

# Plant communities in the vicinity of the industrial areas of Korangi and Landhi in Karachi, Pakistan.

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**Abstract**--Phytosociological studies were carried in the verge of Korangi and Landhi industrial locations of Karachi. The vegetation was herbaceous, shrubs and principally dispersed in character. Fifteen plant communities focused on the composition, structure and distribution of species were determined. Most of the plant communities in the proximity of industrial zones had low number of plant species as compared to less polluted site of Karachi University Campus. Highest numbers of species were recorded in *Abutilon* and *Amaranthus-Prosopis* communities around industrial regions, whereas *Salsola* community had particularly reduced species numbers. Importance value index of whole the species were calculated and eleven leading dominant species were recognized in the industrial areas. *Abutilon indicum* (L.) Sweet, *Corchorus trilocularis* L., *Corchorus depressus* (L.) Stocks and *Prosopis juliflora* Swartz were found in noticeable number in the communities. *A. indicum* had strong association with *Corchorus* spp, *P. juliflora* and *Tribulus terrestris* L. at Industrial sites. *P. juliflora* were representing well connection with *Heliotropium ophioglossum* Boiss, *Orygia decumbens* Forssk, *Chloris barbata* Sw., *Trianthema portulacastrum* L. at Karachi University site. Therefore, it is observed that *A. indicum* was markedly dominant plant species in the surrounding of industrial estates while *P. juliflora* was particularly dominant species at the University Campus.

**Key words:** Dominant species, important value index, industrial areas, industrial pollution, phytosociological attributes, plant communities.

## 1 Introduction

Karachi is situated on the coast of Arabian sea (Latitudes 24° 50' - 25° 15' North and Longitude 65° 51'-67° 40' East) of Pakistan. Karachi is the largest and an industrial and commercial city of Pakistan. Community is a spatial and temporal organization of organisms with different degree of combination and composed of unevenly thriving species [1]. A prevailing species which displays a pattern may inflict a oppose pattern on species with which it is competing [2].

Phytosociological learning in the vicinity of the polluted industrial locations of Karachi were accomplished by [3] and [4]. Ahmed *et al.*, [5]; [6]; [7], [8] and [9] had inspected the vegetation model around a lot of industrial units in Gharo, SITE, Manghopir, Korangi and Landhi industries in the verge of Karachi, respectively. *Paspalidium geminatum* was the most governing species rising next to the sewage waste matters waterway of Malir [10] and Lyari [11] rivers, which were spoiled by the effluents of the industrial zones beside with additional materials. Mehmood and Iqbal [12] distinguished nine plant communities based on overriding species at wasteland of Valika chemical factories close to Manghopir, Karachi and determined that the vegetation was disturbed, generally halophytic and taken over by

*Suaeda fruticosa*, *Tamarix indica*, *Salsola imbricata* and *Cressa cretica*. The phytosociological studies of the Karachi University campus have been carried out by some workers. Qadir *et al.*, [13] and Iqbal and Shafiq [14] have recognized six plant communities. The vegetation was dominated by halophyte, xerophyte and disturbed plants and dominated by *C. depressus* in Karachi University Campus [15]. Industrial pollution due to heavy metals in Karachi is a critical issue. The industries emit extensive range of heavy metals such as ferric, copper, zinc, chromium and lead into the air, water and soil.

Since industries are playing the severe and injurious impact in Karachi, it is indispensable to explore the effects of toxic waste of industrial places on plant communities growing in the nearby industrial lands of Korangi and Landhi.

## 2 Materials and Methods

Sampling of the vegetation around the Korangi and Landhi industrial regions of Karachi was carried out. Twenty eight stands were studied by point centered quarter method by employing twenty five sampling points in each stand. Observations were based on four plants measurement at each point. The circumference of every individual species was recorded. Phytosociological attributes like cover, relative cover, density, relative density, frequency, relative frequency and importance value index of each species were calculated and analyzed [16]. Afterward, fifteen plant communities were recognized among the 28 stands on the basis of leading dominant species.

Sampling of the vegetation was also conducted at the University campus in the some way as carried out at Korangi and Landhi industrial sites. The plant specimens

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were collected and identified according to [17] in the Department of Botany, University of Karachi.

