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A SURVEY OF WEEDS FOUND IN COTTON FIELDS OF THE KHAIRPUR DISTRICT, SINDH, PAKISTAN

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Abstract

A survey of weeds of cotton fields from 8 Talukas of the district Khairpur has been carried out during 1999-2001. Thirty-six weed species belonging to 16 families are reported. The weed communities were recorded from various Talukas on the basis of density analysis. The most frequently occurring weeds of cotton crop placed in the "Assertive" category are *Trianthema portulacastrum* (76.88%), *Dactyloctenium aegyptium* (73.75%), *Brachiaria eruciformis* (70.63%), *Corchorus aestuans* (68.75%), *Euphorbia serpens* (67.50%) and *Setaria pumila* (61.25%). A similarity index (SI) of species has been determined. Most common family representing cotton weeds is Poaceae having 45.74 FIV.

Introduction

Cotton is the major cash crop of Pakistan. More than 20 million people depend on the crop for their livelihood. It supplies cash return to farmers, supplies raw material to the textile industry and provides employment in both the rural and the urban areas. It accounts for almost 60% of the country's $10 billion annual foreign exchange earnings through the export of raw cotton, garments and threads etc (Rizvi, 2000). Beside other reasons its yield is also reduced by heavy weed infestation. The ability of weeds to compete successfully with crops for light, water and nutrients depends on several interrelated factors. These include the timing of weed emergence in relation to crop emergence, the growth form of the weed, and the density of the weed present in the crop. The different environmental conditions determine the specific weed spectrum, composition and population of each region. Hussain (1987) reported diversity of weed spectrum for the 12 cotton growing districts of the Punjab where he found *Cyperus rotundus, Convolvulus arvensis, Cynodon dactylon, Trianthema monogyna, Portulaca oleracea and Sorghum halepense* as dominant weed species. Ullah *et al.,* (1995) reported *Trianthema monogyna, Digeria arvensis, Echinocoloa colonum, Cyperus rotundus, Cynodon dactylon* and *Digitaria timorensis* as the most common weeds in the fields of cotton crop at Agronomic Research Station in Bahawalpur. A list of important weed species of cotton crop occurring in Tandojam area was provided by Brohi & Makhdoom (1987) which includes *Echinochloa colonum, Cyperus rotundus, Cynodon dactylon, Desmostachya bipinnata, Trianthema monogyna, Convolvulus arvensis, Brachiaria reptans, Tribulus terrestris, Euphorbia pilulifera, Chorchorus depressus, Digeria arvensis, Rhynchosia minima, Phyllanthis niruri, Portulaca oleraceae* and *Amranthus polygamus.* Similarly, Bhatti *et al.,* (1993) and Memon *et al.,* (2001) have compiled a list of weed species from cotton fields of Khairpur District.

The present study was carried out to determine the diversity of the weed species in the Khairpur district and their spectrum which includes density, frequency, similarity index and family importance values.

