: Clarendon Press.

Salama1, F, El-Ghani MA, Mahmoud, A and Amro, A. 2021. Macrophytic vegetation and its associations in relation to environmental factors inhabiting a large river-channel, Egypt. *Bioscience Research*, **18(1)**: 259-275

Shah, M, Hussain, F, Shah, SNM, Ahmad, I and Wasila, H. 2013. Life form and floristic characteristics along altitudinal gradient of humid temperate forests located in Northern area of Pakistan. *Global J. Biodiversity Science & Management,* **3(2)**: 276-281.

Sultan-Ud-Din, Ahmad, H, Ali, H and Ali, H. 2016. Floristic composition and life form classes of District Shangla, Khyber Pakhtunkhwa, Pakistan.

JBES, **8(3)**:187-206, ISSN: 2220 6663 (Print) 2222-3045 (Online) 2016. http://www.innspub.net

Raza, A and Shah, SM. 2020. Ecological evaluation and phytodiversity of vascular plants in Mir Ali, North Waziristan, Pakistan .*Intern. J. Biosciences* (IJB), **16 (1)**:205-226.

Reena, RL and Samuel, PD. 2020. Floristic diversity and phytosociological analysis of alien weeds of coconut plantations in Kanyakumari District Tamil Nadu India. *Intern. J. Bot. Studies,* **5(1)**:75-82.*www. botanyjournals.com.*

WWW. 2021. https://www.worldweatheronline.com/tirah-weather-averages/north-west-frontier/ pk.aspx; Accessed 2nd July 2021)

Yeshitila, M and Awas. T. 2020. Floristic composition, structure and distribution on closure area in Dara woreda, Sidama Zone, Southern Ethiopia. *Global Scientific Journal,* **8(1)**: 2116-2136. January) 2020.ISSN 2320-9186.Online: ISSN 2320-9186. www.globalscientificjournal.com.

Table 1. Summary of the Flora of the Tirah Khyber District and its and morpho-ecological features.

A	**Floristic Composition**	**Families**		**Genera**		**Species**	
	Major Group	**No**	**%**	**No**	**%**	**No**	%
	i. Bryophyta	2	2.56	2	0.87	2	0.61
	ii. Pteridophyta	4	5.13	10	4.35	10	3.03
	iii. Gymnosperms	2	2.56	5	2.17	6	1.82
	iv. Angiosperms	70	89.75	213	92.61	312	94.55
	a. Monocots	9	11.54	25	10.87	35	10.61
	b. Dicots	61	78.21	188	81.74	277	83.94
	Total	**78**	**100**	**230**	**100**	**330**	**100**
B	**Habitat Form**	**No**	**%**	**C. Habit Form**		**No.**	**%**
	i. Dry	63	19.09	i. Annual herbs		128	38.79
	ii. Mesic	198	60.0	ii. Perennial herbs		122	36.97
	iii. Moist/aquatic	69	20.91	iii. Shrubs		41	12.42
	Total	**330**	**100**	iv. Trees		39	11.82
				Total		**330**	**100**
D	**Shade & Light Requirement**			**E. Spinescence**			
		No	**%**			**No**	**%**
	i. Heliophytes	253	76.67	i. Non spiny		305	92.42
	ii. Sciophytes	77	23.33	ii. Spiny		25	7.58
	Total	**33o**	**100**	**Total**		**330**	**100**
F	**Leaf Types**	**No**	**%**	**F. Deciduousness**		**No**	**%**
	i. Simple entire	224	67.88	i. Deciduous		280	84.85
	ii. Simple incised	30	9.1	ii. Evergreen		50	15.15
	iii. Simple needles	06	1.82	**Total**		**330**	**100**
	iv. Compound pinnate	33	10.0				
	v. Compound palmate	15	4.55	**H. Cultivation status**		**No**	**%**
	vi. Compound trifoliate	14	4.24	i. Wild		267	80.91
	vii. Compound 4-foliate	01	0.3	ii. Cultivated		29	8.79
	viii. Scale leaves	05	1.52	iii. Wild/Cultivated		34	10.30
	ix. Cladodes	02	0.6	**Total**		**330**	**100**
	Total	**330**	**100**				
I	**Biological Spectrum**	**No**	**%**	**J. Leaf size Spectrum**		**No**	**%**
	i. Therophytes	128	38.79	i. Aphyllous		03	0.91
	ii. Hemicryptophytes	56	16.97	ii. Leptophyll		58	17.58
	iii. Geophytes	41	12.42	iii. Nanophyll		108	32.73
	iv. Megaphanerophytes	40	12.12	iv. Microphyll		108	32.73
	v. Nanophanerophytes	33	10.0	v. Mesophyll		47	14.24
	vi. Chamaephytes	31	9.39	vi. Macrophyll		06	1.82
	vii. Parasite	01	0.30	**Total**		**330**	**100**
	Total	**330**	**100**				

Table 2. Summary of Importance status of various families based on number of genera and species.

A.	**Based on the Number of Species (Total species=330)**		
S. No.	Name of Family	No. of Species	%
	Asteraceae	30	9.09
	Lamiaceae	28	8.48
	Rosaceae	27	8.18
	Poaceae	19	5.76
	Brassicaceae	15	4.55
	Solanaceae	13	3.94
	Cucurbitaceae	12	3.64
	Papilionaceae	11	3.33
	Caryophyllaceae	10	3.03
	Ranunculaceae	10	3.03
	Euphorbiaceae, Boraginaceae	8 each	2.42%
	Pteridaceae	7	2.12
	Geraniaceae, Polygoniaceae, Scrophulariaceae	6 each	1.82% each
	Chenopodiaceae, Salicaceae, Pinaceae	5 each	1.52% each
	10 families	3 each	0.91% each
	11 families	2 each	0.61% each
	35 families	1 each	0.3% each
Total	**78 families**		
B.	**Based on the Number of Genera (Total Genera= 230)**		
S. No.	Name of Family	No. of Genera	%
	Asteraceae	24	30.76
	Lamiaceae	19	24.36
	Poaceae	15	19.23
	Rosaceae	13	16.67
	Brassicaceae	10	12.82
	Papilionaceae	8	10.26
	Solanaceae, Cucurbitaceae, Caryophyllaceae, Boraginaceae, Pteridaceae	7 each	8.97% each
	Ranunculaceae	6	7.69
	Polygonaceae, Scrophulariaceae	5 each	6.41% each
	Euphorbiaceae, Pinaceae	4 each	5.13% each
	Geraniaceae, Thymelaeaceae,Urticaceae	3 each	3.85% each
	16 families	2 each	2.56% each
	43 families	1 each	1.28%each
Total	**78 families**		

Table 3. Floristic inventory and morpho-ecological features of the flora of the TirahValley Khyber District, Pakistan.

