

DISTRIBUTION OF WEEDS IN WHEAT, MAIZE AND POTATO FIELDS OF TEHSIL GOJRA, DISTRICT TOBA TEK SINGH, PAKISTAN

Sohaib Muhammad¹, Zaheer-ud-din Khan
and Tanzeem Akbar Cheema

ABSTRACT

An ecological study was conducted to record the distribution of weeds in wheat, maize and potato crop fields of Tehsil Gojra, District Toba Tek Singh, Punjab. Sixty-seven weed species were reported from the study area out of which two belonging to monocot families, and twenty seven to dicot families. Thirty-five weed species were found only in wheat, thirty-four in maize and twenty-four in potato crop fields while twenty-four weed species found common either in case of wheat-maize, maize-potato or wheat-potato combinations. Only two weed species were common in all three crops, i.e. *Convolvulus arvensis* L. and *Cynodon dactylon* (L.) Pers. having importance value (I.V) of 53.58 and 57.13 respectively.

Key words: Distribution, weeds, wheat, maize, potato.

INTRODUCTION

Weeds are unwanted plant species growing in the domesticated crops. Holm *et al.* (1979) estimated that there are about 8000 plant species, which act as weeds, of these only 250 are important for agriculture world. According to Andreson (1996), weeds compete with the crop mainly for water, light, nutrients and carbon dioxide.

The noxious weeds are harmful, adversely affecting crop productivity, causing health hazards in humans and animals and lowering fish production. Valverde *et al.* (1995) reported that 16-40 % yield losses in the maize fields were due to the weeds. Weeds differ from other plants in being more aggressive, having peculiar characteristics that make them more competitive. They suppress the activity of all other weed communities around them and establish a kingdom of their own within a short period of time. These weeds are generally associated with commercially important crops of export potential. They not only lower the quality but also the quantity of the crop produce resulting in heavy economic losses to the farmer.

Rabbani and Bajwa (2001) studied the weed distribution in rice fields of five Districts of the Punjab and they find out that *Cynodon dactylon* (L.) Pers., *Cyperus rotundus* L., *C. difformis* L., *Echinochloa colonum*

¹Department of Botany, GC University, Lahore. Pakistan E-mail: sohaibs1983@yahoo.com

(Linn.) Link, *E. glabrescense* Manro ex. Egel. and *Paspalum paspalodes* (Michx.) Scribner were highly abundant weeds in the study area. Alam and Shereen (2002) conducted an experiment to check the effects of the weed residues on the growth of the rice and they find out the tremendous growth in the plants. Ali *et al.* (2002) studied the weed flora of wheat fields with respect to floristic composition, life form, frequency and density in Tehsil Pasroor, District Sialkot and they reported 49 weed species which were distributed among 20 different families. Ibrar *et al.* (2003) conducted ethnobotanical study of weeds of five crops in district Abbott Abad, NWFP Pakistan. They had reported 36 weed species out of which 35 weed species belonged to the native area and have medicinal values and only one weed species, i.e. *Poa annua* L. not belonging to study area. Ali and Hassan (2004) studied the weed flora of potato fields with respect to floristic composition, life form, frequency and density in Tehsil Pasroor, District Sialkot and they reported 29 weed species belonging to 14 different families. Pysek *et al.* (2005) provided quantitative information on the occurrence of alien species in Central European cities and analyzed factors determining the richness of alien and native floras in this habitat type. Shah and Khan (2006) prepared a checklist of noxious weeds of District Mansehra, Pakistan. They had reported 63 weed species belonging to 32 families were common in four major crops viz: wheat, maize, rice, tobacco and vegetables. Mohammad *et al.* (2007) studied the importance Value Index (I.V.I) of weed flora of some maize fields of Tehsil Gojra (T.T.Singh) and they reported 34 weeds which were distributed among 17 different plant families. Chaudhary *et al.* (2008) conducted an experiment to find out the effect of weed competition period on yield and yield components of wheat in Gujranawala. The significant reduction in grain yield and yield components was noted, but fresh and dry weight of weeds were increased significantly. Qureshi *et al.* (2009) find out the weed communities of wheat crop in district Toba Tek Singh, Pakistan. They had reported 38 weed species distributed among 35 genera and 17 families were recorded.

