PLANT COMMUNITIES ON THE SANDY AREAS OF KARACHI UNIVERSITY CAMPUS

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SUMMARY: The communities were distinct types ranging from halophytes to xerophytes with disturbed nature. Six plant communities (Suaeda, Haloxylon, Lasiurus, Prosopis, Aerva and Senna) were found in studying area. On the basis of Importance Value Index (IVI) Suaeda fruticosa was the leading dominant species followed by Lasiurus hirsutus and Haloxylon recurvum, respectively. Out of thirty six species, only five species attained highest constancy class III as compared to rest of the species. All the communities were heterogeneous due to the absence of certain frequencies classes. Species diversity and community maturity index was low. As far as the density size classes are concerned, highest number of individuals belonged to class VII. Suaeda fruticosa showed better representation in all the classes. The soil of the study area was sandy and alkaline in nature. The soil had an appreciable amount of calcium carbonate with moderate percentage of maximum water holding capacity and high alkaline earth carbonate, soil Ec and chloride. It was observed that certain edaphic and anthropogenic activity were responsible for variation in the composition and structure of the vegetation.

Key Words: Suaeda, Haloxylon, Lasiurus, Prosopis, Aerva, Senna.

INTRODUCTION

Grisebach (16) recognized groups of plants or communities as a unit of study and described the vegetation on this basis. This was the first step, in the direction of modern studies of plant communities. European workers, who first used the term phytosociology, have long been interested in detailed structure, precise description, and system of classifying plant communities (27). The phytosociological values are necessary for an adequate characterization of a community.

The vegetation of Sindh area had been studied by few researchers in the past. Hussain (21) analyzed the vegetation of Nagarparkar, while Chaudhry and Chulter (11) gave quantitative account of the vegetation of Thar desert. The phytosociological studies around Karachi had also been carried out by few workers (2,10,12,22,33-35,38). A few stands of the Karachi University were investigated in early sixties by Qadir *et al.* (31), while field studies were conducted at six saline communities of the campus vegetation with the relationships of seed bank to plant distribution and restricted to the saline arid communities by Khan (25). Adequate knowledge of the composition at vegetation and edaphic variable is imperative for proper planning of the area for future development project like botanical garden and fruit farming (4). Rain in Karachi is seasonal, averaging less than 22 cm per year between June and September and rare for the remainder of the

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year. Occassionally, there are dry years too while strong coastal winds and better dew formation are the characteristic feature of Karachi.

The university campus is situated about 13 km north east of the environment. The climate conditions of the campus are not different from those of Karachi. The campus lies in a broad valley which is filled by alluvium, slope wash and small area of wind blown sand. The area as a whole is gently sloping towards the north. The vegetation of the campus is rich in vegetational diversity, which was actually the product of diverse edaphic and physiographic features found in the vicinity of Karachi (31).

The aim of present investigation was to provide quantitative description of the vegetation on the sandy areas of the campus which is changing from natural to seminatural form due to grazing and construction work which was started in 1957 and is still in progress.

MATERIALS AND METHODS

A phytosociological survey of the sixteen stands of the campus vegetation was carried out by Cottom and Curtis (13) and Cainfield (9) methods. Sampling points were established at regular interval by spacing ten steps. Relative cover, relative frequency, and relative density was obtained. An importance value index (IVI) was obtained by addition of the above community attributes. The community was named according to dominant species, which have highest IVI. Homogeneity of community was determined by Raunkiaers Law of frequency (32). Community maturity index was found by Pichi-Sermoli (28), and species diversity was determined by the following formulae of Simpson Index:

$D = N (N-1) / \Sigma n (n-1)$

D = Diversity index

N = Total number of plants of a species

n = number of individuals

Σ = Sum of all individuals of a species.

Cain (8) density size table was also used to study regeneration of vegetation.

