Research Article

Investigating the floristic diversity indices of plant species in district Charsadda, Khyber Pakhtunkhwa, Pakistan

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Abstract

The floristic study carried out during 2017-2019 revealed that, district Charsadda comprised total of 146 plant species belonging to 58 families and 127 genera. The leading families were Asteraceae with 14 species (9.58%), Poaceae 12 species (8.21%), Solanaceae 8 species (5.47%) and Cucurbitaceae 7 species (4.79%). Apiaceae, Brassicaceae, Lamiaceae, Moraceae, Papilionaceae contribute by 5 species each (3.42%), Chenopodiaceae, Rosaceae having 4 species each (2.73%), Amaranthaceae, Euphorbiaceae, Malvaceae, Polygonaceae, Pteridaceae contributed by 3 species each (2.05%), Alliaceae, Areaceae, Asclepiadaceae, Cyperaceae, Ebinaceae, Equisetaceae, Fabaceae, Genetaceae, Geraniaceae, Mimosaceae, Myrtaceae, Oleaceae, Pinaceae, Rhamnaceae, Rutaceae contributed by 2 species each (1.36%). The rest of the 27 families contributed by 1 species each (0.68%). The most dominant life form was therophytes having 66 species (45.20%), Microphanerophytes 22 species (15.06%), and Chaemophytes 18 species (12.32%). Hemicyrptophyte 14 species (9.58%) Nanophanerophytes 10 species (6.84%), Geophytes 9 species (6.16%), Megaphanerophytes 4 species (2.75%) followed by Mesophanerophytes having 2 species (1.36%). Leaf size spectra of the flora showed that the most dominant leaf size class were microphyll having 54 species (36.98%), nanophyll 32 species (21.91%), mesophyll 29 species (19.86%), leptophylls 17 species (11.64%), megaphyll contributed by 8 species (5.47%) followed by macrophyll which represent 5 species (3.04%) and the one species is aphyllus. The dominant therophytic life form showed that the flora of the area is under severe anthropogenic activity. This study not only gives information about the flora of Charsadda but can provide a baseline for future studies and plantation of this area.

Keywords: Floristic diversity; Life forms; Leaf spectrum; District Charsadda

Introduction

A huge number of plant species are yet to be uncovered by the botanist. Therefore, the floristic report is the only source to get botanical information about the area and it may help in starting for detailed study [1]. The word floristic is derived from flora which means to list all types of plant species or plant taxa within specific geographical area [2]. To improve conservation stratagems for plants of any area, it is necessary to have a comprehensive floristic record of the area.
centred on collection and correct documentation [3]. Floristic study is a very important for ecological sustainability and conservation of plants for an area. Floristic research is one of the most effective method to manage proper and protection of plants [4]. The documentation of the local plants with the description of an area is very necessary, because it can provide information throughout the time about distribution, occupancy, growing season and species rigidity of the available plants [5]. Floristic study also provide information about new species in a specific area, so by that way we can also analysis about migrated plants species [5]. Furthermore, the documentation of the plant species of the specific area is play chief role in environmental science respect to climate change [6]. Respect to climate change, Life form spectrum may also provide information about plant species, population size and their distribution over the area [7]. The life forms of plants are different in every zone on the basis of altitude. Three types of climates can be seen on earth, which includes phanerophytic in tropic, therophytic in desert and hemicryptophytic in cold temperate zone [8]. This system of grouping of life forms is broadly accepted and it’s has been globally followed.

The present study was started to report the floristic composition and its ecological characteristics of district Charsadda. District Charsadda is located in the west of Khyber Pakhtunkhwa province of Pakistan. It is bounded by district Malakand on the north, district Mardan on the east, district Peshawar on the south and district Mohmand on the west. It is situated on Latitude of 34.150N and Longitude of 71.730E (Fig. 1) [9]. The district cover an area of 996 square kilometres and it is divided into 2 tehsils and 46 Union Councils. It is situated 282 meters above sea level in elevation. The predominant language is Pashto, spoken natively by 99.4% of the total population [10]. Temperature is variable from place to place, the coldest month of year is January, in which the average temperature is 5-10 °C, while June is the hottest month in which the temperature raised up to 44 °C. The average rainfall is 82 mm per year. The most precipitation fall in the month of August [11].

