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Research Article

Floristic Composition and Species Diversity of Plant Resources of rural area "Takht Bhai" District Mardan, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

The study was conducted during 2017-18 to explore and identified flora of rural area Takht Bhai district Mardan. Information based upon floristic knowledge and biological spectrum of rural area Takht Bhai represent 140 taxon with 63 families including 4 Pteridophytic, 3 Gymnospermic and 56 Angiospermic families including 10 Monocots and 46 Dicots. Asteraceae was the topmost in term of number of species (13 sp) followed by Poaceae (9 sp) and Solanaceae (9 sp) each. Fabaceae having 7 species followed by Moraceae, Amaranthaceae, Brassicaceae, Lamiaceae, Myrtaceae and Rosaceae 6 species each. Habit class showed that herbaceous cover were dominant with 58.571% of the total flora followed by trees layer 25%, Shruby layer 11.42% and remaining 5.71% were climbers in area. Plant status concluded that 51.42% of plants were wild while 48.57% are cultivated. Biological spectra depicted that Therophytes were the dominant 40.71% followed by Microphanerophytes 18.57% in life form class while Microphyll 43.57% were highest in leaf size class followed by Nannophyll 20.71%. It was concluded that over utilization, over collection, over exploitation, habitat degradation, overharvesting, deforestation, population explosion and over grazing are the conspicuous biotic stresses which severely threatened the flora in the area which affect the population sustainability on earth crust.

Keywords: Biological spectra; Climbers; Poaceae; Rural area; Takht Bhai

INTRODUCTION

Rural area "Takht Bhai" is located about 15 kilometers from Mardan in Khyber Pakhtunkhwa province Pakistan having 34° 05' to 34° 32' North latitudes and 71" 48' to 72° 25' East longitudes. It is bounded in the North by Buner district and Malakand protected areas, in the Eastern side by district Swabi, South by district Nowshehra and on the West by district Charsadda (Figure 1). The nearby localities of Takht bhai include Shergarh, Thordher, Lund Khuwar, Jalala, Takkar and Khadi Kali. The total area of the district is 1632 square kilometers [1]. The climate of Tehsil Takhat Bhai is sub-humid and semi and sub-Tropical continental highland. The summer season is extremely hot (43.5°C). The coldest month temperature reaches 0.5°C. Most of the rainfall occurs in the month of July, August, December and January. Maximum rainfall is recorded for the months of July and August. The relative humidity is quite high throughout the year reaching 73.33% in December. Major crops of the area are wheat, maize, sugarcane, rice and tobacco. The area is characterized by certain environmental factors such as topography, edaphic factors, climate and special type of soil. These variations may reflect in distinctive ecological habitats, rich flora and important vegetational zones and endowed with a wide range of ecosystem and species diversity. Plants are imperative for the continuation of ecosystem services that is water, air and fertile soil. In spite of great importance, out of approximately 30 million living species only 1.75 million living species of the world have been described so far [2].

A large number of species are yet to be explored by biologists. Therefore, plant check list is usually the only source of botanical information of the area and may serve as a useful starting point for detailed study. Usually floristic listing helps in identification and nomenclature of species [3,4]. To develop conservation strategies and estimate the changes taking place in the vegetation patterns of

