**ABSTRACT**

**Background:** The study of species diversity, its conservations and extinction can be done by using systematics in plant biodiversity. Poaceae is a very diverse grass family with great economic importance as it contains crops like rice, maize, oats, wheat, etc.

**Objectives:** The current study was undertaken in district Charsadda during 2017-18 in flowering season to collect different grass species from the area.

**Methodology:** Grass specimens were gathered, preserved, mounted and then identified from the available literature/native flora (Flora of Pakistan). Ecological parameters like habitat, class, life cycle and biological spectra were determined. A total of 51 taxa comprised of 34 genera, 5 subfamilies and 11 tribes of grasses were collected from the District Charsadda. The subfamily Panicoideae was the leading family with highest number of genera, taxa and tribes, followed by Pooideae.

**Results:** The biological spectrum showed that in the life-form class, Therophyte had the highest number of species 32 (62.74%), followed by Hemicyryptophyte having 13 species (25.49%). In the Leaf size class, microphylls were dominant with 24 species (47.05%) followed by nanophylls having 14 species (27.45%). The adaptational survival of plants showed that 32 species (62.74%) were terrestrial and 19 species (37.25%) were amphibious in our study. The Life-cycle class depicted that 33 species (64.70%) were annual, 17 species (33.33%) were perennial and 1 species (1.960%) was annual or perennial. The Palatability class showed that 35 species (68.62%) were highly palatable, followed by less-palatable 11 species (21.56%), non-palatable 2 species (3.921%) and moderately palatable 3 species (5.882%). The Abundant class were determined through species rating scale in ecology ACFOR (Abundant Common Frequent Occasional Rare) scale to describe species abundance in a given area; 26 species (50.98%) were occasional, 12 species (23.52%) were frequent, 7 species (13.72%) were rare, 5 species (9.803%) were common and only 1 species *Cynodon dactylon* (1.960%) was abundant in the whole area and present everywhere in the research area in every season.

**Conclusion:** It has been concluded from the study that unwise collection, over-grazing, over-exploitation, over-consumption and overutilization are major biotic factors, which affect the diversity of the grasses in the area and affect the populations' sustainability on the earth crust. Therefore, the study aims to document and explore wild grasses from the area, which might help in future researches. This survey will be helpful in identifying plant wealth and status for their exploitation on systematic approaches and scientific basis.

**Keywords**

Grasses, Systematic, Biological Spectra, Tribes, Abundant Class, Charsadda.

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**INTRODUCTION**

Systematics in plant biodiversity is very important to know about the study of species diversity and its conservation, extinction and evolution, threats to biodiversity and biogeographic regions, exploration and other ecological services. Diversity basically means total number of species within specific geographic areas, whether alien or native, which is the identity and source of vegetation and plant natural resources. Agriculture, deforestation, over-grazing, over-browsing, natural disasters and anthropogenic interaction are mainly affected by the plant...
The family Poaceae (Grass family) is the 4th spermatophyte family having 11000 species and 800 genera worldwide. However, in Pakistan, a total of 158 genera and 492 species are available. Arundinoideae, Oryzoideae, Bambusoideae, Eragrostioideae and Panicoideae are important subfamilies of Gramineae. Grasses can survive well to exposed, peripheral and commonly disturbed habitats, and it exist everywhere. Grass is characterized by the presence of its grain or caryopsis, and inflorescence having spikelet with a palea and lemma. Overgrazing, over-browsing, water-logging, soil erosion, over-hunting and non-manageable agrarian methods have turned out to be significant dangers to biodiversity. The over-grazing of these fields has brought about harm to suitable grass and pea species. Due to continuous and heavy grazing, the pastures and forest-areas have deteriorated. The interaction of natural grassland population and its structure with regards to its well-known ecological aspects have not been identified yet. Living organisms on the planet mostly depend on grains like maize, rice, oats, sugarcane, wheat and rye for their substantial need as energy crops. In addition, domesticated ruminants depend on these grasses. Moreover, those weeds growing on the agronomic land are also belong to the family Poaceae. This floristic survey provides a baseline to taxonomists to work on different aspects of plant wealth and status for their exploitation on systematic approaches and scientific basis. A large number of livestock depends on natural vegetation through over-grazing and over-browsing, for fodder. Moreover, fuel, tubers and other edible parts are received from the forest in addition to the cultivation of some seasonal agricultural crops like maize and wheat in small areas. Grasses are among the most adaptable life forms. The flower of grasses suggests that they are tristaminate, bi-stigmatic and lodiculated in which stems exist in two different cycles-two lateral from inner whorl and single outer frontal whorl. The information with regards to species configuration of a region is considered to be an incentive for any phyto-geographical, environmental, ecological, and managing events. The floristic structure reveals the variety of natural resources which are affected by different abiotic and biotic stresses viz. over-grazing, over-browsing, deforestation, soil texture, soil corrosion and improper collection of these grasses in the area. Different authors have studied grasses time to time. In Pakistan most of the study on grasses was done by Chaudhari et al., who studied ethnobotany of grasses from Thal desert, Pakistan, while Mehmood et al., documented floristic list of grasses from Tor Ghar, Pakistan in which 73 species with 54 genera and 6 subfamilies were included. Samreen et al., also conducted the similar study on grasses from district Bannu, Pakistan.

**Objectives of the Research**

The main focus of our study was the documentation and exploration of wild grasses from the area, which might help in future researches.

A floristic survey was conducted helpful in identifying plant wealth and status for their exploitation on systematic approaches and scientific basis.