Figure 1. Map of district Charsadda (study area)
The main crops of the area are wheat, sugarcane, maize, tobacco, rice and several weeds [12]. Most of the area contains sandy, loamy and salty soil [13]. The vegetation can be found i.e herb, shrub, trees, dense vegetation are the maximum in number in this area, where the most common plant species are Xanthium strumarium, Cannabis sativa, Euphorbia helioscopia, Medicago denticulata, Withania somnifera [14]. In tress, Acacia nilotica, Ailanthus altisima, Broussonetia papyrifera, Morus alba, Morus nigra and Ziziphus jujube can be seen [15]. The present study might be helpful for the future researchers in the field of plant taxonomy related to district Charsadda. The purpose of this study was to explore the floristic composition, life form and leaf size spectra of district Charsadda.

Materials and Methods
Floristic study of district Charsadda was carried out during session of 2018-2019. Regular trips were arranged in various seasons (spring, summer, autumn and winter) to collect plant species. The locality, sub locality, vegetation, plant stage and leaf size were recorded after collection followed by [8]. The tools used during this research work were: Map of the area, notebook, pencil, plant presser, old newspaper, polythene bags, knife, compass and digital camera. The plant specimens were dried after identification. The plant specimens were submitted to herbarium, Department of botany, University of Malakand, Pakistan. The identification was carried out with the help of available literature [8-14]. The voucher specimens were deposited in the Herbarium of Centre of Plant Biodiversity, University of Malakand, Pakistan. The plant species were classified into different classes according to [8] as follows:

Therophytes
Annual seed bearing plants, which complete their life cycle in one year and overwinter; the unfavourable season by means of seeds or spores

Geophytes
Perennating buds located below the surface of soil including plants with deep rhizomes, bulbs, tubers and corms

Hemicryptophytes
Herbaceous perennial plants, in which the aerial portion of the plant dies at the end of the growing season, leaving a Perennating bud at or just beneath the ground surface

Chamaephytes
Perennating buds located close to the ground surface (below the height of 25 cm). The plants include herbaceous, low woody trailing, low stem succulents and cushion plants.

Phanerophytes
Most of the species are shrubby and tree, whose perennating buds are borne on aerial shoot reaching a height of at least 25 cm or more above the ground surface.

Data analysis
The data is analysed with Microsoft excel 2019.

Results and Discussion
Floristic and ecological attributes
The flora of district Charsadda consisted of 146 plant species, which is belonging to 58 families. In this study, family Asteraceae was the dominating family having, 14 species including, Catharanthus roseus, Centaurea calcitropa, Hyphocharis radiate, Launaea nudicaulis, Onopordum acanthium, Silybum marianum, Taraxacum officinale and Xanthium strumarium. The subdominant families are Poaceae, Solanaceae and Cucurbitaceae with 7 species, followed by Apiaceae, Brassicaceae, Lamiaceae and Papilionaceae with 5 species. Chenopodiaceae, Rosaceae consisting 4 species, followed by Amaranthaceae, Euphorbiaceae, Malvaceae, Polygonaceae and Pteridaceae with 3 species. Alliaceae, Arecaceae, Asclepiadaceae, Cyperaceae, Ebinaceae, Equisetaceae, Fabaceae,
Genetaceae, Geraniaceae, Mimocaceae, Myrtaceae, Oleaceae, Pinaceae, Rhamnaceae and Rutaceae with 2 species. Each and the rest of 27 Families having single specie (Fig. 2). Our finding is similar with Jan et al., Khan, Ali et al. and Qureshi et al. [16-19], in which the Asteraceae and Poaceae were leading families in their study work. Seasonal variation of vegetation shows that highest numbers of species i.e. 126 species, were found in summer followed by spring i.e. 108 species and autumn 73 species. While, compare to summer, less number of species can be seen in winter season i.e. 64 species (Fig. 3). Most of the herbaceous flora has varied distribution pattern in different seasons. The summer and spring flora is high in number than autumn and winter [20-22].

**Figure 2. Plant families’ percentage of vegetation conclusion**

**Figure 3. Percentage of number of species in different season**
Biological spectrum
Raunkiaer (1934) proposed the term “Biological Spectrum” to express both life-form and distribution of flora and the phytoclimatic under which the prevailing life-forms evolved. The life-form study is thus an important part of vegetation description, ranking next to floristic composition. This study is an important part of the vegetation description, ranking next to floristic composition [23]. Life form and leaf size spectra indicate a climatic and human disturbance of a particular area [24]. The life form and leaf size spectra are beneficial attributes that have been broadly used in vegetation description. Furthermore, it is traditionally being used to describe world vegetation types at the community level [8].