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any area, it is required to have a detailed floristic account of that area based on collections and correct identification [5]. The plant assemblage of a region is a function not only of time but also of altitude, slope, latitude, aspect, rainfall and humidity which play a role in its formation and composition [6-8]. A flora is composed of all taxon in certain geographic region, which inhabits a specific ecosystem with some geological period. The flora includes a number of species, while vegetation refers to their distribution and the number of individuals and size of each [9]. It may be summed up as inventory of the plants of a definite area. This inventory is usually authenticated by citations of herbarium specimens and of location or stations where each element is known to have occurred. It is customary to arrange the plants treated in a flora according to a recognized system of classification. Generally, flora is annually varied due to many factors such as moisture levels, geographical position, physiographic features, and human impacts [10]. Floristic diversity of a region is the total of the species within its boundaries, weather wild or cultivated, which is a reflection of vegetation and plant resources. Plant resources are affected by agriculture, over grazing, anthropogenic interaction and natural disasters. It is a better parameter of plant life, gene pool and diversity of plants in any area [11]. Floristic studies are taxonomic studies of a flora or of a major segment of a flora, of a given area. They may range in extent from a compiled checklist of vascular plants of a small politically bounded area to through taxonomic or biosystematics analysis of the components of the vascular flora of a continent because of this wide scope, the subject of floristic and the professional Botanist. It is a field of interest in which the amateur Botanist have taken active and contributory part. The botanist showed to be encouraged to continue to investigate such problems for they provide an avocation that can produce important contributions to the knowledge of any major flora. Among professional botanists, there are many who have not the time, facilities, or interest required for revisionary studies, but do find that study of the flora of a particular area provide an opportunity for welcomed field activity and the knowledge that valuable data are being recorded. From this it is clear that here is a type of botanical activity that may be conducted for scientific gain which can be limited in scope to meet the potentials and the needs of any serious-minded investigator [12-14]. To till date approximately 6000 flowering plants have been reported in Pakistan with more than 200 families and 414,000 of flowering plants in the world [15]. About 80% of the endemic flowering plants of Pakistan are restricted to the northern and western mountains [16]. Pakistan, though, not among the biodiversity hot spots of the world, still faces immense challenges of conservation and sustainable utilization of biological resources. Degradation in natural resources is visible, caused by increased human activities related to the growing population coupled with, human demolition of natural habitations, relocation of human population causing in the change of land use pattern, introduced species, the increasing demand for natural assets and its incorrect management [17]. Floristic composition some time also termed as species composition is referring to as 'the sum of all species presents in certain area with a specific geographical composition. Life-forms have mutual relationships with environmental factors and can be viewed as strategies for obtaining resources [18-21]. According to Raunkiaer stated that life-form classification is based on the manner in which plants secure their storage buds throughout a period. It can be summed up into five main classes: Phanerophytes, Chamaephytes, Hemicryptophytes, Cryptophytes, and Therophytes. This sequence matches up with an increasing protection of the perennating buds. Climatic types can be characterized by the prevailing life-forms in plant communities growing under a given climatic regime, using the proportions of species in each life-form class, or the biological spectrum. The biological spectrum is one of the significant physiognomic features characterizing vegetation used extensively in analyzing vegetation [22]. Khan et al. [23] stated that it is the index for phytoclimate of the site, deduction of which is based on diverse life-forms composing the flora of the site. The life form of plants is an adaptive response to environmental gradients and indicator of habitat prevailing conditions [24]. Life form can be considered as symbol or direction of shallow and deep climate [25]. Leaf size study is a valuable tool in describing the plant communities [26]. Local plants distribution gives vital information's about plant species, their distribution and climatic effect, which effect the distribution of the plants in that particular region [9].

The main aim of this study is to assess the floristic composition, taxonomic identification of plant resources of rural area "Takht Bhai" District Mardan, Khyber Pakhtunkhwa, Pakistan with special reference to the following objectives

- To prepare a comprehensive checklist of flora.
- Collection, identification, documentation of wild and cultivated plants from the area.

MATERIALS AND METHODS

Site details

"Takht Bhai" is located in district Mardan having 34° 05' to 34° 32' North latitudes and 71" 48' to 72° 25' East longitudes. It is bounded in the North by Buner district and Malakand protected areas, in the Eastern side by district Swabi, South by district Nowshehra and on the West by district Charsadda (Figure 2). The climate is sub-humid and semi and sub-Tropical continental highland. The summer season is extremely hot (43.5°C). The coldest month temperature reaches 0.5°C. Most of the rainfall occurs in the month of July, August, December and January. The relative humidity is quite high throughout the year reaching 73.33% in December [1,27] (Table 1).

Collection of samples and identification

Frequent study tours were made to the research area in different seasons during March 2017 to July 2018 to collect different plant species. The species were then preserved in newspaper for 15 days after mounted in herbarium sheets for identification. Plants were then identified with the help of available literature [28-31]. All specimens were arranged alphabetically. The samples were then submitted to the Department of Botany herbarium, University of Peshawar for further record.

Biological spectra

For biological spectrum plants were categorized into different life-form and leaf size classes (Table 2, Figures 3, 4 and Figure 5) which are Raunkiaer [22] Hussain [32] and Badshah et al. [11]. Life form reflects the adaptation of plants to climate. This classification is based on the position of perennating buds on the plants and the degree of their protection during adverse condition while leaf size helps in identification of physiological process of plant communities and is useful in classifying the association.