The present study area, i.e. Tehsil Gojra, District Toba Tek Singh is located at an elevation of 710 ft and situated at the latitude of 31° 25 North and at longitude of 73° 20 East. The boundary of Tehsil Gojra is joined on the eastern side with the Faisalabad District and in the west with the District Jhang. Its North boundary is joined with the Tehsil Chiniot and in the South with District Toba Tek Singh as shown in Figure 1.

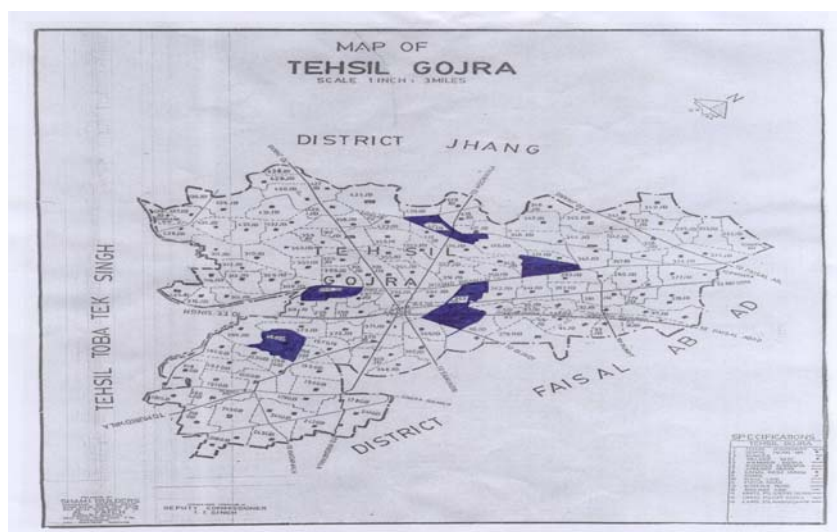


Figure 1: Map of Tehsil Gojra District Toba Tek Singh

MATERIALS AND METHODS

The present study was undertaken to find out the weeds of wheat, maize and potato crop fields of five villages of Tehsil Gojra. Five sites were selected in each village. The quadrat method was used for the present study after Clements (1905). By taking each quadrat of 1m × 1m percentage frequency, density and cover was calculated after Oosting (1956), Ambasht and Ambasht (1969) and Braun Blanquet (1932), respectively in order to find out the importance value (I.V) (Curtis, 1959) of the families of the weeds and individual weeds of the study area. The plants were collected, dried, preserved and identified with the help of available literature (Ali and Qaiser, 1995-2004; Nasir and Ali, 1971-1995). The voucher specimens were deposited in Dr. Sultan Ahmad Choudhary Herbarium Botany Department; GC University, Lahore, Pakistan.

RESULTS AND DISCUSSION

A total of sixty-seven weed species, belonging to twenty seven dicot and two monocot families were collected from wheat, maize and potato crop fields of Tehsil Gojra, District Toba Tek Singh. Thirty-five weed species in wheat, Thirty-four in maize and twenty-four in potato crop fields. Only two weed species, i.e. *Convolvulus arvensis* L. and

Cynodon dactylon L. (Pers.) were common in all the three field crops having I.V 53.58 and 57.13 respectively.

Family Asteraceae had I.V of 14.62 and contained 10 species of weeds, i.e. *Ageratum conyzoides* L., *Calendula arvensis* L., *Conyza ambigua* Dc., *Erigeron conyzoides* L., *Erigeron* sp. L., *Launea nudicalus* Jaub & Spach., *Parthenium hysterophorus* L., *Sonchus asper* L., *Saussurea candicans* CLK. and *Xanthium strumarium* L. having I.V of 15.8, 11.99, 45.85, 9.37, 15.72, 6.22, 18.26, 7.09, 5.73 and 9.87 respectively.

