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Floristic List and Indigenous Uses of Poaceae Family in District Tor Ghar, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

The present study revealed for the first time the floristic diversity and indigenous uses of Poaceae family in district Tor Ghar. The entire district was surveyed and explored during the year 2012 and 2013 for species diversity of grasses. Flowering and fruiting of plant species were recorded. Specimens of each plant species were collected, dried, poisoned and mounted on herbarium sheets and were identified with the help of Pakistan's Flora and deposited in the herbarium of Hazara University, Mansehra for accession numbers. The plant species were tabulated according to the subfamilies.This study revealed that the family Poaceae is represented in the Tor Ghar district by 73 Species in 54 genera and 6 sub families. Out of which Panicoideae was the leading sub family with 32 plant species (44%) and 23 genera, followed by Pooideae with 27 species (37%) and 18 genera and Chloridoideae with 9 species (12%) belong to 08 genera. While remaining three sub families were comprised of less than 3 species each. Among 54 genera, *Poa* and *Digitaria* were the dominant genera with 4 species each, followed by *Chrysopogon, Lolium* and *Agrostis* with 3 species each. Based on life span, perennial grasses were the most dominant one with 46 species (63%) observed in the study area, followed by annual grasses with 27 species (37 %). It is recommeded that this study will provide the baseline for future research on different aspects like ecological, ethnopharmacological studies on Poaceae family members of the area.

KEYWORDS: Floristic checklist, Biodiversity, Poaceae, Tor Ghar, Pakistan

INTRODUCTION

Pakistan is rich in Biodiversity due to different soil type, topography and geological structure [1]. That's why; about 6000 vascular plant species have been reported [2-3] out of these 80% of the endemic flowering plants are limited to the northern and western mountains [4]. Overgrazing, soil erosion, salinity and water logging, non-manageable agrarian practices and hunting have turned out to be significant dangers to the biodiversity. Massive numbers of animals, rising at a rate of 20% in seven years, which troubled the conveying limit of Pakistan's rangelands. Truth be told, the circumstance is severe to the point that most rangelands create under 30% of their potential. Untamed life populaces are additionally at hazard when vegetation is diminished. Pastures arranged in sub-high and snowcapped locales of the Himalaya are an essential search asset for the domesticated animals of the range. The overgrazing of these fields has brought about harm of satisfactory grass and pea species. Because of continuous and heavy grazing, the pastures and forest-areas have been deteriorated. The study of natural grassland communities, regardless of its well known ecological importance, has been historically ignored [5] or limited to leading grass species used in livestock production [6]. There is a lack of floristic and structural studies regarding these communities worldwide. Management of these pastures needs identification and investigation of the grasses of the area.

Grasses are among the most adaptable life forms [7]. Poaceae (Graminae) is a diversified family in the Class Liliopsida (the monocots) of the f lowering plants. The family Poaceae is known to have about 9550 species in about 668 genera [8]. Based on the number of genera; it is the third largest family after Asteraceae and Orchidaceae. Species-wise, its place is fifth after Asteraceae, Orchidaceae, Leguminosae and Rubiaceae [9]. The grass family has been divided into a number of subfamilies ranging from two to 13. One of the most Widely used systems is that of Clayton & Renvoize, which divided the family in six subfamilies: Arundinoideae, Bambusoideae, Centothecoideae,

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Chloridoideae, Panicoideae and Pooideae [10]. The largest proposed number of subfamilies is 13 [11]: Anomochlooideae, Aristidoideae, Bambusoideae, Ehrhartoideae, Entostecoideae, Eragrostoideae (Chloridoideae), Festucoideae (Pooideae), Micrairoideae, Olyroideae, Oryzoideae, Panicoideae, Phragmitoideae and Streptochaetoideae. Most people on Earth depend on grasses, such as wheat, corn, oats, rice, sugarcane, and rye, for a large part of their diet. In addition, domestic animals are fed on grasses. Moreover, many weeds growing on agricultural land are also members of the grass family.

