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Altitudinal Effect on Plant Life Structure in Plains of Tehsil Takht-E-Nasrati, District Karak, Pakistan

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Abstract - Plant life community structure is a key marker of long-term vegetation change in semi-arid ecosystems. In the present investigation overall 11 plant communities were recorded during summer in plains. The number of plant species differ in different communities. As a whole in plains the *Cenchrus-Zizyphus-Saccharum* community was developed and composed of 32 species. There were 6 tree, 7 shrub and 19 herb species. The Importance value contributed by three dominants species i.e. *Cenchrus biflorus, Zizyphus maurtiana* and *Saccharum bengalense* was 79.5 while total importance value of 220.5 was provided by the remaining species. The contribution by tree was 50.6, shrubs (IV = 62.06) and herbs (IV = 187.3). The soil of the area had better calcium carbonate in the range of (12.3 – 12.7 %), with soil pH (6.06 – 8.13). The concentrations of P and K content were found in the range of (3.64-3.86 mg Kg^{-1}) and (112-127 mg Kg^{-1}). The EC was found in the range of (0.15-0.21 dS m^{-1}). The soil texture was found from sandy clay to sandy clay loam. These results emphasize the continuous need for long-term ground-based ecological monitoring in conjunction with satellite-based monitoring of changes in plant life cover.

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I. Introduction

The Tehsil Takht-e-Nasrati plains comprise one of the richest and most curious ecosystems on earth. The investigated area areas are characterized by low productivity, high intensity of solar radiation and high degree of resource seasonality. The vegetation of this fragile biome is adapted to the insignificant conditions occurring with thin populations. The investigated area low altitude grazing plains are very important being a wild life habitat, water catchment and a livelihood source for nomadic and transhumant inhabitants. The community structure and distribution patterns of investigated area and plains have not been given due attention till the date by the plant ecologists, and hence poorly understood (Khan, 2012). The distribution and community structure of plant life is governed by adverse edaphic and climatic factors; mainly by rainfall and redistribution of water that decrease with the increase in altitude. Temperature is also one of the most important limiting factors controlling the distribution and community structure of investigated area plant life. Here the altitude has much greater effect on temperature than latitude. Mean annual temperature decrease with increase in elevation, more rapidly in summer than in winter. This altitude based temperature gradient is the vital factor shaping the plant life types and determining their diversity and distribution (Heaney and Proctor, 1989; Tanner *et al.*, 1998; Vazquez and Givnish, 1998). Plain areas are characterized by scanty rainfall, high ultraviolet (UV) radiation, high wind velocity, blizzards, low temperature and snowstorms. The plants of this zone show an adaptation to these conditions and are generally dwarfed, stunted, wooly or spiny, and develop a mosaic patch of different forms. They possess an early growth initiation with a tiny vegetative period ranging from several days to a few months. The community as a whole usually exhibits seasonal fluctuations, and its structure and composition are strongly influenced by the extent to which periodic phenomena in the individuals are adjusted to each other (Kershaw, 1973). In investigated area, the plains cover 50% (Khan et al., 2011). These areas are used for grazing during March to October. The plains of research area are severely degraded due to nomadic and sedentary livestock overgrazing. Due to huge population increases and frighteningly increasing urbanization practices, existing reserve forests and grazing lands are overburdened with community rights making it impossible to reduce the grazing pressure (Gupta and Nanda, 1970; Gupta, 1977). Grazing practices are one of the important determinants of vegetation distribution patterns and having most obvious impact on the floral biodiversity of an area (Vallentine, 2001). Many researchers (Vigne, 1842; Duthie, 1892; Stewart, 1961; Dickore, 1995; Negi, 1995; Sardar, 1997; Stainton, 1998; Shinwari and Gillani, 2002) have studied different aspects of vegetation structure and distribution patterns in different parts of Pakistan. Phytosociology or plant sociology is an invaluable method for vegetation survey and assessment involving investigation of characteristics of plant communities using simple and rapidly employing field techniques (Rieley and Page, 1990). In the present study, an effort has been made to investigate and analyse correlation of vegetative attributes with key environmental factors i.e. altitude.

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II. Research Area

The Tehsil Takhti Nasratti is situated at 32.47° to 33.28° North and 70.30 ° to 71.30° East. The Tehsil is bounded by Tehsil Banda Dawood Shah on the North West, Tehsil Karak on the North East, District Mianwali and District Lakki Marwat on the South East, and Tribal area Adjoining District Bannu on the South West (Fig. 1). The total area of Tehsil is about 613.66 Sq. kilometer. Majority of the area consists of rigged dry hills and rough fields areas i.e. 323.97 Sq. kilometers and agriculture land is about 289.7 Sq. kilometer. The major income source of the people is Agriculture, which is rain depended. The area is situated at 340 m above the sea level. Environmental data showed that mean air temperature was high in month of June (39.5° C) and low in month of September (21.95° C), relative humidity was high (77.21%) in month of September and low (30.73 %) in May, rainfall (121.6 mm) was high in July and low (31.6 mm) in May, soil temperature (26.77° C) was high in month of July, wind speed was high in month of June (5.5 Km/h) and low (3.7 Km/h) in September, which indicated dry condition during summer. Summer season started from May to September in the area and 11 plant communities were recognized in plains. The investigated area shows altitudinal variation i.e. from 340m - 500m. This also caused deviation in plant life structure (Table 1).