Two soil samples were collected from each stand one from the surface (0-15 cm) and the other from sub-surface (15-30 cm). These samples were brought to the laboratory in polythene bags for physical and chemical analysis. Mechanical analysis of the soil was carried out by the pipette methods of Anonymous (5). Maximum water holding capacity (MWHC) of the soil was calculated by the following formulae. MWHC = Loss in weight / oven dried weight of soil x 100. The soil pH was determined by direct pH reading meter (Model JENWAY PHM 6). Calcium carbonate and inorganic carbonate were determined by a method of acid neutralization. Electrical conductivity of the saturated soil extract was determined by Beckman conductivity meter (Model 26). Soil chlorides were determined by titration method (5), while exchangeable Na^+, and K^+ were measured by flame photometer (Corning 410).

RESULTS

The vegetation of the campus showed the presence of Halophytes, xerophytes and disturbed type of vegetation. A summary of phytosociological data are summarized in Table 1. Among all the listed thirty six species, *Suaeda fruticosa* and *Lasiurus hirsutus* equally shared three times as a leading dominant. *Prosopis juliflora* and *Haloxylon recurvum* equally shared four times as a leading dominant in the community, while *Aerva javanica* and *Senna holoseracea* were only one time leading dominant in the area. As for as IVI is concerned. *Suaeda fruticosa* attained the highest IVI (1018.2) followed by *Lasiurus hirsutus* (728.5) and *Haloxylon recurvum* (654.1), respectively.

For constancy, five species (*Suaeda fruticosa*, *Haloxylon recurvum*, *Prosopis juliflora*, *Blepharis scindicus*, and *Fagonia indica*) showed the constancy class III. Ten species (*Lasiurus hirsutus*, *Salsola baryosma*, *Aerva javanica*, *Senna holoseracea*, *Salvia santelinifolia, Andrachne aspera, Innula granticides, Hibiscus scindicus, Capparis decidua,* and *Grewia tenax*) had constancy class II, while, rest of the species had the lowest constancy class.

Six leading dominant species were selected and mean importance value index of each species was calculated (Table 2). The stands dominated by *Suaeda fruticosa* formed an association with halophytes (*Haloxylon recurvum*) and xerophyte (*Lasiurus hirsutus*) species and showed complete absence of disturbed species (*Prosopis juliflora*, *Aerva javanica*, *Senna holoseracea*). However, *Lasiurus hirsutus* as a leading dominant showed complete absence of other halophytes. *Suaeda fruticosa* and *Haloxylon recurvum* formed an association with disturbed species (*Prosopis*

Table 1: Summary of Phytosociological Data.