The life form differences in various societies make up the basis of their structure. Different classification of the life forms there, but among them, Raunkiaer system is used most. Plants are divided into six main groups: Phanerophyte, Chamaephyte, Hemicryptophyte, Cryptophyte, Therophyte, and Epiphyte [25]. The percentage of life form was calculated as follows:

\[
\% \text{Life-form} = \frac{\text{Numbers of species in any life form}}{\text{Total number of species of all life forms}} \times 100
\]

All the plant species are classified into life forms and their ratio is expressed in number or percentage [26]. Furthermore, the biological spectrum was formed which showed that therophytes (66 spp., 45.20%), microphanerophytes (22 spp., 15.06%) (Fig. 4), chamaephytes (18 spp., 12.32%), hemicryptophytes (14 spp., 9.58%), nanophanerophytes (10 spp., 18.5%), geophytes (9 spp., 6.16%), megaphanerophytes (4 spp., 2.75%), mesophanerophytes (2 spp., 1.36%) and parasite (1 spp., 0.68%) had occurrence in the studied area (Table 1). The therophytes and chaemophytes dominancy showed that our study is similar to Durrani et al. Cain et al. Cain & Castro [27-30] in which the therophytes, chaemophytes, hemicryptophytes were in dominant phase. The results of seasonal variation in different life classes revealed that in spring the therophytes (38 spp., 35.51%) were dominant followed by microphanerophytes (22 spp., 20.56%), chaemophytes (14 spp., 13.08%), nanophanerophytes (10 spp., 9.34%) and geophytes (9 spp., 8.41%). Similar to spring, the dominant in summer the maximum numbers of species (52 spp., 41.6%) were therophytes followed by Microphanerophytes (22 spp., 17.6%), chamaephytes and hemicryptophytes (14 spp., 11.2%), followed by nanophanerophytes (10 spp., 8%), while in autumn, the dominant species were microphanerophytes (22 spp., 30.55%) followed by therophytes (15 spp., 20.83%), nanophanerophytes (10 spp., 13.88%), chaemophytes (9 spp., 12.5%). The winter is the same as autumn the dominant species were microphanerophytes (22 spp., 34.37%) followed by therophytes (11 spp., 17.18%), nanophanerophytes (10 spp., 15.62%), chaemophytes (9 spp., 14.06%) (Fig. 5). Our result is similar regarding the dominancy of therophytes in spring and summer with Saxina et al. [31].
Figure 4(a, b). Microphanerophytes (MP)

Table 1. Seasonal variation in Life form spectra of vegetation of District Charsadda

| Life form classes    | Spring | Summer | Autumn | Winter |
|----------------------|--------|--------|--------|--------|
|                      | No     | % age  | No     | % age  | No     | % age  | No     | % age  |
| 1 Therophytes        | 38     | 35.51  | 52     | 41.93  | 16     | 21.91  | 11     | 17.18  |
| 2 Hemicryptophytes   | 8      | 7.47   | 13     | 10.48  | 7      | 9.58   | 4      | 6.25   |
| 3 Geophytes          | 9      | 8.41   | 7      | 5.64   | 3      | 4.10   | 2      | 3.12   |
| 4 Chaemophytes       | 14     | 13.08  | 14     | 11.29  | 9      | 12.32  | 9      | 14.06  |
| 5 Nanophanerophytes  | 10     | 9.34   | 10     | 8.06   | 10     | 13.69  | 10     | 15.62  |
| 6 Microphanerophytes | 22     | 20.56  | 22     | 17.74  | 22     | 30.13  | 22     | 34.37  |
| 7 Mesophanerophytes  | 2      | 1.86   | 2      | 1.61   | 2      | 2.73   | 2      | 3.12   |
| 8 Megaphanerophytes  | 4      | 3.73   | 4      | 3.22   | 4      | 5.47   | 4      | 6.25   |
| sum                  | 107    | 100    | 124    | 100    | 73     | 100    | 64     | 100    |

Figure 5. Seasonal variation in life form of vegetation
Leaf spectrum
Life form and leaf size spectra indicate climatic and creature fracas of a particular area [24]. Leaf size classes have been found to be very useful for plant associations. Leaf size plays an important role in the physiological processes of plant and plant community in any area. The plant is also classified on the basis of leaf sizes [32]. In our study the leaf area of the species was calculated according to Ilyas et al. [24]. In our study, the dominant plant as regards leaf spectra was microphylls (54 spp., 36.98%) followed by nanophylls (32 spp., 21.91%), mesophylls (29 spp., 19.86 %), leptophylls (17 spp., 11.64%), megaphylls (8 spp., 5.47%) and macrophyll (5 spp., 3.04%). While aphyllus represent only 1 species (Fig. 5, 6, 7 & 9; Table 2 & 3). Our present findings agreed with [33-42], in which microphylls and nanophylls were the dominant leaf-size classes.