	Species	Habit	Life Form	Leaf Size	Habitat	Light/ shade	Spine-scence	Leaf type	Leaf fall	Cultivation status
	A. Bryophyta (2F; 2G; 2Sp)									
	1. Family Funariaceae (1G; 1Sp)									
1	*Funaria hgrometrica* Hedw	AH	Th	L	Moi	S	NS	SL	E	W
	2. Family Polytrichaceae (1G; 1Sp)									
2	*Polytrichum commune* Hedw	AH	Th	L	Moi	S	NS	SL	E	W
	B. **Pteridophytes (4F; 10 G; 10 sp)**									
	1. Family Equisetaceae (1G; 1sp)									
3	*Equisetum ramosissimum* Desh	PH	G	L	Moi	S	NS	SL	E	W
	2. Family Marsiliaceae (1G; 1sp)									
4	*Marsilea quadrifolia* L	PH	G	Mes	Aq	S	NS	C4f	E	W
	3. Family Pteridaceae (7G; 7 sp)									
5	*Adiantum capillus-veneris* L.	PH	G	Mic	Moi	S	NS	CPin	E	W
6	*Asplenium dalhousiae* Hook	PH	G	Mc	Moi	S	NS	CPin	E	W
7	*Cetrach dalhousii*	PH	G	Mic	Moi	S	NS	CPin	E	W
8	*Dryopteris sp*	PH	G	Mic	Moi	S	NS	CPin	E	W
9	*Pteris cretica* L	PH	G	Mic	Moi	S	NS	Cpin	E	W
10	*Pteridium aquilinum* (L) Kuhn	PH	G	L	Moi	S	NS	CPin	D	W
11	*Onychium contiguum* Wall ex Hope	PH	G	L	Moi	S	NS	CPin	D	W
	4. Family Selaginellaceae (1G; 1ap)									

12	*Selaginella sp*	PH	G	L	Moi	S	NS	SL	D	W
	C. **Gymnosperms (2F, 5G; 6Ss)**									
	1. Family Pinaceae (4G; 5 sp)									
13	*Abies pindrow* Royle	Tree	MP	N	Dry	H	NS	SN	E	W
14	*Cedrus deodara* (Roxb. ex D. Don) G.Don	Tree	MP	N	Dry	H	NS	SN	E	W
15	*Picea smithiana* (Wall.) Boiss.	Tree	MP	N	Dry	H	NS	SN	E	W
16	*Pinus roxburghii* Sargent	Tree	MP	L	Dry	H	NS	SN		
17	*Pinus wallichiana* A.B. Jackson	Tree	MP	N	Dry	H	NS	SN	E	W
	2. Family Taxaceae (1G; 1sp)									
18	*Taxus wallichiana* Zucc	Tree	MP	N	Dry	S	NS	SN	E	W
	D. **Angiosperms**									
	I. Monocotyledons (9F, 25G, 35 sp)									
	1. Family Alliaceae (1G; 3 sp)									
19	*Allium cepa* Linn	PH	G	Mic	Mes	H	NS	SE	D	C
20	*Allium griffithianum* Boiss.	PH	G	N	Mes	H	NS	SE	D	W
21	*Allium sativum* Linn	PH	G	N	Mes	H	NS	SE	D	C
	2. Family Araceae (2G; 3 sp)									
22	*Arisaema jacquemontii* Blume	PH	G	Mes	Moi	S	NS	CP	D	W
23	*Arisaema flavum* (Forssk.) Schott	PH	G	Mes	Moi	S	NS	CP	D	W
24	*Sauromatum venosum* (Ait.) Schott,	PH	G	Mes	Moi	S	NS	CP		
	3. Family Asparagaceae (1G; 2 sp)									
25	*Asparagus adscendens* Roxb	PH	G	Aph	Moi	S	NS	Cld	E	W

26	*Asparagus officinalis* L	PH	G	Aph	Moi	S	NS	Cld	E	W
	4. Family Cyperaceae (1G; 2 sp)									
27	*Cyperus rotundus* Linn	PH	G	L	Moi	S	NS	SE	D	W
28	*Cyperus difformis* Linn	AH	Th	L	Moi	S	NS	SE	D	W
	5. Family Haemodoraceae (1G; 1 sp)							SE		
29	*Liriope graminifolia* (L.) Baker.	PH	G	N	Mes	H	NS	SE		W
	6. Family Iridaceae (1G; 1 sp)									
30	*Moraea sisyrinchium* (L.) Ker Gawl.	PH	G	L	Mes	H	NS	SE	D	W
	7. Family Liliaceae (2G; 2 sp)							SE		
31	*Fritillaria roylei* Hook.	PH	G	Mic	Mes	S	NS	SE		W
32	*Tulipa clusiana* DC.	PH	G	Mic	Mes	H	NS	SE	D	W
	8. Family Orchidaceaes (2G; 2 sp)							SE		
33	*Dactylorhiza hatagirea* (D. Don) Soo	PH	G	Mic	Moi	S	NS	SE	D	W
34	*Spiranthes sinensis* (Pers.) Ames	PH	G	Mic	Moi	H	NS	SE	D	W
	9. Family Poaceae (15G; 19 sp)							SE		
35	*Arundo donax* Linn	PH	Ch	N	Moi	H	NS	SE	E	W
36	*Avena sativa* L.	AH	Th	N	Mes	H	NS	SE	D	W/C
37	*Arthraxon prionodes* (Steud.) Dandy	PH	He	Mic	Mes	H	NS	SE	D	W
38	*Cymbopogon jwarancusa* (Jones) Schult.	PH	He	Mic	Mes	H	NS	SE	E	W
39	*Cynodon dactylon* L.	PH	He	L	Mes	H	NS	SE	E	W
40	*Echinochloa crus-galli* (Linn.) P. Beauv	AH	Th	L	Mes	H	NS	SE	D	W