**MATERIALS AND METHODS**

**Site Details and Duration of the Study**

The current survey was carried out in the District Charsadda in the blooming and flowering season during 2017-18 to assemble diverse grass species from the selected area. District Charsadda lies between 34° 03′ to 34° 28′ North latitude and 71° 28′ to 71° 33′ East longitude. Charsadda being the geographic center lies about 282m above sea level, covers an area of 996 square km. The annual precipitation rate is 460.0mm, whereas the hottest month is June (44°C), the coldest month is January (5°C-10°C) and the wettest month is February. Charsadda is surrounded by four districts and one tribal area, on the East is district Mardan, on the North is Malakand, on the South is Peshawar and Nowshera districts and Mohmand Agency on the West.

**Dominant Flora of the Area**

District Charsadda has a unique type of flora which includes a lot of green land vegetation. This District has different types of vegetation comprising herbs, trees, lianas, shrubs and climbers. Among the trees, diverse floral plant species exist, which belong to different genera and families. In selected areas, *Morus alba*, *Dilbergia sissoo*, *Acacia modesta*, *Morus nigra*, *Morus laevigata*, *Populus ciliate*, *Acacia nilotica*, *Melia azederach*, *Populus ciliata*, *Acacia nilotica*, *Melia azederach*,...
**Results and Discussion**

Poaceae is an important grass family with great economic importance as it contains crops like *Oryza sativa*, *Triticum aestivum*, *Zea mays*, *Hordeum vulgare*, *Avena sativa* and *Pennisetum typhoides*. It is one of the leading families of Angiospermic plants growing in every part of the earth’s crust. The current work presents a total of 51 taxa with 34 genera, 5 subfamilies and 11 tribes were collected from the District Charsadda (Table 1, 3 & 4). Among them, 3 species belonged to the genus *Eragrostis* (8.823%), *Saccharum* (8.823%) and *Setaria* (8.823%) respectively. Genera *Avena*, *Brachiaria*, *Bromus*, *Cymbopogon*, *Digitaria*, *Echinochloa*, *Hordeum*, *Phragmites*, *Poa*, *Polypogon* and *Sorghum* had 2 species (5.882%) each. While the remaining genera *Alepecurus*, *Apluda*, *Arundo*, *Acrachne*, *Cenchrus*, *Cynodon*, *Dactyloloxtenium*, *Desmostachya*, * Dichantium*, *Eleusine*, *Imperata*, *Leptochloa*, *Oryza*, *Paspalum*, *Pennisetum*, *Phalaris*, *Rostraria*, *Stipa*, *Triticum* and *Zea* had 1 species (2.941%) each. The dominant genera were *Eragrostis*, *Saccharum* and *Setaria* 3 taxa followed by *Avena*, *Brachiaria* and *Bromus* 2 taxa followed by *Alepecurus*, *Apluda* and *Arundo* had only one taxa. The subfamily *Arundinoideae* had only 1 tribe and 3 taxa, *Chloridoideae* had 2 tribes *Cynodontae* and *Eragrosteae*, the tribe *Cynodontae* had 1 taxa, while the tribe *Eragrosteae* had 7 taxa, the subfamily *Oryzoideae* had 1 tribe and 1 taxa, the subfamily *Panicoideae* had 2 tribes *Andropogoneae* and *Paniceae*, the tribe *Andropogoneae* had 11 taxa, while the tribe *Paniceae* had 12 taxa, the subfamily *Pooidae* had 5 tribes viz. *Avenae*, *Bromeae*, *Poeae*, *Stipeae* and *Triticeae*. The tribe was first documented by Barthélemy Charles Joseph Dumortier from Belgian in 1823 who named it *Triticeae*\(^\text{20}\). The tribe *Poeae* had 5 taxa, the tribe *Avenae* had 4 taxa, the tribe *Triticeae* had 3 taxa, the tribe *Bromeae* had 2 taxa and the tribe *Stipeae* had only 1 taxa. The dominant subfamily was *Pooidae* having 5 tribes followed by *Chloridoideae* and *Panicoideae* having 2 tribes each, followed by *Arundinoideae* and *Oryzoideae* having only 1 tribe each. Various scientists also conducted the same study from different regions of Pakistan (Ahmad et al.,\(^\text{21}\), Mehmood et al.,\(^\text{7}\), Rafay et al.,\(^\text{22}\), Ahmad et al.,\(^\text{23}\) and Ullah et al.,\(^\text{24}\)).

The biological spectrum is the climatic indicator of an area and can be considered as a symbolic representation of deep and shallow or soft and harsh climate of an area. Therefore, it plays an important role in vegetation description\(^\text{25}\).

Biological spectrum (Table 1 & 2-A) showed that in the Life form class, *Therophyte* was the leading life form class with 32 species (62.74%), followed by *Hemicyryptophyte* having 13 species (25.49%), further followed by *Chaemophyte* and *Geophyte* with 3 species (5.882%) each (Figure 1).