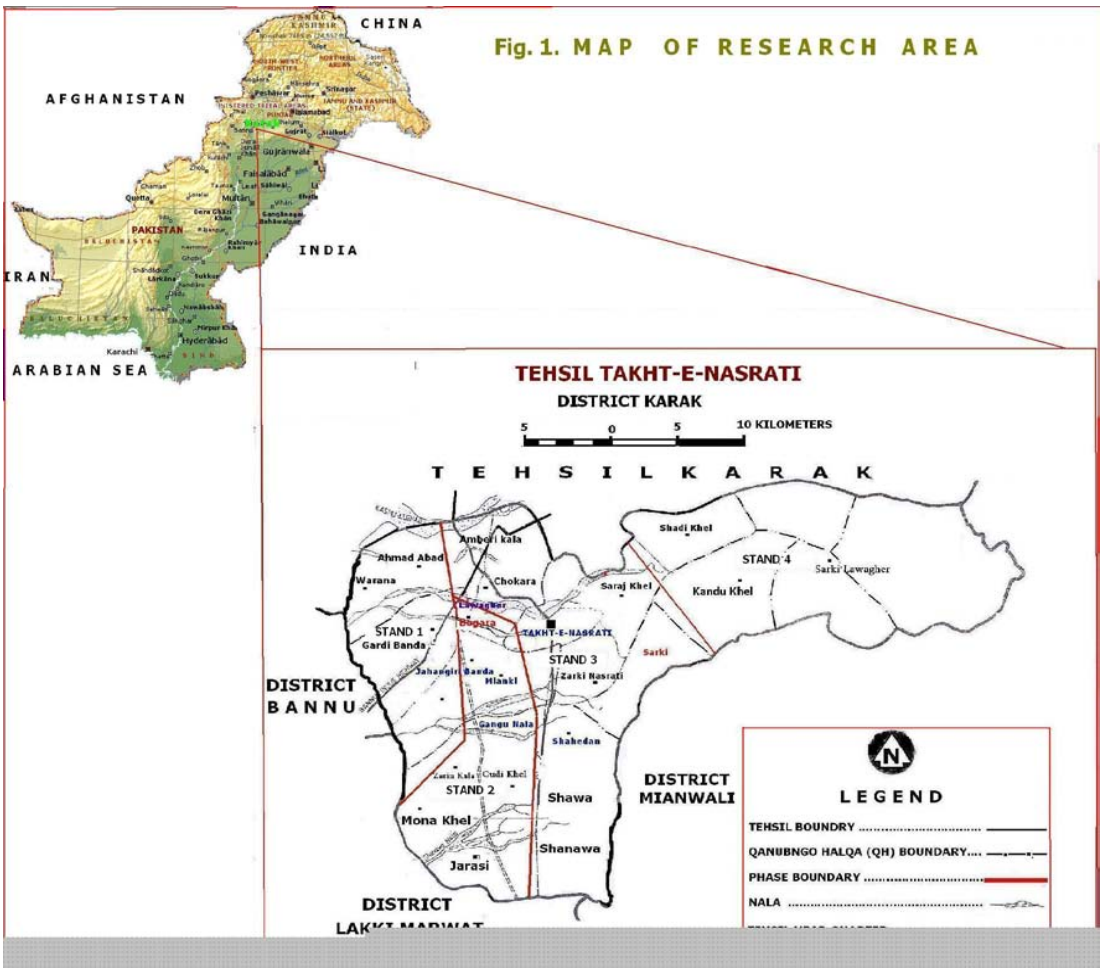

Figure 1 : Map of Tehsil Takht-e-Nasrati showing research spots

Some serious ecological operating problems facing to the area are as follows:

a) Deforestation

A serious ecologically operating problem is rapid cutting of plants (Fig. 2).

b) Over Grazing

Grazing, browsing, and trampling by domestic livestock is a serious problem in the area (Fig. 3). Grazing has caused to decline vegetation where palatable species have been reduced and non-palatable species increased.

Figure 2 : Cutting of trees in the area is a common ecological problem

Figure 3 : Over Grazing has caused *Zizyphus maurtiana* to assume bushy habitat

c) Shortage of Water

Water shortage is one of the most threatening factors for irrigation and drinking because the rainfall is scanty in the area and it is transported from far off places by donkey, Camel etc or on heads (Figs. 4, 5).

Figure 4 : Drinking water is a serious problem in the area

Figure 5 : Open storage water tank for collection of rain water

d) Soil Salinity

Some areas like Warana is facing salinity hazard. The water is neither suitable for cultivation nor for drinking It has poor sparse vegetation.

e) Soil Erosion

Soil erosion by the seasonal torrential stream water / wind in the plain and by rainwater in sloping area is also a threat to habitat (Fig. 6).

Figure 6 : Plant species like *Saccharum bengalense* is effected by wind erosion in plain area

Table 1 : Meteorological data of Tehsil Takht -e -Nasrati for the year 2001-2010

Months	Temperature (C°)		Humidity (%)		Rainfall (mm)	Soil temperature (C°) Average	Wind speed (Km Per/ Hour)
	Max	Min	Max	Min			
January	19.18	4.26	75.80	35.24	27.43	7.03	2.9
February	21.69	7.29	77.39	42.23	37.72	9.14	3.2
March	28.20	12.06	75.38	35.23	37.17	13.89	3.5
April	34.74	17.94	66.12	29.42	36.54	19.02	5.2
May	38.32	22.33	59.66	30.73	31.6	21.87	5.4
June	39.50	25.9	59.96	32.89	74.24	25.78	5.5
July	38.44	25.76	73.33	38.76	121.6	26.77	5.2
August	36.66	25.29	75.68	42.61	108.3	26.37	4.1
September	35.47	21.95	77.21	39.29	61.58	23.49	3.7
October	32.33	16.79	71.55	35.51	15.13	20.09	3.5
November	26.71	10.01	71.56	36.66	5.80	14.10	3.2
December	21.93	5.67	75.20	35.90	15.38	8.96	3.1
Mean	31.1	16.27	71.57	36.21	47.71	18.04	4.04

Source : Agricultural Research Farm Ahmad Wala Karak

III. Materials and Methods

The phytosociological expeditions were carried out in the summer, 2010 -2011 to the Tehsil Takht-e-Nasrati. Quadrat method was used to study and analyse the plant life dynamics as well as to collect the primary data for statistical analyses. A total of 22 sites were laid in the study area. 10 Quadrats were laid in each selected sites having best representation of floral biodiversity and geographic extent of the area. Vegetation attributes including frequency, density and cover were recorded along with environmental coordinates like latitude, longitude, altitude and slope using GPS. The importance value of each species was compiled adding RD, RF and RC following Hussain (1989). On the basis of the highest importance values of the first three dominant species from each layer, the communities were established and named. Plants from the premises of sampling points as well as isolated vegetation patches were also collected to record maximum number of species and their distribution patterns. Collected samples were pressed, dried and transported to herbarium of University of Peshawar Khyber Pakhtun khawa, Pakistan, where they were identified and classified following Stewart (1961) and Nasir and Ali (1970-94).

IV. Edaphology

Two kg soil sample was collected from 11 sites of Tehsil Takht-e-Nasrati up to 15 cm depending upon the area situation using the outer periphery of plants canopy or at the centre of plants with the help of soil auger and mixed to make a composite sample. It was dried and passed through 2 mm sieve and stored in a polythene bag. There were 5 replicates from each site. These were analyzed for different chemical and physical parameters including soil texture, organic matter, lime contents, pH, EC, phosphorus and potassium as following standard methods (Bouyoucos, 1962; Hussain, 1989; Jackson, 1962).

V. Results

a) Stand – 1 (340 – 399 m)

In stand 1, collectively 27 plant species consisting of 6 trees, 6 shrubs, 13 herbs and 2 grasses constructing 4 communities i.e. *Eragrostis-Calotropis-Prosopis* community (ECP), *Phoenix-Saccharum-Cenchrus* community (PSC),*Aerua-Prosopis-Saccharum* community (APS) and *Tribulus-Prosopis-Saccharum* community (TPS) were found in Tater Khel, Gardi Banda, Ahmad Abad and Warana respectively. The TIV contributed by three dominant plant species forming a community was high (109) in ECP while low 89.71 in TTS. The highest amount of TIV of tree (64.24) and grasses (61.72) was found in ECP while shrubs (81.85) and herbs (171.5) were found in APS and TTS respectively (Tables 2 - 5). The details are as follows:

b) Eragrostis-Calotropis -Prosopis community (ECP)

Eragrostis- Calotropis -Prosopis community was composed of 15 species comprising 4 tree, 4 shrubs, 5 herb and 2 grass species at Tater Khel. The Importance value contributed by three dominants species i.e. *Eragrostis poaoides, Calotropis procera* and *Prosopis farcta* was 109.09 while total importance value of 190.91 was provided by the remaining species. The contribution by tree was 64.2, shrubs 67.58, herbs 106.49 and grass 61.73. The associated species in herbaceous stratum included *Cenchrus biflorus* (IV=29.12), *Heliotropium europaeum* (IV = 26.14) and *Chrozophora obliqua* (IV =

