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A PHYTOSOCIOLOGICAL STUDY OF WEEDS OF MAIZE (*ZEA MAYS* L.) CROP FIELDS IN MARDAN DIVISION

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A phytosociological investigation was carried out to find the structure and composition of weed communities of corn fields in Mardan division. The leading weed communities recorded on the basis of high importance values were: *Cyperus-Echinochloa-Brackiaria; Brackiaria-Trianthema-Cyperus; Brackiaria-Sorgham-Leptochloa-Leptochloa; Portulaca-Cyperus; Dactyloctinum-Amaranthus-Cyperus; Brackiaria-Leptochloa-Eleusin; Brackiaria-Cyperus- Eleusin; Brackiaria-Leptochloa-Echinochloa; Brackiaria-Eleusin-Cynodon* and *Cyperus-Brackiaria- Echinochloa*.

A comparison of importance values of maize crop and weed communities (on proportion basis) revealed that approximately 50% cultivated land was covered by dominant, codominant, associated and common weed species. It is presumable that this ratio of weeds infestation severely affect the crop production. A correlation coefficient analysis of the cover (biomass and canopy coverage) of maize and dominant weed species indicated an inversely proportional trend. The distribution of some weeds were found to be affected by ECe.

Key words: Weed, Community, Crop, Cover, Importance value.

Introduction

Weeds are undesired non-cultivated plants which severely affect the economic thresholds by increasing the labour cost on removing them. Nonetheless, less attention has been given towards understanding the weed - crop relationship. Buchanan [1] has stressed upon utilizing the field data of weed populations (densities) in order to determine the economic thresholds. However, owing to the large differences in size and habits of growth of different weed species often considerable problems occur in obtaining good field data. A phytosociological investigation of weeds existing in crop fields could be of vital importance in assessing the productivity of a crop.

There is extensive literature available which describes the sociological aspects of wild plants from different habitats e.g. hills, plains, waterlogged and saline habitats. When there is paucity of information about weeds of crop fields especially in Pakistan. The available information are of Hussain *et al.* [2,3], Hussain and Malik [4], Saeed and Hussain [5] and Kalwar [6]. They reported various weed species of wheat crop fields from different parts of Pakistan.

The present work is an attempt to elucidate the weed crop distribution and its possible effects on the crop production in the cultivated fields of maize crop in Mardan division, NWFP, Pakistan.

Materials and Methods

Selection of sites. After going through the topographic map of Mardan division, 10 sites of maize crop fields in the extremities of the area were selected. The experimental sites and the area covered was as under:- (I) Mohib Banda, 4 Km^2. (II) Khair Abad, 4 Km^2. (III) Swabi, 4 Km^2. (IV) Topi, 6 Km^2. (V) Lahor, 4 Km^2. (VI) Shergarh, 4 Km^2. (VII) Jandai, 4 Km^2. (VIII) Shankar, 4 Km. (IX) Kotlang, 4 Km^2. (X) Tambolak, 3 Km^2.

Sampling procedure and data analysis. Quadrat sampling method was adopted for obtaining quantitative informations about the structure and composition of weed communities in maize crop. The sampling was done periodically with an interval of three week during crop season. Quadrat were laid down in random manner using random pair numbers [7]. The edge effect was considered and measured. Tussoks of grasses were considered as individual plants. Quadrat of 0.5x1.0m was used. A total number of 1000 quadrat samples were taken in maize crop fields (100 in each site). The maize crop was studied at silk stage in July 1987.

Phytosociological parameters. The parameters considered were (a) relative density (b) relative frequency (c) relative cover or dominance (d) and importance value following Wm Cox [8] and Greig Smith [9] wherever appropriate. However, the results are mentioned according to the importance values since it shows a comprehensive estimate of species.

Soil analysis. The soil samples were analysed as bulk density of 5 samples from each site in soil testing laboratory, Agricultural Research Institute, Tarnab, Peshawar following Richards [10]. The parameters were texture analysis, pH, ECe, N, P, K, organic matter and $CaCO_3$. However, owing to the significane of texture, ECe, and $CaCO_3$ they are discussed in

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the present work. A detailed study of the edaphic factors is underway and shall be presented soon.