Family Poaceae had I.V of 35.11 and contained 9 weed species, i.e. *Arunlaria japonica* Benth & Hook., *Avena fatua* L., *Cynodon dactylon* (L.) Pers., *Dichanthium annulatum* (Forrsk.) Stapf, *Echinochloa crusgalli* (L.) P. Beauv., *Leptochloa panacea* (Retz.) Ohwi, *Phalaris minor* Retz., *Panicum repense* L. and *Pennisetum glaucum* (L.) R.Br. having I.V of 20.93, 21.65, 57.13, 44.96, 39.45, 86.33, 22.29, 11.94 and 11.31 respectively.

Family Papilionaceae had I.V of 8.77 and contained 6 weed species, i.e. *Alhagi maurorum* Medic., *Lathyrus aphaca* L., *Medicago polymorpha* L., *Trigonella foenum-graceum* L., *Vicia faba* L. and *Vicia sativa* L. having I.V of 11.27, 12.19, 11.21, 4.98, 7.42 and 5.60 respectively. Family Amaranthaceae and Solanaceae had I.V of 22.12 and 5.96, respectively and contain 4 weed species each. Family Amaranthaceae comprised of *Amaranthus viridis* L., *Achyranthes aspera* L., *Alternanthera sessilis* (L.) Dc. and *Digera muricata* (L.) Mart. having I.V of 5.93, 5.77, 18 and 58.78 respectively. Family Solanaceae included *Datura fastuosa* L., *Solanum nigrum* L., *S. surattense* Burm. F. and *Solanum* sp. L. having I.V 6.64, 7.43, 7.10 and 2.68, respectively.

Family Brassicaceae, Chenopodiaceae and Euphorbiaceae had I.V of 11.68, 7.72 and 22.14, respectively and contained 3 weed species each. Family Brassicaceae was represented by *Brassica rapa* subsp. *compestris* (L.) Clap, *Coronopsis didymus*(L.) Smith, *Raphanus sativus* L. having I.V of 8.36, 22.22 and 12.01, respectively. Family Chenopodiaceae contained *Chenopodium album* L., *C. murale* L. and *Salsola imbricate* Forssk. having I.V of 9.42, 9.56 and 4.16, respectively. Family Euphorbiaceae contained *Croton bonplandianus* Baill., *Euphorbia helioscopia* L. and *E. prostrata* Ait. having I.V of 14.75, 29.54 and 59.56, respectively.

Family Malvaceae, Polygonaceae, Ranunculaceae and Zygophyllaceae had I.V of 11.04, 14.76, 15.40 and 12.29, respectively

and contained 2 weed species each. Family Malvaceae included *Gossypium herbaceum* L. and *Malvastrum coromendelianum* (L.) Gracke having I.V of 3.88 and 18.24, respectively. Family Polygonaceae included *Polygonum plebejum* R. Br. and *Rumex dentatus* L. having I.V of 22.13 and 7.39, respectively. Family Ranunculaceae contained *Ranunculus sceleratus* L. and *R. laetus* Wall. having I.V of 8.30 and 22.50, respectively. Family Zygophyllaceae contained *Peganum harmala* L. and *Tribulus terrestris* L. having I.V of 8.72 and 15.87 respectively.

Remaining families include Family Asclepiadaceae, Boraginaceae, Capparidaceae, Convolvulaceae, Cucurbitaceae, Cyperaceae, Fumariaceae, Gentianaceae, Nyctaginaceae, Oxalidaceae, Portulacaceae, Primulaceae, Rubiaceae, Scrophulariaceae, Tiliaceae, Umbelliferae and Verbenaceae which contained only one weed species each having I.V of 8.06, 26.12, 14.30, 53.58, 9.41, 57.13, 46.68, 55.66, 7.10, 21.60, 6.65, 36.97, 17.23, 3.75, 35.80, 5.66 and 57.13 respectively. The weed species included in above mentioned families are *Calotropis procera* (Ait.) Ait.f., *Heliotropium currassavicum* L., *Cleome viscosa* L., *Convolvulus arvensis* L., *Cucurbita maxima* Duch. ex Lam., *Cyperus rotundus* L., *Fumaria indica* (Hauskn.) Pugsley, *Centaureum pulchellum* (Sw.) Druce., *Boerhavia diffusa* L., *Oxalis corniculata* L., *Portulaca oleracea* L., *Anagallis arvensis* L., *Galium aparine* L., *Mazus pumilus* (Brum. f.), *Corchorus depressus* (L.) Stocks, *Foeniculum vulgare* Mill. and *Phyla nodiflora* (L.) Greene.