25.25), *Saccharum bengalense* (IV = 16.51) and *Datura metel* (IV = 10.52) in shrubby stratum. In tree stratum, the important species were *Zizyphus maurtiana* (IV=12.39) and *Phoenix dactylifera* (IV 10.04) (Table 2). The life form spectrum showed that therophytes (5 spp., 33.33%) was dominant life form class followed by megaphanerophytes (4 spp., 26.67%) while hemicryptophytes and nanophanerophytes (2 spp., 13.33 %) shared each. The vegetation was theromegaphanerophytic. In the leaf form classes, microphyll with 40 % was the leading group. The community preferred to grow on high percentage of sand (63%) and low amount of silt (6%) and clay (31 %) particles. The soil of the community had better calcium carbonate (12.57 %) with alkaline soil pH (7.31). The concentrations of P AND K content were found in the range of 3.78 and 119.1 mg Kg^{-1}. The community preferred EC in the range of 0.18 dS m^{-1}. The soil texture was found sandy clay loam.

c) Phoenix- Saccharum -Cenchrus community (PSC)

Phoenix–Saccharum-Cenchrus community was present at Gardi Banda. This community was supported by 14 plant species in which 3 trees, 4 shrubs, 6 herbs and single grass specie. The dominant plant species were *Phoenix dactylifera* (IV = 38. 6) in tree stratum followed by *Saccharum bengalense* (IV = 37. 9) in shrub stratum and *Cenchrus biflorus* (IV = 37. 5) in herb stratum. *Zizyphus maurtiana* (7. 67) and *Dalbergia sissoo* (5.14) were associated member in tree stratum. The important species in shrub stratum were *Saccharum spontaneum* (IV = 19. 84) and *Calotropis procera* (IV = 9. 19) (Table 3). Ground cover consisted of herbaceous plants had high variety in this period. Biological spectrum showed that therophytes (4 spp., 28.57%), megaphanerophytes (3 spp., 21. 43%) and hemicryptophytes (3 spp., 21. 43) were the dominant life form classes and microphyll (10 spp., 71. 43 %) was the major leaf form classes in the community. The community preferred to grow on high percentage of sand (65%) and low amount of silt (3%) and clay (32 %) particles. The soil of the community had better calcium carbonate (12.34%) with alkaline soil pH (7.66). The concentrations of P AND K content were found in the range of 3.79 and 125.6 mg Kg^{-1}. The community preferred electrical conductivity (EC) in the range of 0.16 dS m^{-1}. The soil texture was found sandy clay loam.

d) Aerua- Prosopis -Saccharum community (APS)

Aerua- Prosopis -Saccharum community was established at Ahmad Abad and is dominated by *Aerua persica* (32. 1), *Prosopis farcta* (31. 62) and *Saccharum spontaneum* (30. 64). The associated species of the tree stratum included *Zizyphus maurtiana* (18. 12) and *Acacia nilotica* (IV = 5. 16). Co dominant species included *Cenchrus biflorus* (23.57), *Fagonia cretica* (23.4) and *Peganum hermala* (22. 03) in ground stratum; *Saccharum bengalense* (IV=21.76) and *Calotropis procera* (IV = 10. 08) were making shrubby stratum (Table 4). The community was composed of 18 species comprising of 4 tree, 6 shrubs, 7 herb and 1 grass species. The Importance value contributed by tree was 58.97, shrubs 81.85, herbs 140.8 and grass 18.38. Hemicriptophytes were the dominant class of the biological spectrum (5 spp., 27.77%) followed by therophytes, nanophanerophytes and megaphanerophytes (4 spp., 22.22%) shared each. In leaf size classes, (9 spp., 50 % microphyll followed by megaphyll (4 spp., 22.22%) and leptophyll (2 spp., 11.11%). The community preferred to grow on high percentage of sand (70%) and low amount of clay (26 %) and silt (4%) particles. The soil of the community had better lime (12.6 %) with alkaline soil pH (7.13). The concentrations of p and K content were initiated in the range of 3.77 and 114 mg Kg-1. The community preferred EC and SOM in the range of 0.19 dS m-1 and 1.27 % respectively. The soil texture was found sandy clay loam.

e) Tribulus - Prosopis -Saccharum community (TPS)

TPS community was composed of 17 species comprising 4 tree, 4 shrubs, 8 herb and 1 grass species at Warana. The Importance value contributed by three dominants species i.e. *Tribulus terrestris, Prosopis farcta* and *Saccharum bengalense* was 89.68 while total importance value of 210.32 was provided by the remaining species. Associated species included *Carthamus oxycantha* (IV=28.9), *Cyperus rotundus* (IV = 28.6), *Cenchrus biflorus* (IV = 26.7) of ground stratum and *Periploca aphylla* (IV=22.4) and *Calotropis procera* (IV = 10.7) were making shrubby stratum. The associated species of the tree stratum *Zizyphus maurtiana* (IV =10.87) and *Tamarix aphylla* (IV = 5.6) (Table 5). The qualitative examination of biological spectrum showed that therophytes (5 spp., 29.41 %) dominated followed by hemicryptophytes, nanophanerophyte and megaphanerophyte (3 spp., 17.65 %) each. In leaf size examination, microphyll (9 spp., 52.94 %) was the dominant class. The community preferred to grow on high percentage of sand (61%) and low amount of clay (33 %) and silt (6%) particles. The soil of the community had better lime content (12.4 %), SOM (1.28 %), EC (0.21 dS m^{-1}), P (3.76 mg Kg^{-1}) and K (121 mg Kg^{-1}) with alkaline soil pH (8.13). The soil texture was found sandy clay loam.

Overall plant life of stand 1 was dominated by therophytes and hemicryptophytes (7 spp., 25.92%) each and microphyll (12 spp., 44.42 %) followed by leptophyll, nanophyll and megaphyll (4 spp., 14.81 %) each. Small leaf size indicating dry and xeric condition while large size leaves indicated cool and moist conditions. As a whole the plant life was dry tropical in nature during summer.

f) Stand – 2 (400 – 499 m)

In this stand, 7 communities of 45 plant species comprising 4 trees, 5 shrubs, 32 herbs and 4 grasses. The *Cenchrus-Saccharum-Zizyphus* community (CSZ) was found in Southern area of Bogara, *Cenchrus-Saccharum-Acacia* community (CSA) in Northern area of Bogara, *Zizyphus-Cenchrus-Saccharum* community (ZCS) in Gandiri Khattak, *Saccharum-Cenchrus-Zizyphus* community (SCZ) in Kiri Dhand, *Cenchrus-*Calligonum*-Acacia* community (CCA) in Jahangiri Banda, *Zizyphus-Cenchrus-Calligonum* community (ZCC) in Mona Khel and *Cenchrus-Zizyphus-Saccharum* community (CZS) in Jarassi. The highest number of species (30) was present in CSZ. The highest number of trees (4) was found in CSZ and CSA while the highest number of shrubs and herbs in SCZ and CSZ respectively. The highest TIV contributed by three dominant species was 200.63 in ZCS at Gandiri Khattak while low 89.90 in SCZ at Kiri Dhand. Furthermore, the highest TIV contributed by trees (93.70), shrubs (90.29), herbs (134.58) and grasses (90.94) in ZCS, CCA, SCZ and CSA respectively (Tables 6-12).