SPECIES	IVI				TOTAL NO OF STANTDS	PRESENCE CLASS	NO. OF STANDS		DOMINANT
	TOTAL	AVERAGE	MAXIMUM	MINIMUM			FIRST	SECOND	THIRD
1. Suaeda fruticosa (L.) Forssk.	1018.2	145.5	249.7	84.7	7	III	3	4	-
2.Lasiurus hirsutus (Forssk.) Boiss	728.5	145.7	232.8	46.2	5	II	3	-	2
3. Haloxylon recurvum Bunge ex Boiss. Bonge	654.1	93.4	176.6	7.2	7	III	4	1	1
4. Prosopis juliflora Swartz	533.7	59.3	118.9	7.2	8	III	4	-	-
5.Blepharis sindica Stocks ex T. Anders.	226.5	28.3	64.6	10.4	8	III	-	3	-
6. Salsola baryosma (R. and S.) Dandy	224.7	37.4	75.3	15.2	6	II	-	2	4
7. Aerva javanica (Burmff.) Juss.	184.9	30.8	86.6	14.9	6	II	1	1	1
8. Fagonia indica HK. f.	180.0	25.7	62.3	5.8	7	III	-	2	-
9. Senna holosercea (Fresen.) Greuter	151.5	30.3	99.6	4.3	5	II	1	-	-
10. Salvia santolinfolia Boiss.	120.7	24.1	31.4	11.1	5	II	-	-	2
11. Andrachne aspera Spreng.	87.5	17.5	38.2	8.3	5	II	-	-	2
12. Inula grantioides Boiss.	76.9	19.2	20.4	17.7	4	II	-	-	-
13. Euphorbia caducifolia Haines.	73.2	73.2	73.2	73.2	1	I	-	-	1
14. Convolvulus glomeratus Choisy	64.7	21.6	55.3	3.6	3	I	-	1	-
15. Crotalaria burhia Ham. ex Bth.	64.3	32.1	45.5	18.8	2	I	-	1	1
16. Hibiscus scindus Stocks	59.8	15.0	24.8	5.8	4	II	-	-	-
17. Capparis decidua (Forssk.) Edgew.	59.0	9.8	14.9	4.7	6	II	-	-	-
18. Commiphora wightii (Amoh) Bhandari	44.3	14.8	27.1	8.2	3	I	-	-	-
19.Grewia tenax (Frossk.) A. and S.	42.4	10.6	13.6	9	4	II	-	-	-
20. Polygola irregularis Boiss.	40.6	40.6	40.6	40.6	1	I	-	-	1
21. Barleria acanthoides Vahl.	40.5	20.3	34.7	5.8	2	I	-	1	-
22. Zizyphus nummularia (Burnf)W.T. and Arn.	37.7	12.6	28.2	3.7	3	I	-	-	-
23. Lycium edgwerthii (L.)	37.3	18.6	32.8	4.5	2	I	-	-	-
24. Sporobolus marginatus Hochst. ex A. Rich	36.9	12.3	15.7	7.1	3	I	-	-	-
25. Heliotropium tuberculosum Boiss.	25.2	12.6	14.1	11.1	2	I	-	-	-
26. Zygophyllum simplex (L.)	22.7	11.3	18.3	4.4	2	I	-	-	1
27. Cocculus pendulus (J.R. and G. Frost.)	21.1	7	8.6	6.2	3	I	-	-	-
28. Saricostemma pauciflorum Stocks.	20.9	10.5	17.5	3.6	2	I	-	-	-
29. Salvadora oleoides Dene.	20.9	20.9	20.9	20.9	1	I	-	-	-
30. Cordia gharaf (Frossk.) Ehren.	17.8	8.9	9.7	8.1	2	I	-	-	-
31. Atriplex stocksii (Wt.) Boiss.	17.5	8.7	9.4	8.1	2	I	-	-	-
32. Aristida sp.	11.8	11.8	11.8	11.8	1	I	-	-	-
33. Breweria latifolia (Hochs and Steud.) Benth.	10.6	5.3	6.1	4.5	2	I	-	-	-
34. Acacia senegal Willd.	6.5	6.5	6.5	6.5	1	I	-	-	-
35. Orygia decumbens Forssk.	5.8	5.8	5.8	5.8	1	I	-	-	-
36. Indigofera sessiliflora D.C.	4.1	4.1	4.1	4.1	1	I	-	-	-

Symbol used: IVI = Importance Value Index.

Table 2: Mean IVI of species in stands in which a given species occurs as a leading dominant.

No of stands*	Species	S.F	L.H	H.R	P.J	A.J	S.H
3	Suaeda fruticosa	23.5	10.12	20.53	-	-	
3	Lasiurus hirsutus	-	210.36	-	7.19	17.25	-
4	Haloxylon recurvum	79.35	46.22	148.12	34.67	-	-
4	Prosopis juliflora	-	-	-	104.48	24.13	14.63
1	Aerva javanica	-	51.24	-	-	86.82	-
1	Senna holoseracea	-	-	-	-	5.84	94.56

Symbol used: S.F : Suaeda fruticosa, L.H : Lasiurus hirsutus, H.R : Haloxylon recurvum,
P.J : Prosopis juliflora, A.J : Aerva javanica, S.H : Senna holoseracea.

* : Number of stands in which a species is a leading dominant.

juliflora, *Aerva javanica*). The stands, dominated by *Haloxylon recurvum* showed an association with both halophytes and disturbed species. The stand dominated by *Senna holoseracea* did not form any association with halophytes (*Suaeda fruticosa* and *Haloxylon recurvum*) and xerophytic species (*Lasiurus hirsutus*).

Homogeneity of Communities: The frequency distribution of all communities showed heterogeneous types of vegetation which is in accordance with the Raunkiaers law of frequency (Table 3).