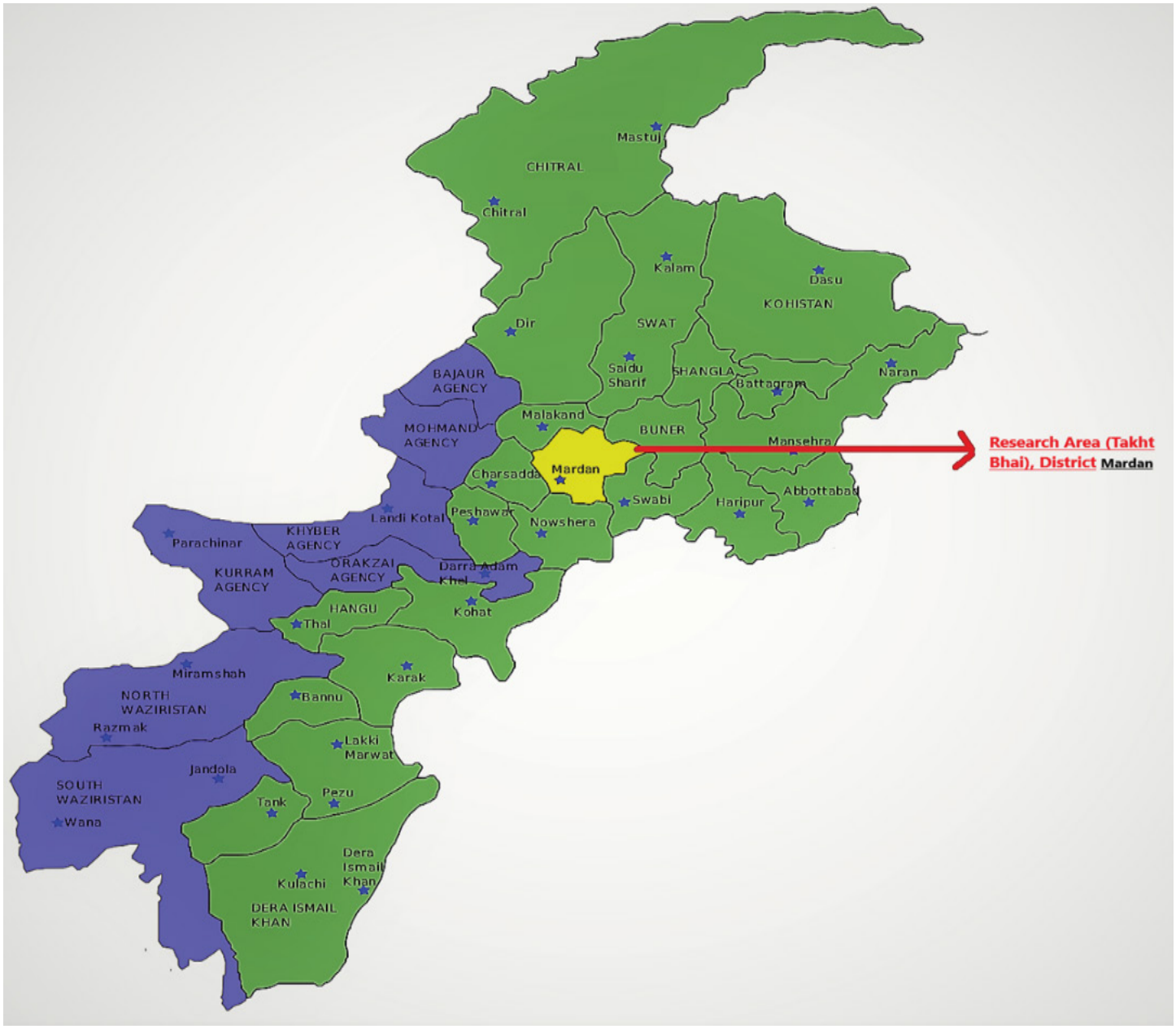

Figure 1: Map of the Research area district Mardan.