In the Leaf size class, *microphyll* had the largest number of species i.e., 24 (47.05%) followed by *nanophyll* having 14 species (27.45%), *mesophyll* with 8 species (15.68%), followed by *macrophyll* 3 species (5.882%) and *leptophyll* 2 species (3.921%), respectively (Table 1 & 2-B, Figure 2). The Therophytic life form can survive with adverse environmental conditions and penetrating anthropogenic disturbance, whereas another affecting factor includes high grazing pressure. Climatic and anthropogenic disturbance in a specific area represents variation in both the Leaf size class and Life form class\(^\text{25}\). *Therophytes* and *microphylls* dominancy indicates the harshness, warmth and climatic environment of the area and the duration of the winter period. Only the cone-bearing and sclerophyllous plants sustain their life span is an...
evergreen area and remain vigorous during the winter season\textsuperscript{26}. Our findings are in line with that of Ali \textit{et al.},\textsuperscript{27}; Khan and Shah\textsuperscript{28} and Sher \textit{et al.},\textsuperscript{29}, who also proved the dominancy of the therophytic and microphyllus class in his study. Badshah \textit{et al.},\textsuperscript{2} stated that species composition is an ecological expression that not only reveals the proper description of semiarid regions, but also gives a lot of quantitative exploration of the vegetation resources that must be needed. Thus, species composition is a basic parameter of plant phenology and conservation of plants in any specific area. The ecological studies of plants biospectrum, habit, habitat, flowering season, phenology and its ethnoecological amplitude are to be worked out. The richness of the number of species of \textit{Asteraceae} and \textit{Poaceae} is due to their extensive conservation in a geographical area. The Habitat class (Table 1 & 2-C, Figure 3) showed that 32 species (62.74\%) were terrestrial and 19 species (37.25\%) were amphibious in our study. The Life cycle class (Table 1 & 2-D, Figure 4) depicted that 33 species (64.70\%) were annual, 17 species (33.33\%) were perennial and 1 specie (1.96\%) was annual or perennial. The Abundant class was determined by the ACFOR scale used to describe species abundance in a given area; 26 species (50.98\%) were occasional, 12 species (23.52\%) were frequent, 7 species (13.72\%) were rare, 5 species (9.80\%) were common and only 1 species \textit{Cynodon dactylon} (1.96\%) was abundant in whole area and present everywhere in research area in every season (Table 1 & 2-E, Figure 5). The Palatability class (Table 2-F & 5, Figure 6) showed that 35 species (68.62\%) were highly palatable followed by less-palatable 11 species (21.56\%), non-palatable 2 species (3.92\%) and moderately palatable 3 species (5.88\%) (Table 5). Khan and Shah\textsuperscript{28} also gave the statement of palatability from the district Mardan. Thus, the taxonomic study of \textit{Poaceae} suggested that it is very homogenous taxon and field recognized family, the stem is usually rounded, hollow internodes are present, 2-ranked leaves, open or sometimes closed sheath, ligule present, floret (flower) containing two bracts palea and lemma, 0-3 lodicules in perianth, the stamens usually 3 in number and the fruit is grain or caryopsis\textsuperscript{30}. Zereen \textit{et al.},\textsuperscript{31} studied the uses of grasses from central Punjab. A total of 51 species and 46 genera of grasses were reported from the area. Our findings also agree with that of Perveen and Qaiser\textsuperscript{30}, Osman \textit{et al.},\textsuperscript{32} Yen and Yang\textsuperscript{20}, who also reported grass species from various parts of the country. As it is clear that no prior work has been done on the grasses in the Charsadda district, hence the current study is a benchmark for future researches.
Figure 5. Showing the Proportions Abundant Class.

Table 1. Biological Spectrum of Some Palatable Grasses of District Charsadda.