### 3 Results

From Korangi and Landhi industrial locations of Karachi, forty nine species were recorded in twenty eight stands (Table 1). Based on the leading dominant species, fifteen plant communities were recognized, according to the importance value index (Table 2, 3). *Abutilon-Prosopis*, *Abutilon*, *Abutilon-Cressa*, *Cressa*, *Cressa-Senna*, *Digera-Senna*, *Suaeda* and *Salsola* communities are of special interest in the study area.

#### 3.1 *Abutilon-Prosopis* community

In this community *Abutilon indicum* (I.V.I.= 153.20) and *Prosopis juliflora* (I.V.I.= 84.85) were leading around Khan Towel factory in the Korangi industrial area. It was found mainly in association with other species like, *Amaranthus viridis*, *Ricinus communis*, *Corchorus trilocularis* and *Rhynchosia minima*.

#### 3.2 *Abutilon* community

*Abutilon indicum* (I.V.I.= 840.26) was the primarily dominant in the vicinity of Chushtia Bed Sheets, Fatima Garment and Fancy Ply Board factories at the Korangi industrial site and One Tech Ply Board factory at Landhi industrial zone. It was recorded along with *Corchorus depressus*, *Corchorus trilocularis*, *Cynodon dactylon* and *Senna holosericea*.

#### 3.3 *Abutilon-Cressa* community

*Abutilon indicum* (I.V.I.= 238.06) and *Cressa cretica* (I.V.I.= 132.46) were maximum range in the surrounding of Paramount Garment factory in the Korangi industrial estate. They were found with *Corchorus depressus*, *Senna holosericea* and *Chloris barbata*.

#### 3.4 *Abutilon-Tribulus* community

*Abutilon indicum* (I.V.I.= 110.72) and *Tribulus terrestris* (I.V.I.= 64.56) were prominent in the proximity of Triple A dying factory in the Korangi industrial region. They were predominantly linked with *Corchorus trilocularis*, *Cressa cretica*, *Corchorus depressus* and *Amaranthus viridis*.

#### 3.5 *Cressa* community

*Cressa cretica* (I.V.I.= 424.44) was much conspicuous in the verge of One Tech Rubber factory at the Korangi industrial land of Karachi. This community was allied with *Cyperus rotundus*, *Cynodon dactylon*, *Tribulus terrestris* and *Heliotropium curassavicum*.

#### 3.6 *Cressa-Abutilon* community

*Cressa cretica* (I.V.I.= 85.27) and *Abutilon indicum* (I.V.I.=79.55) community was in the locality of Polyfex Plastic factory in Korangi industrial place. They formed affiliation with *Digera alternifolia*, *Abutilon indicum*, *Corchorus trilocularis* and *Amaranthus viridis* species.

#### 3.7 *Cressa-Senna* community

*Cressa cretica* (I.V.I.= 71.61) and *Senna holosericea* (I.V.I.= 64.84) were greatly prevailing in the ambient of Tanveer Garment factory in the Korangi industrial location. They were examined with *Digera alternifolia*, *Abutilon indicum*, *Corchorus trilocularis* and *Amaranthus viridis* in the surrounding of Korangi industrial site.

#### 3.8 *Digera-Senna* community

*Digera alternifolia* (I.V.I.= 198.69) and *Senna holosericea* (I.V.I.= 114.95) were visible in number in the location of Mustafa Garment factory and Tanveer Garment factory in Korangi industrial area. They were found with *Abutilon indicum*, *Corchorus trilocularis*, *Zaleya pentandra* and *Chloris barbata*.

#### 3.9 *Suaeda* community

*Suaeda fruticosa* (I.V.I.= 226.14) was remarkable in number nearby National Oil refinery in Korangi industrial zone. It produced relationship with *Digera alternifolia*, *Launaea nudicaulis*, *Cressa cretica* and *Prosopis juliflora*.

#### 3.10 *Salsola* community

*Salsola baryosma* (I.V.I.=188.32) was also striking in number close to National Oil refinery in Korangi industrial region. *Cressa cretica*, *Digera alternifolia*, *Prosopis juliflora* and *Launaea nudicaulis* was companion species of this community.