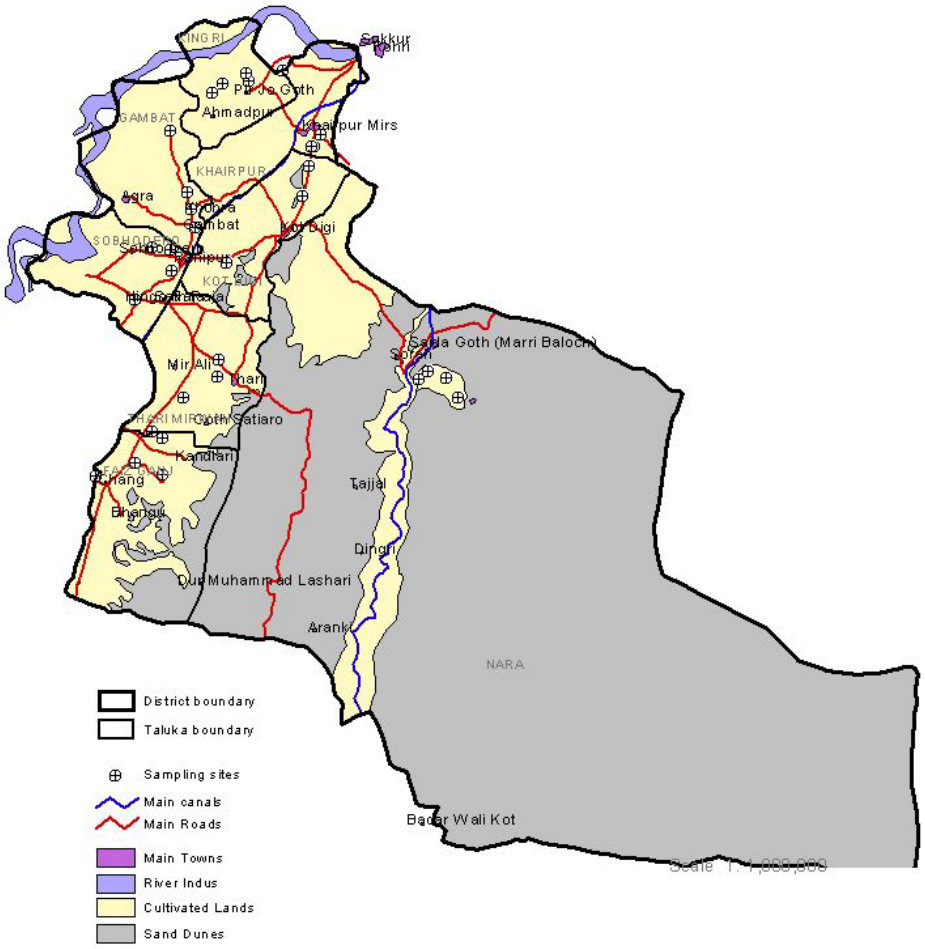

Fig. 1. Sites surveyed during the study for weed distribution in district Khairpur.

Materials and Methods

The survey was carried out during 1999-2001 in cotton fields from 8 Talukas viz., Kingri, Gambat, Khairpur, Sobhodero, Kotdiji, Thari Mirwah, Faiz Ganj and Nara of district Khairpur. Four sampling sites were randomly selected from each Taluka making a total of 32 sites for field observations (Fig. 1). Observations on weed density were recorded with the help of the quadrate method described by Pound & Clements (1898). Specifically five quadrates of $1m^2$ were randomly selected from each site. All the species

in a quadrate were recorded and counted. Frequency and density of each weed species were calculated according to Odum (1971). Statistical analysis of data was performed by applying Factorial Completely Randomized Design using ANOVA and DMRT program following Steel & Torrie (1980). Similarity index (SI) between two Talukas was calculated following Odum (1971).

To determine the similarity index (SI) the value of weed species of cotton occurring in each individual Taluka were compared with those of the species occurring in Taluka Nara as it consists more number of weed species in cotton.

All the species were identified with the help of Flora of Pakistan (Nasir & Ali, 1970-1994 and Ali & Qaiser, 1995-2003), Flora of Karachi (Jafri, 1966), Flora of Bombay (Cooke, 1903-1906), Crop Weeds of Nepal (Rajbhandari & Joshi, 1998), Flora of Egypt (Boulos, 1999) and Flora of Tamilnadu (Matthew, 1982-83).

Number of genera and species were also determined. Family importance values (following Mori *et al.,* 1983) were used to compare the relative distribution of each family to weed community composition

Results and Discussion

Thirty-six weed species of 16 families were recorded from cotton. Different weed communities were recorded from each Talukas of district Khairpur. According to the density analysis (Table 1) the most dominant weeds were *Euphorbia serpens, Trianthema portulacastrum, Brachiaria eruciformis* and *Dactyloctenium aegyptium* in Khairpur; *Euphorbia serpens, Brachiaria eruciformis, Trianthema portulacastrum, Dactyloctenium aegyptium* and *Corchorus aestuans* in Kotdiji; *Trianthema portulacastrum, Ipomoea aquatica, Euphorbia serpens, Celosia argentea* and *Dactyloctenium aegyptium* in Thari Mirwah; *Trianthema portulacastrum, Dactyloctenium aegyptium* and *Euphorbia serpens* in Faiz Ganj; *Brachiaria eruciformis, Dactyloctenium aegyptium, Trianthema portulacastrum, Euphorbia serpens* in Sobhodero; *Euphorbia serpens, Dactyloctenium aegyptium, Trianthema portulacastrum* and *Corchorus aestuans* in Gambat; *Corchorus aestuans, Trianthema portulacastrum, Brachiaria eruciformis* and *Euphorbia serpens* in Kingri and *Cenchrus ciliaris, Bergia aestivosa, Cressa cretica* and *Euphorbia serpens* in Nara.

More broad leaved weeds (BLW) were observed than grass weeds (GW) as shown in Table 2.