g) Eragrostis -Saccharum -Zizyphus community (ESZ)

Eragrostis- Saccharum -Zizyphus community was established at Southern area of Bogara and composed of 24 species consisted of 4 tree, 4 shrubs, 14 herb and 2 grass species. This community was dominated by *Eragrostis poaoides* (IV = 34.6) in herb strata, *Saccharum bengalense* (IV = 21.4) in shrubby strata and *Zizyphus maurtiana* (IV=15.3) in tree strata. The Importance value contributed by tree strata was 30.67, shrubby strata (IV = 52.56) and herbaceous strata (IV = 216.77) (Table 6). The qualitative result of life form classes revealed that hemicryptophytes (7 spp., 29.17%) followed by therophytes (6 spp., 25 %) were dominant classes. Microphyll (12 spp., 50%) followed by leptophyll and mesophyll (4 spp., 16.17%) each were most signifying classes of leaf form spectrum. The community preferred to grow on high percentage of sand (72%) and low amount of clay (24 %) and silt (4%) particles. The soil of the community had better lime contents (12.6 %) with soil pH (6.86). The concentrations of P and K content were initiated in the range of 3.67 and 123 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.17 dS m^{-1} and 1.31 % respectively. The soil texture was found sandy clay loam.

h) Tribulus –Acacia- Saccharum community (TAS)

Tribulus-Acacia-Saccharum community was developed at Northern area of Bogara and was dominated by *Tribulus terrestris* (IV = 41.8) in herbaceous strata, *Acacia nilotica* (IV = 27.1) in tree strata and *Saccharum bengalense* (IV = 26.1) in shrubby strata. *Eragrostis poaoides* was the second leading dominant associate of herbaceous strata with (IV = 25.1). This community was supported by 19 plant species included 4 tree, 4 shrubs, 10 herb and 1 grass species (Table 7). The Importance value contributed of important value by tree was 46.34, shrubs (IV = 47.07), herbs (IV=181.47) and grass (IV = 25.12). Hemicryptophytes and therophytes (5 spp., 26.31 %) each were dominating all the life form classes followed by Megaphanerophyte (4 spp., 21.05 %). Microphyll (10 spp., 52.63 %) had represented leading leaf form spectrum. The community preferred to grow on high percentage of sand (51%) followed by clay (43 %) and silt (6%) particles. The soil of the community had lime contents (12.7 %) with soil pH (6.72). The concentrations of P and K content were initiated in the range of 3.68 and 116 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.18 dS m^{-1} and 1.44 % respectively. The soil texture was found sandy clay.

i) Zizyphus- Cenchrus- Saccharum community (ZCS)

This community was developed at Gandiri Khattak and composed of 17 species. There were 1 tree, 3 shrubs, 11 herb and 2 grass species. Dominant plant species on the basis of important values were *Zizyphus maurtiana* (IV = 81.8) in tree strata, *Cenchrus biflorus* (IV = 39.2) in herbaceous strata and *Saccharum bengalense* (IV = 36) in shrubby strata. The Importance value contributed by tree was 81.9, shrubs (IV =49.98), herbs (IV = 136.5) and grass (IV = 31.62) (Table 8). Mirophyll was the dominant leaf size class represented by 9 plant species (52.94 %) and therophytes were the leading dominant life form classes (7 spp., 41.18 %) followed by hemicryptophytes (5 spp., 29.41%). The community preferred to grow on high percentage of sand (67 %) followed by clay (30 %) and silt (3 %) particles. The soil of the community had lime contents (12.7 %), EC (0.18 dS m^{-1}) and SOM (1.29 %) with soil pH (6.97). The concentrations of P and K content were initiated in the range of 3.64 and 117 mg Kg^{-1}. The soil texture was found sandy clay loam.

j) Calligonum- Tribulus- Zizyphus community (CTZ)

Calligonum-*Tribulus-Zizyphus* community was established at Kiri Dhand was composed of 19 species. There were 3 tree, 5 shrubs, 9 herb and 2 grass species. The Importance value contributed by three dominants species i.e. *Calligonum polygonoides, Tribulus terrestris* and *Zizyphus maurtiana* was 82.78 while total importance value of 217.22 was provided by the remaining species. The contribution by tree was 25.82, shrubs (IV = 65.45), herbs (IV = 159.88) and grass (IV = 48.83) (Table 9). The biological spectrum showed that therophytes and hemicryptophytes were the leading life form classes (5 spp., 26.32 %) followed by chamophytes (3 spp., 15.79%). Mirophyll and nanophyll were the dominant leaf size classes represented by (8 spp., 42.10%) and (4 spp., 21.05 %) plant species respectively. The community preferred to grow on high

percentage of sand (45 %) followed by clay (28 %) and silt (27 %) particles. The soil of the community had lime contents (12.6%) with soil pH (6.43). The concentrations of P and K content were initiated in the range of 3.79 and 120 mg Kg^{-1}. The community preferred EC and SOM in the range of 0.19 dS m^{-1} and 1.33 % respectively. The soil texture was found clay loam.

k) Calligonum-Cenchrus-Zizyphus community (CCZ)

Calligonum-*Cenchrus-Zizyphus* community at 500m was composed of 21 species in Zarin Kala. There were 3 tree, 4 shrubs, 12 herb and 2 grass species. Dominant plant species on the basis of important values were *Calligonum polygonoides* (IV = 42.5), *Cenchrus biflorus* (IV = 30.2) and *Zizyphus maurtiana* (IV = 20.5). The Importance value contributed by tree was 32.61, shrubs (IV = 70.55), herbs (IV = 165.04) and grass (IV=31.8) (Table 10). Mirophyll (10 spp., 47.62%) was dominant leaf size class followed by leptophyll (4 spp., 19.05%). The biological spectrum showed that hemicryptophytes was the leading dominant life form class (7 spp., 33.33 %) followed by therophytes (6 spp., 28.57%) in the community. The community preferred to grow on high percentage of sand (62%) followed by clay (34 %) and silt (4 %) particles. The soil of the community had lime contents (12.6 %) and SOM (1.25 %) with soil pH (6.83). The concentrations of P and K content were initiated in the range of 3.81 and 123 mg Kg^{-1}. The community preferred EC in the range of 0.16 dS m^{-1}. The soil texture was found sandy clay loam.

l) Zizyphus- Cenchrus- Saccharum community (ZCS)