| S. No. | Botanical Name                      | English Name | Habitat   | Life Cycle | Abundance Class | Leaf Form | Leaf Size |
|-------|------------------------------------|--------------|-----------|------------|-----------------|-----------|-----------|
| 1.    | Alopecurus myosuroides (Hudson.)   | Slender Foxtail | Amphibious | Annual     | Frequent        | Th        | Mes       |
| 2.    | Apluda mutica (L.)                 | Mauritain grass | Terrestrial | Perennial  | Frequent        | Th        | Mic       |
| 3.    | Arundo donax (L.)                  | Giant reed | Amphibious | Perennial  | Frequent        | Geo       | Mes       |
| 4.    | Acrauchne racemosa Heey ex Roem. Schult | Goose grass | Terrestrial | Annual     | Rare            | H         | Mic       |
| 5.    | Avena fatua (L.)                   | Oat          | Amphibious | Annual     | Frequent        | Th        | Mic       |
| 6.    | Avena sativa (L.)                  | Wild oat     | Amphibious | Annual     | Occasional      | Th        | Na        |
| 7.    | Brachiaria ramosa (Linn.) Stapf.   | Browntop Millet | Terrestrial | Annual     | Occasional      | Th        | Mic       |
| 8.    | Brachiaria reptans (Linn.) Gardener & Hubbard. | Running Grass | Amphibious | Annual  | Frequent        | Th        | Mic       |
| 9.    | Bromus catharticus (Vahl.)         | Rescue grass | Terrestrial | Perennial  | Occasional      | Th        | Mic       |
| 10.   | Bromus pectinatus (Thunb.)         | Brome grass | Terrestrial | Annual     | Occasional      | Th        | Mes       |
| 11.   | Cenchrus ciliaris (L.)             | Buffel grass, kolukkatai | Terrestrial | Perennial  | Occasional      | Th        | Mes       |
| 12.   | Cymbopogon citratus (DC.) Stapf.   | Lemon grass or oil grass | Terrestrial | Perennial | Rare            | H         | Mes       |
| 13.   | Cymbopogon jwarancusa (Jones) Schult | Oil grass | Terrestrial | Perennial | Frequent        | H         | Na        |
| 14.   | Cynodon dactylon (L.) Pers         | Bermuda grass | Terrestrial | Perennial | Abundant        | H         | Lep       |
| 15.   | Dactylolcentum aegyptium (L.) Wild | crow foot grass | Amphibious | Annual     | Occasional      | Th        | Mic       |
| 16.   | Desmostachya bipinnata (L.) Stapf. | Salt reed-grass | Amphibious | Perennial | Common          | H         | Na        |
| 17.   | Dichanthium annulatum (Forssk.) Stapf | Hindi grass, Sheda grass | Amphibious | Perennial  | Common          | H         | Na        |
| 18.   | Digitaria ciliaris (Retz.) Koeler. | Crab grass   | Amphibious | Annual     | Occasional      | H         | Mic       |
| 19.   | Digitaria sanguinolenta Edgew. ex Altich. | Hairy crabgrass, | Amphibious | Annual     | Rare            | H         | Mic       |
| 20.   | Echinochloa colonia (L.) Link      | Jungle rice  | Amphibious | Annual     | Occasional      | Th        | Na        |
| 21.   | Echinochloa crus-galliis (L.) Beavu | Terrestrial | Annual     | Occasional | Th              | Na        |
| 22.   | Eleusine indica (L.) Garlen.       | Indian goose grass | Amphibious | Annual     | Occasional      | Th        | Mes       |
| No. | Scientific Name | Common Name | Life Form | Leaf Size | Frequency | Life Form Key | Leaf Size Key |
|-----|----------------|-------------|-----------|-----------|------------|---------------|---------------|
| 23  | *Eragrostis nigra* Nees. Ex. S. | Love grass | Amphibious | Annual or perennial | Occasional | Th Mic | |
| 24  | *Eragrostis ciliaris* (All.) Lut. | Love grass | Terrestrial | Annual | Rare | H Na | |
| 25  | *Eragrostis minor* Host. | Pungent meadow grass | Amphibious | Annual | Occasional | Th Na | |
| 26  | *Hordeum murinum* L. | False barley | Terrestrial | Annual | Occasional | Th Na | |
| 27  | *Hordeum vulgare* L. | Barley, barley corn | Terrestrial | Annual | Frequent | Th Mic | |
| 28  | *Imperata cylindrica* (L.) P. Beauv. | Cogon grass | Amphibious | Perennial | Occasional | Geo Lep | |
| 29  | *Leptochloa paniculata* Retz. | Muconate Sprangletop | Terrestrial | Annual | Occasional | Th Mic | |
| 30  | *Oryza sativa* L. | Asian Rice, weedy rice | Amphibious | Annual | Frequent | Th Mic | |
| 31  | *Paspalum paspalodes* (Michx.) scribner. | Water couch, Knotgrass | Terrestrial | Perennial | Frequent | H Mic | |
| 32  | *Pennisetum typhoides* (Burm.f.) Stapf. | Pearl millet | Terrestrial | Annual | Occasional | Th Mic | |
| 33  | *Phalaris minor* Retz. | Canary grass | Terrestrial | Annual | Frequent | Th Na | |
| 34  | *Phragmites australis* (Cav.) Trin. | Common reed | Amphibious | Perennial | Occasional | Geo Mac | |
| 35  | *Phragmites karka* (Retz.) Trin. ex. Steud. | Nodding reed | Amphibious | Perennial | Occasional | Ch Mes | |
| 36  | *Poa annua* L. | Annual blue grass | Terrestrial | Annual | Occasional | Th Na | |
| 37  | *Poa infirma* H. B. K. | Early meadow-grass | Terrestrial | Annual | Occasional | Th Na | |
| 38  | *Polypogon fugax* Ness.ex.Steud. | Asia Minor Blue grass | Terrestrial | Annual | Frequent | H Mic | |
| 39  | *Polypogon monspeliensis* (L.) Desf | Rabbit foot grass | Terrestrial | Annual | Frequent | Th Mic | |
| 40  | *Rostraria cristata* (L.) Tzvelev | Mediterranean hair grass | Terrestrial | Annual | Occasional | Th Mic | |
| 41  | *Saccharum officinarum* L. | Broom sedge | Terrestrial | Perennial | Rare | H Mac | |
| 42  | *Saccharum spontaneum* L. | Sugar cane | Terrestrial | Perennial | Common | Ch Mic | |
| 43  | *Setaria pumila* (Poir.) Roem. &Schult. | Yellow foxtail grass | Terrestrial | Annual | Occasional | Th Mic | |
| 44  | *Setaria verticillata* (L.) P. Beauv. | Fox tail | Terrestrial | Annual | Rare | Th Na | |
| 45  | *Setaria viridis* (L.) P. Beauv. | Green bristle grass | Amphibious | Annual | Occasional | Th Na | |
| 46  | *Sorghum bicolor* (L.) Moench. | Grain sorghum | Terrestrial | Annual | Occasional | Th Mic | |
| 47  | *Sorghum halepense* (L.) Pers. | Johnson grass | Terrestrial | Perennial | Occasional | H Mic | |
| 48  | *Stipa capensis* Thunb. | Cape rice grass | Terrestrial | Annual | Rare | Th Mic | |
| 49  | *Triticum aestivum* L. | Common wheat | Terrestrial | Annual | Common | Th Mic | |
| 50  | *Zea mays* L. | Corn | Terrestrial | Annual | Common | Th Mes | |

**Keys:**

**A. Life form:** Th-Therophyte, H-Hemicryptophyte, Ch-Chamaephyte, G-Geophyte.

**B. Leaf size:** Lep-Leptophyll, Na-Nanophyll, Mic-Microphyll, Mac-Macrophyll, Mes-Mesophyll
Table 2. Ecological Physiognomies of Palatable Grasses of District Charsadda, Pakistan.