Habitat
Habit is the general appearance, growth form and architecture of the plant species. In our study habit of species showed discrepancy, the main class was herbs having 95 species (65.06%), followed by tree and shrub with 32 species (21.91%) and 19 species (13.01%) respectively. Our result showed low percentage of shrubs and trees species, which indicate severe deforestation in the area.
Figure 8. Percentage of species Habit

Figure 9. Leaf types in selected area

Table 2. Leaf size Spectra in a different type of Season of District Charsadda

| Leaf size classes | Spring | Summer | Autumn | Winter |
|-------------------|--------|--------|--------|--------|
|                   | No     | %age   | No     | %age   | No     | %age   | No     | %age   |
| 1 Microphyll      | 37     | 34.57  | 44     | 35.48  | 22     | 30.13  | 20     | 31.25  |
| 2 Leptophyll      | 14     | 13.08  | 16     | 12.90  | 7      | 9.58   | 8      | 12.5   |
| 3 Nanophyll       | 25     | 23.36  | 29     | 23.38  | 18     | 24.65  | 14     | 21.87  |
| 4 Mesophyll       | 24     | 22.42  | 24     | 19.35  | 17     | 23.28  | 16     | 25     |
| 5 Megaphyll       | 4      | 3.73   | 8      | 6.45   | 6      | 8.21   | 3      | 4.68   |
| 6 Macrophyll      | 3      | 2.80   | 3      | 2.41   | 3      | 4.10   | 3      | 4.68   |
| sum               | 107    | 100    | 124    | 100    | 73     | 100    | 64     | 100    |
| Plant species                  | Family       | Local name | Habit | Leaf size | Life form | Seasonality |
|-------------------------------|--------------|------------|-------|-----------|-----------|-------------|
| *Allium sativa* L.            | Alliaceae    | Ooga       | Herb  | mic       | Th        | +           |
| *Allium cepa* L.              | Alliaceae    | Piyaz      | Herb  | mes       | Geo       | +           |
| *Amaranthus viridis* L.       | Amaranthaceae| Ghanhar    | Herb  | Nan       | Th        | -           |
| *Achyranthus aspera* L.       | Amaranthaceae| Not known  | Herb  | mic       | Hem       | -           |
| *Alternanthera sessilis* (L.) RBr | Amaranthaceae| Not known  | Herb  | mic       | Th        | -           |
| *Mangifera indica* L.         | Anacardiaceae| Aam        | Tree  | mes       | Mesp      | +           |
| *Coriandrum sativm* L.        | Apiaceae     | Danya      | Herb  | Lep       | Th        | +           |
| *Capsicum fruticosens* L.     | Apiaceae     | Tour mrach | Tree  | mic       | Mp        | +           |
| *Ammi visnaga* (L.) Lam.      | Apiaceae     | sperkaye   | Shrub | Lep       | Cha       | +           |
| *Daucus carrota* L.           | Apiaceae     | Ghajar     | Herb  | Mes       | Geo       | +           |
| *Ammi visnaga* (L.) Lam.      | Apiaceae     | sperkaye   | Shrub | Lep       | Cha       | +           |
| *Nannorrhops richiana* (Griff.) Aitch. | Areceae | Not known  | Tree  | Mg        | Mp        | +           |
| *Phoenix dactylifera* L.      | Areceae      | Kajora     | Tree  | Mg        | Mp        | +           |
| *Calotropis procera* (Aiton)w.t | Asclepiadaceae| Speen ponakay | Shrub | Mes       | Cha       | +           |
| *Caralluma taberculata* N.E Brown     | Asclepiadaceae| Pammankay  | Herb  | Nan       | Th        | +           |
| *Agave sisalana* perrineex Engelm | Asparagusaceae| Unknown   | Shrub | Meg       | Np        | +           |
| *Hypocaris radiata* Falk      | Asteraceae   | Shodapay   | Herb  | mes       | Th        | +           |
| *Conyza stricta* wildl        | Asteraceae   | Kharboty   | Herb  | Mic       | Cha       | +           |
| *Launaea nudicaulis* (L) Hook .f. | Asteraceae | Gora shodapay | Herb  | Mes       | Th        | +           |
| *Filago hardwaria* (wall. exDc) wagenitz | Asteraceae | Warkharay  | Herb  | Lep       | Th        | -           |
| *Xanthium strumarium* L.      | Asteraceae   | Ghashay    | Herb  | Mac       | Th        | +           |
| *Sonchus aspher* L.           | Asteraceae   | Shodapay   | Herb  | Nan       | Hem       | +           |
| *Silybum marianum* (L) Gaertn. | Asteraceae   | Unknown    | Herb  | Mes       | Th        | +           |
| *Catharanthus roseus* (L.) G.Don | Asteraceae | Chaman gull | Herb  | Mic       | Th        | -           |
| *Calendula arvensis* L.       | Asteraceae   | Zyar gully | Herb  | Mic       | Th        | +           |
| *Carthamus oxyacantha* M.Bieb | Asteraceae   | Ghana shodapay | Shrub | Mic       | Th        | -           |
| No | Scientific Name                      | Family    | Common Name | Type   | Life Form | Natural Range | Habitat |
|----|-------------------------------------|-----------|-------------|--------|-----------|---------------|---------|
| 27 | Centaurea calcitropa L.             | Asteraceae| Unknown     | Herb   | Mes       | Th            | -       |
| 28 | Onopordum acanthium L.             | Asteraceae| Ghana       | Herb   | Nan       | Cha           | +       |
| 29 | Parthenium hysterophorus L.         | Asteraceae| Leuway botay| Herb   | Mes       | Th            | +       |
| 30 | Taraxacum officinale weber         | Asteraceae| Zyargul shadap| Herb   | Mic      | Th            | +       |
| 31 | Coronopus didymus (L) Sm            | Brassicaceae| Sqahtobit | Herb   | Lep      | Th            | +       |
| 32 | Raphanus raphanistrum L.            | Brassicaceae| Tapermoly  | Herb   | Mes      | Th            | +       |
| 33 | Eruca sativa L.                     | Brassicaceae| Teparge    | Herb   | Mic      | Th            | +       |
| 34 | Capsella bursa-pastoris medic      | Brassicaceae| Tour sharsham| Herb   | Mic      | Th            | -       |
| 35 | Brassica compestris L.              | Brassicaceae| Shashtraim | Herb   | Mic      | Th            | +       |
| 36 | Opuntia littoralis (engl.)          | Cactaceae | Zuqam       | Shrub   | Lep      | Np            | +       |
| 37 | Cannabis sativa L.                  | Cannabaceae| Bang        | Herb   | Mic      | Th            | +       |
| 38 | Helianthus annuus (L) cry           | Cryophyllaceae| Unknown     | Herb   | Nan      | Th            | +       |