#### 3.11 *Corchorus-Abutilon* community

*Corchorus trilocularis* (I.V.I.= 416.51) and *Abutilon indicum* (I.V.I.= 256.67) were distinct in number near to Haidery Flour mill in Korangi industrial estate and International Leather industry in Landhi industrial land. *Corchorus depressus*, *Prosopis juliflora*, *Senna holosericea* and *Zaleya pentandra* made a combination with this community.

#### 3.12 *Amaranthus-Prosopis* community

*Amaranthus viridis* (I.V.I.= 315.17) and *Prosopis juliflora* (I.V.I.= 102.53) were evident close by Amin Abdullah Maaz ghee and Fahim carpets factories in Korangi industrial place and Zeba Textile industry around Landhi industrial area. Other species like *Cynodon dactylon*, *Gynandropsis gynandra*, *Zaleya pentandra* and *Chloris barbata* were also recorded in these locations.

#### 3.13 *Gynandropsis-Digera* community

*Gynandropsis gynandra* (I.V.I.= 183.80) and *Digera alternifolia* (I.V.I.= 115.96) were dominantly found at Beam factory at Korangi industrial region. Other species like *Abutilon indicum*, *Senna holosericea*, *Chloris barbata* and *Corchorus depressus* demonstrated friendship along this community.

#### 3.14 *Prosopis-Abutilon* community

*Prosopis juliflora* (I.V.I.= 87.69) and *Abutilon indicum* (I.V.I.= 77.37) were manifestly located at Khan Towel

factory situated at Korangi industrial estate. *Ricinus communis*, *Corchorus trilocularis*, *Aerva javanica* and *Corchorus depressus* were other chief members of this community.

### 3.15 *Cenchrus-Senna* community

*Cenchrus biflorus* (I.V.I.= 76.57) and *Senna holosericea* (I.V.I.= 65.38) were largely present at Mustafa Garment factory around Korangi industrial zone. They were accompanied with *C. trilocularis*, *D. alternifolia*, *R. minima* and *A. indicum*.

The apparently dominant species were also correlated with plant communities of Korangi and Landhi industrial sites. Eleven dominant species were selected among the 28 stands and the total importance value index of each dominant species is depicted in Table 4. *Abutilon indicum* was found as a leading dominant species in ten stands and exhibited firm partnership with *Corchorus* spp, *P. juliflora* and *T. terrestris*. *C. cretica* performed a leading character in four stands with a significant happening in *Abutilon-Cressa* and *Cressa-Abutilon* communities. The three stands dominated by *Amaranthus viridis* showed intimate fellowship with *P. juliflora* and *A. indicum*. *C. trilocularis* also executed a major role in two stands with noteworthy presence of *A. indicum*. *A. indicum*, *C. trilocularis*, *C. depressus* and *P. juliflora* were found in several communities. *Cenchrus biflorus* was found in four communities while, *Suaeda fruticosa* and *Salsola baryosma* were present dominant only in one community.

### *Prosopis* community at Karachi University (as a less polluted area)

In this community *Prosopis juliflora* (I.V.I. = 163.17) was the especial key species present around Karachi University campus (Table 5). Other species which played important role in this community were *Heliotropium ophioglossum*, *Orygia decumbens*, *Chloris barbata*, *Trianthema portulacastrum* and *Launaea nudicaulis*.

## 4 Discussion

Vegetation analysis gives the information necessary to determine the communities and provide data that could be used to compare it with other communities. The vegetation around the Korangi and Landhi industrial lands of Karachi is predominantly composed of halophytes, xerophytes and disturbed species. Iqbal *et al.*, [6]; [7]; [12] had found dominant herbs and shrubs and some common trees around different industrial polluted areas of Karachi. *A. indicum* was the considerably dominant species in the vicinity of Korangi and Landhi industrial estates followed by *C. trilocularis*, *C. cretica* and *C. depressus*. A phytosociological study of Karachi University as a less polluted locality was also carried for comparison of vegetation with Korangi and Landhi industrial zones, which demonstrated that *P. juliflora* was the remarkably dominant species at Karachi University while, *H. ophioglossum* and *O. decumbens* were second and third

dominant species, in that order. *C. cretica* was a discernible species at industrial regions of Sindh Industrial Trading Estate (SITE), Manghopir [6] and Javedan Cement factory [7] and at sewage effluent passage of Lyari river at heap site which were polluted by industrial effluents [11].