Terminologies. The following terminologies were used according to the range of importance values, (a) dominant – 3 species which were of high importance values relatively to all other weed species were considered dominant and were arranged as community in decreasing order (for instance, at site I *Cyperus* ranked first *Echinochloa* second and *Brackiaria* third making a community of *Cyperus - Echinochloa - Brackiaria*, (Table 1), (b) co-dominant – species importance values reaching nearly to the values of third dominant species, (c) similarly, the associated and (d) common, (e) rare – the species having the importance values below 2.

Results and Discussion

Weed communities. The leading or dominant weed communities in corn fields from ten different sites were recorded on the basis of their importance values. The weed communities recognized were: *Cyperus - Echinochloa - Brackiaria* at site I (Mohib Banda); Brackiaria - *Trianthema - Cyperus* at site II (Khair Abad); *Brackiaria - Sorgham - Leptochloa* at site III (Swabi); *Leptochloa - Portulaca –Cyperus* at site IV (Topi); *Dactyloctinum - Amaranthus - Cyperus* at site V (Lahor); *Brackiaria - Leptochloa - Eleusin* at site VI (Shergarh); *Brackiaria - Leptochloa - Echinochloa* at site VII (Shankar); *Brackiaria - Cyperus - Eleusin* at site VIII (Jandai); *Brackiaria - Eleusin - Cynodon* at site IX (Kotlang) and *Cyperus - Brackiaria - Echinochloa* at site X (Tambolak) (Fig. 1, Table 1).

However, the dominant species at one site became codominant, associated or common . For instance, *Brackiaria reptans* (L) G and H became co-dominant at site V and associated at site IV *Leptochloa paincea* (Retz) Chior was I, IV and IX associated at site II and common at site V, *Dactyloctinum aegytium* (L) Beauv. was co- dominant at site IV and common at site VII. Similarly *Trianthema monogyna* L. as co-dominant at site VII associated at site III and common at sites IV, V and VI, *Echinochloa colona* (L) Link. as associated at site III and common at sites V, VI and IX, *Eleusin indica* Gaertn. as associated species at site IV and common at sites II and V and *Cynodon dactylon* (L) Pers. as associated at sites I and X and common at sites III and IV (Fig. 1 and Table 1).

Besides this some other species which were neither dominant nor co-dominant became associated or common at one or more sites (e.g. *Corchorus trilocularis* L. site I *Amaranthus graecizans* L. *A. spinosa* L. sites III and IV *Convolvulus arvensis* L. site X *Digeria muricata* (L) Mart. site VII, *Portulaca oleracea* L. site VII, *Euphorbia prostrata* Ait. site I, IV, VI and X, *Ipomea perviana* Lamk. site IX and *Panicum virgatum* L. site IV. (Fig. 1, Tables 1 and 2).