Density/square meter: The district average data shown in Table 1 depict that in cotton *Euphorbia serpens* and *Trianthema portulacastrum* were the most dense weeds having an average density of 13.86 and 13.06 respectively, followed by *Brachiaria eruciformis* (11.65), *Dactyloctenium aegyptium* (11.26) and *Corchorus aestuans* (10.16). There was variation among the densities of weeds in different sampling fields within the Talukas. *Oxystelma esculentum* was found only from two sites of Faiz Gang having 4.50 density. *Bergia aestivosa, Cenchrus ciliaris, Crotalaria medicaginea, Mukia maderaspatana* and *Tephrosia villosa* were recorded only from the Nara having density values 11.75, 12.00, 11.00, 10.25 and 9.75 respectively. Probably the reason could be the close proximity of agriculture area to sandy flat or dunes. Bhatti *et al.,* (2001) and Bhatti (2003) reported these species from the Nara desert. The occurrence of such species as a weed in crop is certainly due to their seeds dispersals by wind or any other human activities. The flora of Nara Taluka has different weed flora as compared to the rest of the Talukas in our study.

Table 1. Density of weeds of cotton crop in different Talukas of district Khairpur.

S. No.	Weed species	Site									
		Khairpur	Kotdiji	Thari Mirwah	Faiz Ganj	Sobhodero	Gambat	Kingri	Nara	Total	Average
1.	*Alhagi maurorum* Medic.	1.30 DE	0.90 DE	0.90 I	1.40 EF	1.60 CDE	1.75 F	1.90 CD	5.50 ABCDEF	15.25	1.91
2.	*Amaranthus virdis* Linn.	5.10 CDE	5.00 CDE	4.20 DEFGHI	4.10 DEF	4.75 BCDE	4.25 DEF	6.00 BCD	5.85 ABCDEF	39.25	4.91
3.	*Atylosia platycarpa* Benth.	2.90 DE	2.65 DE	1.60 GHI	1.00 EF	0.00 E	1.40 F	0.00 D	10.00 ABCDE	19.55	2.44
4.	*Bergia aestivosa* Wight & Arn.	0.00 E	0.00 E	0.00 I	0.00 F	0.00 E	0.00 F	0.00 D	11.75 AB	11.75	1.47
5.	*Brachiaria eruciformis* (J.E. Sm.) Griseb.	13.40 AB	19.85 A	8.35 BCDEFG	7.00 CDE	11.60 A	9.50 BCD	13.00 A	10.50 ABCDE	93.20	11.65
6.	*Celosia argentea* Linn.	0.00 E	0.00 E	11.00 ABCD	0.00 F	3.50 BCDE	6.00 CDEF	4.00 BCD	3.75 ABCDEF	28.25	3.53
7.	*Cenchrus ciliaris* Linn.	0.00 E	0.00 E	0.00 I	0.00 F	0.00 E	0.00 F	0.00 D	12.00 A	12.00	1.50
8.	*Cleome viscosa* Linn.	7.45 BCD	5.75 CDE	5.00 DEFGHI	6.25 CDEF	4.60 BCDE	5.25 DEF	4.10 BCD	3.40 ABCDEF	41.80	5.23
9.	*Convolvulus arvensis* Linn.	4.90 CDE	3.00 DE	7.25 CDEFGHI	3.70 DEF	3.95 BCDE	2.75 DEF	4.90 BCD	2.25 DEF	32.70	4.09
10.	*Conyza bonariensis* (Linn.) Cronquist.	2.35 DE	2.85 DE	1.00 HI	3.20 EF	2.30 CDE	1.75 F	1.60 CD	2.90 ABCDEF	17.95	2.24
11.	*Corchorus aestuans* Linn.	7.80 BCD	10.25 BC	9.50 BCDEF	9.60 BCD	7.85 ABC	11.90 ABC	14.80 A	9.55 ABCDE	81.25	10.16
12.	*Corchorus tridens* Linn.	5.25 CDE	4.75 DE	4.65 DEFGHI	2.90 EF	3.10 DEF	3.25 DEF	3.20 CD	4.70 ABCDEF	31.80	3.98
13.	*Cressa cretica* Linn.	4.40 DE	3.65 DE	4.35 DEFGHI	5.05 DEF	6.20 ABCDE	4.25 DEF	2.85 CD	11.50 ABC	42.25	5.28
14.	*Crotalaria medicaginea* var. *medicaginea* Lamk.	0.00 E	0.00 E	0.00 I	0.00 F	0.00 E	0.00 F	0.00 D	11.00 ABCDE	11.00	1.38