ZCS community was established at Mona Khel and dominated by *Zizyphus maurtiana* (IV=58.6) in tree stratum, *Cenchrus biflorus* (IV = 37.5) in herbaceous stratum and *Saccharum bengalense* (IV = 24.6) in shrubby stratum. Other important plant species with respect to importance values were *Euphorbia helioscopia* (IV = 30.5), *Eragrostis poaoides* (IV = 22.7) and *Calligonum polygonoides* (IV = 13.5). A total of 17 plant species in the site composed of 3 tree, 4 shrubs and 10 were included in herbaceous stratum. The Importance value contributed by tree was 71.56, shrubs (IV = 48.95), herbs (IV=156.81) and grass (IV = 22.66) (Table 11). Therophytes (6 spp., 35.29%) were the dominating all the life form classes followed by hemicryptophytes (4 spp., 23.53%) and megapha-nerophytes (3 spp., 17.65%). Mirophyll (35.29%) had comprised leading leaf form class. The community preferred to grow on high percentage of sand (63%) followed by clay (32 %) and silt (5 %) particles. The soil of the community had lime contents (12.7%) and SOM (1.26 %) with soil pH (6.19). The concentrations of P and K content were originated in the range of 3.67 and 125 mg Kg^{-1}. The community preferred EC in the range of 0.19 dS m^{-1}. The soil texture was found sandy clay loam.

m) Saccharum-Zizyphus-Cynodon community (SZC)

Saccharum-Zizyphus-Cynodon community was developed at Jarasi and composed of 19 species. There were 3 tree, 4 shrubs, 10 herb and 2 grass species. The Importance value contributed by three dominants species i.e. *Saccharum bengalense, Zizyphus maurtiana* and *Cynodon dactylon* was 88.79 while total importance value of 211.21 was provided by the remaining species. The contribution by tree was 41.69, shrubs (IV = 55.88), herbs (IV = 140.96) and grasses (IV = 61.46) (Table 12). Mirophyll (8 spp., 42.10%) and leptophyll (4 spp., 21.05%) were leading leaf form classes while hemicryptophytes (7 spp., 36.84%) and therophytes (4 spp., 21.05%) were the dominating life form classes in community. The community preferred to grow on high percentage of sand (42%) followed by silt (33 %) and clay (25 %) particles. The soil of the community had lime contents (12.7%) and SOM (1.2 %) with soil pH (6.06). The concentrations of P and K contents were originated in the range of 3.84 and 127 mg Kg^{-1}. The community preferred EC in the range of 0.17 dS m^{-1}. The soil texture was found sandy clay loam.

VI. Discussion

The investigated area comprised of 32 species in the 11 communities during summer in plains. The environmental factors, habitat and different plant life determined communities' structure. Plants communities are useful in classification, naming and identification of plant life structure. Muller Dumbois and Ellenberg (1974) stated that plant community structure interpret and analyze the plant life at diverse revelation and offer immediate information regarding plant life and are origin for deduction of future alteration. Brinkmann *et al.* (2009) evaluated the plant life reaction to ecological situation of open woodlands along an altitudinal and animal palatability preference. The factors which influenced plant life structure are unplanted settlements, overgrazing, erosion, land sliding, habitat destruction, poverty and anthropogenic activities. In plains, during summer, 11 plant communities were identified at various parts of the investigated area at different altitudes. In summer, the plant number are limited due to unavailability of water and high temperature. The diverse plant communities documented in diverse seasons reflected different remains as recognized by Champion *et al.* (1965).

Soil is essential that has continued life on earth and it also helps the plants' growth that increased the competition of grazing animals and human. According to Turner *et al.* (2004) and Shameem *et al.* (2011) stated that the distinctive habitation altered due to increasing human transportation and population. Other progression results into increased the expected attack of organism has been happening the world over. Plant life changed

the physical and chemical properties of soil. It improves the soil infiltrations, structure and prevents erosion. Shameem *et al*. (2011) and Buckman and Brady (1967) described that the resources of soil is limited and its physical and chemical properties are restricted mostly by humus and clay. Several research works dealing with different features of plant life from diverse parts of the state have been taken out form time to time (Stewart, 1982; Dar *et al*., 2001). The investigated area presents a limited number of animal and plant species. The investigated area is more suitable for the legume plant due the presence of high content of sand particles in the area. Plant growth somewhat indirectly manipulated through soil structure. It also effects the seedling growth which is very sensitive to physical condition of soil texture. The rigid compacted layer slows down the growth of the seedling for root cannot penetrate easily in such soil.

VII. Conclusion

The area still needs very detailed and comprehensive investigations regarding different vegetative attributes and their correlation with environmental as well as anthropogenic variables. A single study can not serve the whole purpose in such a large, diverse and geographically important area. Repeated and integrated explorations are recommended in all parts of Tehsil Takht-e-Nasrati to explore the dynamic and variations in floral biodiversity. Grazing practices need to be limited and monitored along with creating the awareness among the grazers about conservation and sustainable management of grasslands. Fenced vegetation plots should be designed at regular intervals to act as seed banks in whole Tehsil. Grazing practices should be synchronized with plant growth seasons so that damage to vegetation during flowering stage can be avoided. A great deal can be done about the ethnobotanical application of the local flora by identifying, investigating and evaluating the utilization practices of local folklore. The most important point to be considered is conservation of endemic flora, which has its restricted distribution in the study area and is posed with severe threats due to overexploitation by grazing, medicinal plant harvest and harsh environmental conditions.

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Table 2 : Phytosociological attributes of *Eragrostis-Calotropis-Prosopis* community recorded at Tater Khel, during summer, Tehsil Takht-e-Nasrati, Karak

S.No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.4	40	0.5	1.61	4.55	1.36	7.52
2	*Phoenix dactylifera* L.	0.8	30	1.27	3.23	3.41	3.4	10.04
3	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.6	100	6.05	6.45	11.4	16.4	34.25
4	*Zizyphus maurtiana* Lam.	0.6	50	1.58	2.42	5.68	4.29	12.39
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	4.8	100	1.71	19.4	11.4	4.64	35.44
6	*Datura metel* L.	1	50	0.3	4.03	5.68	0.81	10.52
7	*Periploca aphylla* Decne.	0.3	30	0.18	1.21	3.41	0.49	5.11
8	*Saccharum bengalense* Retz.	1.2	90	0.54	4.84	10.2	1.47	16.51
Herbaceous layer								
15	*Carthamus oxycantha* Bieb.	0.9	40	1	3.6	4.55	2.71	10.86
9	*Cenchrus biflorus* Hook. f.	3.2	90	2.22	12.9	10.2	6.02	29.12
10	*Chrozophora obliqua* (Vahl) A. Juss.	1.1	40	6	4.4	4.55	16.3	25.25
11	*Cynodon dactylon* (L.) Pers.	2.5	30	3.25	10.1	3.41	8.82	22.33
12	*Eragrostis poaoides* Beauv.	3.2	90	6	12.9	10.2	16.3	39.4
13	*Euphorbia prostrata* Ait.	1.5	50	1.25	6.05	5.68	3.39	15.12
14	*Heliotropium europaeum* L.	1.7	50	5	6.86	5.68	13.6	26.14

D: Density, F: Frequency, C: Cover, RD: Relative Density, RF: Relative Frequency, RC: Relative Cover.