Species diversity: The species diversity index is another important value for the community studies. Higher species diversity value is a characteristic of stable communities. The species diversity of the studied communities was generally low and ranged from 1.41 to 6.04 (Table 3). The highest species diversity (6.04) was observed in *Suaeda* community. The *Lasiurus* and *Haloxylon community* had better species diversity (5.37) while, the lowest species diversity (1.41) was observed in *Aerva* community.

Community Maturity Index: This index is an important indicator for the maturity of the communities. All the communities showed less than 50% CMI value which proved the immaturity of vegetation (Table 3). *Aerva* and *Senna* community had slightly higher CMI

Table 3: Frequency, Species Diversity and Community Maturity Index.

Community	A 1-20%	B 21-40%	C 41-60%	D 61-80%	E 81-100%	SD	CMI
Suaeda	84.79	5	5.21	-	5	6.04	16.83
Lasiurus	80.55	4.17	6.94	-	-	5.37	16.95
Haloxylon	57.27	33.03	-	9.09	-	5.37	23.47
Prosopis	78.75	8.13	5	-	8.13	3.29	15.90
Aerva	50	25	-	-	25	1.41	33.30
Senna	85.71	-	-	-	14.28	2.15	30.00

Symbol used: S.D = Species diversity;
CMI = Community Maturity Index.

Table 4: Density size classes of leading dominant communities.

Communities	Total number of individuals	Size classes						
		I	II	III	IV	V	VI	VII
Suaeda fruticosa	152	12	22	29	21	28	12	28
Lasiurus hirsutus	104	24	23	14	16	9	6	12
Haloxylon recurvum	63	3	5	11	8	9	7	20
Prosopis juliflora	17	-	-	1	2	-	-	14
Aerva javanica	23	7	6	2	5	3	-	-
Senna holoseracea	15	2	5	1	3	4	-	-

Density size classes:

I upto 25 cm circumference III 51 cm-75 cm circumference V 101-125 cm circumference VII 151-175 cm circumference

II 26 cm-50 cm circumference IV 76 cm-100 cm circumference VI 126-150 cm circumference

values 33.3 and 30.0, respectively, while *Lasiurus*, *Suaeda* and *Prosopis had* CMI less than 17.0. A better CMI value (23.47) was found in *Haloxylon* community.

As far as the density size classes of the vegetation are concerned, the community dominated by *Suaeda* showed better sign of regeneration (Table 4). The other halophytic species, *Haloxylon recurvum* has also showed better regeneration capacity in all classes. Among the disturbed species, *Aerva* and *Senna* were unable to attained highest density size classes VI and VII.

Soil Characteristics: The soil of the study area was calcareous and alkaline in nature. It had an appreciable amount of calcium carbonate with moderate percentage of maximum water holding capacity. The soil was mostly loamy sand, sandy loam or sandy (Table 5). Thirteen stands were found on loamy sand and the remaining were on sandy loam and sandy. Six communities based on leading dominant species and their edaphic characters are as follows:

1. *Suaeda* community: *Suaeda* community formed main association with other halophytic species such as *H. recurvum* and *S. baryosma*. This community was dominated by succulant shruby perennial which had high percentage of sand (74.05%) and low amount of clay (4.95%). The community was found on highest percentage of silt (17%) as compared to other communities (Table 5). The community had moderate percentage of maximum water holding capacity (19.39%). The soil of the community had better alkaline earth carbonate (2.44 meq/l) with alkaline soil pH (7.86). The concentration of potassium (449.75 ppm) and sodium (762.15 ppm), chloride (8.43 meq/l) and electrical conductivity (EC) (473.5 μs/cm) was the characteristic feature of the community.

2. Lasiurus community: This community is dominated by xerophytic perennial shruby grasses. The community formed an association with halophytes (*S. baryosma*) and disturbed species (P. *juliflora*, *A. javanica*, *B. acanthoides* and *C. burhia*). The community preferred to grow on high percentage of total sand (80.78%) and silt (9.83%) along with highest percentage of clay particles (7.8%) and MWHC (23.8%). The soil of the community had slightly alkaline pH (7.49), chloride content (7 meq/l), electrical conductivity (539.3 μs/cm) and lowest potassium (199.3 ppm) concentration.