15.	*Cucumis melo* var. *agrestis* Naudin.	4.40 DE	3.10 DE	5.05 DEFGHI	4.05 DEF	4.30 BCDE	2.85 DEF	4.05 BCD	3.20 ABCDEF	31.00	3.88
16.	*Cynodon dactylon* (Linn.) Pers.	6.50 CDE	3.00 DE	3.85 DEFGHI	5.75 CDEF	7.50 ABC	6.50 CDEF	6.75 BC	4.20 ABCDEF	44.05	5.51
17.	*Cyperus rotundus* Linn.	4.85 CDE	6.25 CD	3.75 EFGHI	5.10 DEF	4.75 BCDE	3.25 DEF	4.50 BCD	4.50 ABCDEF	36.95	4.62
18.	*Dactyloctenium aegyptium* (Linn.) Willd.	11.50 ABC	11.55 B	10.60 ABCDE	13.50 AB	11.50 A	14.10 AB	9.40 AB	7.90 ABCDEF	90.05	11.26
19.	*Desmostachya bipinnata* (Linn.) Stap.	2.10 DE	1.60 DE	2.15 DEFGHI	2.10 EF	2.85 BCDE	0.90 F	2.30 CD	3.10 ABCDEF	17.10	2.14
20	*Digeria muricata* (Linn.) Mart.	3.25 DE	6.00 CD	4.00 DEFGHI	4.85 DEF	4.40 BCDE	4.50 DEF	5.65 BCD	3.75 ABCDEF	33.55	4.55
21.	*Eclipta prostrata* L. Mant.	4.35 DE	4.60 DE	5.70 DEFGHI	3.30 DEF	2.45 BCDE	4.50 DEF	3.55 BCD	2.35 CDEF	30.80	3.85
22.	*Euphorbia serpens* Kunth.	14.25 A	21.15 A	13.20 ABC	11.50 ABC	8.60 AB	17.90 A	12.95 A	11.30 ABCD	110.85	13.86
23.	*Ipomoea aquatica* Forssk.	1.60 DE	1.90 DE	14.90 AB	1.00 EF	4.10 BCDE	2.10 F	2.40 CD	1.90 EF	29.90	3.74
24.	*Launaea procumbens* (Roxb.)	5.50 CDE	3.80 DE	2.95 FGHI	2.40 EF	2.60 BCDE	2.50 DEF	3.00 CD	2.55 BCDEF	25.30	3.16
25.	*Mukia maderaspatana* (Linn) M. J. Roem.	0.00 E	0.00 E	0.00 I	0.00 F	0.00 E	0.00 F	0.00 D	10.25 ABCDE	10.25	1.28
26.	*Oxystelma esculentum* (L.f.) R.Br.	0.00 E	0.00 E	0.00 DEFGHI	0.00 F	0.00 E	0.00 F	0.00 D	0.00 F	4.50	0.56
27.	*Phragmites australis* (Cav.) Trin. ex Steud.	1.75 DE	2.3 0 DE	4.50 DEFGHI	3.85 DEF	3.50 BCDE	3.90 DEF	2.60 CD	3.50 ABCDEF	25.90	3.24
28.	*Phyla nodiflora* (Linn.) Greene	2.85 DE	4.50 DE	2.60 FGHI	2.40 EF	2.60 BCDE	2.65 DEF	4.00 BCD	2.50 CDEF	24.10	3.01
29.	*Physalis peruviana* Linn.	2.10 DE	1.75 DE	0.60 I	2.25 EF	0.00 E	1.60 F	0.00 D	9.00 ABCDEF	17.30	2.16
30.	*Pluchea lanceolata* (DC.) Oliv. & Hiern.	3.00 DE	3.10 DE	1.80 GHI	1.80 EF	1.10 DE	0.00 F	1.90 CD	8.50 ABCDEF	21.20	2.65
31.	*Sesbania bispinosa* (Jacq.) W.F. Wight	1.60 DE	3.30 DE	3.00 FGHI	2.65 EF	2.85 BCDE	2.45 DEF	3.00 CD	7.60 ABCDEF	26.45	3.31
32.	*Setaria pumila* (Poir.) Roem. & Schult.	5.75 CDE	5.75 CDE	8.25 BCDEFGH	6.70 CDE	7.10 ABCD	9.35 BCDE	6.25 BCD	8.75 ABCDEF	57.90	7.24
33.	*Tephrosia villosa* (Linn). Pers.	0.00 E	0.00 E	0.00 I	0.00 F	0.00 E	0.00 F	0.00 D	9.75 ABCDE	9.75	1.22
34.	*Trianthema portulacastrum* Linn.	13.55 AB	13.50 B	16.90 A	15.45 A	10.55 A	13.05 AB	13.50 A	8.00 ABCDEF	104.50	13.06
35.	*Tribulus terrestris* Linn.	4.60 CDE	3.40 DE	4.85 DEFGHI	4.60 DEF	4.25 BCDE	4.65 DEF	2.85 CD	2.65 BCDEF	27.60	3.980
36.	*Xanthium stromarium* Linn.	4.65 CDE	2.70 DE	3.55 EFGHI	1.80 EF	3.10 BCDES	2.25 EF	3.80 BCD	5.40 ABCDEF	27.25	3.41
LSD		**28.79**	**23.78**	**29.28**	**26.00**	**25.15**	**29.32**	**25.16**	**36.56**		

Values having different letters in a column differ significantly at 0.050 probability levels.