41	*Echinochloa colona* (Linn.) Link	AH	Th	L	Mes	H	NS	SE	D	W
42	*Eragrostis sp*	AH	Th	L	Mes	H	NS	SE	D	W
43	*Hyparrhenia hirta* (L.) Stapf	PH	He	L	Mes	H	NS	SE	E	W
44	*Lolium perenne* Linn	PH	H	L	Mes	H	NS	SE	D	W
45	*Poa annua* L.	AH	Th	L	Mes	H	NS	SE	D	W
46	*Sorghum bicolor* (Linn.) Moench	AH	Th	N	Mes	H	NS	SE	D	C
47	*Sorghum halepense* (Linn.) Pers	PH	He	N	Mes	H	NS	SE	D	W/C
48	*Saccharum spontaneum* Linn	PH	Ch	Mic	Moi	H	NS	SE	E	W
49	*Saccharum griffithii* Munro ex Boiss	PH	Ch	Mic	Moi	H	NS	SE	E	W
50	*Saccharum officinarum* Linn	PH	Ch	Mic	Moi	H	NS	SE	E	C
51	*Triticum arstivum*	AH	Th	N	Mes	H	NS	SE	D	C
52	*Hordeum vulgare*	AH	Th	N	Mes	H	NS	SE	D	C
53	*Zea mays* L.	AH	Th	Mes	Mes	H	NS	SE	D	C
	II. **Dicotyledons**									
	1. Family Acanthaceae (2G; 2 sp)									
54	*Strobilanthes glutinosus* Nees	Shrub	Ch	Mic	Moi	S	NS	SE	D	W
55	*Dodonaea viscosa* (Linn.) Jacq.	Shrub	NP	N	Dry	S	NS	SE	E	W/C
	2. Family Amaranthaceae (2G; 3 sp)							SE		
56	*Amaranthus viridis* L.	AH	Th	N	Mes	H	NS	SE		W
57	*Amaranthus spinosus* L.	AH	Th	Mic	Mes	H	SP	SE		W
58	*Digera muricata* (L.) Mart	AH	Th	L	Mes	H	NS	SE	D	W
	3. Family Apiaceae (2G; 3 sp)									
59	*Bupleurum falcatum L*	PH	He	L	Mes	H	NS	SE	D	W
60	*Bupleurum longicaule* Wall. ex DC.	AH	Th	Mic	Mes	H	NS	SE	E	W
61	*Coriandrum sativum* Linn.	AH	Th	L	Mes	H	NS	SI	D	C
	4. Family Araliaceae (1G; 1 sp)									

62	*Hedera nepalensis* K. Koch.	PH	MP Cl)	Mic	Mes	S	NS	SE	E	W
	5. Family Asteraceae (24G; 30 sp)									
63	*Anthemis arvensis* Linn.	AH	Th	L	Mes	H	NS	SI	D	W/c
64	*Artemisia vulgaris* L.	Shrub	Ch	N	Dry	H	NS	SI	D	W
65	*Artemisia scoparia* Waldst & Kit.	Shrub	Ch	N	Dry	H	NS	SI	D	W
66	*Calendula arvensis* (Vaill.) L.	AH	Th	N	Mes	H	NS	SE	D	W
67	*Calendula officinalis* Linn.	AH	Th	N	Mes	H	NS	SE	D	C
68	*Carpesium cernuum* Linn.	PH	Ch	Mic	Mes	H	NS	SE	D	W
69	*Centaurea iberica* Treviranus ex Sprengel	AH	Th	N	Mes	H	SP	SI	D	W
70	*Chrysanthemum leucanthemum* Linn	PH	He	L	Mes	H	NS	SI	D	W
71	*Cichorium intybus* L.	AH	Th	N	Mes	H	NS	SE	D	W
72	*Cirsium arvense* (L.) Scop.	AH	Th	N	Mes	H	SP	SE	D	W
73	*Cirsium verutum* (D.Don) Spreng.	AH	Th	Mes	Mes	H	SP	SE	D	W
74	*Cnicus benedictus* L	AH	Th	Mes	Mes	H	SP	SI	D	W
75	Echinops echinatus Roxb.	AH	Th	Mes	Dry	H	SP	SI	D	W
76	*Conyza bonariensis* (L) Cronquist.	AH	Th	Mes	Mes	H	NS	SE	D	W
77	*Conyza canadensis* (L.) Cronquist.	AH	Th	N	Mes	H	NS	SE	D	W
78	*Cotula hemisphaerica* (Roxb.) Wall. ex Benth. & Hook. f	AH	Th	L	Mes	H	NS	SE	D	W
79	*Filago arvensis* L.	AH	Th	Mic	Mes	H	NS	SE	D	W
80	*Galinsoga parviflora* Cavanilles	AH	Th	N	Mes	H	NS	SE	D	W
81	*Helianthus annuus* L.	AH	Th	Mic	Mes	H	NS	SE	D	W/C
82	*Launaea nudicaulis* (L.) Hook.f.	AH	Th	Mic	Mes	H	NS	SE	D	W
83	*Leucanthemum vulgare* Lam.	PH	He	Mic	Mes	H	NS	SE	D	W

84	*Matricaria chamomile* L.	AH	Th	L	Mes	H	NS	CPin	D	W
85	*Senecio analogus* DC.	PH	G	Mic	Mes	H	NS	SI	D	W
86	*Senecio chrysanthemoides* DC.	AH	Th	Mes	Mes	H	NS	SI	D	W
87	*Seriphidium kurramenesis* (Qazilb.) Y. R. Lling	Shrub	Ch	L	Mes	H	NS	SI	D	W
88	*Sonchus asper* L.	AH	Th	Mic	Moi	S	NS	SI	D	W
89	*Sonchus oleraceus* L.	AH	Th	Mic	Moi	S	NS	SI	D	W
90	*Tagetus patula*.	AH	TH	Mic	Mes	S	NS	SI	D	W
91	*Taraxacum officinale* Weber.	AH	Th	Mic	Mes	H	NS	SI	D	W
92	*Xanthium strumarium* L.	AH	Th	N	Dry	H	SP (Fruit spiny)	SE	D	W
	6. Family Balsaminaceae (1G; 4 sp)							SE		
93	*Impatiens bicolor* Royle	AH	Th	Mes	Mes	S	NS	SE	D	W
94	*Impatiens brachycentra* Kar.	AH	Th	N	Mes	S	NS	SE	D	W
95	*Impatiens edgeworthii* Hook.	AH	Th	Mes	Mes	S	NS	SE	D	W
96	*Impatiens glandulifera* Royle	AH	Th	N	Mes	S	NS	SE	D	W
	7. Family Berberidaceae (1G; 1 sp)							SE		
97	*Berberis lycium* Royle	Shrub	NP	Mic	Dry	H	SP	SE	E	W
	8. Family Bignoniaceae (1G; 1 sp)									
98	*Incarvillea emodi* (Royle ex Lindl.) Chatterjee	PH	He	N	Mes	H	NS	CPin	D	W
	9. Family Boraginaceae (7G; 8 sp)									
99	*Cordia gharaf* (Forssk.) Ehren.ex Asch.	Tree	MP	Mes	Mes	H	NS	SE	D	W/C
100	*Cynoglossum lanceolatum* Forssk.	PH	He	N	Mes	H	NS	SE	D	W
101	*Ehretia obtusifolia*Hochst.ex DC	Shrub	NP	Mic	Dry	H	NS	SE	D	W