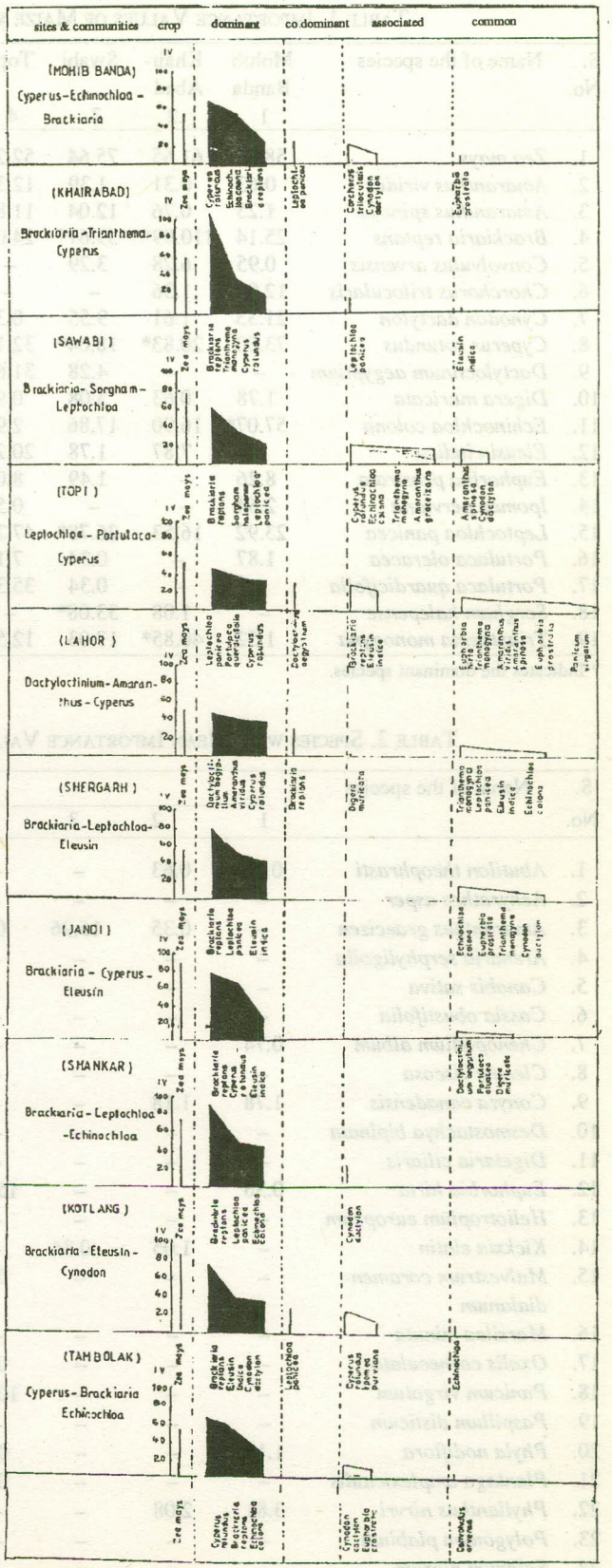

Fig. 1. Indicates the importance values of dominant, co-dominant, associated and common weed species at different experimental site.

TABLE 1. IMPORTANCE VALUES OF MAIZE AND WEED SPECIES RECORDED DURING THE SEASON.

S. No.	Name of the species	Mohib Banda 1	Khair-Abad 2	Swabi 3	Topi 4	Lahor 5	Sher Garh 6	Jandai 7	Shankar 8	Kotlang 9	Tambo Lak 10	MIV
1.	*Zea mays*	58.86	61.65	75.64	52.24	49.41	54.69	88.03	73.88	84.85	5.73	65.69
2.	*Amaranthus viridus*	0.63	0.31	1.39	12.33	40.20*	5.94	2.00	0.33	6.50	–	6.96
3.	*Amaranthus spinosa*	1.25	0.76	12.04	11.85	–	–	0.51	–	1.34	–	2.77
4.	*Brackiaria reptans*	25.14	110.99*	59.67*	24.07	30.05	76.49*	74.13*	83.34*	67.04*	63.20*	61.41
5.	*Convolvulus arvensis*	0.95	6.28	3.29	–	–	6.40	2.74	3.86	0.44	8.72	3.26
6.	*Chorchorus trilocularis*	12.96	1.36	–	–	–	2.52	–	0.96	3.77	4.93	2.65
7.	*Cynodon dactylon*	21.33	1.61	9.55	0.34	0.67	8.56	5.56	5.85	30.35	18.90	10.26
8.	*Cyperus rotundus*	73.00	20.83*	18.64*	32.12*	38.56*	8.80	67.61*	14.87	20.55	69.75*	36.47
9.	*Dactyloctinum aegyptium*	–	–	4.28	31.60	48.99*	2.39	12.50	0.33	3.28	–	10.33
10.	*Digera muricata*	1.78	0.63	3.08	0.98	2.49	2.12	8.34	4.69	4.91	0.63	2.96
11.	*Echinochloa colona*	57.07*	16.90	17.86	2.96	8.47	12.00	3.73	41.39*	9.89	36.55	20.68
12.	*Eleusin indica*	–	7.87	1.78	20.21	11.75	40.45*	20.92	3.17	33.12*	–	13.87
13.	*Euphorbia prostrata*	8.26	–	1.49	8.08	0.32	10.64	5.25	6.16	0.70	15.99	5.68
14.	*Ipomea perviana*	2.64	–	–	0.51	3.11	0.59	–	0.93	16.82	–	2.46
15.	*Leptochloa panicea*	23.92	16.53	26.78*	47.21*	12.18	48.28	18.56	44.68*	26.59	3.01	26.77
16.	*Portulaca oleracea*	1.87	–	0.34	7.19	3.37	1.65	9.70	0.58	2.68	1.31	2.86
17.	*Portulaca quardicifolia*	–	–	0.34	35.32*	–	–	–	–	11.21	–	3.68
18.	*Sorgham halepense*	–	1.08	33.08*	–	0.50	5.59	2.99	2.09	–	7.04	5.23
19.	*Trianthema monogyna*	1.52	40.85*	17.03	12.55	12.97	9.84	18.13	2.37	7.30	7.47	12.97

* Indicates the dominant species.