Table 2. Frequency% of weeds of cotton crop in different Talukas of district Khairpur.

S. No.	Name of weed species	Site									
		Khairpur	Kotdiji	Thari Mirwah	Faiz Ganj	Sobhodero	Gambat	Kingri	Nara	Total	Average
1.	*Alhagi maurorum* Medic.	30.00	35.00	25.00	50.00	30.00	30.00	35.00	55.00	290.00	36.25
2.	*Amaranthus virdis* Linn.	60.00	65.00	55.00	60.00	60.00	35.00	60.00	60.00	455.00	56.88
3.	*Atylosia platycarpa* Benth.	45.00	45.00	30.00	20.00	0.00	30.00	0.00	75.00	245.00	30.63
4.	*Bergia aestivosa* Wight & Arn.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	60.00	7.50
5.	*Brachiaria eruciformis* (J.E. Sm.) Griseb.	85.00	85.00	60.00	65.00	70.00	65.00	70.00	65.00	565.00	70.63
6.	*Celosia argentea* Linn.	0.00	0.00	70.00	0.00	35.00	40.00	40.00	50.00	235.00	29.38
7.	*Cenchrus ciliaris* Linn.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.00	65.00	8.13
8.	*Cleome viscosa* Linn.	60.00	65.00	50.00	60.00	60.00	65.00	60.00	50.00	470.00	58.75
9.	*Convolvulus arvensis* Linn.	60.00	60.00	65.00	45.00	50.00	45.00	60.00	50.00	435.00	54.38
10.	*Conyza bonariensis* (Linn.) Cronquist.	35.00	55.00	20.00	55.00	40.00	25.00	35.00	40.00	305.00	38.13
11.	*Corchorus aestuans* Linn.	70.00	80.00	70.00	70.00	65.00	65.00	75.00	55.00	550.00	68.75
12.	*Corchorus tridens* Linn.	45.00	55.00	50.00	35.00	40.00	40.00	40.00	50.00	355.00	44.38
13.	*Cressa cretica* Linn.	65.00	60.00	50.00	65.00	65.00	55.00	45.00	65.00	470.00	58.75
14.	*Crotalaria medicaginea* var. *medicaginea* Lamk.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.00	70.00	8.75
15.	*Cucumis melo* var. *agrestis* Naudin.	50.00	60.00	55.00	60.00	50.00	40.00	60.00	45.00	420.00	52.50
16.	*Cynodon dactylon* (Linn.) Pers.	45.00	50.00	60.00	70.00	65.00	60.00	60.00	60.00	470.00	58.75
17.	*Cyperus rotundus* Linn.	60.00	60.00	60.00	65.00	60.00	50.00	60.00	55.00	470.00	58.75
18.	*Dactyloctenium aegyptium* (Linn.) Willd.	70.00	70.00	75.00	80.00	80.00	90.00	60.00	65.00	590.00	73.75
19.	*Desmostachya bipinnata* (Linn.) Stap.	25.00	25.00	40.00	40.00	45.00	20.00	45.00	45.00	285.00	35.63
20.	*Digeria muricata* (Linn.) Mart.	45.00	55.00	40.00	55.00	45.00	50.00	60.00	65.00	415.00	51.88
21.	*Eclipta prostrata* L. Mant.	60.00	65.00	65.00	60.00	50.00	60.00	55.00	45.00	460.00	57.50
22.	*Euphorbia serpens* Kunth.	60.00	90.00	60.00	60.00	60.00	80.00	70.00	60.00	540.00	67.50
23.	*Ipomoea aq*uatica Forssk.	25.00	45.00	95.00	35.00	45.00	30.00	40.00	25.00	340.00	42.50
24.	*Launaea procumbens* (Roxb.)	55.00	70.00	45.00	50.00	55.00	40.00	45.00	50.00	410.00	51.25
25.	*Mukia maderaspatana* (Linn) M. J. Roem.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.00	65.00	8.13
26.	*Oxystelma esculentum* (L.f.) R.Br.	0.00	0.00	45.00	0.00	0.00	0.00	0.00	0.00	45.00	5.63
27.	*Phragmites australis* (Cav.) Trin. ex Steud.	30.00	45.00	55.00	50.00	60.00	40.00	30.00	35.00	345.00	43.13
28.	*Phyla nodiflora* (Linn.) Greene	40.00	70.00	55.00	40.00	30.00	45.00	65.00	50.00	395.00	49.38
29.	*Physalis peruviana* Linn.	25.00	30.00	15.00	40.00	0.00	25.00	0.00	75.00	210.00	26.25
30.	*Pluchea lanceolata* (DC.) Oliv. & Hiern.	35.00	50.00	30.00	30.00	25.00	0.00	25.00	50.00	245.00	30.63
31.	*Sesbania bispinosa* (Jacq.) W. F. Wight	25.00	40.00	40.00	45.00	40.00	30.00	40.00	40.00	300.00	37.50
32.	*Setaria pumila* (Poir.) Roem. & Schult.	60.00	60.00	65.00	50.00	65.00	75.00	55.00	60.00	490.00	61.25
33.	*Tephrosia villosa* (Linn). Pers.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.00	65.00	8.13
34.	*Trianthema portulacastrum* Linn.	85.00	85.00	75.00	80.00	60.00	70.00	90.00	70.00	615.00	76.88
35.	*Tribulus terrestris* Linn.	50.00	50.00	65.00	65.00	60.00	55.00	40.00	45.00	430.00	53.75
36.	*Xanthium stromarium* Linn.	70.00	40.00	45.00	55.00	45.00	40.00	55.00	60.00	410.00	51.25