102	*Heliotropium europaeum*var. *lasiocarpum*(F. & M.) Kazmi	AH	Th	N	Dry	H	NS	SE	D	W
103	*Lithospermum officinale* L.	PH	He	N	Mes	H	NS	SE	D	W
104	*Nonea edgeworthii* A. DC.	AH	Th	N	Mes	H	NS	SE	D	W
105	*Nonea pulla* (L.) DC	AH	Th	N	Mes	H	NS	SE	D	W
106	*Onosma khyberianum* I. M. Johnston	AH	Th	Mic	Mes	H	NS	SE	D	W
	10. Family Brassicaceae (10 G; 10 sp)									
107	*Brassica juncea* (Linn.) Czern. et Coss	AH	Th	N	Dry	H	NS	SI	D	C
108	*Brassica napus* subsp. *napus*	AH	Th	N	Dry	H	NS	SI	D	C
109	*Brassica nigra* (Linn.) Koch	AH	Th	N	Dry	H	NS	SI	D	W/c
110	*Brassica oleracea* var. *botrytis* Linn. Gobi	AH	Th	N	Dry	H	NS	SI	D	C
111	*Brassica rapa* subsp. *campestris* (Linn.) Clapham	AH	Th	Mic	Mesi	H	NS	SI	D	W/C
112	*Eruca sativa* Mill	AH	Th	L	Dry	H	NS	SI	D	W/C
113	*Capsella bursa-pastoris* (Linn) Medikus	AH	Th	L	Moi	H	NS	SI	D	W
114	*Cardaria draba* (L.) Desv.	AH	Th	N	Mes	H	NS	SI	D	W
115	*Coronopus didymus* L.	AH	Th	L	Moi	H/S	NS	SI	D	W
116	*Nasturtium officinale* R. Br	PH	G	N	Aq	H	NS	SI	E	W
117	*Neslia apiculata* Fisch., C.A. Mey. & Ave'-Lall	AH	Th	L	Mes	H	NS	SE	D	W
118	*Lepidium apetalum* Willd	AH	Th	L	Dry	H	NS	SE	D	W
119	*Lepidium sativum* Linn	AH	Th	L	Dry	H	NS	SI	D	W
120	*Rorippa indica* (Linn.) Hiern,	AH	Th	L	Aq	H	NS	SI	D	W
121	*Sisymbrium irio* Linn	AH	Th	L	Mes	H	N	SI	D	W
	11. Family Cannabaceae (1G; 1 sp)									
122	*Cannabis sativa* L.	AH	Th	Mic	Mes	H	NS	CP	D	W
	12. Family Convallariaceae (1G; 1 sp)									
123	*Polygonatum multiflorum* L.	PH	G	Mic	Mes	S	NS	SE	D	W

	13. Family Caprifoliaceae (2G; 3 sp)									
124	*Lonicera griffithii* Hook.f. & Thoms.	Shrub	NP	Mic	Mes	H	NS	SE	D	W
125	*Lonicera quinquelocularis*	Shrub	NP	Mic	Mes	H	NS	SE	D	W
126	*Viburnum cotinifolium* D. Don	Shrub	NP	Mic	Mes	H	NS	SE	D	W
	14. Family Caryophyllaceae (7G; 10 sp)									
127	*Arenaria serpyllifolia* L	AH	Th	L	Mes	H	NS	SE	D	W
128	*Cerastium dichotomum* L	PH	He	L	Mes	H	NS	SE	D	W
129	*Cerastium cerastioides* (L.) Britton	PH	He	L	Mes	H	NS	SE	D	W
130	*Cerastium glomeratum* Thuill	AH	Th	L	Mes	H	NS	SE	D	W
131	*Dianthus anatolicus* Boiss	PH	Ch	N	Dry	H	NS	SE	D	W
132	*Silene vulgaris* (Moench) Garcke	AH	Th	L	Mes	H	NS	SE	D	W
133	*Silene conoidea* L.	AH	Th	L	Mes	H	NS	SE	D	W
134	*Spergula arvensis* L.	AH	Th	L	Mesic	H	NS	SE	D	W
135	*Spergularia media* (L.) Presl	PH	He	L	Mesic	H	NS	SE	D	W
136	*Stellaria media* (L.) Vill	AH	Th	N	Mesic	S	NS	SE	D	W
	15. Family Chenopodiaceae (2G; 5 sp)									
137	*Chenopodium album* L.	AH	Th	Mic	Mesic	H	NS	SE	D	W
138	*Chenopodium ambrosioides* L.	AH	Th	Mic	Moist	H	NS	SE	D	W
139	*Chenopodium botrys* L.	AH	Th	N	Mesic	H	NS	SE	D	W
140	*Chenopodium murale* Linn	AH	Th	N	Mesic	H	NS	SE	D	W
141	*Spinacia oleracea* Linn	AH	Th	N	Mesic	H	NS	SE	D	C