Out of the sixty-seven weed species reported two weed species, i.e. *Cynodon dactylon* and *Convolvulus arvensis* were found in wheat, maize and potato crop fields of Tehsil Gojra. Thirty-five weed species were found only in wheat, Thirty-four in maize and twenty-four in potato crop fields while twenty-four weed species were found common either in case of wheat-maize, maize-potato or wheat-potato combinations.

Pakistan is an agrarian country and its economy revolves around production of its cash crops but unfortunately the per hector yield of Pakistan as compared to the other agriculture countries is less due to many factors out of which problem of weed is the biggest contributor in the loss of total production. These losses occur due to the competition for nutrients, water, solar radiations, space and other growing factors (Rao, 1983; Malik, 2002). Total 35 weed species were reported out of which only two weed species were common in all three crops i.e. *Cynodon dactylon* and *Convolvulus arvensis* which were described as the major weeds of cash crops (Holm *et al.*1977; Oreeke

et al.1994). Different studies regarding the taxonomy and distribution of weeds was being taken in different parts of the country as in this study and reported *Cynodon dactylon*, *Chenopodium album* and *Cyperus rotundus* as the main weeds of wheat, maize and potato crop fields (Larik, 1987; Ahmad et al. 1994). Increasing the density of *Phalaris minor* to 200 plants m⁻² decreased the grain yield of wheat by 36% as present study data regarding the particular species confirms it (Anonymous, 1992). Since there is need to identify and recognize the biological and ecological factors leading the long term persistence of species of weeds communities, as some of the weeds are ethnobotanical or ethnomedicinal like the *Chenopodium album* is being used for certain cooking recipes in the study area which confirms the previous studies (Nejad et al. 2004; Shah and Khan, 2004). Weed species like *Cynodon dactylon*, *Cyperus rotundus*, *Convolvulus arvensis*, *Chenopodium album* posses certain medicinal properties and used in pharmaceutical industries. Further research work is needed in the fields of weed control, weed biology and weed utilization as the components of the integrated weed management. Present study may help to under stand distribution and growth of weeds in wheat, maize, and potato crop fields. It may be helpful for the economists, ecologists, agriculturists and the scientists involved in the management of weed. The above mentioned data is being represented in table 1 and the comparative I.V of weed families and individual weed species is graphically represented in Fig.2 and 3 respectively.

Table 1. Showing the I.V. of the different families of weeds of Wheat, Maize and Potato crop fields of Tehsil Gojra (T.T.Singh)

S.No	Family	Weed species	Species Averg.	C ₁	C ₂	C ₃	% Freq.	% De ns	% Cov.	I.V.	I.V. of Family
01	Asteraceae	1. <i>Ageratum conyzoides</i> L.	5.26b±0.87	P	A	P	24.75	06	37.76	15.8	14.62
		2. <i>Calendula arvensis</i> L.	1.91f±0.21	A	P	A	8.75	04	7.50	5.73	
		3. <i>Conyza ambigua</i> Dc.	2.36ef±0.03	P	P	A	12.14	05	8.57	7.09	
		4. <i>Erigeron conyzoides</i> L.	6.08b±0.08	A	A	P	16.25	06	11.67	18.26	
		5. <i>Erigeron</i> sp. L.	1.90f±0.24	A	P	A	8.33	03	10.27	6.22	
		6. <i>Launea nudicalus</i> Jaub. & Spach.	5.24b±0.03	A	P	P	10.75	03	7.50	15.72	
		7. <i>Parthenium hysterophorous</i> L.	3.12de±0.03	P	P	A	11.25	04	18.75	9.37	
		8. <i>Sonchus asper</i> L.	15.28a±0.03	P	A	P	68.98	29	78.29	45.85	
		9. <i>Saussurea candicans</i> CLK.	3.99c±0.04	P	A	A	17.26	07	23.75	11.99	
		10. <i>Xanthium strumarium</i> L.	3.29cd±0.03	A	P	A	9.28	03	11.32	9.87	