TABLE 2. SPECIES WITH MEAN IMPORTANCE VALUES BELOW 2 AT DIFFERENT SITES OF MARDAN DIVISION.

S. No.	Name of the species	Sites 1	2	3	4	5	6	7	8	9	10	MIV
1.	*Abutilon theophrasti*	0.63	0.63	–	–	–	–	–	–	0.43	–	0.16
2.	*Aehyrathes asper*	–	–	–	–	3.55	–	–	–	–	–	0.35
3.	*Amaranthus graecizen*	–	0.35	15.96	0.76	0.8	–	0.58	–	–	–	1.8
4.	*Arenaria serphyligolla*	–	–	–	–	8.97	–	–	–	–	–	0.89
5.	*Canabis sativa*	–	–	–	–	1.52	–	–	–	–	–	0.15
6.	*Cassia obustifolia*	–	–	–	–	0.40	–	–	–	–	–	0.04
7.	*Chenopodium album*	0.74	–	–	–	–	–	0.44	–	–	–	0.11
8.	*Cleome viscosa*	–	–	–	–	6.61	–	0.68	–	–	–	0.72
9.	*Conyza canadensis*	1.78	1.18	–	–	0.31	–	5.31	0.44	–	–	0.90
10.	*Desmostachya bipinata*	–	–	–	–	–	2.31	–	–	–	–	0.23
11.	*Digetaria ciliaris*	–	–	–	–	14.76	–	–	–	–	–	1.47
12.	*Euphorbia hirta*	0.36	–	–	15.66	0.32	–	0.33	–	0.52	–	1.71
13.	*Heliotropium europeum*	–	–	–	–	–	0.31	–	1.67	–	–	0.19
14.	*Kickxia elatin*	–	1.05	0.34	–	–	–	–	–	–	–	0.13
15.	*Malvestrum coramen-dialanum*	–	–	–	0.31	–	–	–	–	–	–	0.03
16.	*Marsilea minuta*	–	–	–	–	-	–	–	–	–	1.08	0.1
17.	*Oxalis corneculata*	–	–	–	0.95	–	–	–	–	–	–	0.09
18.	*Panicum virgatum*	–	–	–	10.9	1.19	0.31	1.71	–	–	–	1.41
19.	*Paspillum disticum*	–	–	–	–	–	–	–	–	–	1.69	0.16
20.	*Phyla nodiflora*	1.19	–	–	0.31	–	–	–	–	–	–	0.15
21.	*Plantago amplexicaulis*	–	–	–	0.34	–	–	–	–	–	1.19	0.16
22.	*Phyllanthus nirvri*	3.81	2.08	–	–	–	–	–	0.68	–	–	0.65
23.	*Polygonum plabium*	–	–	–	–	–	–	–	–	–	0.39	0.03
24.	*Solanum nigrum*	–	–	–	–	1.05	–	–	–	–	–	0.10
25.	*Tribulus tertestris*	–	–	0.5	–	4.2	–	–	–	–	–	0.47
26.	*Xanthium strumarium*	–	2.17	0.34	–	0.5	–	–	0.33	7.26	–	1.06

Mean importance values of maize and leading weed species. The mean importance values of maize (*Zea mays* L.) from all study sites of Mardan division was 65.69. The leading or dominant weed species *Brackiaria reptans, Cyperus rotundus* and *Leptochloa panicea* showed the mean importance values of 61.56, 36.47 and 26.77 respectively. The co-dominant *Echinochloa colona* showed mean importance values of 20.68, whereas associated and common species *Eleusin indica, Trianthema monogyna, Dactyloctinum aegyptium* showed the mean values of 13.87, 12.97, 10.33 and 10.26 respectively (Table 1). However, 26 other weed species showed low mean importance values below 2 and were considered as rare species (Table 2). Although, these rare species showed slightly higher values at one or two sites relatively to the mean values of all sites.

Cover. The cover data in terms of fresh biomass of maize and dominant species indicated that when the crop weight per square meter increased the weed species weight decreased or vice versa. A correlation coefficient analysis also showed a negative trend between crop and weeds (r = -0.259) (Table 3).

The cover data of canopy coverage of maize and dominant weed species also negative correlation (r = -0.616) significant at 5% level (Table 4).