*P. juliflora* was the eighth dominant species at Korangi and Landhi industrial locality. Iqbal *et al.*, [11] had found *P. juliflora* around the sewage effluents channels of Lyari river and described that Lyari river passing through the city is the main cause of disturbing the plants. *P. juliflora* was found as a dominant species around the National and Javedan cement factories of Karachi whereas, *A. indicum* was also recorded [7]. *C. depressus*, *P. juliflora* and *Prosopis glandulosa* were also found in Karachi University. Shafiq and Iqbal [8] had expressed that *P. juliflora* and *P. glandulosa* were considered to be the indicator of disturbance. Usually, *P. juliflora* could grow in the wide regions due to its survival and tolerance in almost all types of environment.

*C. dactylon* and *C. barbata* were recorded around Korangi and Landhi industries and Karachi University. These species are usually found in lawns, play grounds and sometimes near the growing fields. *S. fruticosa* and *S. baryosma* are halophyte species and were recorded at Korangi industrial estate. *S. fruticosa* and *S. baryosma* were recorded in salty places of Peshawar district by [18]. *S. fruticosa* had been reported in the verge of Sindh Industrial Trading Estate (SITE) and Manghopir by [6] as well as in the vicinity of Karachi University Campus [14]. Photosynthetic activity of the species declined and making of anthocyanin pigments increased, giving rise to the reddish brown colour of the halophytic species in a variety of plant communities [12]. *Salsola baryosma* was assayed by [10].

*P. juliflora*, *C. barbata*, *S. holosericea*, *C. depressus* and *C. dactylon* were emerged at factories and Karachi University lands. A notable number of communities had fewer species in numbers around industrial localities than Karachi University. Lessening in the number of species was noted at entire the waste disposal drains along the plain site as compared to heap area because of sewage contaminants [11]. Plant density, species richness and varieties completely diminished with increasing in sludge rate on a degraded semi-arid broom snake weed [19].

The findings of this research could be helpful in monitoring the plant communities around the industrial estates. Furthermore, such information could also be useful for landscaping and urban planning.

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Table 1. Summary of phytosociological attributes for industrial areas of Korangi and Landhi.									
Sr. No.	Name of species	No. of stands in which a species occurred	Total I.V.I.	Average I.V.I.	Maximum I.V.I.	Minimum I.V.I.	No. of stands in which a species is dominant		
							1st	2nd	3rd
1.	<i>Abutilon indicum</i> (L.) Sweet	23	1993.30	86.66	205.76	2.88	10	4	3
2.	<i>Corchorus trilocularis</i> L.	22	862.75	39.22	195.53	3.13	2	2	5
3.	<i>Cressa cretica</i> L.	10	830.90	83.09	230.83	11.13	4	3	–
4.	<i>Corchorus depressus</i> (L.) Stocks	20	507.44	25.37	94.59	2.76	1	3	1
5.	<i>Senna holosericea</i> (Fresen.) Greuter	19	494.27	26.01	66.90	2.66	–	4	2
6.	<i>Amaranthus viridis</i> L.	18	482.06	26.78	157.86	2.69	3	–	1
7.	<i>Digera alternifolia</i> (L.) Aschers.	9	456.57	50.73	128.98	3.14	2	3	2
8.	<i>Prosopis juliflora</i> Swartz	21	446.61	21.27	87.69	2.78	1	3	2
9.	<i>Cynodon dactylon</i> (L.) Pers.	16	260.53	16.28	48.18	2.63	–	2	2
10.	<i>Gynandropsis gynandra</i> (L.) Briq.	5	231.73	46.35	105.34	2.60	2	–	1
11.	<i>Suaeda fruticosa</i> (L.) Forssk.	1	226.14	226.14	226.14	226.14	1	–	–
12.	<i>Salsola baryosma</i> (R. & S.) Dandy	1	188.32	188.32	188.32	188.32	1	–	–
13.	<i>Chloris barbata</i> Sw.	12	179.77	14.98	33.88	3.45	–	–	–
14.	<i>Cyperus rotundus</i> L.	7	144.08	20.58	52.46	3.05	–	2	–
15.	<i>Zaleya pentandra</i> (L.) Jeffrey	10	144.05	14.41	43.46	2.87	–	–	1
16.	<i>Tribulus terrestris</i> L.	5	111.34	22.27	64.56	3.53	–	1	–
I.V.I. = Importance value index. (Cont.)									