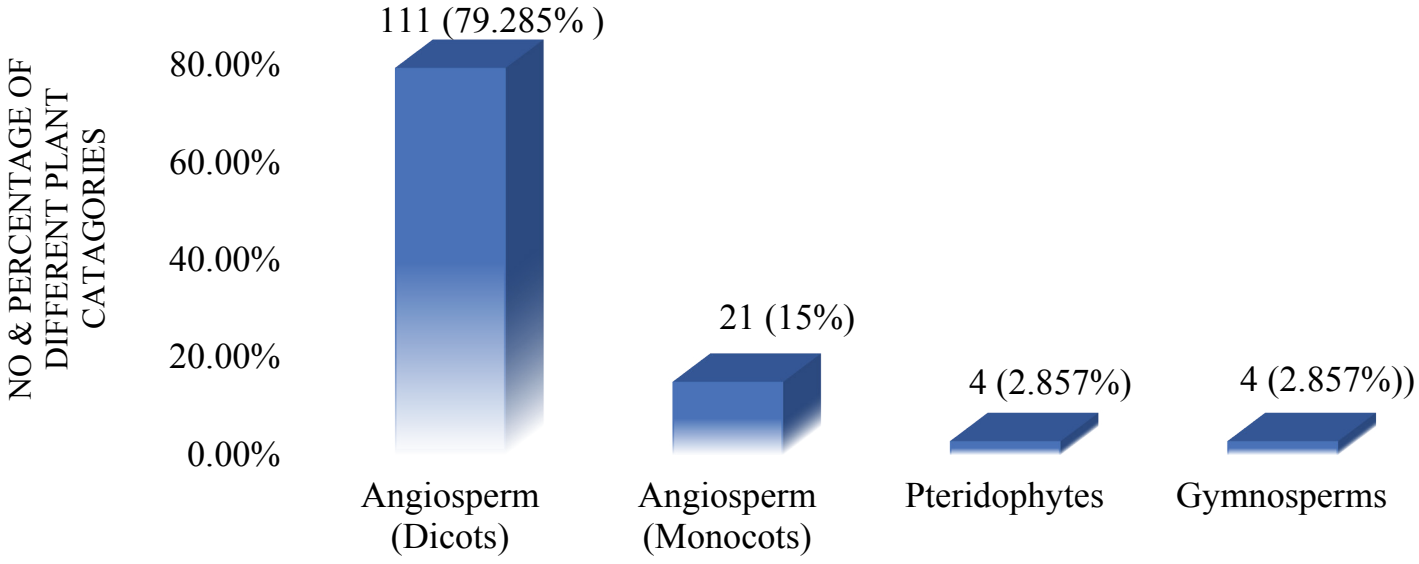

Figure 2: Family-wise distribution.

Table 1: Floristic checklist, status, habit, life form and leaf size spectra.

Division	Family	Botanical Name	Status	Habit	Life form	Leaf size
A. Pteridophytes	Adiantaceae	*Adiantum capillus-veneris* L.	W	H	H	N
	Dryopteridaceae	*Dryopteris serrato-dentata* (Bedd) Hay.	W	H	H	Mg
	Equisetaceae	*Equisetum arvense L.*	W	H	H	N
	Marsileaceae	*Marsilea quadrifolia* L.	W	H	H	N
B. Gymnosperms	Araucariaceae	*Araucaria columnaris* L.	C	T	Mp	Mac
	Cupressaceae	*Cupressus sempervirens* L.	C	T	Meg	Mes
		Thuja orientalis L.	C	T	Mp	N
	Pinaceae	*Pinus roxburghii* Sargent.	C	T	G	Mic
C. Angiosperm (Monocots)	Alliaceae	*Allium cepa* L.	C	H	G	Mic
		Allium sativum L.	C	H	G	Mic
	Amaryllidaceae	*Narcissus poeticus* L.	C	H	Mp	Mes
		Narcissus tazetta L.	C	H	Mp	Mes
		Zephyranthes rosea Lindle.	W	H	Mp	Mes
	Araceae	*Colocasia esculentus* L.	C	H	G	Mg
	Arecaceae	*Phoenix dactylifera* L.	C	T	Mp	Mis
	Asparagaceae	*Asparagus officianalis* L.	C	H	Np	L
	Asphodelaceae	*Aloe vera* L.	C	H	Ch	Mes
	Cannaceae	*Canna indica* L.	W	H	Ch	Mes
	Cyperaceae	*Cyperus rotundus* L.	W	H	Th	N
	Poaceae	*Arundo donax* L.	W	H	Ph	Mac
		Avena sativa L.	W	H	Th	N
		Cymbopogan citratus Spreng.	C	H	Np	N
		Cynodon dactylon (L.) Pers.	W	H	H	L
		Desmostachya bipinnata (L.) Stapf.	W	H	H	Mac
		Dichanthium annulatum (Forssk) Stapf.	W	H	H	N
		Phalaris minor L.	W	H	Th	Mic
		Sorghum halepense (L.) Pers.	W	H	G	Mic
		Triticum aestivum L.	C	H	Th	Mic
	Zingiberaceae	*Curcuma longa* L.	C	H	Ch	Mes
(Dicots)	Aizoaceae	*Trianthema portulacastrum* L.	W	H	Th	N
	Amaranthaceae	*Achyranthes aspera* L.	W	H	Th	Mes
		Amaranthus spinosus L.	W	H	Ch	Mic
		Amaranthus viridis L.	W	H	Th	Mic
		Digera muricata L.	W	H	Th	Mic
Anacardaceae		*Mangifera indica* L.	C	T	Mp	Mes
Apiaceae		*Coriandrum sativum* L.	C	H	Th	N
		Foeniculum vulgaris Mill.	C	H	Th	L
Apocynaceae		*Catharanthus roseus* (L.) G.Don.	C	H	Ch	Mis
		Nerium oleander L.	C	S	Np	Mic
		Rhazya stricta Decne.	W	S	Ch	Mic
Asclepiadaceae		*Calotropis procera* Willd R.Br.	W	S	Ch	Mes
Asteraceae		*Calendula officinalis* L.	C	H	Th	N
		Chrysanthemum indicum L.	C	H	H	N
		Cirsium arvense (L.) Scope.	W	H	Th	Mic
		Conyza canadensis (L.) Cronq.	W	H	Th	N
		Helianthus annuus L.	C	H	Th	Mes
		Lactuca sativa L.	C	H	Th	Mic