Floristic surveys are helpful in proper identification of plant-wealth for their exploitation on a scientific and systematic basis. The identification of local plants along with the description of an area is very important because it can show specific species of the local area and their occurrence, growing season, species hardness, distinct species, finding new species and the effect of climatic conditions like drought and overgrazing on vegetation [12]. To develop conservation strategies and estimate the changes taking place in the vegetation patterns of any area, it is required to have a detailed floristic description of that area based on collections and correct identification [13]. In Pakistan, more than 60% of the area has been declared as rangeland, which is the major land use of the country [14]. This vast natural resource of the country is not being managed on scientific basis and at present, only 10-15% of their actual potential is being realized [15]. From Pakistan, various floristic studies are reported and contributed in the local flora, but research on grasses is neglected. Only few studies are reported from the country [16-22]. Khalid [23] reported 55 grass weeds from various crops in Pakistan.

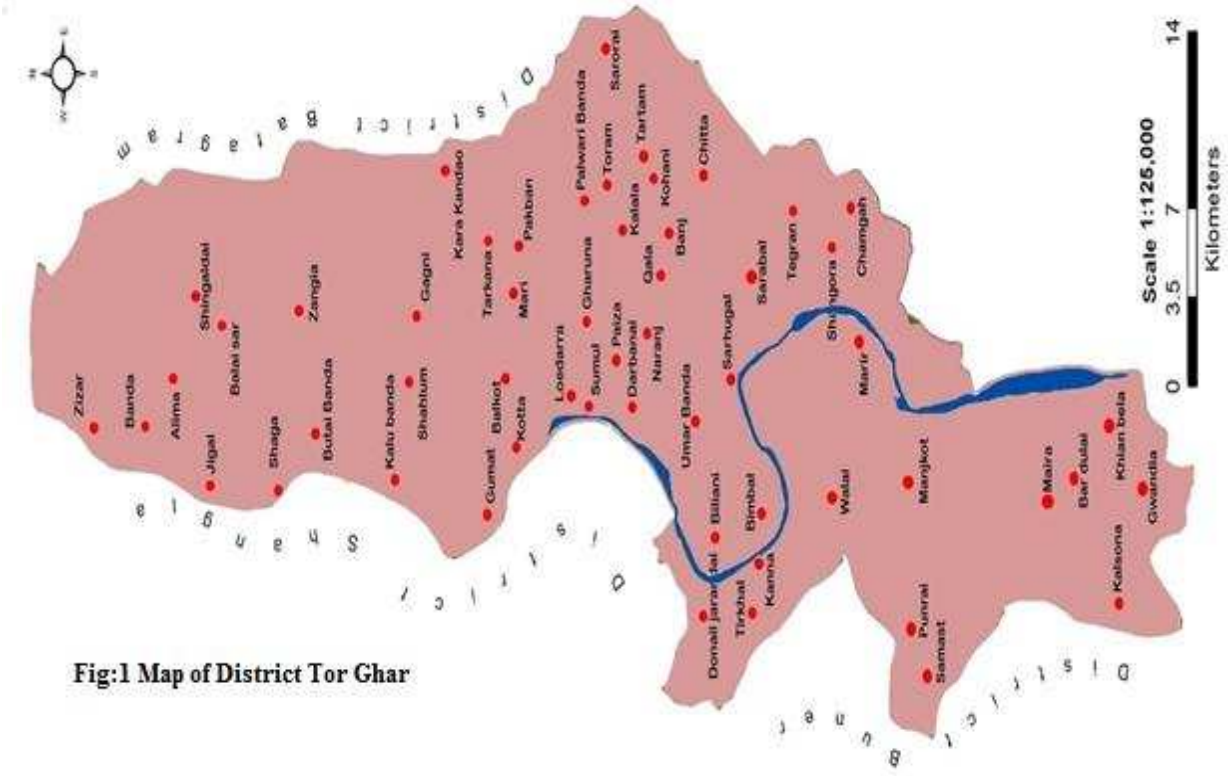

Fig:1 Map of District Tor Ghar

The Himalaya is one of the mountain range where most of the natural forest resources of Pakistan lie. Tor Ghar district is one of the unexplored areas situated at the western edge of the lesser Himalayas at the bank of Indus (Hazara, Khyber Pakhtunkhwa, Pakistan) (Fig.1). In the investigated area, most people are poor and lack the basic facilities. Floristically, it is part of the Western Himalayan Province of Irano-Turanian Region [24]. A Climate of Tor Ghar is pleasant in spring and autumn, but winter remains very harsh due to heavy snowfall. The People of the area are mostly illiterate and not aware of loss of biodiversity and its impact on human life. They are using natural resources ruthlessly. They use live stocks for milk, meat, transportation and farming. Seasonal nomads with large number of cattle also stay in this area. The large numbers of live stocks result in the overgrazing of natural vegetation and they get fuel, fodder, edible roots and tubers from forest besides cultivating some seasonal agricultural crops like wheat, maize, etc in small areas. Grasses assume greater importance in the area like Tor Ghar, where most of the people are dependent on agriculture and livestock. Keeping the utmost importance of first ever exploration present study was planned with the objectives to explore, identify and document grasses species