	16. Family Cucurbitaceae (7G; 12 sp)									
142	*Cucurbita maxima* Duch. ex Lam Metha kadu	AH, trailer	Th	Meg	Mesic	H	NS	SE	D	W
143	*Cucurbita moschata* (Duch. ex Lam.) Duch. ex Poir	AH trailer	Th	Meg	Mesic	H	NS	CP	W	C
144	*Lagenaria siceraria* (Molina) Standley	AH trailer	Th	Mes	Mesic	H	NS	CP	D	C
145	*Cucumis melo* subsp. *melo* var. *melo* Sweet melon	AH trailer	Th	Mic	Mesic	H	NS	SE	D	C
146	*Cucumis prophetarum* Linn	AH trailer	Th	Mic	Mesic	H	NS	SE		W
147	*Cucumis sativus* Linn	AH	Th	Mic	Mesic	H	NS	SE	D	C
148	*Momordica charantia* Linn	AH trailer	Th	Mic	Mesic	H	NS	CP	D	C
149	*Citrullus lanatus* (Thunb.) Mats. & Nakai Tarboa	AH trailer	Th	Mes	Mesic	H	NS	SE	D	C
150	*Citrullus colocynthis* (Linn.) Schrad.	PH trailer	He	Mes	Dry	H	NS	SE	D	W
151	*Luffa cylindrica* (Linn.) Roem	AH	Th	Mes	Mesic	H	NS	SE	D	C
152	*Luffa acutangula* var. *acutangula*	AH	Th	Mes	Mesic	H	NS	SE	D	C
153	*Praecitrullus fistulosus* (Stocks) Pangalo Tinda	AH	Th	Mes	Mesic	H	NS	SE	D	C
	17. Family Convolvulaceae (2G; 2 sp)									
154	*Convolvulus arvensis* Linn.	PH	He	N	Mesic	H	NS	SE	D	W
155	*Ipomoea purpurea* L.	AH	Th	N	Mesic	H	NS	CP	D	W
	18. Family Cornaceae (1G; 1 sp)									
156	*Cornus macrophylla* Wall.	Tree	MP	Mic	Mesic	H	NS	SE	D	W
	19. Family Dipsacaceae (1G; 1 sp)									
157	*Dipsacus* sp.	AH	Th	Mic	Mesic	H	NS	SE	D	W
	20. Family Ebenaceae (1G; 1 sp)									

158	*Diospyros lotus* L.	Tree	MP	Mic	Mesic	H	NS	SE	D	W
	21. Family Euphorbiaceae (4G; 8 sp)									
159	*Andrachne cordifolia* (Wall. ex Decne.) Muell. Arg.	Shrub	NP	Mic	Dry	H	NS	SE	D	W
160	*Chrozophora tinctoria* (L) Raf.	AH	Th	Mic	Dry	H	NS	SE	D	W
161	*Euphorbia indica* Lam.	AH	Th	L	Dry	H	NS	SE	D	W
162	*Euphorbia helioscopia* L.	AH	Th	N	Mesic	H	NS	SE	D	W
163	*Euphorbia hirta* L	AH	Th	L	Mesic	H	NS	SE	D	W
164	*Euphorbia granulata* Forssk	PH	Th	L	Mesic	H	NS	SE	D	W
165	*Euphorbia prostrata* Ait	AH	Th	L	Mesic	H	NS	SE	D	W
166	*Ricinus communis* L.	Shrub	Ch	Mac	Mesic	H	NS	CP	D	W
	22. FamilyFagaceae (1G; 2 sp)									
167	*Quercus baloot* Griffth	Tree	MP	Mic	Dry	H	Leaf spiny	SE	E	W
168	*Quercus dilatata* Royle	Tree	MP	Mic	Dry	H	NS	SE	E	W
	23. FamilyFumariaceae (1G; 1 sp)									
169	*Fumaria indica* (Hausskn.) Pugsley	AH	Th	N	Mesic	S	NS	SI	D	W
	24. Family Geraniaceae (3G; 6 sp)									
170	*Erodium malacoides* (L.) L'Herit ex Aiton,	AH	Th	N	Mesic	D	NS	SI	D	W
171	*Erodium cicutarium* (L.) L'Herit, ex Aiton	AH	Th	N	Mesic	D	NS	SI	D	W
172	*Geranium lucidum* L.	AH	Th	N	Mesic	S	NS	SI	D	W
173	*Geranium nepalense* Sweet,	AH	Th	Mic	Mesic	S	NS	SI	D	W
174	*Geranium wallichianum* D. Don ex Sweet.	PH	He	Mic	Mesic	S	NS	SI	D	W
175	*Pelargonium zonale* L'Herit ex Soland	PH	He	N	Mesic	S	NS	SE		C
	25. Family Hypericaceae (1G; 1 sp)									

176	*Hypericum perforatum* L.	PH	He	N	Mesic	H	NS	SE	D	W
	26. FamilyJuglandaceae1G; 1 sp)							SE		
177	*Juglans regia* L.	Tree	MP	Mg	Mesic	H	NS	SE	D	W
	27. Family Lamiaceae (19 G; 28 sp)									
178	*Ajuga bracteosa* Wall.	PH	He	Mic	Moist	S	NS	SE	D	W
179	*Ajuga parviflora* Benth.	PH	He	Mic	Moist	S	NS	SE	D	W
180	*Clinopodium umbrosum* (M. Bieb.) Fisch. & Meyer	PH	He	Mic	Moist	H	NS	SE	D	W
181	*Isodon rugosus* (Wall. ex Benth.) Codd	Shrub	NP	N	Dry	H	NS	SE	D	W
182	*Lamium album* L.	PH	He	N	Mesic	S	NS	SE	D	W
183	*Lamium amplexicaule* L	AH	Th	N	Moist	S	NS	SE	D	W
184	*Leonurus cardiaca* L.	AH	Th	Mic	Mesic	H	NS	SE	D	W
185	*Marrubium vulgare* L.	PH	H	Mic	Mesic	H	NS	SE	D	W
186	*Mentha arvensis* L.	PH	G	Mic	Moist	H	NS	SE	E	W
187	*Mentha longifolia* L.	PH	G	N	Moist	H	NS	SE	E	W
188	*Mentha viridis* L.	PH	G	Mic	Moist	H	NS	SE	E	W
189	*Micromeria biflora* (Buch.-Ham.ex D. Don) Benth.	PH	He	L	Mesic	S	NS	SE	D	W
190	*Nepeta erecta* (Boyle ex Benth.) Berth.	PH	He	Mic	Mesic	H	NS	SE	D	W
191	*Nepeta laevigata* (D. Don) Hand.	PH	He	L	Mesic	H	NS	SE	D	W
192	*Ocimum basilicum* L.	pH	Ch	Nan	Mesic	H	NS	SE	E	C
193	*Origanum vulgare* L.	Shrub	Ch	Mic	Dry	H	NS	SE	D	W
194	*Phlomis cashmeriana* Royle ex Benth.	PH	Ch	Mic	Mesic	H	NS	SE	D	W
195	*Phlomis spectabilis* Falc. Ex Bth	PH	Ch	Mic	Mesic	H	NS	SE	D	W
196	*Prunella vulgaris* L.	PH	He	N	Mesic	H	NS	SE	D	W
197	*Salvia hians* Royle ex Benth	PH	Ch	N	Mesic	H	NS	SE		