S.No	Family	Weed species	Species Averg.	C 1	C 2	C 3	% Freq.	% De ns	% Cov.	I.V.	I.V. of Family
02	Poaceae	1. <i>Arunlaria japonica</i> Benth & Hook.	6.97d±0.04	A	P	A	37.44	07	9.00	20.93	35.11
		2. <i>Avena sativa</i> L.	7.21d±0.11	P	A	A	35.45	12	33.18	21.65	
		3. <i>Cynodon dactylon</i> (L.) Pers.	19.04b±0.04	P	P	P	82.05	23	90.27	57.13	
		4. <i>Dichanthium annulatum</i> (Forssk.) Stapf	14.98c±0.05	A	P	A	67.36	29	75.26	44.96	
		5. <i>Echinochloa crusgalli</i> (L.) P.Beauv.	13.15c±0.02	P	A	A	28.00	10	23.00	39.45	
		6. <i>Leptochloa panicea</i> (Retz.) Ohwi	28.77a±1.20	A	P	A	27.81	09	16.00	86.33	
		7. <i>Phalaris minor</i> Retz.	7.43d±1.28	P	A	A	40.45	06	56.65	22.29	
		8. <i>Panicum repense</i> L.	3.98e±1.07	P	P	A	17.50	07	26.87	11.94	
		9. <i>Pennisetum glaucum</i> P.Beauv.	3.77e±0.19	P	A	P	20.45	08	19.44	11.31	
03	Papilionaceae	1. <i>Alhagi maurorum</i> Medk.	3.75a±0.14	P	A	A	15.65	05	9.95	11.27	8.77
		2. <i>Lathyrus aphaca</i> L.	4.06a±0.14	P	A	A	13.22	03	8.90	12.19	
		3. <i>Medicago polymorpha</i> L.	3.73a±0.13	P	A	A	27.86	05	35.65	11.21	
		4. <i>Trigonella foenum-graecum</i> L.	1.66c±0.24	P	A	A	5.77	03	7.26	4.98	
		5. <i>Vicia faba</i> L.	2.47b±0.19	A	A	P	12.77	07	15.30	7.42	
		6. <i>Vicia sativa</i> L.	1.86bc±0.42	P	A	P	13.78	06	13.95	5.60	

S.No	Family	Weed species	Species Averg.	C 1	C 2	C 3	% Freq.	% De ns	% Cov.	I.V.	I.V. of Family
04	Amaranthaceae	1. <i>Amaranthus viridus</i> L.	1.97c±0.86	P	P	A	15.46	06	7.26	5.93	22.12
		2. <i>Achyranthus aspera</i> L.	1.92c±0.18	P	P	A	12.95	04	8.25	5.77	
		3. <i>Alternanthera sessilis</i> (L.) Dc.	6.00b±0.16	A	P	A	30.00	10	33.33	18.00	
		4. <i>Digera muricata</i> (L.) Mart.	19.59a±0.73	A	P	A	52.3	23	68.92	58.78	
05	Solanaceae	1. <i>Datura alba</i> Nees.	2.21a±0.02	P	A	A	8.75	03	20.25	6.64	5.96
		2. <i>Solanum nigrum</i> L.	2.47a±0.27	P	A	P	14.83	05	7.23	7.43	
		3. <i>Solanum surattense</i> Schard. & Wend.	2.36a±0.25	A	P	P	12.50	04	10.50	7.10	
		4. <i>Solanum</i> sp. L.	0.89b±0.06	A	P	P	5.00	02	17.50	2.68	
06	Brassicaceae	1. <i>Brassica campestris</i> L.	2.78b±0.60	A	A	P	12.75	04	27.85	8.36	11.68
		2. <i>Coronopsis didymus</i> (L.) Smith.	7.40a±0.28	P	A	P	47.67	04	60.75	22.22	
		3. <i>Raphanus sativus</i> L.	4.00b±0.51	P	A	A	13.50	04	5.75	12.01	
07	Chenopodiaceae	1. <i>Chenopodium album</i> L.	3.14a±0.21	A	P	P	7.90	02	7.85	9.42	7.72
		2. <i>Chenopodium murale</i> L.	3.18a±0.20	P	A	P	8.75	04	7.85	9.56	
		3. <i>Salsola imbricata</i> Forssk.	1.37b±0.34	A	P	A	6.68	04	5.55	4.16	