diversity of the study area. Through these studies, valuable data about the grasses is recorded which could be used as reference for future studies.

Figure 2: Scenic view of district Tor Ghar.

Figure 3: Some grasses collected from district Tor Ghar.

MATERIALS AND METHODS

District Torghar is located at 32' - 34º 50' N, and 72º 48' - 72º58' E with an altitudinal range of 450 masl to 3,000 masl. The entire district was surveyed and explored during the year 2012 and 2013 for species diversity of grasses. Flowering and fruiting of plant species were recorded. Specimens of each plant species were collected, dried, poisoned and mounted on herbarium sheets and were identified with the help of Pakistan's Flora [1, 25-26] and deposited in the herbarium of Hazara University, Mansehra for accession numbers. The plant species were tabulated according to the subfamilies. The common names, habitat and flowering period were also provided. All plant names were subfamily wise alphabetically arranged by following GPWG [27] and presented in the result.

RESULTS

This study revealed that the family Poaceae is represented in the Tor Ghar district by 73 Species in 54 genera and 6 sub families. Out of which Panicoideae was the leading sub family with 32 plant species (44%) and 23 genera, followed by Pooideae with 27 species (37%) and 18 genera and Chloridoideae with 9 species (12%) belong to 08 genera. While remaining three sub families were comprised of less than 3 species each. Among 54 genera, *Poa* and *Digitaria* were the dominant genera with 4 species each, followed by *Chrysopogon, Lolium* and *Agrostis* with 3 species each. Based on life span, perennial grasses were the most dominant one with 46 species (63%) observed in the study area, followed by annual grasses with 27 species (37 %).

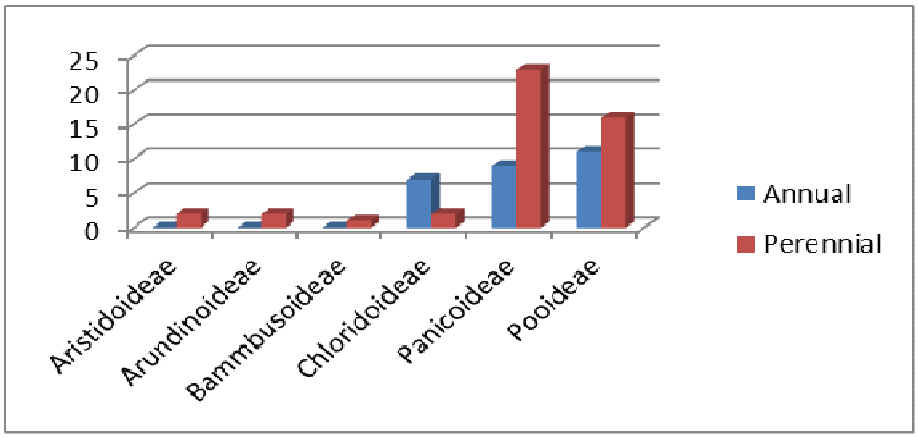

Figure 4: Life span of different plant species belonging to different subfamilies of Poaceae.