198	*Salvia moocroftiana*Wall. Ex Benth.	PH	He	Mic	Mesic	H	NS	SE	D	W
199	*Salvia nubicola* Wall. ex Sweet,	PH	He	Mic	Mesic	H	NS	SE	D	W
200	*Salvia plebeia* R. Br.	AH	Th	Mes	Mesic	H	NS	SE	D	W
201	*Scutellaria chamaedrifolia* Hedge & Paton	PH	Ch	N	Mesic	H	NS	SE	D	W
202	*Stachys emodi* Hedge.	PH	He	N	Mesic	H	NS	SE	D	W
203	*Teucrium royleanum* Wall. ex Benth.	PH	Ch	Mic	Dry	H	NS	SE	D	W
204	*Teucrium stocksianum* Boiss	PH	Ch	L	Dry	H	NS	SE	D	W
205	*Thymus linearis* subsp. *linearis* Jalas	PH	He	N	Mesic	H	NS	SE	E	W
	28. Family Malvaceae (2G; 3 sp)									
206	*Hibiscus rosa-sinensis* Linn	Shrub	Ch	N	Mesc	H	NS	SE	E	
207	*Malva neglecta* Wallr.	PH	He	Mic	Mesic	H	NS	SE	DC	W
208	*Malva parviflora* L.	AH	Th	Mic	Mesic	H	NS	SE	D	W
	29. Family Moraceae (2G; 4 sp)									
209	*Ficus carica* L.	Tree	MP	Mes	Mesic	H	NS	SE	D	W
210	*Ficus palmata* Forssk.	Tree	MP	Mes	Mesic	H	NS	SE	D	W
211	*Morus alba* L.	Tree	MP	Mes	Mesic	H	NS	SE	D	W
212	*Morus nigra* L.	Tree	MP	Mes	Mesic	H	NS	SE	D	W
	30. FamilyMorinaceae(1G; 1 sp)									
213	*Morina coulteriana* Royle	PH	He	Mes	Mesic	H	SP	SE	D	W
	31. Family Oleaceae (2G; 3 sp)									
214	*Jasminum humile* L.	Shrub	NP	Mic	Mesic	H	NS	CPin	E	W/C
215	*Jasminum officinale* L.	Shrub	NP	Mic	Mesic	H	NS	CPin	E	W/C
216	*Olea ferruginea* Royle	Tree	MP	Mic	Dry	H	NS	SE	E	W/C
	32. Family Onagraceae (2G; 2 sp)									
217	*Epilobium hirsutum* L.	PH	He	N	Mesic	H	NS	SE	D	W
218	*Oenothera rosea* L	PH	He	Mic	Mesic	H	NS	SE	D	W
	33.Family Orobonchaceae (1G; 1 sp)									

219	*Orobanche agyptiaca* Steph.	AH	Root (Para)	Aph	Mesic	H	NS	SL	D	W
	34. Family Oxalidaceae (1G; 1 sp)									
220	*Oxalis corniculata* L.	PH	He	N	Moist	S	NS	CT	D	W
	35. Family Papaveraceae (1G; 1 sp)									
221	*Papaver somniferum* L.	AH	Th	Mes	Mesic	H	NS	SE	D	W
	36. Family Papilionaceae(8G; 11sp)									
222	*Astragalus graveolens* Buch.	Shrub	Ch	L	Dry	H	NS	CPin	D	W
223	*Desmodium elegans* DC.	Shrub	NP	Mes	Dry	H	NS	CT	D	W
224	*Astragalus neubauerianus* Sirjaev & Rechinger fil	PH	Ch	N	Dry	H	NS	CPin	D	W
225	*Indigofera heterantha* Wall.ex Brandis	Shrub	NP	L	Dry	H	NS	CPin	D	W
226	*Lespedeza juncea* (L. f.) Pers.	PH	He	N	Mesic	H	NS	CT	D	W
227	*Medicago lupulina* L.	AH	Th	N	Mesic	H	NS	CT	D	W
228	*Medicago minima* (Linn.) Grufb	AH	Th	N	Mesic	H	NS	CT	D	W
229	*Medicago polymorpha* L.	AH	Th	N	Mesic	H	NS	CT	D	W
230	*Sophora mollis* (Royle) bakerin hook.	Shrub	NP	L	Dry	H	NS	CPin	D	W
231	*Trifolium repens* L.	PH	He	N	Moist	H	NS	CT	D	W
232	*Robinia pseudo-acacia* L.	Tree	MP	N	Dry	H	NS	Cpin	D	W/C
	37. Family Plantaginaceae (1G; 4 sp)									
233	*Plantago himalaica* Pilger	PH	He	Mic	Moist	H	NS	SE	D	W
234	*Plantago lanceolata* L.	PH	He	Mes	Mesic	H	NS	SE	D	W
235	*Plantago major*L.	PH	G (Aq)	Mic	Moist	H	NS	SE	D	W
236	*Plantago ovata* Forssk.	AH	Th	N	Mesic	H	NS	SE	D	W
	38. Family Platanaceae (1G; 1 sp)									
237	*Platanus orientalis* Linn	Tree	MP	Mac	Mesic	H	NS	CP	D	W/C