S.No	Family	Weed species	Species Averg.	C 1	C 2	C 3	% Freq.	% De ns	% Cov.	I.V.	I.V. of Family
08	Euphorbiaceae	1. <i>Croton bonplandianus</i> Baill.	7.38b±0.75	A	P	A	7.50	06	11.67	14.75	22.14
		2. <i>Euphorbia helioscopia</i> L.	9.84b±0.48	P	P	A	52.50	21	72.50	29.54	
		3. <i>Euphorbia prostrata</i> Ait.	19.85a±1.06	A	P	A	57.85	11	78.98	59.56	
09	Malvaceae	1. <i>Gossypium herbaceum</i> L.	1.29b±0.10	A	P	A	5.00	01	2.00	3.88	11.04
		2. <i>Malvastrum coromendelianum</i> Garcke.	6.08 a±0.11	A	P	A	27.50	09	40.00	18.24	
10	Polygonaceae	1. <i>Polygonum plebejum</i> R.Br.	7.37a±0.27	P	A	A	42.85	08	50.75	22.13	14.76
		2. <i>Rumex dentatus</i> L.	2.46b±0.41	P	A	P	10.78	04	8.97	7.39	
11	Ranunculaceae	1. <i>Ranunculus sceleratus</i> L.	2.76b±0.38	A	A	P	12.50	05	9.95	8.30	15.40
		2. <i>Ranunculus laetus</i> Wall.	7.50a±0.51	P	A	A	10.50	04	32.85	22.50	
12	Zygophyllaceae	1. <i>Peganum hermala</i> L.	2.90b±0.59	P	A	A	27.35	04	11.23	8.72	12.29
		2. <i>Tribulus terrestris</i> L.	5.29a±0.18	A	P	P	26.42	08	30.35	15.87	
13	Asclepiadaceae	1. <i>Calotropis procera</i> (Ait.) Ait.f.	2.68±0.38	A	A	P	6.30	03	7.85	8.06	8.06
14	Boraginaceae	1. <i>Heliotropium curassavicum</i> L.	8.70±0.46	P	A	A	15.78	04	25.30	26.12	26.12
15	Capparidaceae	1. <i>Cleome viscosa</i> L.	4.78±0.61	A	P	A	23.00	08	18.00	14.30	14.30
16	Convolvulaceae	1. <i>Convolvulus arvensis</i> L.	17.86±0.72	P	P	P	70.25	32	75.65	53.58	53.58