	Parthenium hysterophorus L.	W	H	Th	Mes
	Silybum marianum (L.) Gaeth.	W	H	Th	Mes
	Sonchus asper L.	W	H	Th	Mic
	Tagetes erecta L.	C	H	Th	N
	Tagetes patula L.	C	H	Th	N
	Taraxacum officinale Weber.	W	H	Th	Mic
	Xanthium strumarium L.	W	S	Th	N
Boraginaceae	*Cordia myxa* L.	C	T	Ph	Mic
Brassicaceae	*Brassica campestris* L.	C	S	Th	Mac
	Brassica rapa L.	C	H	Th	Mes
	Coronopus didymus (L.) Sm.	W	H	Th	L
	Raphanus sativus L.	C	H	Th	N
Caesalpinaceae	*Bauhinia variegata* L.	C	T	Mp	Mes
	Cassia occidentallis L.	W	H	Th	Mes
Canabinaceae	*Cannabis sativa* L.	W	H	Th	Mic
Chenopodiaceae	*Chenopodium album* L.	W	H	Th	Mic
	Spinacea oleraceae L.	C	H	Th	Mic
Convolvulaceae	*Convolvulus arvensis* L.	W	Cl	Th	Mic
Cucurbitaceae	*Cucurbita pepo* L.	C	Cl	Th	Mg
	Luffa cylindrica (L.) Roem.	C	Cl	Th	Mg
	Momordica charantia L.	C	Cl	Th	Mes
Ebenaceae	*Diospyrus lotus* L.	C	T	Mp	Mic
Euphorbiaceae	*Euphorbia helioscopia* L.	W	H	Th	N
	Euphorbia hirta L.	W	H	Th	Mic
	Ricinus communis L.	W	S	Np	Mg
Fabaceae	*Dalbergia sissoo* Roxb.	W	T	Meg	Mic
	Lathyrus aphaca L.	W	Cl	Th	N
	Medicago polymorpha L.	W	H	Th	N
	Melilotus indica (L.)	W	H	Th	Mic
	Pisum sativum L.	C	H	Th	N
	Trifolium repens L.	C	H	Th	Mic
	Vicia sativa L.	W	H	Th	Mic
Fumaraceae	*Fumaria indica* (Hausskn) H. N. Pugsley	W	H	Th	L
Lamiaceae	*Mentha longifolia* (L.) Huds.	W	H	G	Mic
	Mentha spicata L.	C	H	G	Mic
	Vitex negundo L.	W	S	Np	N
Malvaceae	*Abelmoschus esculentus* L.	C	H	Th	Mic
	Hibiscus rosa-sinensis L.	C	S	Th	Mic
	Malvastrum coromandelianum (Linn.) Garcke	W	H	H	Mic
Meliaceae	*Melia azedarach* L.	W	T	Mp	Mic
Mimosaceae	*Acacia nilotica* (Linn.) Delile.	W	T	Ph	L
	Acacia modesta Wall.	W	T	Ph	L
Moraceae	*Broussonetia papyrifera* (L.) Vent.	W	T	Mp	Mg
	Ficus carica L.	W	T	Mp	Mes
	Ficus palmata Forssk.	C	T	Mp	Mes
	Morus alba L.	W	T	Mp	Mes
	Morus laevigata Wall.Ex Brandis.	W	T	Mp	Mes
	Morus nigra L.	W	T	Mp	Mes
Myrtaceae	*Callistemon lanceolatus* L.	C	T	Np	Mic

	Eucalyptus camaldulensis Dehnh.	C	T	Mp	Mic
	Myrtus communis L.	C	T	Np	Mic
	Psidium guajava L.	C	T	Ch	N
Nyctaginaceae	*Bougainvillea spectabilis* L.	C	Cl	Mp	Mic
	Mirabilis jalaba L.	W	H	Ch	Mes
Oleaceae	*Jasminum sambac* L.	C	H	Ch	Mic
	Ligustrum ovalifolium L.	C	S	Th	Mic
Oxalidaceae	*Oxalis corniculata* L.	W	H	G	N
Papaveraceae	*Papaver somniferum* L.	C	H	Th	Mic
Plantaginacae	*Plantago lanceolata* L.	W	H	Th	Mic
Platanaceae	*Platanus orientalis* L.	C	T	Mp	Mes
Polygonaceae	*Polygonum barbatum* L.	W	H	Ch	Mic
	Rumex dentatus L.	W	H	Th	Mes
Portulacaceae	*Portulaca oleaceae* L.	W	H	H	N
Punicaceae	*Punica granatum* L.	C	T	Ph	N
Ranunculaceae	*Ranunculus muricatus* L.	W	H	G	Mic
Rhamnaceae	*Ziziphus jujuba* Mill.	C	T	Mp	Mic
	Ziziphus mauritiana L.	W	T	Mp	Mic
Rosaceae	*Prunus amygdalis* L.	C	T	Mp	Mic
	Prunus domestica L.	C	T	Ph	Mac
	Pyrus communis L.	C	T	Mp	Mic
	Rosa alba L.	C	S	Np	Mic
Rubiaceae	*Galium aparine* L.	W	Cl	Th	L
Rutaceae	*Citrus auratiifolia* (christm) Swingle.	C	T	Mp	Mic
	Citrus limonum (L.) Osbeck.	C	T	Th	N
Salicaceae	*Populus alba* L.	C	T	Mp	Mes
	Salix acmophylla Boiss.	W	T	Th	Mic
Sapindaceae	*Dodonaea viscosa* (L.) Jacq.	C	S	Np	Mic
Scrophulariacee	*Verbascum thapsus* L.	W	H	Np	Mic
Simaroubaceae	*Ailanthus altissima* (Mill) Swingle.	W	T	Mp	Mic
	Cestrum diurnum L.	C	S	Ch	N
	Cestrum nocturnum L.	C	S	Ch	N
	Datura alba L.	W	H	Ch	Mes
Solanaceae	*Lycopersicum esculentum* L.	C	H	Th	Mic
	Physalis minima L.	W	H	Ch	Mic
	Solanum melongena L.	C	S	Th	Mac
	Solanum nigrum L.	W	H	Th	Mic
	Solanum surattense Burm.f.	W	H	Th	Mic
	Solanum tuberosum L.	C	H	Ch	Mic
Verbenaceae	*Lantana camara* L.	W	S	Th	Mic
	Verbena officinalis L.	W	H	Th	N
Vitaceae	*Vitis vinifera* L.	C	Cl	Np	Mac
Zygophyllaceae	*Tribulus terrestris* L.	W	H	Th	N