	39. F amilyPlumbaginaceae(1G; 1 sp)									
238	*Limonium macrorhabdon* (Boiss.) O. Kuntze.	PH	Ch	Mic	Mesic	H	NS	SE	D	W
	40. Family Podophyllaceae (1G; 1sp)									
239	*Podophyllum emodi* Wall. ex Royle	PH	G	N	Mesic	S	NS	CT	D	W
	41. Family Polygonaceae (5G; 6 sp)									
240	*Bistorta amplexicaulis* (D. Don) Green	PH	He	Mes	Moist	S	NS	SE	D	W
241	*Emex spinosus* (L.) Campd	AH	Th	Mes	Moist	S	SP	SE	D	W
242	*Persicaria glabra* (Willd.) M. Gomes	PH	He	N	Moist	S	NS	SE	D	W
243	*Polygonum plebejum* R. Br.	AH	Th	N	Moist	H	NS	SE	D	W
244	*Rumex dentatus* subsp. klotzschianus (Meisn.) Rech. f	AH	Th	Mes	Dry	H	NS	SE	E	W
245	*Rumex hastatus* D. Don	PH	Ch	N	Dry	H	NS	SE		
	42. Family Primulaceae (2G; sp)									
246	*Anagallis arvensis*	AH	Th	L	Moist	H	NS	SE	D	W
247	*Androsace himalaica* (Knuth) Handel-Mazzi	PH	He	L	Mesic	S	NS	SE	D	W
248	*Androsace rotundifolia* Hardwicke	PH	He	L	Moist	S	NS	SE	D	W
	43. Family Punicaceae (1G; 1 sp)									
249	*Punica granatum* L.	Tree	MP	N	Dry	H	NS	SE	D	W/C
	44. Family Ranunculaceae (6G; 10 sp									
250	*Actaea spicata* L.	PH	He	N	Mesic	H	NS	CPin	D	W
251	*Aquilegia fragrans* Benth.	PH	G	L	Mesic	S	NS	SE	D	W
252	*Clematis grata* Wall.	Tree	MP (Cl)	Mic	Mesic	H	NS	CPin	D	W
253	*Clematis montana* Buch. -Ham. ex DC	Tree	MP (Cl)	Mic	Mesic	H	NS	CPin	D	W
254	*Delphinium uncinatum* Hk.f. & T.	PH	He	N	Mesic	S	NS	SI	D	W
255	*Ranunculus laetus* Wall. ex Hook.	PH	G	Mes	Moist	H	NS	CP	D	W
256	*Ranunculus muricatus* L.	AH	Th	Mic	Moist	H	NS	CP	D	W

257	*Ranunculus sceleratus* L.	AH	Th	N	Moist	H	NS	SI	D	W
258	*Thalictrum foliolosum* DC.	PH	He	Mic	Mesic	S	NS	CPin	D	W
259	*Thalictrum pedunculatum* Edgew	PH	He	Mic	Mesic	S	NS	CPin	D	W
260	**45. FamilyRhamnaceae (1G; 1 sp)**									
	Sageretia thea (Osbeck) M.C Johnston	Shrub	NP	Mic	Mesic	H	NS	SE	E	W
	46. Family Rosaceae (13G; 27 sp)									
261	*Cotoneaster microphyllus* Wall. Ex Lindl.	Tree	MP	L	Dry	H	NS	SE	E	W
262	*Cotoneaster nummularius* Fisch. & C.A. Mey.	Shrub	NP	N	Dry	H	NS	SE	D	W
263	*Crataegus songarica* K. Koch	Tree	MP	Mic	DRy	H	NS	SE	D	W/C
264	*Duchesnea indica* (Andrews) Focke	PH	G	N	Moist	S	NS	CT	D	W/C
265	*Fragaria nubicola* (Hook.f.) Lindl.ex Lacaita	PH	G	L	Moist	S	NS	CT	D	W/C
266	*Malus pumila* Mill.	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
267	*Potentilla supina* L.	AH	Th	N	Dry	H	NS	CT	D	W/C
268	*Prunus armeniaca* L.	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
269	*Prunus domestica* L.	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
270	*Prunus persica* (L.) Butsch	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
271	*Pyrus communis* L.	Tree	MP	Mic	Dry	H	NS	SE	D	W/C
272	*Pyrus pashia* Buch-Ham.ex D.Don	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
273	*Pyrus pyrifolia* (Burn.) Nak.	Tree	MP	Mes	Dry	H	NS	SE	D	W/C
274	*Rosa alba* L.	Shrub	NP (Cl)	N	Dry	H	SP	CPin	D	W
275	*Rosa brunonii* Lindl.	Shrub	NP (Cl)	Mic	Mesic	H	SP	CPin	D	W
276	*Rosa indica* Lindl	Shrub	NP, (Cl)	N	Mesic	H	SP	CPin	D	W/C
277	*Rosa macrophylla* Lindl.	Shrub	NP (Cl)	N	Mesic	H	SP	CPin	D	W/C
278	*Rosa moschata* J. Herrm	Shrub	NP (Cl)	Mic	Mesic	H	SP	CPin	D	W/C
279	*Rosa webbiana* Wall. ex Royle	Shrub	NP (Cl)	Mic	Mesic	H	SP	CPin	D	W

280	*Rubus macilentus* Jacquem ex Cambess	Shrub	NP	Mic	Mesic	H	SP	CT	D	W
281	*Rubus fruticosus* L	Shrub	NP (Cl)	Mic	Moist	S	SP	CPin	D	W
282	*Rubus niveus* Thunb	Shrub	NP (Cl)	Mic	Mesic	H	SP	CPin	D	W
283	*Rubus sanctus* Schreber	Shrub	NP (Cl)	Mic	Mesic	H	SP	CT	D	W
284	*Sorbaria tomentosa* (Lindl.) Rehdr	Shrub	NP	Mic	Mesic	H	NS	Cpin	D	W
285	*Spiraea canescens* D. Don	Shrub	NP	Mic	Mesic	H	NS	SE	D	W
286	*Spiraea hypericifolia* L	Shrub	NP	Mic	Dry	H	NS	SE	D	W
287	*Spiraea vacciniifolia* D.Don	Shrub	NP	Mic	Dry	H	NS	SE	D	W
	47. Family Rubiaceae (2G; 2 sp)							SE		
288	*Galium aparine* L	AH cl	Th	L	Mesic	S	SP	SE	D	W
289	*Rubia cordifolia* L.	PH	He (Cl)	Mic	Moist	S	SP	SE	D	W
	48. Family Rutaceae (1 G; 1 sp)									
290	*Skimmia laureola* (DC.) Sieb.	Shrub	NP	Mes	Mesic	S	NS	SE	E	W
	49. Family Salicaceae (2G; 5 sp)									
291	*Populus alba* L.	Tree	MP	Mes	Mesic	H	NS	SE	D	W/C
292	*Populus nigra* L.	Tree	MP	Mic	Mesic	H	NS	SE	D	W/C
293	*Salix alba* L.	Tree	MP	N	Mesic	H	NS	SE	D	W/C
294	*Salix tetrasperma* Roxb	Tree	MP	Mic	Moist	H	NS	SE	D	W
295	*Salix babylonica* Linn	Tree	MP	Mic	Moist	H	NS	SE	D	W
	50. Family Sambucaceae (1G; 1 sp)									
296	*Sambucus wightiana* Wall. ex Wight & Arn	PH	Ch	N	Mesic	H	NS	CP	D	W
	51. Family Saxifragaceae (1G; 1sp)									
297	*Bergenia ciliata* (Haw.) Sternb.	PH	G	Mes	Moist	S	NS	SI	D	W
	52. Family Scrophulariaceae (5G; 6 sp)									

