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RESEARCH ARTICLE

CAMPARATIVE STUDY OF OOSTING SCALE OF WEED SPECIES FOUND IN SUGARCANE, MAIZE, RICE AND WHEAT FIELDS OF DISTRICT BANNU, KHYBER PAKHTUNKHWA, PAKISTAN

Rehman Ullah Khan¹, Sultan Mehmood Wazir¹, Sikandar Khan Sherwani², Saad ullah khan¹, Ihsan ullah¹, Aziz Khan¹ and Tasveer Zahra Bokhari³,

1. Department of Botany, University of Science & Technology Bannu, Pakistan.

2. Department of Microbiology, Federal Urdu University, Karachi-Pakistan.

3. Institute of Pure and Applied Biology BZU Multan

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Abstract

The research work presented was initiated during 2013 to get information and report common weeds found in cereal crops (Maize, Rice and Wheat) and sugarcane fields of District Bannu. The relative density of weeds was determined by using the Oosting scale method. As a whole about 135 weeds plant belonging to 37 families were collected, identified botanically, documented and preserved. The most common families in terms of abundance and number of species infesting above mention crops were Asteraceae (54%, 20 species), Poaceae (51%, 19 species), Amaranthaceae, Boraginaceae and Solanaceae (21%, 8 species). Papilionaceae, Brassicaceae and Euphorbiaceae (18.9%, 7 species). Malvaceae and Polygonaceae (13.5%, 5 species), Chenopodiaceae (10.8%, 4 species), Plantaginaceae (8%, 3 species). Verbenaceae, Genetaceae, Convolvulaceae, Cucurbitaceae, Caryophyllaceae, Apiaceae, and Asclepiadaceae (5.4%, 2 species). The rest of the families were represented by 2.7% with only one species each.

According to Oosting Scale *Cynodon dactylon*, *Echinochloa crus-galli*, *Eclipta alba*, *Enneapogon avrnuceus* and *Leptochloa panicea* observed very abundant (Class V) weeds in sugarcane field while *Amaranthus viridis*, *Alopecurus nepalensis*, *Carduus argentatus*, *Cirsium arvense*, *Cyperus rotundus*, *Dichanthium annulatum*, *Eleusine indica*, *Oxalis corniculata*, *Parthenium hysterophorus*, *Phalaris minor*, *Polygonum barbatum*, *Sorghum halepense* occurred in class IV (Abundant). In wheat very plentiful weed were *Cynodon dactylon* while *Asphadelus tunifolius*, *Astragalus hamosus*, *Convolvulus arvensis*, *Euphorbia oblongata*, *Euphorbia helioscopia*, *Psammogeton biternatum*, *Silene vulgaris* and *Trigonella corniculata* were weeds occurred in large quantities in wheat. In Maize the dominant weed was *Cynodon dactylon*. The weeds happened abundantly in Maize fields were *Aristida cyanantha*, *Cyperus rotundus*, *Eleusine indica*, *Leptochloa panacea* and *Tribulus terrestris*. This was effect on the crop yield. In Rice, *Cynodon dactylon* and *Cyperus rotundus* were plentiful weeds.

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Introduction

Bannu is a district of Khyber Pakhtoonkhwa. It is sited at a distance of 190 km, in the South of Peshawar. It lies between 32.43 to 33.06 North latitude and from 70.22 to 70.57 East longitudes. It is bordered in the North by the Tribal Area and in the East by district Karak, while in the South by Lakki

Marwat of Bannu district. The district has a total area of 1227 square kilometers. Its population is more than half a million (700000). Greater part of the population live in villages but still the Urban area is filled to capacity with people. The climate of district Bannu is warm in summer and cold in winter. The summer season starts from May till mid of August.