SOIL ANALYTICAL DATA

Site-I. The soil of sampling sites at Mohib Banda (*Cyperus - Echinochloa - Brackiaria* community) was silty loam and silty clay loam in texture. It was alkaline moderately calcareous, low to medium in organic matter and medium to high in ECe (Table 5).

Site-II. The soil at Khairabad (*Brackiaria - Trianthema - Cyperus* community) was silty loam, alkaline, low calcareous, low in organic matter and it was of low to medium range of ECe (Table 5).

Site-III. The soil at Swabi (*Brackiaria - Sorgham - Leptochloa* community) was silty loam in texture, alkaline and moderately calcareous. It was of low to medium organic matter and low range of ECe (Table 5).

Site-IV. The soil at Topi (*Leptochloa - Portulaca - Cyperus* community) was silty loam in texture, alkaline, slightly calcareous, low in organic matter and ECe (Table 5).

Site-V. The soil at Lahor (*Dactyloctinum - Amaranthus - Cyperus* community) was silty and sandy loam in texture, alkaline and low to moderately calcareous . It was of medium organic matter and low range of ECe (Table 5).

Site-VI. The soil at Shergarh (*Brackiaria - Leptochloa - Eleusin* community) was silty loam in texture, alkaline, low to

TABLE 3. THE COVER DATA OF MAIZE CROP AND DOMINANT WEED COMMUNITIES PER sq. m. AT EACH SITE (BIOMASS IN gm.^{2}).

Species	Sites										r
	1	2	3	4	5	6	7	8	9	10	Correlation coefficient
Zea mays	379.52	733.20	1025.0	934.4	1238.8	977.16	1260.08	720.66	1594.6	1030.46	-0.259
Weed species	175.94	231.71	52.32	83.57	50.72	320.64	108.34	212.98	189.86	156.97	

TABLE 4. THE COVER DATA OF MAIZE AND DOMINANT WEED SPECIES FROM DIFFERENT SITES. THE CORRELATION COEFFICIENT AND REGRESSION IS MENTIONED IN THE BOTTOM OF THE TABLE.

S. No.	Name of the species		Mohib Banda	Khair-Abad	Swabi	Topi	Lahor	Sher Garh	Jandai	Shankar	Kotlang	Tambo Lak
			1	2	3	4	5	6	7	8	9	10
1.	*Zea mays*	x	25.78	31.37	35.89	22.14	11.55	25.34	43.09	33.55	46.49	27.58
2.	*Amaranthus viridis*		0.06	0.03	0.09	3.37	11.84	0.88	0.49	0.02	2.01	0.38
3.	*Brackiaria reptans*		6.67	37.22	7.09	2.33	14.18	19.65	10.63	24.35	13.07	16.51
4.	*Cynobon dactylon*		10.79	0.25	2.34	0.05	0.07	1.98	0.21	1.12	7.01	7.37
5.	*Cyperus rotundus*		18.40	3.09	7.19	8.05	10.38	1.72	13.97	2.96	2.28	13.58
6.	*Dactyloctinum aegytium*		–	–	–	10.60	20.21	0.66	4.98	0.02	0.34	–
7.	*Echinochloa colona*	y	23.38	16.90	5.51	1.22	8.47	3.11	0.33	16.48	2.45	15.83
8.	*Eleusin indica*		–	1.90	0.13	6.08	5.41	17.61	7.72	0.10	8.72	–
9.	*Leptochloa panicea*		6.37	16.53	8.85	15.42	0.09	13.55	1.44	12.40	6.30	0.66
10.	*Portulaca quardicifolia*		–	–	0.03	12.83	–	–	–	–	0.50	–
11.	*Sorgham helepense*		–	0.80	13.04	–	0.21	2.67	2.38	0.98	–	4.27
12.	*Trianthema monogyna*		0.22	14.91	8.68	3.09	6.15	3.72	8.64	1.28	1.68	2.29

r# 0.616, reoression of x on y = -0.91y + 87.09 of y on x = -0.91 x +89.88.

moderately calcareous. The organic matter was medium and the ECe was low (Table 5).

Site-VII. The soil at Jandai (*Brackiaria - Cyperus - Eleusin* community) was silty loam and silty clay loam in texture, alkaline and moderately. The organic matter content was low to medium and the ECe was also medium (Table 5).

Site-VIII. The soil at Shankar (*Brackiaria - Leptochloa - Echinochloa* community) was silty clay loam and silty loam in texture, alkaline, moderately calcareous, low in organic matter and medium to high ECe (Table 5).