Sr. No.	Name of species	No. of stands in which a species occurred	Total I.V.I.	Average I.V.I.	Maximum I.V.I.	Minimum I.V.I.	No. of stands in which a species is dominant		
							1st	2nd	3rd
17.	<i>Cenchrus biflorus</i> Roxb.	5	98.68	19.74	76.57	3.91	1	-	-
18.	<i>Ricinus communis</i> L.	3	62.80	20.93	37.87	10.79	-	-	1
19.	<i>Launaea nudicaulis</i> Hk. f. (non Less.)	9	62.42	6.94	15.77	2.68	-	-	1
20.	<i>Heliotropium curassavicum</i> L.	5	56.12	11.22	28.98	3.55	-	-	2
21.	<i>Achyranthes aspera</i> L.	5	55.27	11.05	22.47	2.54	-	-	1
22.	<i>Desmostachya bipinnata</i> (L.) Stapf	3	47.60	15.87	32.99	2.50	-	1	-
23.	<i>Leucaena leucocephala</i> (Lam.) de-Wit	7	39.71	5.67	19.72	2.52	-	-	-
24.	<i>Convolvulus arvensis</i> L.	8	39.43	4.93	10.92	2.50	-	-	-
25.	<i>Dactyloctenium scindicum</i> Boiss.	3	37.84	12.61	30.24	3.02	-	-	1
26.	<i>Rhynchosia minima</i> (L.) DC.	3	33.17	11.06	23.76	2.76	-	-	-
27.	<i>Hibiscus scindicus</i> Stocks.	3	33.15	11.05	27.01	2.91	-	-	1
28.	<i>Euphorbia prostrata</i> Ait.	2	31.78	15.89	28.11	3.66	-	-	-
29.	<i>Withania somnifera</i> (L.) Dunal	2	29.95	14.97	21.94	8.01	-	-	1
30.	<i>Suaeda monoica</i> Forssk.	2	24.58	12.29	20.39	4.19	-	-	-
31.	<i>Aerva javanica</i> (Burm. f.) Juss.	2	23.26	11.63	20.07	3.19	-	-	-
32.	<i>Amaranthus polygamus</i> L.	4	22.47	5.62	11.36	3.04	-	-	-
33.	<i>Cyamopsis tetragonoloba</i> (L.) Taub.	3	17.60	5.87	7.20	3.57	-	-	-
34.	<i>Catharanthus roseus</i> L.	2	15.45	7.72	12.72	2.73	-	-	-

(Cont.)

Sr. No.	Name of species	No. of stands in which a species occurred	Total I.V.I.	Average I.V.I.	Maximum I.V.I.	Minimum I.V.I.	No. of stands in which a species is dominant		
							1st	2nd	3rd
35.	<i>Ziziphus nummularia</i> (Burm. f.) Wight & Arn.	3	13.54	4.51	8.08	2.50	-	-	-
36.	<i>Sida ovata</i> Forssk.	3	13.15	4.38	7.71	2.67	-	-	-
37.	<i>Acacia senegal</i> (Linn.) Willd.	2	10.52	5.26	6.02	4.50	-	-	-
38.	<i>Setaria verticillata</i> (L.) P. Beauv.	2	10.41	5.21	7.11	3.30	-	-	-
39.	<i>Aerva pseudotomentosa</i> Blatt. & Hallb.	2	8.83	4.42	5.21	3.21	-	-	-
40.	<i>Abutilon fruticosum</i> Guill.	3	8.66	2.89	3.05	2.59	-	-	-
41.	<i>Calotropis procera</i> (Willd.) R. Br.	2	7.51	3.75	4.50	3.01	-	-	-
42.	<i>Datura alba</i> Nees	2	6.92	3.46	4.13	2.78	-	-	-
43.	<i>Tephrosia uniflora</i> Pers.	2	6.61	3.30	3.59	3.01	-	-	-
44.	<i>Salvadora oleoides</i> Dcne.	2	5.64	2.82	3.12	2.52	-	-	-
45.	<i>Ipomoea sindica</i> (Stocks) Stapf	2	5.55	2.78	3.03	2.52	-	-	-
46.	<i>Euphorbia clarkeana</i> Hk. f.	1	3.35	3.35	3.35	3.35	-	-	-
47.	<i>Solanum surattense</i> Burm. f.	1	2.92	2.92	2.92	2.92	-	-	-
48.	<i>Malvastrum coromandelianum</i> (L.) Garcke	1	2.86	2.86	2.86	2.86	-	-	-
49.	<i>Azadirachta indica</i> (L.) A. Juss.	1	2.40	2.40	2.40	2.40	-	-	-