3. *Haloxylon* community: *Haloxylon recurvum* formed an association with both halophytic species (*S. fruticosa*, *S. baryosma*) and disturbed species (P. *juliflora*). The community had high percentage of total

Table 5: Soil characteristic with relation to plant communities.

Edaphic variables	Suaeda Community	Lasiurus Community	Community types Haloxylon community	Prosopis community	Aerva community	Senna community
			Number of stands			
	1,2,3,4	5,7,8	9,10,12	11,13,14,16	6	15
Clay %	4.95 (4.4-5.5)	7.83 (5.3-13)	3.83 (3.5-4)	3.88 (0.6-6)	5.4 -	3.1 -
Silt %	17 (11-22)*	9.83 (5.5-13)	12.33 (12-13)	8.13 (3-13.5)	13 -	12 -
Sand %	74.05 (71-78.2)	80.78 (79.8-81.7)	80.90 (79.1-84.5)	87.15 (82-94.4)	80.6 -	82 -
Soil type	Loamy sand -Sandy loam	Sand- Loamy sand	Sandy loam- Loamy sand	Loamy sand- Sandy	Loamy sand	Loamy sand
MWHC %	19.39 (15.30-25.7)	23.86 (19.12-26.86)	22.99 (15.45-29.54)	18.62 (16.78-20.2)	19.12 -	14.25 -
pH	7.86 (7.7-8)	7.49 (7.01-8.05)	7.54 (7.11-8.39)	7.85 (7.11-8.38)	7.42 -	7.75 -
$CaCO_3$%	21.25 (15-24)	16.33 (12-21)	13.33 (13-14)	25.75 (17-38)	16 -	30 -
EC μs/cm	473.5 (395-508)	539.3 (162-950)	241.67 (205-260)	593.5 (418-996)	950 -	365 -
Inorganic CO_3 %	2.44 (2.38-2.48)	2.49 (2.49-2.50)	2.45 (2.37-2.49)	2.49 (2.48-2.49)	2.48 -	2.49 -
Cl meq/l	8.43 (8.3-8.6)	7.00 (4.4-8.6)	12.80 (11.2-13.6)	4.85 (2.6-8)	8.6 -	3.4 -
Na^+ ppm	762.15 (533.3-966)	632 (366-800)	485 (500-966)	803.75 (366-1033)	800 -	800 -
K^+ ppm	449.75 (233-733)	199.3 (166-266)	399.67 (300-466)	366.25 (166-600)	233 -	488 -

Symbol used:

* Range of edaphic variables

MWHC Maximum water holding capacity.

sand (80.90%) and better silt particles (12.33%). The maximum water holding capacity of the soil was 22.99% and soil type was loamy sand. The soil pH (7.54), Na^+ (485 ppm) and K^+ (399.67 ppm) was moderate in the community. The dominance of the community might be due to the highest chloride content (12.80 meq/l) and lowest concentration of calcium carbonate.

4. Prosopis community: It is disturbed and heterogenous type of community. *P. juliflora* formed an association with other species (*Fagonia indica*, *Aerva javanica*, *Andrachne aspera*) along with halophytes (*Salsola baryosma*) and *Salvia santolinifolia*. It appeared to grow on the highest percentage of total sand (87.15%), low percentage of silt (8.13%) and clay

particles (3.88%) with low water holding capacity (18.62%). The community was found to grow on high percentage of calcium carbonate (25.75%) as compared to other plant communities. The community had slightly alkaline soil pH (7.85). EC (593.5 μs/cm), chloride contents (4.85 meq/l) and high potassium (366.25 ppm) concentration.

5. *Aerva* community: *Aerva* community formed main association with halohytes (*Haloxylon recurvum*). The soil of the community had a high percentage of total sand (80.6%) with better percentage of silt (13%) and clay (5.4%) particles. The soil was loamy sand with slightly alkaline pH (7.42). The community showed moderate concentration of Na^+ (800 ppm) and K^+ (233 ppm). Chloride, EC and calcium carbonate were 8.6 meq/1, 950 μs/cm and 16%, respectively.