| S. No. | Parameters               | No. of Taxa | Percentages |
|--------|--------------------------|-------------|-------------|
| A.     | Life form                |             |             |
| 1.     | Therophyte               | 32          | 62.74       |
| 2.     | Hemicryptophyte          | 13          | 25.49       |
| 3.     | Chaemophyte              | 3           | 5.882       |
| 4.     | Geophyte                 | 3           | 5.882       |
|        | **Total**                | **51**      | **99.99**   |
| B.     | Leaf size                |             |             |
| 1.     | Microphyll               | 24          | 47.05       |
| 2.     | Nanophyll                | 14          | 27.45       |
| 3.     | Mesophyll                | 8           | 15.68       |
| 4.     | Macrophyll               | 3           | 5.882       |
| 5.     | Leptophyll               | 2           | 3.921       |
|        | **Total**                | **51**      | **99.99**   |
| C.     | Habitat class/Adaptation |             |             |
| 1.     | Terrestrial              | 32          | 62.74       |
| 2.     | Amphibious               | 19          | 37.25       |
|        | **Total**                | **51**      | **99.99**   |
| D.     | Life cycle               |             |             |
| 1.     | Annual                   | 33          | 64.70       |
| 2.     | Perennial                | 17          | 33.33       |
| 3.     | Annual or perennial      | 1           | 1.960       |
|        | **Total**                | **51**      | **99.99**   |
| E.     | Abundant class           |             |             |
| 1.     | Occasional               | 26          | 50.98       |
| 2.     | Frequent                 | 12          | 23.52       |
| 3.     | Rare                     | 7           | 13.72       |
| 4.     | Common                   | 5           | 9.803       |
| 5.     | Abundant                 | 1           | 1.960       |
|        | **Total**                | **51**      | **99.99**   |
| F.     | Palatability             |             |             |
| 1.     | Highly palatable         | 35          | 68.62       |
| 2.     | Less palatable           | 11          | 21.56       |
| 3.     | Non palatable            | 2           | 3.921       |
| 4.     | Moderately palatable     | 3           | 5.882       |
|        | **Total**                | **51**      | **99.99**   |
### Table 3. List of Genera and its Percentage.

| S. No. | Genera        | No. of Taxa | Percentages |
|--------|---------------|-------------|-------------|
| 1.     | Eragrostis    | 3           | 8.823%      |
| 2.     | Saccharum     | 3           | 8.823%      |
| 3.     | Setaria       | 3           | 8.823%      |
| 4.     | Avena         | 2           | 5.882%      |
| 5.     | Brachiaria    | 2           | 5.882%      |
| 6.     | Bromus        | 2           | 5.882%      |
| 7.     | Cymbopogon    | 2           | 5.882%      |
| 8.     | Digitaria     | 2           | 5.882%      |
| 9.     | Echinochloa   | 2           | 5.882%      |
| 10.    | Hordeum       | 2           | 5.882%      |
| 11.    | Phragmites    | 2           | 5.882%      |
| 12.    | Poa           | 2           | 5.882%      |
| 13.    | Polypogon     | 2           | 5.882%      |
| 14.    | Sorghum       | 2           | 5.882%      |
| 15.    | Apluda        | 1           | 2.941%      |
| 16.    | Alopecurus     | 1           | 2.941%      |
| 17.    | Arundo        | 1           | 2.941%      |
| 18.    | Acracline     | 1           | 2.941%      |
| 19.    | Cenchrus      | 1           | 2.941%      |
| 20.    | Cynodon       | 1           | 2.941%      |
| 21.    | Desmostachya  | 1           | 2.941%      |
| 22.    | Dactylotoenium| 1           | 2.941%      |
| 23.    | Dicranthium   | 1           | 2.941%      |
| 24.    | Eleusine      | 1           | 2.941%      |
| 25.    | Imperata      | 1           | 2.941%      |
| 26.    | Leptochloa    | 1           | 2.941%      |
| 27.    | Oryza         | 1           | 2.941%      |
| 28.    | Paspalum      | 1           | 2.941%      |
| 29.    | Pennesetum    | 1           | 2.941%      |
| 30.    | Phalaris      | 1           | 2.941%      |
| 31.    | Rostraria     | 1           | 2.941%      |
| 32.    | Stipa         | 1           | 2.941%      |
| 33.    | Triticum      | 1           | 2.941%      |
| 34.    | Zea           | 1           | 2.941%      |
| Total  | 34            | 51          | 99.99%      |
Table 4. Distribution of Sub Families, Tribes and Taxa.