**Table 2. Dominant plant communities found around the industrial areas of Korangi and Landhi.**

Sr. no.	Communities
1.	<i>Abutilon-Prosopis</i>
2.	<i>Abutilon</i>
3.	<i>Abutilon-Cressa</i>
4.	<i>Abutilon-Tribulus</i>
5.	<i>Cressa</i>
6.	<i>Cressa-Abutilon</i>
7.	<i>Cressa-Senna</i>
8.	<i>Digera-Senna</i>
9.	<i>Suaeda</i>
10.	<i>Salsola</i>
11.	<i>Corchorus-Abutilon</i>
12.	<i>Amaranthus-Prosopis</i>
13.	<i>Gynandropsis-Digera</i>
14.	<i>Prosopis-Abutilon</i>
15.	<i>Cenchrus-Senna</i>



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Table 3. Importance value index (I.V.I.) of species found in different communities around the industrial areas of Korangi and Landhi.																
Communities																
Sr. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	<i>Abutilon indicum</i>	153.20	840.26	238.06	110.72	-	79.55	34.90	80.51	-	-	256.67	15.92	83.61	77.37	22.53
2.	<i>Corchorus trilocularis</i>	9.81	156.37	10.80	25.59	-	27.91	26.08	64.00	-	-	416.51	27.92	16.87	25.49	55.41
3.	<i>Cressa cretica</i>	-	-	132.46	17.78	424.44	85.27	71.61	11.13	14.93	73.26	-	-	-	-	-
4.	<i>Corchorus depressus</i>	4.46	192.65	47.37	16.95	-	63.29	5.34	14.05	-	-	94.59	21.97	20.44	15.25	11.09
5.	<i>Senna holosericea</i>	3.15	76.33	35.98	2.78	-	21.77	64.84	114.95	-	-	35.02	2.66	64.97	6.43	65.38
6.	<i>Amaranthus viridis</i>	12.32	72.67	3.30	12.67	-	3.24	12.65	8.88	-	-	9.79	315.17	19.58	11.78	-
7.	<i>Digera alternifolia</i>	-	-	-	-	-	-	60.85	198.69	27.39	22.32	-	3.14	115.96	-	28.22
8.	<i>Prosopis juliflora</i>	84.85	55.52	12.82	7.65	-	-	10.51	7.53	11.65	10.34	42.87	102.53	12.65	87.69	-
9.	<i>Cynodon dactylon</i>	-	84.41	22.87	5.29	37.89	18.97	-	-	4.13	-	2.82	75.99	-	5.53	2.63
10.	<i>Gynandropsis</i>	-	-	-	-	-	-	-	2.60	-	-	-	45.33	183.80	-	-
11.	<i>Suaeda fruticosa</i>	-	-	-	-	-	-	-	-	226.14	-	-	-	-	-	-
12.	<i>Salsola baryosma</i>	-	-	-	-	-	-	-	-	-	188.32	-	-	-	-	-
13.	<i>Chloris barbata</i>	-	24.58	31.49	6.21	-	-	7.51	33.88	-	-	-	39.95	36.15	-	-
14.	<i>Cyperus rotundus</i>	-	28.62	-	-	96.63	-	-	-	-	-	-	18.82	-	-	-
15.	<i>Zaleya pentandra</i>	-	17.50	8.84	5.96	-	-	-	43.46	-	-	17.26	44.12	6.92	-	-
16.	<i>Tribulus terrestris</i>	-	3.53	-	64.56	25.24	-	-	-	-	-	-	18.00	-	-	-
(Cont.)																