6. *Senna* community: *Senna* community formed main association with *Aerva javanica*. The community was found on soil having high percentage of total sand (82%) with lowest percentage of clay particles (3.1%). However, the amount of silt was moderate (12%). The community had the lowest CI contents (3.44 meq/l) along with high calcium carbonate (30%). The other soil characteristics such as EC, Na, K and pH of the community were moderate.

DISCUSSION

The subject of vegetation description and classification is extremely diverse and complex. Vegetation may be regarded as being composed of all different types of plant communities within the region. A summary of phytosociological study gave us a better picture of the vegetation. The vegetation is predominantly composed of halophytes, xerophytes and disturbed species. The disturbance is mainly due to the construction of new structure, biotic, cattle grazing etc. It is one of the most urgent problem which is confronted by the mankind; due to his own activities, the natural vegetation is converted to seminatural vegetation. Similar observations were found by other research workers in various other parts of the country on the phytosociological studies of Quaid-e-Azam University campus. Islamabad (4), Ahmed and Qadir (2) had reported that natural vegetation is being taken over by seminatural vegetation due to disturbances of anthropogenic nature along Gilgit to Shunder road. Among all the listed thirty six species, *S. fruticosa* attained the highest Importance Value Index (IVI) followed by *L. hirsutus*, *H. recurvum* and P. *juliflora*. Since importance value index showed the relative ecological importance of each species in the stands (7). Vegetation analysis gives the information necessary to determine the name of community and provide data that can be used to compare it with other communities.

Six plant communities; *Suaeda*, *Lasiurus*, *Haloxylon*, Prosopis, *Aerva* and *Senna* were investigated as a leading dominant. The leading dominants of one stands was also found in other stands as co-dominant. If more than one species are equally dominant than was described as co-dominant (39). The dominant of one stands was also found in other stands alongwith few species as second dominant or third dominant (*E. caducifolia, S. sentolinifolia, B. scindicus, S. baryosma, F. indica, A. aspera, C. burhia, P. irregularis, B. acanthoides* and *Z. simplex*). Out of the thirty six species, five species e.g., *H. recurvum*, P. *juliflora*, *B. scindicus*, *S. fruticosa* and *F. indica* got the highest constancy class III as compared to other species, while, the other ten species had class II and the remaining were in constancy class I.

Homogeneity studies of the communities is a useful synthetic character and proves the idea of dominance in the stand. The communities in the study area were heterogeneous. The absence of certain frequencies classes in all communities reflected the heterogeneity of the vegetation, which is either due to biotic disturbance or the floral poverty. The result obtained by Raunkiaer (32) may be regarded only as possibilities to be confirmed by other alternative approaches. Species diversity is considered to be an important attribute of community organization and allowed comparison of structural characteristics of communities (19,20). It is often related to community dynamics stability, productivity, integration, evolution, structure and competition

(29,30). While the idea of displacement of one species through competition with other is net prime importance (18,41). The species diversity was low and the community maturity index was below 50%, which indicates that the communities are under several changes. The general diversity was low in early stages of succession but increased suddenly and subsequently declined and remained more or less steady at a slightly higher level than that found initially (37). Whittaker (41) also comments that so far as the data can be interpreted in relation to community development or succession, suggested that diversities may both increase during succession and decrease during parts of succession. The presence of *Suaeda* community with better figures in all density size classes showed the better regeneration capacity. Similarly, *Haloxylon* and *Lasiurus* communities also exhibited better regeneration capacity.