298	*Euphrasia himalaica* Wettst.	AH	Th	L	Moist	S	NS	SE	D	W
299	*Scrophularia polyanthis*	Ph	He	L	Mesic	S	NS	SE	D	W
300	*Verbascum thapsus* L.	AH	Th	Mes	Dry	H	NS	SE	D	W
301	*Veronica anagallis-aquatica* L.	PH	G	N	Moist	H	NS	SE	D	W
302	*Veronica biloba*	AH	Th	L	Moist	S	NS	SE	D	W
303	*Wulfeniopsis amherstiana* (Wall. ex Bth.) Hong	PH	He	Mes	Moist	S	NS	SI	E	W
	53. Family Simaroubaceae (1G; 1 sp)									
304	*Ailanthus altissima* (Mill.) Swingle	Tree	MP	Mes	Dry	H	NS	CPin	D	W
	54. Family Solanaceae (7G; 13 sp)									
305	*Capsicum annuum* L	AH	Th	Mes	Mesic	H	NS	SE	D	C
306	*Datura innoxia* Miller	AH	Th	Mes	Dry	H	NS (fruit spiny)	SE	D	W
307	*Datura stramonium* L.	AH	The	Mic	Dry	H	NS	SE	D	W
308	*Hyoscyamus niger* L	AH	Th	L	Dry	H	NS	SE	D	W
309	*Solanum nigrum* L.	AH	Th	Mic	Mesic	H	NS	SE	D	W
310	*Solanum surattense* Burm.f.	AH	Th	N	Mesic	H	SP	SI	D	W
311	*Solanum tuberosum* L	PH	G	Mic	Mesic	H	NS	CPin	D	C
312	*Solanum melengena*	AH	Th	Mic	Mesic	H	NS	SE	D	C
313	*Solanum pseudocapsicum* L	PH	Ch	Mic	Mesic	H	NS	SE	D	W
314	*Physalis divaricata* D. Don	AH	Th	Mic	Mesic	S	NS	SE	D	W
315	*Lycopersicon esculentum* Miller	AH	Th	L	Mesic	H	NS	CPin	D	C
316	*Withania somnifera* (L.) Dunal	PH	Ch	N	Mesic	H	NS	SE	D	W
317	*Withania coagulans* (Stocks) Dunal	PH	Ch	N	Dry	H	NS	SE	D	W

	55. Family Thymelaeaceae (3G; 3 sp)									
318	*Daphne mucronata* Royle.	Shrub	NP	N	Mesic	S	NS	SE	E	W
319	*Thymelaea passerina* (L.) Cosson and Germain	AH	Th	L	Mesic	H	NS	SE	D	W
320	*Wikstroemia canescens* Meisn.	Shrub	NP	N	Mesic	H	NS	SE	D	W
	56. Family Ulmaceae (1G; 1 sp)									
321	*Celtis caucasica* Willd.	Tree	MP	N	Dry	H	NS	SE	D	W
	57. Family Urticaceae (3G; 3 sp)									
322	*Girardinia palmata* (Forssk.) Gaudich. (Stining nettle)	PH	Ch	Mac	Moist	S	NS	CP	D	W
323	*Pilea umbrosa* Blume	PH	Ch	N	Moist	S	NS	SE	D	W
324	*Urtica dioica* L. (Stining nettle)	PH	Ch	N	Mesic	S	NP	SE	D	W
	58. Family Valerianaceae (1G; 2 sp)									
325	*Valeriana jatamansi*Jones	PH	G	Mic	Moist	S	NS	SE	D	W
326	*Valerianella muricata* (Stev.) Baxt.	AH	Th	N	Moist	S	NS	SE	D	W
	59. Family Verbenaceae (2G; 2 sp)									
327	*Verbena officinalis* L.	PH	He	Mic	Mesic	H	NS	SI	D	W
328	*Vitex negundo* Linn	Shrub	NP	Mic	Misic	H	NS	CT	E	W
	60. Family Violaceae (1G; 1 sp)									
329	*Viola canescens* Wall. ex Roxb.	PH	He	N	Moist	S	NS	SE	D	W/C
	61. Family Vitaceae (1G; 1 sp)									
330	*Vitis vinifera* L.	Tree (Cl)	MP	Mes	Mesic	H	NS	CP	D	W/C

Key to the legend:

Habit: AH=Annual herb, PH=Perennial herb. **Lifeform**: Th=Therophyte, He=Hemicryptophyte, CH=Chamaephyte, G=Geophyte, NP=Nanophanerophyte, MP= Megaphanerophyte, Cl= Climber/scandent/trailing. **Leaf sizes**: L=Leptophyll, N= Nanophyll, Mic=Microphyll, Mes=Mesophyll, Mac=Macrophyll, Meg=Megaphyll, Aph=Aphyllous. **Habitat**: Dry= Dry/ no moisture, Mes= normal/ terrestrial soil, Moi= with some soil moisture, Aq= Aquatic/hydrophytic. **Light requirement**: H= Heliophyte, S=Sciophyte. **Spinescence**: SP= Spiny (any part), NS= Non-spiny. **Deciduousness**: D= Deciduous, E=Evergreen. **Cultivation status:** W=Wild, C= Cultivated, W/C= both wild and cultivated. Leaf Type: SE= Simple entire, SI= Simple incised, SN=Simple Needles, CP= Compound palmate, CPin= Compound pinnate, CT= Compound Trifoliate, SL= Scale leaves, Cld: Cladodes.