| 39 | Chenopodium album L.                | Chenopodiaceae| Spensag    | Herb   | Mic      | Th            | -       |
| 40 | Spinacea oleracea L.               | Chenopodiaceae| Pakak      | Herb   | Mic      | Th            | +       |
| 41 | Kochia indica wight                | Chenopodiaceae| Sqaayaga   | Shrub   | Nan      | Cha           | +       |
| 42 | Convolvulus arvensis L.             | Convolvulaceae| Unknown     | Herb   | Nan      | Th            | -       |
| 43 | Citrus colocynthis (L) schrad      | Cucurbitaceae| Unknown     | Herb   | Mic      | Th            | -       |
| 44 | Citrus lanatus (thum.)mats          | Cucurbitaceae| Hindwana   | Herb   | Mes      | Th            | -       |
| 45 | Cucurbita maxima Duchesne          | Cucurbitaceae| Kado       | Herb   | Mg       | Th            | -       |
| 46 | Luffa cylindrica (L) Roem           | Cucurbitaceae| Tori       | Herb   | Mg       | Th            | -       |
| 47 | Momordica charantia L.             | Cucurbitaceae| Karela     | Herb   | Mes      | Th            | -       |
| 48 | Cucumis melo L.                     | Cucurbitaceae| Harboza    | Herb   | Mac      | Th            | -       |
| 49 | Cucurbita pepo L.                   | Cucurbitaceae| Harbaza    | Herb   | Mg       | Th            | -       |
| 50 | Cuscuta reflexa Roxb               | Cuscutaceae| Unknown     | Herb   | Lep      | P             | +       |
| 51 | Cyperus niveus Retz                 | Cyperaceae | Unknown     | Herb   | Nan      | Hem           | -       |
| 52 | Cyperus rotundus L.                 | Cyperaceae | Unknown     | Herb   | Nan      | Th            | -       |
| 53 | Diospyros kaki L.                   | Ebinaceae | Amlaok      | Tree    | Mes      | Mp            | +       |
| 54 | Diospyros lotus L.                  | Ebinaceae | Amlaok      | Tree    | Mic     | megp          | +       |
| 55 | Equisetum ramosiusis Desf           | Equisetaceae| Banakdya   | Herb   | Ap      | Geo           | +       |
| 56 | Equisetum arvensis L.               | Equisetaceae| Banakdya   | Herb   | Lep      | Hem           | +       |
| 57 | Euphorbia helioscopia L.            | Euphorbiaceae| Mandaro    | Herb   | Nan      | Th            | -       |
| 58 | Euphorbia prostrata Aiton           | Euphorbiaceae| Unknown    | Herb   | Lep      | Th            | +       |
| No. | Species Name                             | Family               | Use       | Height | Habit  | Synonym | Type   |
|-----|------------------------------------------|----------------------|-----------|--------|--------|---------|--------|
| 60  | *Ricinus communis* L.                     | Euphorbiaceae        | Pomba     | Shrub  | Nan    | Megp    | +      |
| 61  | *Medicago denticulata* Wild               | Fabaceae             | Peshataray| Herb   | Nan    | Th      | +      |
| 62  | *Trifolium alexandrium* L.                | Fabaceae             | Riksha    | Herb   | Nan    | Th      | +      |
| 63  | *Fumaria indica* Pugsley                 | Fumariaceae          | Unknown   | Herb   | Lep    | Th      | -      |
| 64  | *Centaurium pulchellum* (Sw.) Druce       | Gentianaceae         | Kargha mewa| Herb   | Mic    | Th      | -      |
| 65  | *Swertia ciliate* (G. Don) B.L Bur        | Gentianaceae         | Unknown   | Herb   | Mes    | Th      | -      |
| 66  | *Erodium cicutarium* (L.) L. Heritx      | Geraniaceae          | Unknown   | Herb   | Mac    | Cha     | +      |
| 67  | *Geranium winum* sweet                    | Geraniaceae          | Unknown   | Herb   | Mic    | Hem     | -      |
| 68  | *Juglans regia* L.                        | Juglandaceae         | Ghoz      | Tree   | Mic    | Mp      | +      |
| 69  | *Ocimum basilicum* L.                     | Lamiaceae            | Kashmaly  | Shrub  | Nan    | Cha     | +      |
| 70  | *Mentha arvensis* L.                      | Lamiaceae            | Venally   | Herb   | Nan    | Geo     | +      |
| 71  | *Mentha sylvestris* L.                    | Lamiaceae            | Venally   | Herb   | Nan    | Th      | +      |
| 72  | *Mentha longifolia* L.                    | Lamiaceae            | Venally   | Herb   | Mic    | Geo     | +      |
| 73  | *Salvia lanata* Roxb                      | Lamiaceae            | Unknown   | Herb   | Mes    | Th      | -      |
| 74  | *Malva neglecta* Wallr                    | Malvaceae            | Panderak  | Herb   | Mic    | Th      | +      |
| 75  | *Ablemoschus esculentus* L.               | Malvaceae            | Unknown   | Herb   | Mic    | Th      | -      |
| 76  | *Malvastrum coromandelianum* (L.) Garcke  | Malvaceae            | Ghanta boly| Herb  | Mic    | Th      | +      |
| 77  | *Melia azedarach* L.                      | Meliaceae            | Bakyana   | Tree   | Nan    | Mp      | +      |
| 78  | *Ficus palmate* Forssk                    | Moraceae             | Waroki inzar| Tree   | Mes    | Mp      | +      |
| 79  | *Ficus carica* L.                         | Moraceae             | Ghat inzar| Tree   | Mes    | Np      | +      |
| 80  | *Morus alba* L.                           | Moraceae             | Speen tot | Tree   | Mes    | Mp      | +      |
| 81  | *Morus nigra* L.                          | Moraceae             | Tor tot   | Tree   | Mes    | Mp      | +      |
| 82  | *Broussonetia papyrifera* (L.) Vent       | Moraceae             | Shahtot   | Tree   | Mac    | Megp    | +      |
| 83  | *Acacia nilotica* (L.) Delile             | Mimosaceae           | Kikar     | Tree   | Lep    | Mp      | +      |
| 84  | *Acacia farnesiana* (L.) wild             | Mimosaceae           | Ghana     | Tree   | Lep    | Mp      | +      |
| 85  | *Eucalyptus lanceolatus* –Honey           | Myrtaceae            | Lachi     | Tree   | Mic    | Cha     | +      |
| 86  | *Psidium guajava* L.                      | Myrtaceae            | Amrod     | Tree   | Mes    | Mp      | +      |
| 87  | *Olea ferruginea* Royle                   | Oleaceae             | Jaman     | Tree   | Mic    | Mp      | +      |