An organism without environment is inconceivable for living things have certain requirements that must be satisfied by their surrounds if life is to continue (17). One of the main factors influencing plant distribution is the type of soil (6). Most plants are specially adapted to more or less specific soil types. It is a good indicator of the quality of soil which effects it on every conceivable direction. Detailed studies have been carried out for soil plant relationship. The distribution and composition of plant communities is there's seems to be affected by environmental gradient like climate, topography, soil and anthropogenic activity. The soil of the study area was alkaline in nature with loamy sand, sandy loam and sandy having an appreciable amount of calcium carbonate which is a characteristic feature of arid soil. In arid region, the vegetation cover is low and sparse (14). Under arid conditions the density of vegetation decreases with decreasing precipitation (26), which is characterized by shallow root system with considerable horizontal growth (40). Soil of the communities showed significant variation in their characteristics. However, some communities recognized in the study area are also found in other parts of the country. *Suaeda* community which is a fleshy herbaceous types of halophytes, found on loamy sand with mo-derate percentage of maximum water holding capacity and soluble salts. Shafiq and Iqbal (34) had found similar results on the phytosociological studies around the industrial area of Korangi, Karachi. The dominant of *Suaeda* community was also found near the industrial polluted channel of Karachi by Iqbal *et al.* (23). The genus *Suaeda* is generally considered halophytes (24) due to the saline desert conditions. High salinity could cause the dominance of halophytes. Rain may play a prominant role in regulating saline community. Annual moonsoon rain, lower the salinity level by drainage and high moisture content in the soil. Seeds of annual as weel as perennials have a chance to recurit into the community. However, rapid drying in a desert condition result in a corresponding rapid increase in soil salinity (25). *Lasiurus* community as a dominant, formed an association with disturbed species and showed complete absence of halophytes which might be correlated with high percentage of sand and low potassium level. The community had high maximum water holding capacity which might be due to high proportion of find textured soil particles. *Haloxylon* community was also found in other parts of the country. *Haloxylon-Haliotropium* community was reported between gilgit and shunder (1) while in another association *Ephedra - Artemesia-Haloxylon* community was found on the foot hills of Himalayan region (3). *Haloxylon* community was also found around the industrial area of Korangi by Shafiq and Iqbal (34) *Haloxylon* community is heterogenous type of community. It is intend to grow on loamy sand. The community had wide ecological amplitude and was also reported in the northern areas of the country (3). *Haloxylon* community had succulant habit (31) and grow on flat topographic saline soils. *Prossopis* community in association with other disturbed species was observed at low percentage of fine textured soil, whereas, similar type of fine textured soil was found by Shafiq and Iqbal (33) while observing the plant communities around the stone quarries and processing plants of Karachi and Thatta districts. Similar range of soil pH and calcium carbonate was also found by Iqbal *et al.* (23) around the polluted channels of

industrial area of Karachi. Furthermore, particular classes of vegetation seems to be associated with certain types of soil and vice versa. The distribution of plant communities, even undisturbed condition is determined by a great number of interrelated factors. The chemical composition and physical characteristics of the soil parent material are important. *Aerva* community was found on the loamy sand and agree with the findings of Shafiq and Iqbal (35), who had studied the plant sociology on the industrial area of Landhi, Karachi. This community had the lowest percentage of fine textured soil which might be the cause of low water holding capacity of the soil. The community had also the lowest species diversity. *Senna* community is distinct from the above studied community, that, it did not formed any association with the dominant halophytes. The community had high percentage of sand with the lowest percentage of fine particles (clay) which might be responsible for the lowest water holding capacity of the soil in this community. Similar types of community was found by Iqbal *et al.* (23) in the industrial areas (SITE) and concluded that the disturbance was mainly due to grazing and cutting of the original vegetation.

The development and construction of new structure and increasing human activity would gradually disturbe the natural vegetation pattern of the campus vegetation. Similar conclusion was drawn by Akbar and Ahmed (4) about the vegetation of Quaid-e-Azam University campus.

No apology is made for this in spite of the fact that human communities have now modified the plant cover almost beyond recognition over wide areas, indeed, the very fact that this transformation has taken place very recently in terms of evolutionary time scale means that it would be unrealistic to reach the cognisance of the present situation alone (15). If similar types of disturbance could be carried out, the future of the campus vegetation would be in danger. There is a need to adopt a policy in which a plantation campaign should be carried out, as, they did in Britain, where the replacement of wild vegetation covered up with the cultivation of permanent grasses, which helped in maintaining the richness of the nutrient cycle of the soil (15).

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