BLW (78%), GW (20%), SW (3%).

Frequency: Memon *et al.,* (2003) proposed status of wheat weeds based on their frequency as assertive, ascendant, average and below average. The recorded cotton weed species were grouped into aforesaid status given in Table 3.

Average frequency of weed species in the Khairpur district (Table 2 and 3) showed that the most frequently occurring weeds of cotton placed in the "Assertive" category were *Trianthema portulacastrum* (76.88%), *Dactyloctenium aegyptium* (73.75%), *Brachiaria eruciformis* (70.63%), *Corchorus aestuans* (68.75%), *Euphorbia serpens* (67.50%) and *Setaria pumila* (61.25%). Ullah *et al.,* (1995) also reported *Trianthema portulacastrum* as dominant weed from cotton fields of the Agronomic Research Station in Bahawalpur.

The weed species placed in the "Ascendant" category were *Cynodon dactylon*, *Cyperus rotundus*, *Cleome viscose* and *Cressa cretica*, each with 58.75% of frequency followed by *Eclipta prostrata* (57.50%), *Amaranthus virdis* (56.88%), *Convolvulus arvensis* (54.38%), *Tribulus teresterris* (53.75%), *Cucumis melo* (52.50%), *Digeria muricata* (51.88%), *Launea nudicaulis* and *Xanthium stromarium* (each with 51.25%). The weeds having high percentage of frequency are shown in Fig. 1.

Analysis of density and frequency on Taluka basis as shown in Table 1 and 2 revealed that *Brachiaria eruciformis*, *Corchorus aestuans*, *Euphorbia serpens* and *Trianthema portulacastrum* were thickly occupied in Kingri as it is obvious from their density values of 13.00, 14.80, 12.95 and 13.50 respectively. They also occurred frequently having 70%, 75%, 70% and 90% respectively. The density of *Cynodon dactylon* and *Dactyloctenium aegyptium* was 8.75 and 9.40 respectively, each with 60% frequency.

In Taluka Gambat *Corchorus aestuans*, *Dactyloctenium aegyptium*, *Euphorbia serpens* and *Trianthema portulacastrum* with 11.90, 14.10, 17.90 and 13.05 densities was found thickly populated, having higher frequency of 65%, 90%, 80% and 70% respectively. *Cynodon dactylon* showed less value of density (6.50) as compared to its frequency (60%).

In Takuka Khairpur *Brachiaria eruciformis*, *Dactyloctenium aegyptium*, *Euphorbia serpens* and *Trianthema portulacastrum* with density of 13.40, 11.50, 14.25 and 13.55 respectively were encountered abundant. These weeds were also common having highest frequency of 85%, 70%, 60% and 85% respectively. *Corchorus aestuans* and *Setaria pumila* were found less abundant having density of 7.00 and 5.75 respectively. On the other hand their frequency was high with 70% and 60% respectively.

In Taluka Sobhodero *Brachiaria eruciformis*, *Dactyloctenium aegyptium*, *Trianthema portulacastrum* and *Euphorbia serpens* were densely populated having density 11.60, 11.50, 10.55 and 8.60 respectively. Besides, they all were found frequent having 70%, 80%, 60% and 60% frequency respectively.

In Taluka Kotdiji *Euphorbia serpens* with 21.15, *Brachiaria eruciformis* with 19.85, *Trianthema portulacastrum* having 13.50, *Dactyloctenium aegyptium* with 11.55 and *Corchorus aestuans* with 10.25 density values were found more abundant. Their frequency was recorded 90%, 85%, 85%, 70% and 80% respectively. Likewise Khairpur *Setaria pumila* accounted for similar values of density (5.75) and frequency (60%).