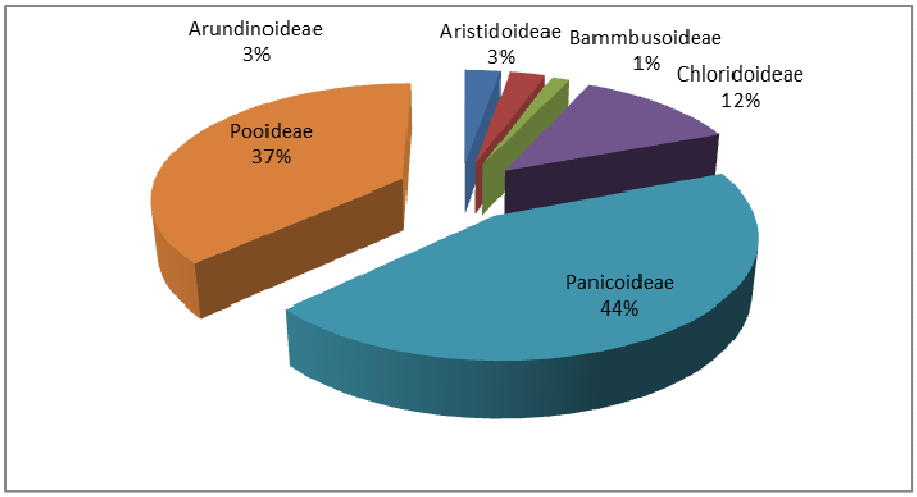

Figure 5: Percentage of different subfamilies of Poaceae.

The check list presented here is arranged based principally on latest format and classification system proposed by GPWG (2001)

Table1: Inventory of Plants of family Poaceae collected from district Tor Ghar.

S. Family/ Genus.	Subfamilies	Spp.	Botanical Name	Local Name	Flowering period	Life Cycle	Locality
1	Aristidoideae						
1		1	*Aristida adscensionis* L.	Lamba	June-December	Perennial	Kunhar
2		2	*Aristida cyanantha* Nees ex Steud.		May-Sept.	Perennial	Kunhar
2	Arundinoideae						
1		3	*Arundo donax* L.	Nara	April-June	Perennial	Kotkay
2		4	*Phragmites australis* (Cay.) Trin.		July- Oct	Perennial	Judbah
3	Bammbusoideae						
1		5	*Bambusa glaucescens* (Willd.) Sieb.	Bans		Perennial	Kunhar
4	Chloridoideae						
1		6	*Acrachne racemosa* (Hayne) Ohwi		July-Sept.	Annual	Soral
2		7	*Cynodon dactylon* (L) Pers	Kabal	May-August	Perennial	Soral
3		8	*Dactyloctenium aegyptium* (L) Willd	crow foot grass	July-Oct	Annual	Zizari