Keys:
Status: W =Wild; C = Cultivated;
Habit class: Cl = Climber; H = Herb; S = Shrub; T = Tree;
Life form: H-Hemicryptophyte; C-Chamaephyte; G-Geophytes; Np-Nanophanerophyte; Th-Therophyte; Ph- Phanerophyte; Mp-Microphanerophyte; Mac-Macrophanerophyte Meg-Megaphanerophytes; Np-Nanophanerophyte:
Leaf size: L-Leptophyll; N-Nanophyll; Mic-Microphyll; Mes-Mesophyll; Mac-Macrophyll; Meg-Megaphyll.

Table 2: Status, Habit, Life form and Leaf size spectra percentages.

S. No	Habit of plants	Total species	% age
1	Herb	82	57.86%
2	Tree	35	25%
3	Climber	8	5.71%
4	Shrub	16	11.43%
	Total	**140**	**100%**
S. No	**Status of plants**	**Total species**	**% age**
1	Wild	72	51.43%
2	Cultivated	68	48.57%
Total		**140**	**100%**
S. No	**Life form**	**Total species**	**% age**
1	Therophytes	57	40.71%
2	Microphanerophytes	26	18.57%
3	Chamaephytes	19	13.57%
4	Nannophanerophytes	12	8.57%
5	Hemicryptophytes	10	7.14%
6	Geophytes	8	5.71%
7	Phanerophytes	6	4.29%
8	Mega phanerophytes	2	1.43%
Total		**140**	**100%**
S. No	**Leaf size**	**Total species**	**% age**
1	Microphyll	61	43.57%
2	Nanophyll	29	20.71%
3	Mesophyll	27	19.29%
4	Leptophyll	10	7.14%
5	Macrophyll	7	5%
6	Megaphyll	6	4.29%
Total		**140**	**100%**

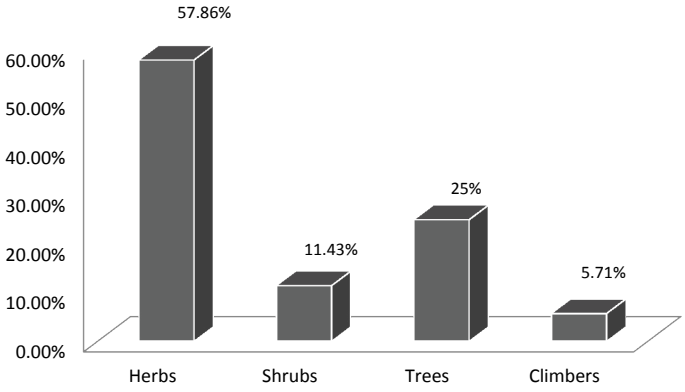

Figure 3: Habit class classification.

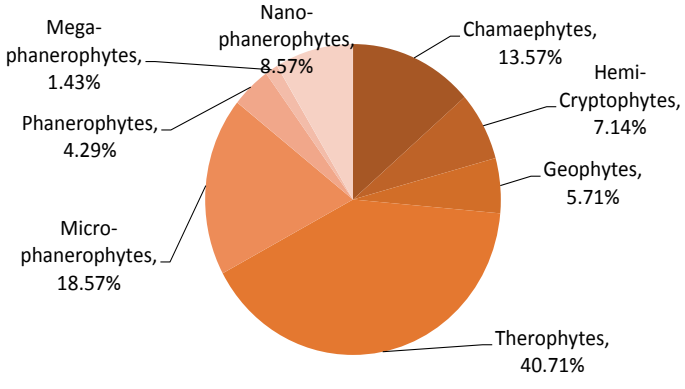

Figure 4: Life form classification.