In Taluka Thari Mirwah heavily populated weeds were *Trianthema portulacastrum* with 16.90 density, followed by *Euphorbia serpens* (13.20), *Dactyloctenium aegyptium* (10.60) and *Corchorus aestuans* (9.50). All these weeds showed 75%, 60%, 75% and 70% frequency respectively. *Brachiaria eruciformis* and *Setaria pumila* acquired 60% and 65% frequency as compared to their middling density values of 8.35 and 8.25, respectively. *Cynodon dactylon* having 60% frequency was frequent as compared to its less density value (3.85).

Table 3. Status of weeds of cotton crop.

S. No.	Status	Name of weed species	Frequency %
1.	Assertive	*Trianthema portulacastrum* Linn.	76.88
2.	Assertive	*Dactyloctenium aegyptium* (Linn.) Willd.	73.75
3.	Assertive	*Brachiaria eruciformis* (J.E. Sm.) Stap	70.63
4.	Assertive	*Corchorus aestuans* Linn.	68.75
5.	Assertive	*Euphorbia serpens* Kunth.	67.50
6.	Assertive	*Setaria pumila* (Poir.) Roem. & Schult.	61.25
7.	Ascendant	*Cynodon dactylon* (Linn.) Pers.	58.75
8.	Ascendant	*Cyperus rotundus* Linn.	58.75
9.	Ascendant	*Cleome viscosa* Linn.	58.75
10.	Ascendant	*Cressa cretica* Linn.	58.75
11.	Ascendant	*Eclpta alba* (Linn.) Hassk.	57.50
12.	Ascendant	*Amaranthus virdis* Linn.	56.88
13.	Ascendant	*Convolvulus arvensis* Linn.	54.38
14.	Ascendant	*Tribulus terrestris* Linn.	53.75
15.	Ascendant	*Cucumis melo* var. *agrestis* Naudin.	52.50
16.	Ascendant	*Digeria muricata* (Linn.) Mart.	51.88
17.	Ascendant	*Launaea procumbens* (Roxb.)	51.25
18.	Ascendant	*Xanthium stromarium* Linn.	51.25
19.	Average	*Phyla nodiflora* (Linn.) Greene	49.38
20.	Average	*Corchorus tridens* Linn.	44.38
21.	Average	*Phragmites australis* (Cav.) Trin. ex Steud.	43.13
22.	Average	*Ipomoea aquatica* Forssk.	42.50
23.	Average	*Conyza bonariensis* (Linn.) Cronquist.	38.13
24.	Average	*Sesbania bispinosa* (Jacq.) W. F. Wight.	37.50
25.	Average	*Alhagi maurorum* Medic.	36.25
26.	Average	*Desmostachya bipinnata* (Linn.) Stap.	35.63
27.	Average	*Atylosia platycarpa*Benth.	30.63
28.	Average	*Pulchea lanceolata* (DC.) Oliv. & Hiern.	30.63
29.	Average	*Celosia argentea* Linn.	29.38
30.	Below average	*Physalis peruviana* Linn.	26.25
31.	Below average	*Crotalaria medicaginea* var. *medicaginea* Lamk.	8.75
32.	Below average	*Cenchrus ciliaris* Linn.	8.13
33.	Below average	*Mukia maderaspatana* (Linn) M. J. Roem.	8.13
34.	Below average	*Tephrosia villosa* (Linn). Pers.	8.13
35.	Below average	*Bergia aestivosa* Wight & Arn.	7.50
36.	Below average	*Oxystelma esculentum* (L.F.)R.Br.	5.63

In Taluka Faiz Ganj *Trianthema portulacastrum* and *Dactyloctenium aegyptium* were thickly populated having 15.45 and 13.50 densities respectively. In addition to that they occurred frequently each with 80% of frequency. Similarly *Corchorus aestuans* (9.60) and *Euphorbia serpens* (11.50) were densely populated and common having 70% and 60% frequency respectively. *Cynodon dactylon* showed less value of density (5.75) as compared to its value of frequency (70%).

Table 4. Similarity Index (SI) of weed species of cotton in different Talukas of district Khairpur.

Talukas	SI
Nara-Khairpur	0.91
Nara-Kotdiji	0.91
Nara-Thari	0.91
Nara-FaizGanj	0.91
Nara-Sobhodero	0.87
Nara-Gambat	0.91
Nara-Kingri	0.89

Table 5. Family importance values (FIV) of cotton weeds.