Table 3 : Phytosociological attributes of *Phoenix-Saccharum-Cenchrus* community recorded at Gardi banda during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Dalbergia sissoo* Roxb.	0.3	30	0.35	1.06	3.2	0.88	5.14
2	*Phoenix dactylifera* L.	3.1	100	6.7	11	10.8	16.8	38.6
3	*Zizyphus maurtiana* Lam.	0.4	40	0.78	1.41	4.3	1.96	7.67
Shrubby layer								
4	*Calotropis procera* (Wild) R.Br.	0.9	50	0.25	3.18	5.38	0.63	9.19
5	*Periploca aphylla* Decne.	0.7	50	0.25	2.47	5.38	0.63	8.48
6	*Saccharum bengalense* Retz.	6.3	100	1.92	22.3	10.8	4.8	37.9
7	*Saccharum spontaneum* L.	2.5	90	0.54	8.8	9.68	1.36	19.84
Herbaceous layer								
8	*Aerua persica* (Burm.f) Merrill.	1.3	60	5.25	4.59	6.4	13.2	24.19
9	*Boerhavia diffusa* L..	0.9	30	2	3.18	3.2	5.03	11.41
10	*Cenchrus biflorus* Hook. f.	4	100	5	14.1	10.8	12.6	37.5
11	*Eragrostis poaoides* Beauv.	1.9	70	3	6.71	7.5	7.5	21.71
12	*Euphorbia helioscopia* L.	1.6	60	1.5	5.6	6.4	3.77	15.77
13	*Carthamus oxycantha* Bieb.	1.5	50	8.5	5.3	5.38	21.4	32.08
14	*Tribulus terrestris* L.	2.9	100	3.75	10.3	10.8	9.42	30.52

Table 4 : Phytosociological attributes of *Aerua-Prosopis-Saccharum* community recorded at Ahmad Abad during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.34	1.28	3.06	0.82	5.16
2	*Dalbergia sissoo* Roxb.	0.3	20	0.33	1.28	2.04	0.79	4.11
3	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.8	80	6.56	7.66	8.16	15.8	31.62
4	*Zizyphus maurtiana* Lam.	1.1	70	2.6	4.68	7.14	6.3	18.12
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	1	50	0.3	4.26	5.1	0.72	10.08
6	*Datura metel* L.	0.6	30	0.18	2.55	3.06	0.43	6.04
7	*Periploca aphylla* Decne.	0.3	30	0.13	1.28	3.06	0.31	4.65
8	*Ricinus communis* L.	0.7	50	0.3	2.98	5.1	0.72	8.8
9	*Saccharum bengalense* Retz.	2.7	80	0.85	11.5	8.16	2.1	21.76
10	*Saccharum spontaneum* L.	4.2	90	1.47	17.9	9.2	3.54	30.64
Herbaceous layer								
11	*Aerua persica* (Burm.f.) Merrill.	2	90	6	8.5	9.2	14.4	32.1
12	*Cenchrus biflorus* Hook. f.	2.5	80	2	10.6	8.16	4.81	23.57
13	*Eragrostis poaoides* Beauv.	1	50	3.75	4.26	5.1	9.02	18.38
14	*Euphorbia helioscopia* L.	1.2	50	1.25	5.1	5.1	3.01	13.21

15	*Fagonia cretica* L.	1.1	60	5.25	4.68	6.12	12.6	23.4
16	*Peganum hermala* L.	1.3	50	4.75	5.53	5.1	11.4	22.03
17	*Solanum surattense* Burm .f.	0.3	30	3.25	1.28	3.06	7.82	12.16
18	*Tribulus terrestris* L.	1.1	40	2.25	4.68	4.08	5.41	14.17

Table 5 : Phytosociological attributes of *Tribulus–Prosopis-Saccharum* community recorded at Warana during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.2	20	0.54	0.8	1.92	0.84	3.56
2	*Prosopis farcta* (Banks & Soland.) J.F. Macbr.	1.6	90	10.6	6.4	8.65	16.4	31.5
3	*Tamarix aphylla* (L.) Karst.	0.2	20	1.86	0.8	1.92	2.88	5.6
4	*Zizyphus maurtiana* Lam.	0.7	70	0.82	2.8	6.73	1.27	10.8
Shrubby layer								
5	*Calotropis procera* (Wild) R.Br.	0.9	70	0.27	3.6	6.73	0.42	10.7
6	*Datura metel* L.	0.8	50	0.2	3.2	4.81	0.31	8.32
7	*Saccharum bengalense* Retz.	3.5	100	1.53	14	9.62	2.37	26
8	*Periploca aphylla* Decne.	2.9	100	0.73	11.6	9.62	1.13	22.4
Herbaceous layer								
9	*Aerua persica* (Burm.f) Merrill.	0.3	20	3	1.2	1.92	4.65	7.77
10	*Boerhavia diffusa* L.	1.5	60	7.75	6	5.77	12	23.8
11	*Carthamus oxycantha* Bieb.	2.1	80	8.25	8.4	7.69	12.8	28.9
12	*Cenchrus biflorus* Hook. f.	2.2	90	6	8.8	8.65	9.3	26.7
13	*Cyperus rotundus* L.	3.2	60	6.5	12.8	5.77	10.1	28.6
14	*Eragrostis poaoides* Beauv.	1	30	2	4	2.89	3.1	9.99
15	*Euphorbia helioscopia* L.	0.5	30	2	2	2.89	3.1	7.99
16	*Fagonia cretica* L.	0.8	60	4	3.2	5.77	6.2	15.2
17	*Tribulus terrestris* L.	2.6	90	8.5	10.4	8.65	13.2	32.2

Table 6 : Phytosociological attributes of *Eragrostis-Saccharum-Zizyphus* community recorded at Southern Bogara during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Dalbergia sissoo* Roxb.	0.2	20	1.02	0.51	1.82	0.87	3.19
2	*Acacia nilotica* (L.) Delice	0.2	20	0.37	0.51	1.82	0.31	2.64
3	*Phoenix dactylifera* L.	1.2	50	2.27	3.05	4.55	1.93	9.52
4	*Zizyphus maurtiana* Lam.	1.4	80	5.29	3.55	7.27	4.49	15.3
Shrubby layer								
5	*Periploca aphylla* Decne.	0.5	40	0.61	1.27	3.64	0.52	5.42
6	*Calotropis procera* (Wild) R.Br.	0.6	40	0.42	1.52	3.64	0.36	5.52
7	*Calligonum polygonoides* L.	4	100	1.14	10.2	9.09	0.97	20.2
8	*Saccharum bengalense* Retz.	4.5	100	1.05	11.4	9.09	0.89	21.4