4		9	*Desmostachya bipinnata* (L) Stapf	Drab	May-August	Perennial	Kalish
5		10	*Eleusine indica* (L.) Gaertn.		April-August	Annual	Kalish
6		11	*Eragrostis pilosa*(L.) P. Beauv.		June-Sept.	Annual	Kotkay
7		12	*Eragrostis ciliaris* (L.) R.Br.		May-Sept.	Annual	Judbah
8		13	*Leptochloa panicea* (Retz.) Ohwi		Agust-Nov.	Annual	Shagahi
9		14	*Tragus roxburghii* Panigrahi		April-Dec.	Annual	Basikhel
5	Panicoideae						
1		15	*Alloteropsis cimicina* (L.) Stapf		July-Oct	Annual	Shagahi
2		16	*Apluda mutica* L.		Agust-Oct.	Perennial	Shagahi
3		17	*Arthraxon prionodes* (Steud.) Dandy		Jun -Sept	Perennial	Shagahi
4		18	*Bothriochloa ischaemum* (L.) Keng	Ganderi	May-Oct	Perennial	Soral
5		19	*Brachiaria eruciformis* (Sm.) Griseb.		July- Sept	Annual	Surmal
6		20	*Brachiaria ramosa* (Linn.) Stap		July - Oct	Annual	Surmal
7		21	*Cenchrus ciliaris* L.	Dhamni	Feb-March	Perennial	Dadam
8		22	*Chrysopogon aucheri* (Boiss.) Stapf		june-Sept.	Perennial	Surmal
9		23	*Chrysopogon gryllus* (L) Trin.		June-Sep	Perennial	Surmal
10		24	*Chrysopogon serrulatus* Trin		Jun-sep	Perennial	Dadam
11		25	*Cymbopogon commutatus* (Steud.) Stapf		April-Oct	Perennial	Zizari
12		26	*Dichanthium annulatum* (Forssk) Stapf.	Danul	April-Oct.	Perennial	Kotkay
13		27	*Digitaria ciliaris* (Retz.) Koel		June-Sept.	Annual	Kandow Gali
14		28	*Digitaria nodosa* Perl.	Madana	June-Sept.	Perennial	Kotkay
15		29	*Digitaria stricta* Roth.		August- Oct.	Annual	Kunhar
16		30	*Digitaria violascens* Link		May-Sept.	Annual	Soral
17		31	*Echinochloa crus-galli* (L.) P. Beauv.		May-Sept.	Annual	Manasar
18		32	*Echinochloa colona* (L.) Link	Sawarai	Jun-Oct.	Annual	Manasar
19		33	*Eulaliopsis binata* (Retz.) C.E. Hubbard.	Wakhay	April July	Perennial	Manasar
20		34	*Hemarthria compressa* (L.f) R. Br.	Baika	July-Oct.	Perennial	Banda
21		35	*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.	Sarwal	June-Sept.	Perennial	Banda
22		36	*Imperata cylindrica* (L)P. Beauv	Dhub	March-Sept.	Perennial	Kotley
23		37	*Isachne himalaica* Hook.f.		August-Nov.	Perennial	Banda
24		38	*Oplismenus compositus* (L.) P. Beauv.		August-Sept	Perennial	Doda
25		39	*Oplismenus undulatifolius* (Ard.) P. Beauv.			Perennial	Doda
26		40	*Panicum antidotale Retz*	Gunara	March-oct.	Perennial	Judbah
27		41	*Paspalum dilatatum* Poir.	Naru	July-Oct.	Perennial	Judbah
28		42	*Paspalidium flavidum* (Retz.) A. Camus	Kangra	July-Oct.	Perennial	Bakery
29		43	*Saccharum spontaneum* L.	Sar kahi	July-Oct.	Perennial	Machara
30		44	*Setaria pumila* (Poir.) Roem. & Schult	Ban Kangi	July-Oct.	Annual	Machra
31		45	*Sorghum halepense* (L.) Pers.	Dadam/Baru	May-Sept.	Perennial	Banda
32		46	*Themeda anathera* (Nees ex Steud.) Hack.	Loonder	June –Oct.	Perennial	Banda
6	Pooideae						
1		47	*Agrostis pilosula* Trin.		August- Sept.	Annual	Gut
2		48	*Agrostis gigantea* Roth		July -August	Perennial	Gut
3		49	*Agrostis stolonifera* Linn		May-Sept.	Perennial	Hasan Zai
4		50	*Alopecurus myosuroides* Huds		March- April	Annual	Kotkay
5		51	*Avena fetua* L.	Jawdar	April-July	Annual	Judbah
6		52	*Brachypodium sylvaticum* (Huds.) P. Beauv.		July- Sept	Perennial	Shagai
7		53	*Bromus pectinatus* Thunb.		March-May	Annual	Shagai

8		54	*Calamagrostis decora* Hook. f., Fl. Bri		May-June	Perennial	Shatal
9		55	*Calamagrostis pseudophragmites* (Haller f.) Koeler		Agust-Octo	Perennial	Shahtal
10		56	*Dactylis glomerata* L.		May-August	Perennial	Machara
11		57	*Deschampsia caespitosa* L	Broom grass	Sept-Oct.	Perennial	Kandar
12		58	*Elymus himalayanus* (Nevski) Tzvelev		June-August	Perennial	Dadam
13		59	*Festuca gigantea* (L.) Vill.		July-Agust	Perennial	Soral
14		60	*Festuca valesiaca* Schleich. ex Gaudin		July-Agust	Perennial	Paiza
15		61	*Hordeum murinum* L.		July-Oct	Annual	Paiza
16		62	*Lolium perenne* L.		April-August	Perennial	Gut
17		63	*Lolium tomulentum*. L		April-August	Annual	Dadam
18		64	*Lolium multiflorum* Lam		May-August	Perennial/A	Banda
19		65	*Phalaris minor* Retz	Dumbi Booty	March-June	Annual	Kandar
20		66	*Phleum alpinum* L.		July-Sept.	Perennial	Shahtal
21		67	*Piptatherum gracile* Mez		June-August	Perennial	Manasar
22		68	*Poa alpina* L.		June- Sep	Perennial	Machasar
23		69	*Poa bulbosa* L.		April-October	Perennial	Soral
24		70	*Poa infirma* H. B. K.		March-August	Annual	Soral
25		71	*Poa sinaica* Stued		April-Oct.	Perennial	Haleema
26		72	*Polypogon fugax* Ness ex Steud		May-August	Annual	Zizari
27		73	*Vulpia myuros* (L.) C.C.Gmel		May-Oct.	Annual	Shagai