| 88  | *Jasminum officinale* L.                  | Oleaceae             | Unknown   | Tree   | Nan    | Np      | +      |
| 89  | *Oxalis corniculata* L.                   | Oxalidaceae          | Trewaky   | Herb   | Nan    | Th      | +      |
| 90  | *Phaseolus vulgaris* L.                   | Papilionaceae        | Unknown   | Shrub  | Mes    | Cha     | -      |
| 91  | *Papaver somniferum* L.                   | Papaveraceae         | Bang      | Herb   | Mes    | Th      | +      |
| 92  | *Abizia lebeck* (L.) Benth               | Papilionaceae        | Emli      | Tree   | Lep    | Mp      | +      |
| 93  | *Pisum sativum* L.                        | Papilionaceae        | Matar     | Herb   | Mic    | Th      | +      |
| No. | Scientific Name                                                                 | Family            | Common Name | Type    | Habitat | Characteristics |
|-----|---------------------------------------------------------------------------------|-------------------|-------------|---------|---------|-----------------|
| 94  | *Astragulus hamosus* (L) Boiss                                                  | Papilionaceae     | Jamdar      | Herb   | Mic     | Th              |
| 95  | *Delbegia sesso* Roxb. ExDc                                                     | Papilionaceae     | Shawa       | Tree    | Nan     | Mp              |
| 96  | *Vicia hirsuta* (L). Gray                                                       | Papilionaceae     | Mompa       | Herb    | Nan     | Th              |
| 97  | *Pinus roxburghii* Sargent                                                     | Pinaceae          | Nakhtir     | Tree    | Lep     | Mesp            |
| 98  | *Pinus wellichiana* A.B.Jackson                                                 | Poaceae           | Deyar       | Tree    | Lep     | Megp            |
| 99  | *Cynodon dactylon* (L) Pers                                                     | Poaceae           | Kabal       | Herb    | Nan     | Hem             |
| 100 | *Aristida adscensions* L.                                                        | Poaceae           | WakhA       | Herb    | Mic     | Hem             |
| 101 | *Bromus japonicus* Houtt                                                        | Poaceae           | Jaodar      | Herb    | Mic     | Hem             |
| 102 | *Secale cereal* L.                                                              | Poaceae           | Warbashi    | Herb    | Mic     | Th              |
| 103 | *Phragmites australis* (cav) Trinex steud                                      | Poaceae           | Makay       | Shrub   | Mes     | Geo             |
| 104 | *Avena sativa* L.                                                                | Poaceae           | Koray       | Herb    | Nan     | Hem             |
| 105 | *Zea mays* L.                                                                   | Poaceae           | Jowar       | Herb    | Th      |                |
| 106 | *Phalaris minor* Retz                                                           | Poaceae           | Jowar       | Herb    | Mg      | Th              |
| 107 | *Triticum aestivum* L.                                                           | Poaceae           | Ghanam      | Herb    | Mic     | Th              |
| 108 | *Echinochola colona* L.                                                          | Poaceae           | Roji        | Herb    | Mic     | Geo             |
| 109 | *Rumex hastatus* L.                                                              | Polygonaceae      | Shalkhy     | Herb    | Mes     | Th              |
| 110 | *Homalocladium platycleidum* (F.Muell.)                                         | Polygonaceae      | Unknown     | Shrub   | Mes     | Cha             |
| 111 | *Polygonum baratum* L.                                                           | Polygonaceae      | Unknown     | Herb    | Mic     | Cha             |
| 112 | *Portulaca oleracea* L.                                                          | Portulaceae       | Warkhary    | Herb    | Nan     | Th              |
| 113 | *Pteris vitata* L.                                                               | Pteridaceae       | Unknown     | Herb    | Mic     | Hem             |
| 114 | *Pteris cretica* L.                                                              | Pteridaceae       | Unknown     | Herb    | Mic     | Hem             |
| 115 | *Adiantum-capillus-veneris* L.                                                   | Pteridaceae       | Unknown     | Herb    | Nan     | Hem             |
| 116 | *Punica granatum* L.                                                             | Punicaeae         | Anar        | Tree    | Nan     | Np              |
| 117 | *Ranunculus muricatus* L.                                                        | Ranunculaceae     | Jaghagha    | Herb    | Mic     | Geo             |
| 118 | *Rosa indica* L.                                                                | Rosaceae          | Gulab       | Shrub   | Mic     | Np              |
| 119 | *Rosa webiana* L.                                                               | Rosaceae          | Gulab       | Shrub   | Mic     | Np              |
| 120 | *Eriobotrya japonica* (Thunb) Lindl                                              | Rosaceae          | Loakat      | Tree    | Mac     | Mp              |
| 121 | *Ziziphus mauritana* Jam.                                                        | Rhamnaceae        | Sara bera   | Tree    | Nan     | Mp              |
| 122 | *Galium aparine* L.                                                              | Rubiaceae         | Kotriboty   | Herb    | Lep     | Th              |
| 123 | *Prunus armeniaca* L.                                                            | Rosaceae          | Khubany     | Tree    | Nan     | Mp              |
| 124 | *Citrus indica* L.                                                               | Rutaceae          | Naranj      | Shrub   | Mic     | Micp            |