Herbaceous layer								
9	*Aerua persica* (Burm.f.) Merrill.	0.3	20	3	0.76	1.82	2.55	5.13
10	*Boerhavia diffusa* L.	0.6	30	4.5	1.52	2.73	3.82	8.07
11	*Cenchrus biflorus* Hook. f.	3.4	70	10.5	8.63	6.36	8.92	23.9
12	*Chrozophora obliqua* (Vahl) A. Juss.	0.2	20	3	0.51	1.82	2.55	4.87
13	*Citrullus colocynthis* L. Schrad.	0.2	20	5.25	0.51	1.82	4.46	6.79
14	*Cynodon dactylon* (L.) Pers.	2	10	3.75	5.08	0.91	3.19	9.17
15	*Cyperus rotundus* L.	1.1	30	4.5	2.79	2.73	3.82	9.34
16	*Echinops echinatus* Roxb.	2.1	70	10.5	5.33	6.36	8.92	20.6
17	*Eragrostis poaoides* Beauv.	4.4	90	18	11.2	8.18	15.3	34.6
18	*Euphorbia helioscopia* L.	4.6	70	12.8	11.7	6.36	10.9	28.9
19	*Euphorbia prostrata* Ait.	2.8	60	7.75	7.11	5.45	6.58	19.1
20	*Fagonia cretica* L.	0.6	30	3.25	1.52	2.73	2.76	7.01
21	*Peganum hermala* L.	1.5	60	5.25	3.81	5.45	4.46	13.7
22	*Carthamus oxycantha* Bieb.	0.8	20	6	2.03	1.82	5.1	8.95
23	*Solanum surattense* Burm .f.	0.3	10	1.5	0.76	0.91	1.27	2.94
24	*Tribulus terrestris* L.	1.9	40	6	4.82	3.64	5.1	13.6

Table 7 : Phytosociological attributes of *Tribulus–Acacia-Saccharum* community recorded at Nothern Bogara during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	2.5	70	14.8	4.77	7.69	14.6	27.1
2	*Dalbergia sissoo* Roxb.	0.3	30	0.72	0.57	3.3	0.71	4.58
3	*Phoenix dactylifera* L.	0.3	10	0.79	0.57	1.1	0.78	2.45
4	*Zizyphus maurtiana* Lam .	1.1	60	3.61	2.1	6.59	3.56	12.3
Shrubby layer								
5	*Calligonum polygonoides* L.	1	40	0.24	1.91	4.4	0.24	6.54
6	*Calotropis procera* (Wild) R.Br.	2	50	0.3	3.82	5.49	0.3	9.61
7	*Periploca aphylla* Decne.	0.7	30	0.18	1.34	3.3	0.18	4.81
8	*Saccharum bengalense* Retz.	7.5	90	1.95	14.3	9.89	1.92	26.1
Herbaceous layer								
9	*Boerhavia diffusa* L.	1.4	40	4.75	2.67	4.4	4.68	11.7
10	*Carthamus oxycantha* Bieb.	0.7	30	4.5	1.34	3.3	4.44	9.07
11	*Cenchrus biflorus* Hook. f.	8	80	14.3	15.3	8.79	14.1	38.2
12	*Chrozophora obliqua* (Vahl) A. Juss.	0.6	30	4.5	1.15	3.3	4.44	8.88
13	*Citrullus colocynthis* L. Schrad.	0.1	10	3.75	0.19	1.1	3.7	4.99
14	*Cyperus rotundus* L.	1.9	40	6	3.63	4.4	5.91	13.9
15	*Eragrostis poaoides* Beauv.	3.7	70	10.5	7.06	7.69	10.4	25.1
16	*Euphorbia helioscopia* L.	3.3	60	9	6.3	6.59	8.87	21.8
17	*Euphorbia prostrata* Ait.	9	40	1	17.2	4.4	0.99	22.6
18	*Peganum hermala* L.	1.1	30	3.25	2.1	3.3	3.2	8.6
19	*Tribulus terrestris* L.	7.2	100	17.3	13.7	11	17.1	41.8

Table 8 : Phytosociological attributes of *Zizyphus-Cenchrus-Saccharum* community recorded at Gandiri Khattak during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Zizyphus maurtiana* Lam.	2.4	90	132	8.824	11.5	61.5	81.8
Shrubby Layer								
3	*Calotropis procera* (Wild) R.Br.	0.7	50	0.3	2.574	6.41	0.14	9.12
4	*Periploca aphylla* Decne.	0.3	30	0.08	1.103	3.85	0.04	4.99
	Saccharum bengalense Retz.	6	100	2.38	22.06	12.8	1.11	36
Herbaceous layer								
5	*Boerhavia diffusa* L.	0.6	40	6	2.206	5.13	2.79	10.1
6	*Carthamus oxycantha* Bieb.	0.8	30	4.5	2.941	3.85	2.1	8.88
7	*Cenchrus biflorus* Hook. f.	4.7	100	19.5	17.28	12.8	9.08	39.2
8	*Cynodon dactylon* (L.) Pers.	2.3	50	7.5	8.456	6.41	3.49	18.4
9	*Echinops echinatus* Roxb.	0.3	30	2	1.103	3.85	0.93	5.88
10	*Eragrostis poaoides* Beauv.	1.6	40	4.75	5.882	5.13	2.21	13.2
11	*Euphorbia helioscopia* L.	0.4	20	3	1.471	2.56	1.4	5.43
12	*Euphorbia prostrata* Ait.	1.6	30	6.75	5.882	3.85	3.14	12.9
13	*Fagonia cretica* L.	0.4	30	4.5	1.471	3.85	2.1	7.41
14	*Heliotropium europaeum* L.	1.2	30	4.5	4.412	3.85	2.1	10.4
15	*Launaea nudicaulis* (L.) Hook. f.	1.1	30	3.25	4.044	3.85	1.51	9.4
16	*Solanum surattense* Burm .f.	0.4	30	4	1.471	3.85	1.86	7.18
17	*Tribulus terrestris* L.	2.4	50	9.75	8.824	6.41	4.54	19.8

Table 9 : Phytosociological attributes of Calligonum-*Tribulus*-Zizyphus community recorded at Kiri Dhand during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.5	40	0.68	1.69	3.7	1.28	6.68
2	*Dalbergia sissoo* Roxb.	0.3	30	0.37	1.02	2.78	0.7	4.49
3	*Zizyphus maurtiana* Lam.	0.8	80	2.4	2.71	7.41	4.53	14.6
Shrubby Layer								
4	*Calligonum polygonoides* L.	6.3	100	2.48	21.4	9.26	4.68	35.3
5	*Calotropis procera* (Wild) R.Br.	0.4	30	0.13	1.36	2.78	0.25	4.38
6	*Datura metel* L.	0.8	40	0.24	2.71	3.7	0.45	6.87
7	*Periploca aphylla* Decne.	1.1	80	0.48	3.73	7.41	0.91	12
8	*Saccharum bengalense* Retz.	0.8	40	0.24	2.71	3.7	0.45	6.87
Herbaceous layer								
9	*Boerhavia diffusa* L.	1.2	70	5.5	4.07	6.48	10.4	20.9
10	*Cenchrus biflorus* Hook. f.	3.4	90	3.5	11.5	8.33	6.6	26.5

11	*Chrozophora obliqua* (Vahl) A. Juss	0.3	30	4.5	1.02	2.78	8.49	12.3
12	*Cymbopogon jwarancusa* (Jones) Schult.	0.5	50	7.5	1.69	4.63	14.1	20.5
13	*Cyperus rotundus* L.	3	50	3.75	10.2	4.63	7.07	21.9
14	*Eragrostis poaoides* Beauv.	2.7	70	6.75	9.15	6.48	12.7	28.4
15	*Euphorbia helioscopia* L.	1.9	50	1.25	6.44	4.63	2.36	13.4
16	*Heliotropium europaeum* L.	0.3	20	3	1.02	1.85	5.66	8.53
17	*Solanum surattense* Burm .f.	1.4	70	1.75	4.75	6.48	3.3	14.5
18	*Carthamus oxycantha* Bieb.	0.6	50	1.25	2.03	4.63	2.36	9.02
19	*Tribulus terrestris* L.	3.2	90	7.25	10.8	8.33	13.7	32.9