S.No	Family	Weed species	Species Averg.	C 1	C 2	C 3	% Freq.	% Dens	% Cov.	I.V.	I.V. of Family
17	Cucurbitaceae	1. <i>Cucurbita maxima</i> Duch. ex Lam.	3.13±0.005	A	P	A	15.83	03	20.41	9.41	9.41
18	Cyperaceae	1. <i>Cyperus rotundus</i> L.	19.04±0.19	A	P	A	23.94	11	26.31	57.13	57.13
19	Fumariaceae	1. <i>Fumaria indica</i> (Husskn.) Pugsley	15.56±1.55	P	A	P	68.73	26	58.98	46.68	46.68
20	Gentianaceae	1. <i>Centaurium pulchellum</i> (Sw.) Druce.	18.55±1.22	P	A	A	27.68	05	12.00	55.66	55.66
21	Nyctaginaceae	1. <i>Boerhavia diffusa</i> L.	2.36±0.15	A	P	A	11.87	03	15.00	7.10	7.10
22	Oxalidaceae	1. <i>Oxalis corniculata</i> L.	7.20±0.30	P	A	P	33.75	08	27.87	21.60	21.60
23	Portulacaceae	1. <i>Portulaca oleracea</i> L.	2.21±0.12	A	P	A	1.25	04	56.25	6.65	6.65
24	Primulaceae	1. <i>Anagallis arvensis</i> L.	12.32±0.50	P	A	P	40.67	08	8.30	36.97	36.97
25	Rubiaceae	1. <i>Galium aparine</i> L.	5.74±0.42	A	A	P	30.25	13	25.32	17.23	17.23
26	Scrophulariaceae	1. <i>Mazus pumilus</i> Horn.	1.25±0.06	A	P	A	8.30	02	6.67	3.75	3.75
27	Tiliaceae	1. <i>Corchorus depressus</i> L.	11.93±0.55	P	P	A	34.11	14	35.00	35.80	35.80
28	Umbelliferae	1. <i>Foeniculum vulgare</i> Mill.	1.88±0.13	P	A	A	12.50	04	5.00	5.66	5.66
29	Verbenaceae	1. <i>Phyla nodiflora</i> (L.) Greene	19.04±0.55	A	P	A	23.94	11	26.31	57.13	57.13

Mean value of plant species in column followed by different letters within a family are significantly different at P = 0.05 according to Duncan's Multiple Range Test (Steel & Torrie, 1996).

C₁: Wheat crop C₂: Maize crop
 C₃: Potato crop % P: Presence of weed in particular crop
 A: Absence of weed in particular crop Freq.: Percentage frequency
 % Dens.: Percentage density % Cov.: Percentage cover
 I.V.: Importance value

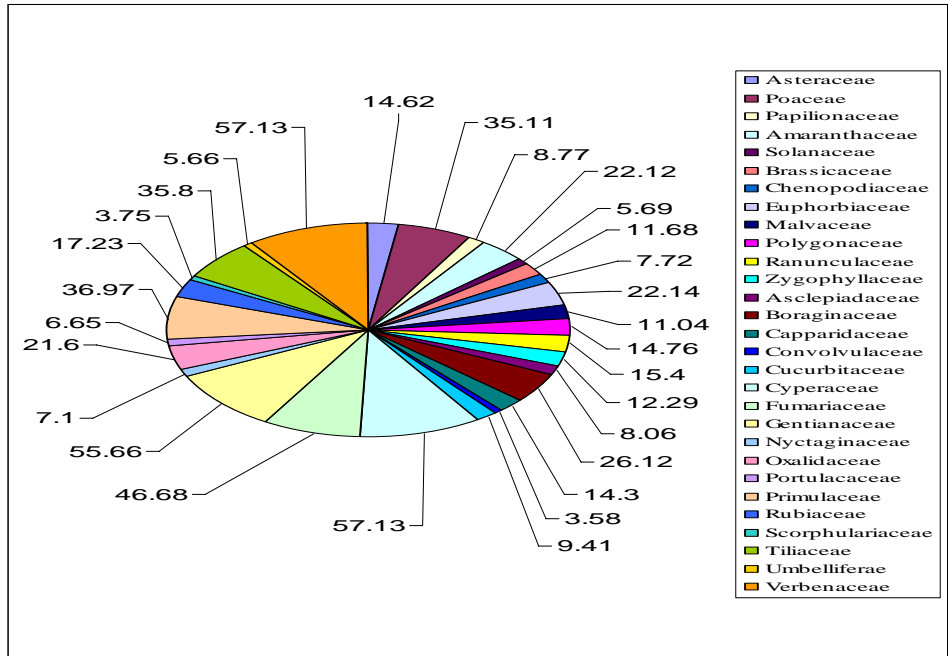


Fig. 2: Comparative Importance Value (I.V) of weed families of wheat, maize and potato crop fields of Tehsil Gojra, District Toba Tek Singh

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