Site-IX. The soil at Kotlang (*Brackiaria - Eleusin - Cynodon* community) was silty loam in texture, alkaline moderately calcareous, low to medium in organic and medium range ECe (Table 5).

Site-X. The soil at Tambolak (*Cyperus - Brackiaria - Echinochloa* community) was silty clay loam and silty loam in texture, alkaline moderately calcareous. It was of low organic matter and high range of ECe (Table 5).

The general variation in weed communities that occurred at different study sites demonstrate that there are differences in adaptation or preferences in weed species to cover the area. These differences may be as a result of variation in edaphic, e.g. soil conditions, availability of water nutrients and time of planting (maize crop is planted in April and June in Mardan division, however, the study was carried out at silk stage). However, in the present investigation some important factors have been noted, but a detailed study is required.

On the basis of the present work it appears that mean importance values provide valuable information on weed - crop relationship. Apparently there is a little difference in the mean importnce values of maize crop and the leading weed species (*Zea mays*, 65.69 and *Brackiaria*, 61.41). Thus it appears that approximately 50% of the land (on proportion basis the ratio occurs approx. 1:1) has been covered by the crop or weed vice

Table 5. Physico-chemical Analysis of Soils of Different Sites.

S. No.	Name of sites	Mechanical analysis			Texture	Chemical analysis			
		Clay (%)	Silt (%)	Sand (%)		pH	ECe m. mhos /cm	Organic matter (%)	Lime $CaCO_3$ (%)
1.	Mohib Banda	23.2	63.0	13.8	Silty clay loam	8.2	3.8	0.71	9.25
2.		19.2	70.0	10.8	Silty loam	8.3	2.8	1.77	11.0
3.		20.2	63.0	16.8		8.1	4.87	1.63	12.0
1.	Khair Abad	15.2	63.0	18.8		8.0	2.4	1.09	2.3
2.		21.2	64.0	14.8		8.1	2.5	1.05	1.75
3.		18.2	73.0	8.4		8.2	3.3	1.58	5.75
1.	Swabi	21.6	72.0	6.4		8.0	2.3	0.82	4.0
2.		19.6	68.0	12.4		8.1	2.3	0.75	8.75
3.		19.6	66.0	14.4		8.1	2.4	1.05	4.75
1.	Topi	5.6	50.0	44.44	Sandy loam	8.2	2.0	0.98	2.50
2.		3.6	54.0	42.4		8.2	1.8	0.88	4.75
3.		16.6	71.0	12.4		8.2	2.0	1.75	4.50
1.	Lahor	7.6	34.0	58.4		8.2	1.8	0.48	2.50
2.		11.6	60.0	28.4	Silty loam	8.3	2.5	0.68	4.0
3.		7.6	28.0	64.4	Sandy loam	8.2	1.5	0.44	2.0
1.	Shergarh	18.6	77.0	4.4		8.0	2.8	1.17	7.75
2.		23.6	70.0	6.4		7.8	1.9	1.58	3.25
3.		28.6	63.0	8.4	Silty clay loam	7.9	2.8	1.46	3.25
1.	Jandai	28.6	65.0	6.4		7.9	3.0	1.46	4.75
2.		16.6	67.0	16.4	Silty loam	7.8	3.0	0.92	15.0
3.		13.6	64.0	22.4		7.8	3.2	1.29	6.50
1.	Shankar	22.6	71.0	6.4		7.7	3.5	1.26	4.25
2.		30.65	65.0	4.4	Silty clay loam	8.0	4.8	1.39	4.75
3.		22.6	75.0	2.4	Silty loam	7.8	4.0	1.49	5.25
1.	Kotlang	20.6	75.0	4.4		7.8	2.0	1.6	3.50
2.		19.6	74.0	6.4		7.8	0.5	2.34	5.25
3.		7.6	27.0	65.4	Sandy loam	8.2	1.5	0.60	0.60
1.	Tambolak	17.6	74.0	8.4	Silty loam	7.7	3.5	2.28	10.25
2.		18.6	67.0	14.4		8.0	4.2	2.0	5.75
3.		19.6	72.0	8.4		8.1	4.0	1.80	13.85

	EC_e	Lime % ($CaCO_3$);
Low	1-2 m.mhos/cm;	1-5,
Medium	2.1-3.5;	5.1-10;
High	> 3.5	>10.

versa. Besides this, co-dominant, associated, common and rare species also cover the area. It is presumable that total coverage of the weed species could possibly be more than 50% of the cultivated area.