Table 10 : Phytosociological attributes of Calligonum-*Cenchrus-Zizyphus* community recorded at Jahangiri banda during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.28	0.6	2.75	0.38	3.73
2	*Dalbergia sissoo* Roxb.	0.8	50	1.63	1.6	4.59	2.2	8.39
3	*Zizyphus maurtiana* Lam.	2.7	80	5.74	5.4	7.34	7.75	20.5
Shrubby layer								
4	*Calligonum polygonoides* L.	15.2	100	2.2	30.4	9.17	2.97	42.5
5	*Calotropis procera* (Wild) R.Br.	0.6	40	0.24	1.2	3.67	0.32	5.19
6	*Periploca aphylla* Decne.	0.5	40	0.33	1	3.67	0.45	5.12
7	*Saccharum bengalense* Retz.	3.5	100	1.14	7	9.17	1.54	17.7
Herbaceous layer								
8	*Aerua persica* (Burm.f) Merrill.	0.3	20	1.75	0.6	1.83	2.36	4.8
9	*Boerhaavia diffusa* L.	0.8	40	3.5	1.6	3.67	4.73	10
19	*Carthamus oxycantha* Bieb.	0.8	30	0.75	1.6	2.75	1.01	5.36
10	*Cenchrus biflorus* Hook. f.	4.6	100	8.75	9.2	9.17	11.8	30.2
11	*Citrullus colocynthis* L. Schrad.	0.2	30	9.25	0.4	2.75	12.5	15.6
12	*Cynodon dactylon* (L.) Pers.	2.5	20	5	5	1.83	6.75	13.6
13	*Cyperus rotundus* L.	1.9	50	3.75	3.8	4.59	5.06	13.5
14	*Eragrostis poaoides* Beauv.	2.8	60	5.25	5.6	5.5	7.09	18.2
15	*Euphorbia helioscopia* L.	3.8	70	6.25	7.6	6.42	8.44	22.5
16	*Euphorbia prostrata* Ait.	4.4	90	3.5	8.8	8.26	4.73	21.8
17	*Fagonia cretica* L.	0.6	30	3.25	1.2	2.75	4.39	8.34
18	*Peganum hermala* L.	1.5	60	5.25	3	5.5	7.09	15.6
20	*Solanum surattense* Burm .f.	0.3	10	1.5	0.6	0.92	2.03	3.54
21	*Tribulus terrestris* L.	1.9	40	4.75	3.8	3.67	6.41	13.9

Table 11 : Phytosociological attributes of *Zizyphus-Cenchrus-Saccharum* community recorded at Mona Khel during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.2	20	0.23	0.64	2.27	0.3	3.21
2	*Dalbergia sissoo* Roxb.	0.7	50	1.4	2.23	5.68	1.84	9.76
3	*Zizyphus maurtiana* Lam.	4	100	26.2	12.7	11.4	34.5	58.6
Shrubby layer								
4	*Calligonum polygonoides* L.	2.6	40	0.51	8.28	4.55	0.67	13.5
5	*Calotropis procera* (Wild) R.Br.	0.4	40	0.24	1.27	4.55	0.32	6.14
6	*Datura metel* L.	0.3	30	0.18	0.96	3.41	0.24	4.6
7	*Saccharum bengalense* Retz.	3.7	100	1.14	11.8	11.4	1.5	24.6
Herbaceous layer								
8	*Boerhaavia diffusa* L.	0.8	40	3.5	2.55	4.55	4.61	11.7
9	*Carthamus oxycantha* Bieb.	0.2	20	0.5	0.64	2.27	0.66	3.57
10	*Cenchrus biflorus* Hook. f.	4.6	100	8.75	14.6	11.4	11.5	37.5
11	*Citrullus colocynthis* L. Schrad.	0.3	30	9.25	0.96	3.41	12.2	16.6
12	*Cyperus rotundus* L.	1.9	50	3.75	6.05	5.68	4.94	16.7
13	*Eragrostis poaoides* Beauv.	2.8	60	5.25	8.92	6.82	6.92	22.7
14	*Euphorbia helioscopia* L.	4.3	70	6.75	13.7	7.95	8.89	30.5
15	*Euphorbia prostrata* Ait.	3.9	90	3.5	12.4	10.2	4.61	27.3
16	*Fagonia cretica* L.	0.6	30	3.25	1.91	3.41	4.28	9.6
17	*Solanum surattense* Burm .f.	0.1	10	1.5	0.32	1.14	1.98	3.43

Table 12 : Phytosociological attributes of *Saccharum–Zizyphus-Cynodon* community recorded at Jarassi during summer, Tehsil Takht-e-Nasrati, Karak

S. No	Species	Community Attributes						
		D	F	C	RD	RF	RC	IV
Tree layer								
1	*Acacia nilotica* (L.) Delice.	0.3	30	0.4	1.62	3.13	1.26	6.01
2	*Dalbergia sissoo* Roxb.	0.5	50	1.9	2.7	5.21	5.98	13.9
3	*Zizyphus maurtiana* Lam.	1.7	100	0.7	9.19	10.4	2.2	21.8
Shrubby layer								
4	*Calotropis procera* (Wild) R.Br.	0.6	60	0.36	3.24	6.25	1.13	10.6
5	*Datura metel* L.	0.8	60	0.54	4.32	6.25	1.7	12.3
6	*Periploca aphylla* Decne.	0.4	40	0.24	2.16	4.17	0.76	7.08
7	*Saccharum bengalense* Retz.	2.2	100	1.14	11.9	10.4	3.59	25.9
Herbaceous layer								
8	*Aerua persica* (Burm.f.) Merrill.	0.3	20	1.75	1.62	2.08	5.51	9.21
9	*Boerhaavia diffusa* L.	0.8	40	1	4.32	4.17	3.15	11.6
10	*Cenchrus biflorus* Hook. f.	1.7	100	2.5	9.19	10.4	7.87	27.5
11	*Citrullus colocynthis* L. Schrad.	0.2	20	5.25	1.08	2.08	16.5	19.7

12	*Cynodon dactylon* (L.) Pers.	1.3	30	3.25	7.03	3.13	10.2	20.4
13	*Cyperus rotundus* L.	1.7	50	1.25	9.19	5.21	3.93	18.3
14	*Eragrostis poaoides* Beauv.	3.5	100	3.75	18.9	10.4	11.8	41.1
15	*Euphorbia prostrata* Ait.	0.8	50	2.5	4.32	5.21	7.87	17.4
16	*Fagonia cretica* L.	0.5	40	1	2.7	4.17	3.15	10
17	*Launaea nudicaulis* (L.) Hook. f.	0.2	20	0.5	1.08	2.08	1.57	4.74
18	*Solanum surattense* Burm .f.	0.2	20	3	1.08	2.08	9.44	12.6
19	*Tribulus terrestris* L.	0.8	30	0.75	4.32	3.13	2.36	9.81