May and June are hottest months of the area. In July and August the weather is hot and moist while June is the hottest month with mean min and max temperature 30 C° and 42 C° respectively. Winter months are December, January and February. The mean maximum Rainfall occurs during the month of August i.e. 111.36 millimeters. Bannu's Land is fertile. By the grace of Almighty enough water is available to cultivate these lands. About 45% area of the district is irrigated mostly through canals while 10 % people have their own tube wells for the purpose of irrigation. That's why abundant crops of both summer and winter seasons are harvested each year. The rest of the soil consists of rain fed area. Important canals are Kachkot, Vial Ghulam Muhammad, Vial Durana Khan, Vial Shah and Rura canal. The area has a broad spectrum of plant biodiversity. There is no regular forestation in Bannu district. The distribution of trees is of patchy type. The major crop species of district Bannu are *Triticum aestivum* L. (Wheat), *Zea mays* L. (Maize), *Oryza sativa* L. (Rice), *Hordium vulgare* L. (Barly) and *Saccharum officinarum* L. (Sugarcane).

Weeds are strong competitors, for water, nutrients, space and light, to cereal crops because of their profuse growth in different environmental conditions and are considered to be the hidden enemies of crops that cause huge losses to crop yields Rs. 115 to 200 billion annually (Atta & Khaliq, 2002). Hamid *et al.*, (1998) reported that weed competition in cereal crop decreased yield by 42-56%. A number of studies have been conducted on the weed flora of cereal crops from different regions of Pakistan (Hussain *et al.*, 2004; Mohammad *et al.*, 2005; Naveed & Hussain, 2007; Qureshi *et al.*, 2009 and Waheed *et al.*, 2009), from Peshawar (Hussain *et al.*, 1985), Abbotabad (Hashim and Marwat, 2002), Chitral (Hussain *et al.*, 2004), District Bannu (Khan *et al.*, 2004), Qambar village from Swat (Akhtar and Hussain, 2007) and District Karak (Wazir *et al.*, 2007). The distribution, density and frequency percentage of weed species of wheat and rice crop of Khairpur district was determined by Memon *et al.*, (2003). Present paper is an attempt to provide the checklist of fully identified problematic weeds of different crops (*Triticum aestivum* L. (Wheat), *Zea mays* L. (Maize), *Oryza sativa* L. (Rice) and *Saccharum officinarum* L. (Sugarcane) of District Bannu which may provide an idea for future strategies for weed management in light of the findings.

Material and Methods

The present study was conducted during 2013. The weeds were collected from different fields. Specimen collection and preservation were made according to

standard protocols. Several field trips (regularly twice in a month) were arranged during 2013 to the experimental area. The collected specimens were pressed, dried, and mounted on herbarium sheets. The specimens were then identified. The identification was also confirmed using Flora of Pakistan and other related literature (e.g. Stewart 1972; Nasir and Ali, 1971-2007). Results were re-checked and compared with literature (e.g. Rubina, 1998; Ali and Fefevre, 1996; Khalid, 1995).

Weed species distribution The distribution of specimens was calculated by using Oosting (1956) scale.

S.No	Class	Rarity
1.	Class I	Very Rare
2.	Class II	Rare
3.	Class III	Infrequent
4.	Class IV	Abundant
5.	Class V	Very abundant

Table 1. Oosting (1956) Scale

Result and Discussion

In the present research work the relative density of weeds was determined using the Oosting scale method. As a whole about 135 weeds plant belonging to 37 families were collected, identified botanically, documented and preserved.

Oosting Scale in Sugarcane fields:

According to Oosting Scale, *Cynodon dactylon* (L.) Pers., *Echinochloa crus-galli* (L.) Pers., *Eclipta alba* (L.) Hassk. Beauv., *Enneapogon avenaceus* and *Leptochloa panicea* (Retz) Ohwi were observed very abundant (Class V) weeds in sugarcane field while *Amaranthus viridis* L., *Alopecurus nepalensis* Trin Ex, *Carduus argentatus* L., *Cirsium arvense* (L) Scop, *Cyperus rotundus* L., *Dichanthium annulatum* Forssk, *Eleusine indica* (L) Gaertn, *Oxalis corniculata* L., *Parthenium hysterophorus* L., *Phalaris minor* Retz, *Polygonum barbatum* L., *Sorghum halepense* (L.) Pers occurred in class IV (Abundant)

Achyranthes aspera L., *Achyranthes japonica* (Miq) Nakai, *Alternanthera sessilis* (L) R.Br.Ex.Dc, *Boerhavia procumbens* Banks ex Roxb, *Chenopodium album* L., *Chenopodium murale* L, *Convolvulus arvensis* L, *Conyza bonariensis* (L.) Cronquist, *Euphorbia helioscopia* L., *Medicago sativa* L., *Melilotus parviflora/ indica* (L) All, *Phyllanthus nodiflora* Linn, *Phyllanthus niruri* L., *Physalis angulata* L, *Poe bulbosa* L., *Polygonum biaristatum* Aitch and Hemsl, *Rumex dentatus* (Meisn) Rech.f,

Sonchus asper (L.) Hill, *Vicia hirsute* (L.) S.F. Gray. Nat. and *Xanthium strumarium* L. are found infrequent (class III) while the remaining weeds species are found very rare in sugarcane field.