A correlation coefficient analysis of the cover data of maize and dominant weeds (in terms of fresh biomass per sq.m) suggested that maize crop and weed species are inversely proportional (negative correlation). Although, correlation coefficient (r = - 0.259) of mean values at different sites was not quite significant but it was near to the significance. The reason may be error in sampling. Nevertheles in order to get a vivid picture of the cover, the canopy coverage data of maize and dominant weed species was also analysed for correlation coefficient. The data indicate a similar negative correlation as it was in biomass data. The correlation coefficient value (r = -0.616) was significant at 5% level. Hence, it becomes quite clear that the crop and weed species are inversely poportional (i.e. when the cover of crop increases the cover of weeds decreases or vice versa both in terms of biomass and canopy coverage).

The soil analytical data on texture, pH, organic matter and $CaCO_3$ (lime) do not provide sufficient information in relation to its effect on growth and distribution of weeds. Since the texture, pH, organic matter and $CaCO_3$ content were more or less similar at all sites except a few variation in chemical content possibly as a result of seasonal variations during collection periods and in tenure that a few sites showed sandy loam texture. However, the distribution of weed communities showed prominant differences in their adaptations in relation to ECe. Thus, the weed communities grouped in three according to the level of salinity (ECe) *viz: Cyperus - Echinochloa - Brackiaria* (site I); *Brackiaria - Leptochloa - Echinochloa* (site VIII) and *Cyperus - Echinochloa - Brackiaria* (site X) as group I. The soil of the sites where these communities were found was medium to high saline (3.5 m.mhos/cm ECe).

Conversely the communities *Leptochloa - Portulaca - Cyperus* (site IV); *Dactyloctinum - Amaranthus - Cyperus* (site VI) and *Brackiaria - Eleusin - Cynodon* (site IX) group-II, inhabited low salinity areas (ECe 1-2 m.mhos/cm). However, the species which were common in both group I and II showed prominant differences in their importance values. Hence, the species with high importance value in group I placed as first dominant species become third dominant species in group II (e.g. *Cyperus* and *Leptochloa*, Table 1). Whereas, the remaining four communities of group III, *viz: Brackiaria - Trianthema - Cyperus* (site II); *Brackiaria - Sorgham - Leptochloa* (site III); *Brackiaria - Leptochloa - Eleusin* (site VI) and *Brackiaria - Cyperus - Eleusin* (site VII) showed their inhabitance at medium salinity (ECe ranging 2.1 - 3.5 m.mhos/cm).

One striking factor appeared in correlation coefficient analysis of dominant weeds importance values vs ECe that some species showed positive correlation (e.g. *Brackiaria, Cynodon, Cyperus and Echinochloa*) and others negative correlation (e.g. *Amaranthus, Elusin* and *Trianthema*). Although the correlation coefficient was significant for only two species (*Amaranthus*, -ve and *Echinochloa*, +ve; P = 10% and 0.1% respectively), while other species showed positive or negative trend (Table 6). We infer that the species which showed significant positive correlation are to some extent salt tolerant and those which showed positive trend are adaptable to both saline or non-saline environment. Conversely the species which showed either negative trend or significant negative correlation are sensitive to increasing levels of ECe.

TABLE 6. THE CORRELATION COEFFICIENT ANALYSIS OF SOME DOMINANT WEED SPECIES IMPORTANCE VALUES VS ECe.

S. No.	Name of species	Correlation coefficient (r)	Probability
1.	*Amaranthus viridus*	-0.549	significant at 10% level
2.	*Brackiaria reptans*	+0.09	N.S.
3.	*Leptochloa paniceae*	-0.107	N.S.
4.	*Eleusin indica*	-0.409	N.S.
5.	*Echinochloa colona*	+0.85	significant at 0.1% level
6.	*Trianthema monogyna*	-0.347	N.S.
7.	*Cyperus rotundus*	+0.488	N.S.
8.	*Cynodon dactylon*	+0.058	N.S.

Some of the dominant species which were absent at more than two sites have been omitted here.

The present work concurs with Pakistan Agricultur Research Councils report based on experimental results on crop losses [11]. Those results were more or less similar to our phytosociological conclusions. We presume that if weed control programme is not undertaken the losses would be severe for maize crop in Mardan division.

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