DISCUSSION

The *Flora of Pakistan* is a comprehensive inventory of plants of Pakistan. Many regions have recently been introduced in floristic term. Many floristic studies have been reported from Pakistan, but the grasses have not been given sufficient attention in floristic study. Only few studies have been reported from the country [16-17, 19, 21-22, 28-29-30]. Cope [28] described in the *Flora of Pakistan*, five sub families of Poaceae. Khalid [23] reported 55 grass weeds from various crops in Pakistan. Shah and Khan [30] reported 12 species of weeds of family Poaceae from Mansehra district. Rafay *et al.* [32] studied life form, life trend and abundance of grass species in Cholistan desert and reported twenty seven grass species belonged to16 genera from Cholistan desert. There is no previous report available on the flora of this District. So, this is the first attempt to record the flora of this region.

In present study, complete floristic composition of family Poaceae is represented in the Tor Ghar district by 73 Species in 54 genera and 6 sub families. This number will increase when further studies will be carried out in the future. This number is the highest number of species in comparison with the other studies at the adjoining area. Out of 6 sub families, Panicoideae was the leading sub family with 32 plant species (44%) and 23 genera, followed by Pooideae with 27 species (37%). The Panicoideae also includes many high productive grasses and cereals which follow C4 type of photosynthesis. Out of total 32 grass species 23 were perennial and 9 were annual. Out of which Panicoideae was the leading sub family with 32 plant species (44%) and 23 genera, followed by Pooideae with 27 species (37%) and 18 genera and Chloridoideae with 9 species (12%) belong to 08 genera. While remaining three sub families were comprised of less than 3 species each. Among 54 genera, *Poa* and *Digitaria* were the dominant genera with 4 species each, followed by *Chrysopogon, Lolium* and *Agrostis* with 3 species each. Our study is in line with a study conducted by [23] who reported 55 grass weeds from various crops in Pakistan. She also reported that subfamilies Panicoideae is most important and dominant representing 47% weeds of Poaceae in Pakistan. Based on life span, perennial grasses were the most dominant one with 46 species (63%) observed in the study area, followed by annual grasses with 27 species (37 %). The dominance of perennials grass species over annuals was also reported by Qureshi *et al*. [33]. The perennial species domination over annuals is an evident of harsh climate of most of the area of district.

On the basis zonal categories, the study area is the representative of three zones i.e., subtropical, moist temperate and sub alpine type. Identification of 73 grasses from the district is proof of the grass species diversity of the locale, however a large portion of the area display unforgiving atmosphere. A large portion of these plants are essential from biological community benefit perspective, for example, therapeutic plant, source of aromatic oil and food for livestock. The major utility of plants was as fodder.

The important weeds belong to family Poaceae were *Avena fatua*, *Imperata, Echinocola, Brachiopodium, poa, Bromos, Cenchrus, Festuca* and *Brachiaria.* Identification of these grass weeds will be helpful in control

measure. *Chrysopogon, Panicum, Brachiaria* and *Cymbopogon spp.* can be used to check soil erosion. Many grasses are used as a health food for the cattle and also show sound effects on the cattle's growth and development. Further study is needed to assess nutritional value of these grasses. Detailed ecological study about these grasses will help in the conservation of many palatable species in the region. It is recommended that a long term comprehensive study should be continued to document the complete flora of the study area.

CONCLUSION

The present investigation demonstrated extremely productive in delineating the customary connection and reliance on rural individuals with plant assets of the zone. The assets must be monitored for future. The explored zone is the recently made region where the vast majorities of the general population are reliant on agribusiness and animals, confronted with issues like deforestation, overgrazing, soil disintegration and over-abuse of therapeutic and fuelwood species. It is a critical need to make a move and make mindfulness about the handiness of the greenery with the goal that individuals can spare these plants out of anthropogenic pressure. Development of debilitated restorative plants ought to be supported by the neighborhood group with a specific end goal to calm weight on these plants. It is trusted that this exploration will contribute a great deal in giving a valuable data on the preservation and manageable utilization of the natural assets of the study area.

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