| No. | Species Name                  | Family       | Type     | Leaf Type | Pubescence | Height | Flowering | Fruit Type | Notes |
|-----|-----------------------------|--------------|----------|-----------|------------|--------|-----------|------------|-------|
| 128 | Zanthoxylum armatum Dc       | Rutaceae     | Tree     | Mic       | Np         | +      | +         | +          |       |
| 129 | Dodonea viscosa (L.) Jacq    | Sapindaceae  | Tree     | Nan       | Np         | +      | +         | +          |       |
| 130 | Manilkara zapota (L.) P.Royen| Sapotaceae   | Tree     | Mic       | Mp         | +      | +         | +          |       |
| 131 | Verbenas sp Thapsus L.       | Scrophulariaceae | Herb   | Meg       | Th         | +      | -         | -          |       |
| 132 | Ailanthus altissima (mill)  | Simarubaceae | Tree     | Mic       | Mp         | +      | +         | +          |       |
| 133 | Solanum nigrum L.           | Solanaceae   | Herb     | Mic       | Th         | +      | +         | -          | -     |
| 134 | Datura metel L.              | Solanaceae   | Shrub    | Mic       | Th         | +      | +         | -          | -     |
| 135 | Withania somnifera (L.) Dunal| Solanaceae   | Shrub    | Mic       | Cha        | -      | +         | -          | -     |
| 136 | Withania coagulans (stocks) | Solanaceae   | Shrub    | Mic       | Cha        | -      | +         | -          | -     |
| 137 | Solanum surrattense Burn. f.| Solanaceae   | Herb     | Nan       | Hem        | +      | +         | -          | +     |
| 138 | Physalis minima L.           | Solanaceae   | Herb     | Mic       | Cha        | -      | +         | -          | +     |
| 139 | Lycopersicum esculentum Mill.| Solanaceae   | Tamatar  | Mic       | Th         | +      | +         | -          | -     |
| 140 | Cestrum nocturnum L.         | Solanaceae   | Rat ke rani | Mic   | Cha        | +      | +         | +          | +     |
| 141 | Uritica dioica L.            | Urticaceae   | Unknown  | Herb      | Mic       | Th      | +         | -          | +     |
| 142 | Verbena officinalis L.       | Verbinaceae  | Unknown  | Herb      | Mic       | Th      | +         | +          | +     |
| 143 | Vitis vinifera L.            | Vitaceae     | Angur    | Root climber | Mes  | Mp      | +         | +          | +     |
| 144 | Aloe vera (L.) Burm.f,Fl.    | Xanthorrhoeaceae | Alovera | Mes       | Cha        | +      | +         | +          | +     |
| 145 | Cucuma longa L.              | Zingiberaceae| Korkaman | Mes       | Geo        | +      | +         | +          | +     |
| 146 | Peganum harmala L.           | Zygophyllaceae| Spekany | Shrub    | Mic       | Cha    | +         | -          | -     |