Sr. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17.	<i>Cenchrus biflorus</i>	-	3.92	-	-	-	-	-	-	-	-	-	3.91	14.29	-	76.57
18.	<i>Ricinus communis</i>	10.79	14.15	-	-	-	-	-	-	-	-	-	-	-	37.87	-
19.	<i>Launaea nudicaulis</i>	-	10.56	2.92	-	4.26	-	-	-	15.77	5.75	13.75	9.40	-	-	-
20.	<i>Heliotropium curassavicum</i>	-	6.39	28.98	-	11.53	-	-	-	-	-	-	5.67	-	3.55	-
21.	<i>Achyranthes aspera</i>	4.77	41.11	-	-	-	-	-	-	-	-	-	6.86	2.54	-	-
22.	<i>Desmostachya bipinnata</i>	-	45.11	-	2.50	-	-	-	-	-	-	-	-	-	-	-
23.	<i>Leucaena leucocephala</i>	-	8.17	2.97	-	-	-	-	2.66	-	-	-	19.72	2.52	-	3.67
24.	<i>Convolvulus arvensis</i>	-	15.78	-	4.17	-	-	-	13.43	-	-	-	3.40	-	-	2.65
25.	<i>Dactyloctenium scindicum</i>	-	30.24	-	-	-	-	-	-	-	-	3.02	4.58	-	-	-
26.	<i>Rhynchosia minima</i>	6.64	-	-	-	-	-	-	-	-	-	-	-	-	2.76	23.76
27.	<i>Hibiscus scindicus</i>	3.24	29.92	-	-	-	-	-	-	-	-	-	-	-	-	-
28.	<i>Euphorbia prostrata</i>	-	-	3.66	-	-	-	-	-	-	-	-	28.11	-	-	-
29.	<i>Withania somnifera</i>	-	-	-	-	-	-	-	-	-	-	-	29.95	-	-	-
30.	<i>Suaeda monoica</i>	-	4.19	-	-	-	-	-	-	-	-	-	20.39	-	-	-
31.	<i>Aerva javanica</i>	3.19	-	-	-	-	-	-	-	-	-	-	-	-	20.07	-
32.	<i>Amaranthus polygamus</i>	-	-	-	11.36	-	-	3.04	4.21	-	-	-	3.86	-	-	-
33.	<i>Cyamopsis tetragonoloba</i>	-	-	-	-	-	-	-	-	-	-	-	10.40	7.20	-	-
34.	<i>Catharanthus roseus</i>	-	12.72	-	-	-	-	-	-	-	-	-	2.73	-	-	-
(Cont.)																

Sr. No.	Name of species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
35.	<i>Ziziphus nummularia</i>	-	2.96	-	-	-	-	-	-	-	-	-	-	2.50	-	8.08
36.	<i>Sida ovata</i>	-	-	-	2.78	-	-	2.67	-	-	-	7.71	-	-	-	-
37.	<i>Acacia senegal</i>	-	6.02	4.50	-	-	-	-	-	-	-	-	-	-	-	-
38.	<i>Setaria verticillata</i>	-	-	-	-	-	-	-	-	-	-	-	10.41	-	-	-
39.	<i>Aerva pseudotomentosa</i>	-	-	5.62	-	-	-	-	-	-	-	-	-	-	3.21	-
40.	<i>Abutilon fruticosum</i>	-	6.06	-	-	-	-	-	-	-	-	-	-	2.59	-	-
41.	<i>Calotropis procera</i>	-	-	4.50	-	-	-	-	-	-	-	-	-	-	3.00	-
42.	<i>Datura alba</i>	-	4.13	-	-	-	-	-	-	-	-	-	2.78	-	-	-
43.	<i>Tephrosia uniflora</i>	3.59	3.01	-	-	-	-	-	-	-	-	-	-	-	-	-
44.	<i>Salvadora oleoides</i>	-	3.12	-	-	-	-	-	-	-	-	-	-	2.52	-	-
45.	<i>Ipomoea sindica</i>	-	-	-	3.03	-	-	-	-	-	-	-	-	2.52	-	-
46.	<i>Euphorbia clarkeana</i>	-	-	-	-	-	-	-	-	-	-	-	3.35	-	-	-
47.	<i>Solanum surattense</i>	-	-	-	-	-	-	-	-	-	-	-	2.92	-	-	-
48.	<i>Malvastrum coromandelianum</i>	-	-	2.86	-	-	-	-	-	-	-	-	-	-	-	-
49.	<i>Azadirachta indica</i>	-	-	-	-	-	-	-	-	-	-	-	-	2.40	-	-

Table 4. Importance value index (I.V.I.) of the species which occurred as a leading dominant in the industrial areas of Korangi and Landhi.