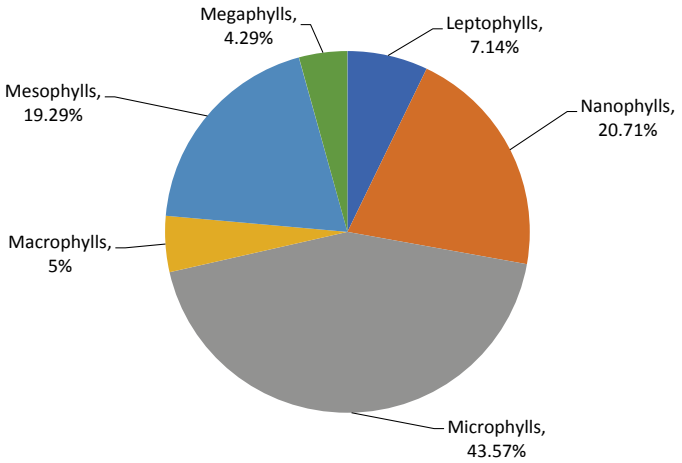

Figure 5: Leaf size classification.

RESULTS AND DISCUSSION

Floristic composition and its ecological characteristics

Floristic diversity of a region is the total of the species within its boundaries, weather wild or cultivated, which is a reflection of vegetation and plant resources. Plant resources are affected by agriculture, over grazing, anthropogenic interaction and natural disasters. The flora of Takht Bhai, Mardan, KP, Pakistan revealed 140 plant taxon and 63 families during 2017-18 in which 4 families were Pteridophytic, 3 were Gymnospermic and rest of 56 families

were Angiospermic including 10 Monocot (21 species 15%) and 46 Dicot (111 species 79.285%) families (Table 1). According to plant habit (Table 2 and Figure 3) herbaceous cover were dominant with 82 species (58.571%) followed by trees 34 species (24.285%), shrubs 16 species (11.428%) and climber 8 species (5.714%). Status of plants includes, 72 species (51. 428%) were wild and 68 species (48.571%) were cultivated (Table 2). The dominant family was Asteraceae with 13 species, followed by Solanaceae and Poaceae with 9 spp. each, Fabaceae 7 spp, Moraceae 6 spp, Amaranthaceae, Brassicaceae, Lamiaceae, Myrtaceae and Rosaceae 4 spp. each, Amaryllidaceae, Apocynaceae, Cucurbitaceae, Euphorbiaceae and Malvaceae with 3 spp. each, Alliaceae, Apiaceae, Caesalpinaceae, Chenopodiaceae, Cupressaceae, Mimosaceae, Nyctaginaceae, Oleaceae, Polygonaceae, Rhamnaceae, Rutaceae, Salicaceae and Verbenaceae with 2 spp. each. The rest of 35 families are monophilitic and comprised of 1 genus and 1 specie each (Table 3). Similar results were made by [11,33-35] Sher et al. who also explored same floristic study of these families from different region of KP, Pakistan [36]. Badshah et al. also reported these families to be well represented in semiarid area of district Tank, Pakistan [11]. Mehmood et al. [37] highlighted 25 (Asteraceae) and 21 species of Poaceae from Torghar and Qureshi et al. [38] also reported (7) Asteraceae and (6) Poaceae members and considered these families as a richest in district Toba Tek Singh, Pakistan. [39,40] also observed that these families were dominant in their respective study sites. Some other literature also indicated similar results in Flora of Pakistan [16,27-30]. Our results are predominantly sponsored by them as Asteraceae, Poaceae and Solanaceae have emerged as the common families in the investigated area. Rahman et al. [14] and Rawat & Pangtey, Rawat also stated the abundance of same families in Rajshahi City and Central Himalaya, India [41]. The members of Poaceae and Asteraceae due to their wide ecological amplitude are diverse in their habitat occurrence.

Life form spectra and its composition

Plant species can be categorized into different life form classes depend upon structural and functional similarities [20]. Life forms of species also vary profoundly under the influence of such altitudinal variations. Life forms in an ecosystem indicate the adaptations of plant species' physiognomy to the surrounding climate [24,42]. We use Raunkiaerean classification and thus proved that overall Therophytes (Table 2, Figure 4) found to be 57 spp. (40.714%), Microphanerophytes 26 spp. (18.571%), Chamaephytes 19 spp. (13.571%), Nanophanerophytes 12 spp. (8.571%), Hemicryptophyte 10 spp. (7.142%), Geophytes 8 spp. (5.714%), Phanerophytes 6 spp. (4.285%) and Megaphanerophytes 2 spp. (2.97%). Alsherif et al. [43] also reported the dominancy of Therophytic plants from Khulais region, Western Saudia Arabia and identified 251 plant species with 50 families. In 1934 Raunkiaer [21] described three major phytoclimates on the basis of life form on the planet. This may include Phanerophytic climate in the tropics, Therophytic in deserts and Hemicryptophytic in the greater part of cold temperate zone. Biological spectra change due to biotic influences like agricultural practices, grazing, deforestation, trampling and climatic change. The current overall spectra revealed the dominancy of Therophytic plants.