**Note:** Lep = Leptophyll, Nan = Nanophyll, Mic = Microphyll, Mes = Mesophyll, Mac = Macrophyll, Meg = Megaphyll, Ap = Aphyllus, Th = Therophytes, Geo = Geophytes, Cha = Chaemophytes, Hem = Hemicyryptophytes, Nan = Nanophanerophytes, Micp = Microphanerophyts, Mesp = Mesophanerophytes, Megp = Megaphanerophytes, P = Parasite, Sp = Spring, Sm = Summer, W = Winter, Au = Autumn
Conclusion
From the present study it was concluded that flora of the area is diverse and consisted of 146 plants species distributed among 58 families and 127 genera. The dominant life form was therophytes with 66 species (45.20%) followed by Microphanerophytes having 22 species (15.06%). While, microphyll dominating the leaf size spectra. In district Charsadda harsh winter creates unfavourable conditions which resulted in the abundance of these life forms. The locality also confronting a number of threats in the form of overgrazing, soil erosion, construction and agricultural extension. These factors combined with anthropogenic pressures are a serious threat to local biodiversity. Therefore, proper conservation strategies are the need of the hour to conserve this natural wealth for the generation to come.

Authors’ contributions
Conceived and designed the experiments: S Shah & S Ullah. Performed the experiments: S Shah. Analyzed the data: Y Khan & T Yaseen. Contributed reagents/materials/analysis tools: S Ullah, MF Basit. Wrote & revised the paper: Y Khan & T Yaseen.

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