No. of stand in which species is leading dominant	10	4	3	2	2	2	2	2	1	1	1	1	1
Communities	<i>Abutilon indicum</i>	<i>Cressa cretica</i>	<i>Amaranthus viridis</i>	<i>Corchorus trilocularis</i>	<i>Digera alternifolia</i>	<i>Gynandropsis gynandra</i>	<i>Corchorus depressus</i>	<i>Prosopis juliflora</i>	<i>Suaeda fruticosa</i>	<i>Salsola baryosma</i>	<i>Cenchrus biflorus</i>		
<i>Abutilon-Prosopis</i>	153.20	–	12.32	9.81	–	–	4.46	84.85	–	–	–	–	–
<i>Abutilon</i>	840.26	–	72.67	156.37	–	–	192.65	55.52	–	–	–	–	3.92
<i>Abutilon-Cressa</i>	238.06	132.46	3.30	10.80	–	–	47.37	12.82	–	–	–	–	–
<i>Abutilon-Tribulus</i>	110.72	17.78	12.67	25.59	–	–	16.95	7.65	–	–	–	–	–
<i>Cressa</i>	–	424.44	–	–	–	–	–	–	–	–	–	–	–
<i>Cressa-Abutilon</i>	79.55	85.27	3.24	27.91	–	–	63.29	–	–	–	–	–	–
<i>Cressa-Senna</i>	34.90	71.61	12.65	26.08	60.85	–	5.34	10.51	–	–	–	–	–
<i>Digera-Senna</i>	80.51	11.13	8.88	64.00	198.69	2.60	14.05	7.53	–	–	–	–	–
<i>Suaeda</i>	–	14.93	–	–	27.39	–	–	11.65	226.14	–	–	–	–
<i>Salsola</i>	–	73.26	–	–	22.32	–	–	10.34	–	188.32	–	–	–
<i>Corchorus-Abutilon</i>	256.67	–	9.79	416.51	–	–	94.59	42.87	–	–	–	–	–
<i>Amaranthus-Prosopis</i>	15.92	–	315.17	27.92	3.14	45.33	21.97	102.53	–	–	–	–	3.91
<i>Gynandropsis-Digera</i>	83.61	–	19.58	16.87	115.96	183.80	20.44	12.65	–	–	–	–	14.29
<i>Prosopis-Abutilon</i>	77.37	–	11.78	25.49	–	–	15.25	87.69	–	–	–	–	–
<i>Cenchrus-Senna</i>	22.53	–	–	55.41	28.22	–	11.09	–	–	–	–	–	76.57

Table 5. Importance value index (I.V.I.) of different species in stand of Karachi University.		
Sr. No.	Karachi University	I.V.I.
1.	<i>Prosopis juliflora</i> Swartz	163.17
2.	<i>Heliotropium ophioglossum</i> Boiss.	33.85
3.	<i>Orygia decumbens</i> Forssk.	30.32
4.	<i>Chloris barbata</i> Sw.	12.80
5.	<i>Trianthema portulacastrum</i> L.	9.81
6.	<i>Launaea nudicaulis</i> Hk. f. (non Less.)	9.48
7.	<i>Indigofera hochstetteri</i> Baker	6.27
8.	<i>Cadaba fruticosa</i> (L.) Druce	5.39
9.	<i>Abutilon fruticosum</i> Guill.	3.68
10.	<i>Convolvulus arvensis</i> L.	3.37
11.	<i>Senna holosericea</i> (Fresen.) Greuter	3.21
12.	<i>Cynodon dactylon</i> (L.) Pers.	3.14
13.	<i>Euphorbia</i> sp.	3.15
14.	<i>Corchorus depressus</i> (L.) Stocks	3.10
15.	<i>Tribulus terrestris</i> L.	3.10
16.	<i>Amaranthus viridis</i> L.	3.09
17.	<i>Prosopis glandulosa</i> Torr.	3.08