| S. No. | Sub Family | Tribe | Taxa |
|--------|------------|-------|------|
| 1.     | Arundinoideae | Arundineae | Arundo donax L. |
|        |            |       | Phragmites australis (Cav.) Trin. ex Steud |
|        |            |       | Phragmites karka (Retz.) Trin. ex. Steud |
| 2.     | Chloridoideae | Cynodonteae | Cynodon dactylon (L.) Pers. |
|        |            |       | Acracline racemosa (B. Heyne ex Roth) Ohwi. |
|        |            |       | Dactylisetum aegyptium (L.) Wild |
|        |            |       | Desmostachya bipinnata (L.) Stapf. |
|        |            |       | Eleusine indica (L.) Garetn. |
|        |            |       | Eragrostis nigra Nees. Ex. Steud |
|        |            |       | Eragrostis ciliarisensis (All.) Lut. |
|        |            |       | Eragrostis minor Host. |
|        |            |       | Leptochloa panicea Retz. |
| 3.     | Oryzoideae | Oryzeae | Oryza sativa L. |
|        |            | Andropogoneae | Apluda mutica L. |
|        |            |       | Cymbopogon citratus (DC.) Stapf. |
|        |            |       | Cymbopogon jwarancusa (Jones) Schult. |
|        |            |       | Dichanthium annulatum (Forssk.) Stapf. |
|        |            |       | Imperata cylindrica (L.) P. Beauv |
|        |            |       | Saccharum griffithi Munro ex Boiss. |
|        |            |       | Saccharum officinarum L. |
|        |            |       | Saccharum spontaneum L. |
|        |            |       | Sorghum bicolor (L.) Moench |
|        |            |       | Sorghum halepense (L.) Pers |
|        |            |       | Zea mays L. |
| 4.     | Panicoideae | Paniceae | Bracharia ramosa L. |
|        |            |       | Bracharia reptans (L.) Gardner & Hubbard |
|        |            |       | Cenchrus ciliaris L. |
|        |            |       | Digitaria ciliaris (Retz.) Koeler. |
|        |            |       | Digitaria sanguinolenta Edgew. ex Aitch. |
|        |            |       | Echinochoa colona (L.) Link |
|        |            |       | Echinochoa crus-galliis (L.) Beauv |
|        |            |       | Passpalum paspalodes (Michx.) scribner |
|        |            |       | Pennisetum typhoides (Burm.f.) Stapf & C.E. Hubb. |
|        |            |       | Setaria pumila (Poir.) Roem. & Schult. |
|        |            |       | Setaria verticillata (L.) P. Beauv |
|        |            |       | Setaria viridis (L.) P. Beauv |
|        |            | Aveneae | Avena fatua L. |
|        |            |       | Avena sativa L. |
|        |            |       | Polypgon fugax Ness.ex.Steud |
|        |            |       | Polypgon monspeliensis (L.) Desf |
|        |            | Bromeae | Bromus catharticus Vahl. |
|        |            |       | Bromus pectinatus Thunb. |
| 5.     | Pooideae | Poeae | Alopecurus myosuroides Hudson. |
|        |            |       | Phalaris minor Retz. |
|        |            |       | Poa annua L. |
|        |            |       | Poa infirma H. B. K. |
|        |            |       | Rostraria cristata (L.) Tzvelev |
|        |            | Stipeae | Stipa capensis Thunb. |
|        |            |       | Hordeum murinum L. |
|        |            | Triticaceae | Hordeum vulgare L. |
|        |            |       | Triticum aestivum L. |

Source: Gould & Shaw(33, (1983)
Table 5. Botanical Taxa and its Common Names, Palatability and Distribution Pattern of Weedy Grasses in Pakistan and in the World.