Leaf size spectra and its composition

The leaf size knowledge helps in understanding physiological process of plants and plant communities and is useful in classifying the associations. The leaf size spectrum indicated (Table 2, Figure 5) that Microphyll 61 species (43.571%) were dominant of the area followed by Nanophyll 29 species (20.714%), Mesophyll 27 species (19.285%), Leptophyll 10 species (10.89%), Macrophyll 7 species (6.93%) and Megaphyll 6 species (4.285%) were reported. Khan et al. [44] studied 55 families from Sathan Galli, District Mansehra of Khyber Pakhtoonkhawa (KP) Pakistan. Leaf size spectra were dominated by Microphyll contributing 68 species, followed by Mesophylls 45 species. Therophytes were found as leading life form of the area encompassing 30.35% species. Current exploration revealed that Therophytes and Microphyll were dominant in the study area depicting heavy biotic pressure due to deforestation, over grazing and soil erosion. Shaheen et al. [45] carried out the floristic composition, phenology, leaf and biological spectrum of Tehsil Havelian and enlisted 205 plant species belonging to 78 families. Shaheen et al. Identified 132 species belonging to 101 Genera and 41 families floristically from alpine region of Deosai Plateau, Western Himalayas. Khan et al. [33] identified and documented 18 families in which 6 genera and 7 species were monocots and 27 genera and 28 species were dicots from Village Ochawala, district Charsadda, Pakistan. Shah and Hussain, [46] observed Therophytes as most dominant class in Hayatabad, Peshawar. Some prominants works related to this area are; [47] reported 132 species with 104 genera and 47 families from Shahbaz Garhi, District Mardan in which family Poaceae and class therophytes were the dominant in his study. Similarly [24] also reported 38 flowering families from Sheikh Maltoon Town district Mardan and recorded Therophytes and Microphylls were important class. Khan et al. also documented 124 genera from tehsil Katlang [48], district Mardan and concluded the dominancy of therophytes prove the area is under heavy biotic stress. Genera like *Amaranthus, Euphorbia, Juncus, Marsilea, Morus, Populus, Polygonum, Tegetes, Zinnia* and *Zizipus* were reported from riparian zone of Lund Khuwar, district Mardan, KP, Pakistan by Khan et al. [49]. Khan and Shah, [50] reported 13.7% xerophytes, 82.7% mesophytes and 3.4% hydrophytes plant from district Mardan. Khan et al. documented leaf size and life form spectra from Allai valley in the western Himalayan region of Pakistan [51]. Nazir A reported life-form and index of similarity from Sarsawa Hills, District Kotli [52]. Gul recorded different life forms and leaf size classes in University of Peshawar Campus [53]. Hussain et al. explored biological spectrum of Lesser Himalayan, Pakistan [54]. Nawab et al. depicted life form and leaf size spectra of native vascular flora of Kalam Valley, district Swat, Pakistan [55]. Ali et al. reported from district Nowshera [56], Khyber Pakhtunkhwa [57] from Tehsil Oghi, Mansehra. Amjad studied life form and leaf size from subtropical forest of Kotli District, AJK, Pakistan [58]. from Nikyal valley, Azad Jammu and Kashmir [59]. This is the 1st ever reports on floristic study of plants of Takht Bhai which might help for future researches.

Table 3: Enumeration of species and families.

S. No	Division	No of families	Total species	% age
1	Pteridophytes	4	4	2.857%
2	Gymnosperms	3	4	2.857%
3	Monocots	10	21	15 %
4	Dicots	46	111	79.285%
	Total	**63**	**140**	**100%**

CONCLUSION

The current study revealed that 140 plant species have been identified with 63 families in worked in rural area Takht Bhai district Mardan. 4 Pteridophytic, 3 Gymnospermic and 56 Angiospermic families including 10 Monocots and 46 Dicots. Family Asteraceae (13 species) was the most dominant in all followed by Poaceae (9 species). 35 families were monophilitic and had one species and 1 genus each. Herbaceous cover was dominant with 58.571% of the total flora. 51.42% of flora is wild in nature and 48.57% are cultivated. Therophytes were the dominant 40.71% in life form class and Microphyll 43.57% were in leaf size class. From the current exploration it was concluded that over utilization, over collection, over exploitation, habitat degradation, overharvesting, deforestation, population explosion and over grazing are the conspicuous biotic stresses which severely threatened the flora in the area which affect the population sustainability on earth crust.

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