S.No.	Families	Relative diversity	Relative density	FIV
1.	Asteraceae	13.89	9.47	23.36
2.	Aizoaceae	2.78	9.65	12.43
3.	Amaranthaceae	8.33	6.94	15.27
4.	Poaceae	19.44	26.30	45.74
5.	Asclepiadaceae	2.78	0.35	3.13
6.	Convolvulaceae	8.33	8.11	16.44
7.	Cypraceae	2.78	2.86	5.64
8.	Fabaceae	13.89	6.34	20.23
9.	Cucurbitaceae	5.56	3.19	8.75
10.	Caparidaceae	2.78	3.23	6.01
11.	Euphorbiaceae	2.78	8.57	11.35
12.	Tiliaceae	5.56	8.74	14.30
13.	Verbenaceae	2.78	1.86	4.64
14.	Solanaceae	2.78	1.34	4.12
15.	Elatinaceae	2.78	0.91	3.69
16.	Zygophyllaceae	2.78	2.13	4.91

Table 6. Number of genera and species of weeds representing families of cotton crop.

S. No.	Family	Genera	Species
1.	Asteraceae	5	5
2.	Aizoaceae	1	1
3.	Amaranthaceae	3	3
4.	Poaceae	7	7
5.	Asclepiadaceae	1	1
6.	Convolvulaceae	3	3
7.	Cypraceae	1	1
8.	Fabaceae	5	5
9.	Cucurbitaceae	2	2
10.	Caparidaceae	1	1
11.	Euphorbiaceae	1	1
12.	Tiliaceae	1	2
13.	Verbenaceae	1	1
14.	Solanaceae	1	1
15.	Elatinaceae	1	1
16.	Zygophyllaceae	1	1

In Taluka Nara *Brachiaria eruciformis, Euphorbia serpens, Setaria pumila, Trianthema portulacastrum* and *Dactyloctenium aegyptium* were thickly populated having density values 10.50, 11.30, 8.75, 8.00 and 7.90 respectively and also occurred frequent with frequency of 65%, 60%, 60%, 70% and 65% respectively. *Cynodon dactylon* showed less value of density (4.20) as compared to its frequency (60%).

The above study reveals that *Dactyloctenium aegyptium, Euphorbia serpens* and *Trianthema portulacastrum* having greater values of both density and frequency in all the Talukas. This can be regarded as most devastating weeds of cotton. In Taulka-wise, the other weeds with highest values of both density and frequency include *Brachiaria eruciformis* in Khairpur, Kotdiji, Sobhodero, Kingri and Nara; *Corchorus aestuans* in Kotdiji, Thari Mirwah, Faiz Ganj, Gambat and Kingri and *Setaria pumila* in Nara. Whereas, the weed species with low rating of density but higher frequency were *Corchorus aestuans* in Nara; *Setaria pumila* in Khairpur and Kotdiji and *Cynodon dactylon* in Thari Mirwah, Faiz Ganj, Gambat and Nara.

Among the recorded weed species *Alhagi maurorum, Convolvulus arvensis, Cressa cretica, Cynodon dactylon, Cyperus rotundus, Phragmites australis, Phyla nodiflora* were found common in both the crops because of their perennial life span.

Similarity index (SI): To determine the SI value all Talukas were compared with Nara as it contained more number of species. Like wheat, in cotton Sobhodero also showed dissimilar species having 0.87 SI (Table 4). Which clearly depicted that the rest of the Talukas possessed less dissimilarity among the weed species.

Family importance value (FIV): Poaceae (grasses) represented by seven species and 26.30% of individuals stood first having highest 45.74 FIV. It was followed by Asteraceae and Fabaceae having 23.36 and 20.23 FIVs respectively (Table 5). Family Fabaceae was represented by 5 species with 6.34% of individuals. All 36 weed species were representing 16 families (Table 6). Poaceae having 7 genera each with single species, Fabaceae and Asteraceae with 5 genera each representing single species, Convolvulaceae and Amaranthaceae having 3 genera each with single species, Cucurbitaceae represented by 2 genera each with single species, while Tiliaceae having only 1 genus with 2 species. Whereas, the remaining 9 families were accounted for one genus with single species each. The above study depicts the weed spectrum, density, frequency percentage which shows that different weeds are increasing at an alarming rate in the cotton crop.

While planning weed management one should include not only those species causing the present economic damage but also those present in small numbers with a potential of becoming economically important later on. In this regard list of weeds present in each field and their relative abundance can be used to select the most effective management options. Early recognition of serious weeds invading a new area is also important to prevent them from becoming established. Weed control management can thus be programmed according to the presence of types of weeds for increasing the yield of crops.

There are number of species which are accounted for their high density and frequency in specific fields. The high frequency percentage of some of the species suggests the wider presence of such species in terms of areas. Hence, strategies may be planned to control such species first. More threat to crops can be anticipated from these species.

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