| S. No. | Taxon                                           | Common Name      | Palatability | Distribution Pattern in Pakistan | Distribution Pattern in World |
|--------|------------------------------------------------|------------------|--------------|----------------------------------|-------------------------------|
| 1.     | Alopecurus myosuroides Hudson                   | Slender Foxtail  | Highly palatable | Baluchistan, Khyber Pakhtunkhwa & Kashmir | Europe, Asia, North America and other temperate regions of the world |
| 2.     | Apluda mutica L.                               | Mauritian grass  | Highly palatable | Sind, Punjab, Khyber Pakhtunkhwa & Kashmir | Tropical Asia, new Caledonia, Oman, new Guinea and throughout Australia |
| 3.     | Arundo donax L.                                | Giant reed       | Less palatable | Baluchistan, Punjab, Khyber Pakhtunkhwa & Kashmir | Eastwards to Burma; Mediterranean regions and North Africa and introduced into new World |
| 4.     | Acracne racemosa Heyne ex Roem. & Schult        | Goose grass      | Highly palatable | Punjab, Khyber Pakhtunkhwa & Kashmir | Tropical part of Australia, southeast Asia and Africa |
| 5.     | Avena fatua L.                                 | Oat              | Highly palatable | Khyber Pakhtunkhwa and Northern Punjab | Central Asia, Europe, USA, Mississippi, Tennesseand Australia |
| 6.     | Avena sativa L.                                | Wild oat         | Highly palatable | Khyber Pakhtunkhwa and Punjab | Throughout Europe, Asia and northwest Africa |
| 7.     | Brachiaria ramosa (Linn.) Stapf                 | Browntop Millet  | Highly palatable | Kashmir, Punjab, Baluchistan, Sind, Khyber Pakhtunkhwa | Tropical Asia, South Africa, Senegal, Yemen, Rhodesia and Malawi |
| 8.     | Brachiaria reptans (Linn.) Gardner & Hubbard.   | Running Grass    | Highly palatable | Khyber Pakhtunkhwa, Sind, Baluchistan & Punjab | Tropical Asia and throughout the tropics |
| 9.     | Bromus catharticus Vahl.                       | Rescue grass     | Highly palatable | Punjab & Khyber Pakhtunkhwa | Native to South America, Europe, Australia and North America. |
| 10.    | Bromus pectinatus Thunb.                        | Brome grass      | Highly palatable | Khyber Pakhtunkhwa, Baluchistan, Punjab, Gilgit & Kashmir | Through Ethiopia, Egypt and Sudan, Arabia and Sinai, South Africa, Afghanistan, Iran, eastwards through India to Europe and China. |
| 11.    | Cenchrus ciliaris L.                            | Buffel grass, kolukkatai | Less palatable | Khyber Pakhtunkhwa, Baluchistan, Sind & Punjab | Distributed throughout Africa, extending through Middle East to Arabia and to India |
| 12.    | Cymbopogon citratus (DC.) Stapf.               | Lemon grass or oil grass | Non-palatable | Khyber Pakhtunkhwa and Punjab | North and Central America, Sri Lanka, China, India, Pakistan, Indonesia, Nigeria, Thailand, Cameroon, Italy, Congo, Egypt, Argentina, Brazil, Venezuela and Papua Guinea. |
| 13.    | Cymbopogon jwarancusa (Jones) Schult.           | Oil grass        | Less palatable | Khyber Pakhtunkhwa, Sind, Baluchistan, Punjab & Gilgit | Westwards to Iraq and Socotra also in Nepal and Northwest India |
| 14.    | Cynodon dactylon (L.) Pers                      | Bermuda grass    | Highly palatable | Sind, Khyber Pakhtunkhwa, Baluchistan, Punjab & Kashmir | Warm temperate and Tropical regions; Cosmopolitan |
| 15.    | Dactylolcenum aegyptium(L.) Wild                | Crow foot Grass  | Highly palatable | KhyberPakhtunkhwa , Sind, Punjab & Kashmir | Commonly spread in warm temperate and tropical regions of the world. |
| 16.    | Desmostachya bipinnata (L.) Stapf               | Salt reed-grass  | Less palatable | Sind, Baluchist, Punjab Kashmir & Khyber Pakhtunkhwa | Through-out the Middle east to Indo-China, tropical Africa and North America |
| No. | Species                                                                 | Native Habitat                                                                 | Growth Habitats                                                                 |
|-----|------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 17  | Dichanthium annulatum (Forsk.) Stapf.                                   | Hindi grass, Sheda grass                                                      | Highly palatable, Sind, Baluchistan, Punjab, Kashmir & Khyber PakhtunKhwa          |
|     |                                                                        |                                                                              | Tropical America, Middle East, Kenya, Tanzania, southern Africa and Senegal, Indonesia and introduced to Australia. |
| 18  | Digitaria ciliaris (Retz.) Koeler.                                      | Summer grass                                                                 | Highly palatable, Sind, Punjab, Kashmir & Khyber PakhtunKhwa.                    |
|     |                                                                        |                                                                              | Throughout the Tropics.                                                          |
| 19  | Digitaria sanguinolenta Edgew. Ex. Aitch                              | Hairy crabgrass, Hairy finger grass.                                          | Highly palatable, Baluchistan, Khyber PakhtunKhwa, Punjab, Gilgit & Kashmir       |
|     |                                                                        |                                                                              | Tropical and temperate, specifically into the tropics.                         |
| 20  | Echinochloa colona (L.) Link.                                          | Jungle rice                                                                  | Highly palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir         |
|     |                                                                        |                                                                              | Distributed throughout tropics and sub tropics.                                 |
| 21  | Echinochloa crus-galli (L.) Beauv.                                      | Cockspur grass, water grass                                                  | Highly palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa, Gilgit & Kashmir|
|     |                                                                        |                                                                              | Confined to the Subtropical and temperate regions of the world                  |
| 22  | Eleusine indica (L.) Garetan.                                          | Indian goose grass                                                           | Highly palatable, Sind, Khyber PakhtunKhwa & Kashmir.                            |
|     |                                                                        |                                                                              | Present in Subtropical and Tropical zones of the world.                         |
| 23  | Eragrostis nigra Nees. Ex. Steud.                                      | Love grass                                                                   | Highly palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa                  |
|     |                                                                        |                                                                              | Present in Subtropical and Tropical zones of the world.                         |
| 24  | Eragrostis ciliarisens (All.) Lut. Ex. F.T.                            | Love grass                                                                   | Highly palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir         |
|     |                                                                        |                                                                              | Present in moist and Tropical zones of the world                                |
| 25  | Eragrostis minor Host.                                                 | Pungent meadow grass                                                         | Highly palatable, Sind, Punjab, Gilgit, Baluchistan, Khyber PakhtunKhwa & Kashmir |
|     |                                                                        |                                                                              | Subtropical and Warm temperate regions of the world.                            |
| 26  | Hordeum murinum L.                                                     | False barley                                                                 | Less palatable, Khyber PakhtunKhwa & Kashmir.                                   |
|     |                                                                        |                                                                              | Central Asia and Mediterranean regions to China.                                |
| 27  | Hordeum vulgare L.                                                     | Barley, barley corne                                                          | Less palatable, Sind, Punjab, Khyber PakhtunKhwa & Kashmir.                     |
|     |                                                                        |                                                                              | Throughout most temperate zones of the world.                                   |
| 28  | Imperata cylindrica (L.) P. Beauv.                                     | Cogon grass                                                                  | Moderately palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir    |
|     |                                                                        |                                                                              | Mediterranean, Old World tropics, Middle East and also in Chile.                 |
| 29  | Leptochloa panicea Retz.                                               | Mucronate Sprangletop                                                        | Moderately palatable, Sind, Punjab & Khyber PakhtunKhwa                          |
|     |                                                                        |                                                                              | Natal, Sudan to Transvaal; Tropical Asia and West Africa.                       |
| 30  | Oryza sativa L.                                                        | Asian Rice, weedy rice                                                        | Less palatable, Sind, Punjab, Khyber PakhtunKhwa and the chief crop is in Kashmir & Liddar Valley. |
|     |                                                                        |                                                                              | Cultivated mostly in Central and South America, southern Europe, Africa, Asia and Australia |
| 31  | Paspalum paspalodes (Michx.) scribner                                   | Water couch, Knotgrass                                                       | Moderately palatable, Sind, Punjab, Khyber PakhtunKhwa & Kashmir                |
|     |                                                                        |                                                                              | Tropics and sub-tropics throughout the world.                                   |
| 32  | Pennisetum typhoides (Burm.f.) Stapf & C.E. Hubb.                     | Pearl millet                                                                 | Highly palatable, Punjab, Sindh, Khyber PakhtunKhwa and Balochistan              |
|     |                                                                        |                                                                              | South Africa from West to East; It was Alien to India and later to Australia, America and Brazil. |
| 33  | Phalaris minor Retz.                                                   | Canary grass                                                                 | Highly palatable, Baluchistan, Punjab, Khyber PakhtunKhwa and Balochistan         |
|     |                                                                        |                                                                              | Cosmopolitan                                                                    |
| 34  | Phragmites australis (Cav.) Trin. ex Steud.                            | Common reed                                                                  | Non palatable, Khyber PakhtunKhwa, Punjab & Kashmir.                             |
|     |                                                                        |                                                                              | Distributed throughout moderate climate zones of New World and Old World.       |
| 35  | Phragmites karka (Retz.) Trin. ex. Steud.                              | Nodding reed                                                                 | Less palatable, Sind, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir          |
|     |                                                                        |                                                                              | Throughout Polynesia, Tropical Africa, tropical Asia and northern Australia.    |
| 36  | Poa annua L.                                                           | Annual blue grass                                                            | Highly palatable, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir              |
|     |                                                                        |                                                                              | Cosmopolitan                                                                    |
| 37  | Poa annua H. B. K.                                                     | Early meadowgrass                                                            | Highly palatable, Punjab & Khyber PakhtunKhwa                                   |
|     |                                                                        |                                                                              | Central Asia, Himalayas of South America; South Europe                          |
| 38  | Polygognus fugax Ness. ex. Steud.                                      | Asia Minor Blue grass                                                       | Highly palatable, Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir              |
|     |                                                                        |                                                                              | Mainly in Himalayas of Burma and Iraq                                           |
### CONCLUSION

In the present study, we have reported 51 grass species belonging to 34 genera from 5 sub-families and 11 tribes for the first time from this area. The subfamily Panicoideae were more diverse sharing highest number of taxa, genera and tribes followed by subfamily Pooideae. Biological data represents that Therophyte was the dominant life form class, while the leaf size of Microphyll was dominant. Majority of our studied grasses were terrestrial with annual life span. The palatable grasses were documented due to its grazing in the area while fewer numbers of grasses were observed occasional in the area. *Cynodon dactylon* were recorded abundant in the study area. Therefore, it was concluded that due to uncontrolled grazing, over-exploitation and over-consumption are the major biotic threats which affects the diversity of the grasses in the area and also affects the livestock’s production in the area. These present botanical endeavors provide a base line in the field of Agrostology for further study.

| No. | Species Name                                  | Habitat Type               | Palatability | Distribution                                                                 |
|-----|---------------------------------------------|---------------------------|--------------|-------------------------------------------------------------------------------|
| 39. | *Polypogon monspeliensis* (L.) Desf.        | Rabbit foot grass         | Highly palatable | Sind, Baluchistan, Punjab, Khyber Pakhtunkhwa, Gilgit & Kashmir; Introduced and adopted in most warm temperate regions; Mediterranean northwards zones to British Isles; India and China; North-east parts of south Africa |
| 40. | *Rostraria cristata* (L.) Tzvelev.          | Mediterranean hair grass  | Highly palatable | Baluchistan, Punjab, Khyber Pakhtunkhwa; Mediterranean region and Northwest India; introduced in North America and South Africa |
| 41. | *Saccharum griffithii Munro ex Boiss*        | Broom sedge               | Less palatable | Sind, Baluchistan, Punjab & Khyber Pakhtunkhwa; Asia-tropical; Asia-tropical; western Asia and Arabia; Afghanistan; India, Bangladesh; Iran; Pakistan; Oman; Yemen; Saudi Arabia and West Himalaya |
| 42. | *Saccharum officinarum* L.                  | Sugar cane                | Highly palatable | Sindh, Punjab and Khyber Pakhtunkhwa; Throughout the tropical regions while extending to temperate regions of the world. |
| 43. | *Saccharum spontaneum* L.                   | Wild sugarcane            | Less palatable | Sindh, Punjab, Khyber Pakhtunkhwa; Extensively scattered in the tropical region of the Old World. |
| 44. | *Setaria pumila* (Poir.) Roem. & Schult.    | Yellow foxtail grass      | Highly palatable | Sind, Baluchistan, Punjab, Khyber Pakhtunkhwa, Gilgit & Kashmir; Introduced into warm temperate and Tropical zones of the Old World and North America. |
| 45. | *Setaria verticillata* (L.) P. Beauv.        | Fox tail                  | Highly palatable | Sind, Baluchistan, Punjab, Khyber Pakhtunkhwa & Kashmir; Confined to the warm temperate, Tropical regions of the world. |
| 46. | *Setaria viridis* (L.) P. Beauv.            | Green bristle grass       | Highly palatable | Baluchistan, Punjab, Gilgit, Kashmir and Khyber Pakhtunkhwa; Introduced to New World while present also in cooler zones of the Old World |
| 47. | *Sorghum bicolor* (L.) Moench.              | Grain sorghum             | Highly palatable | Sind, Baluchistan, Punjab, Khyber Pakhtunkhwa; Radiating center/hotspot in Africa, and is now widely cultivated in subtropical and tropical regions of the world. |
| 48. | *Sorghum halepense* (L.) Pers.              | Johnson grass             | Highly palatable | Sind, Punjab, Baluchistan, Gilgit, Kashmir and Khyber Pakhtunkhwa; Mediterranean zones of southwards to Madras and Kashmir |
| 49. | *Stipa capensis* Thunb.                     | Cape rice grass           | Highly palatable | Baluchistan, Punjab, Kashmir and Khyber Pakhtunkhwa; Mediterranean region eastwards to Northwest India, South Africa. |
| 50. | *Triticum aestivum* L.                      | Common wheat              | Less palatable | Throughout Pakistan; Widely cultivated all over the world. |
| 51. | *Zea mays* L.                               | Corn/ Makki               | Highly palatable | Sindh, Punjab, Khyber Pakhtunkhwa, Kashmir, Gilgit and Balochistan; Introduced to the Old World from tropical America. |
LIST OF ABBREVIATIONS

ACFOR Abundant Common Frequent Occasional Rare

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