Oosting Scale in wheat crops:

According to Oosting Scale *Cynodon dactylon* observed very abundant weed in wheat field. *Asphodelus tunifolius*, *Astragalus hamosus*, *Convolvulus arvensis*, *Euphorbia oblongata*, *Euphorbia helioscopia*, *Psammogeton bitermum*, *Silene vulgaris* and *Trigonella corniculata* occurred abundant weeds in wheat. *Amaranthus viridis*, *Aristida adscensionis*, *Atriplex stoksii*, *Avena fatua*, *Carduus argentatus*, *Carthamus persicus*, *Chenopodium murale*, *Cirsium arvense*, *Cyperus rotundus*, *Datura alba*, *Euphorbia prostrata*, *Farsetia jacquemontii*, *Galium tricarne*, *Hypocoum pendulum*, *Lathyrus aphaca*, *Launaea angustifolia*, *L. procumbens*, *Malcomia africana*, *Medicago polymorpha*, *Melilotus indica*, *Nonea philistaea*, *Oligomeris linifolia*, *Onosma chitralicum*, *Oxyria digyna*, *Pegnum harmala*, *Phalaris minor*, *Plantago lanceolata*, *Poa bulbosa*, *Polygonum biaristatum*, *P. plebejum*, *Ranunculus muricatus*, *Rumex dentatus*, *Sisymbrium irio*, *Sonchus asper*, *Solanum surattense*, *Taraxacum officinale*, *Tribulus terrestris*, *Verbena officinalis* and *Vicia hirsuta* found infrequent weeds in wheat crops. *Aerva javanica*, *Alopecurus nepalensis*, *Anagallis arvensis*, *Boerhavia procumbens*, *Calendula officinalis*, *Calotropis procera*, *Citrullus colocynthis*, *Conyza bonariensis*, *Cymbopogon distensa*, *Eragrostis pilosa*, *Fagonia cretica*, *Filago pyramidata*, *Fumeria indica*, *Heliotropium europaeum*, *Hyoscyamus niger*, *Ifloga spicata*, *Linum corymbulosum*, *Malva neglecta*, *Neslia apiculata*, *Nonea pulla*, *Parthenium hysterophorus*, *Plantago ovate*, *Portulaca oleracea*, *Setaria pumila*, *Spergula fallax*, *Torilis nodosa*, *Trichosanthes dioica* and *Withania coagulans* found rare weeds in wheat crop. *Alhagi maurorum*, *Amaranthus blitoides*, *Aristida cyanantha*, *Arnebia hispidissima*, *Brassica tournefortii*, *Carthamus tinctorius*, *Celosia argentea*, *Centaurea iberica*, *Centaureum pulchellum*, *Cistanche tubulosa*, *Convolvulus spicatus*, *Echinops echinatus*, *Eruca sativa*, *Heliotropium strigosum*, *Nerium indicum*,

Saccharum arundinaceum and *Zeuxine strateumatica* found very rare weeds in wheat crop.

Oosting Scale in maize crops:

In Maize the more common weed is *Cynodon dactylon*, which occurred very abundant. *Aristida cyanantha*, *Cyperus rotundus*, *Eleusine indica*, *Leptochloa panacea* and *Tribulus terrestris* occurred abundant weeds in maize crops. *Achyranthes aspera*, *Aerva javanica*, *Boerhavia procumbens*, *Cenchrus ciliaris*, *Convolvulus arvensis*, *Conyza bonariensis*, *Corchorus depressus*, *Dichanthium annulatum*, *Digera muricata*, *Dinebra retroflexa*, *Echinochloa crus-galli*, *Eragrostis pilosa*, *Euphorbia prostrata*, *Heliotropium europaeum*, *Lactuca serriola*, *Malvastrum coromendelianum*, *Nicotiana plumbaginifolia*, *Parthenium hysterophorus*, *Poa botryoides*, *Portulaca oleracea* and *Sorghum halepense* occurred infrequent weeds in maize crops. *Amaranthus viridis*, *Atriplex stocksii*, *Chenopodium murale*, *Chrozophora plicata*, *Cirsium arvense*, *Citrullus colocynthis*, *Croton bonplandianus*, *Datura alba*, *Euphorbia helioscopia*, *Galium tricarne*, *Heliotropium crispum*, *Iris lacteal*, *Oligomeris linifolia*, *Oxalis corniculata*, *Ranunculus muricatus*, *Solanum surattense*, *Sonchus asper* and *Withania somnifera* occurred rare weeds in maize crops.

Oosting Scale in rice crops:

Cynodon dactylon and *Cyperus rotundus* occurred abundant weeds in rice crops. *Achyranthes aspera*, *Aerva javanica*, *Conyza bonariensis*, *Corchorus depressus*, *Digera muricata*, *Dinebra retroflexa*, *Echinochloa crus-galli*, *Euphorbia prostrata*, *Iris lacteal*, *Lactuca serriola*, *Malvastrum coromendelianum*, *Parthenium hysterophorus*, *Poa botryoides*, and *Sorghum halepense* occurred infrequent weeds in rice crops. *Cirsium arvense*, *Convolvulus arvensis*, *Datura alba*, *Dichanthium annulatum*, *Euphorbia helioscopia*, *Nicotiana plumbaginifolia*, *Oligomeris linifolia*, *Setaria pumila* and *Verbena officinalis* occurred rare weeds in rice crops. *Oxalis corniculata*, *Plantago lanceolata*, *Sonchus asper* and *Xanthium strumarium* occurred very rare weeds in rice crops.

Table-1. Comparative study of Oosting (1956) scale of weed species found in sugarcane, Maize, Rice and Wheat fields in district Bannu.

S.NO	Botanical Name	Family	S	M	R	W
1.	<i>Abutilon indicum</i> (L.) sweet	Malvaceae	II	-	-	-
2.	<i>Achyranthes aspera</i> L.	Amaranthaceae	III	III	III	-
3.	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	III	III	-	-
4.	<i>Aerva javanica</i> (Burm. f.) Juss.	Amaranthaceae	-	III	III	II
5.	<i>Alhagi maurorum</i> Medic.	Papilionaceae	-	-	-	I
6.	<i>Alopecurus nepalensis</i> Trin Ex	Poaceae	IV	-	-	II

7.	<i>Alternanthera sessilis</i> (L.) R.Br.Ex.Dc	Amaranthaceae	III	-	-	-
8.	<i>Amaranthus blitoides</i> S. Watson	Amaranthaceae	I	-	-	I
9.	<i>Amaranthus viridis</i> L.	Amaranthaceae	IV	II	-	III
10.	<i>Anagallis arvensis</i> L.	Primulaceae	II	-	-	II
11.	<i>Aristida adscensionis</i>	Poaceae	-	-	-	III
12.	<i>Aristida cyanantha</i> Nees ex Steud.	Poaceae	-	IV	-	I
13.	<i>Arnebia hispidissima</i> (Lehm.) A. DC.	Boraginaceae	-	-	-	I
14.	<i>Asphadelus tunifolius</i> Car.	Asphodelaceae	I	-	-	IV
15.	<i>Astragalus hamosus</i> L.	Papilionaceae	II	-	-	IV
16.	<i>Atriplex stocksii</i> Boiss.	Chenopodiaceae	-	II	-	-
17.	<i>Avena fatua</i> L.	Poaceae	I	-	-	III
18.	<i>Boerhavia procumbens</i> Banks ex Roxb	Nyctaginaceae	III	III	-	II
19.	<i>Brassica campestris</i> L.	Brassicaceae	II	-	-	I
20.	<i>Brassica tournefortii</i> Gouan	<u>Brassicaceae</u>	=	=	=	I
21.	<i>Calendula officinalis</i> L.	<u>Asteraceae</u>	=	=	=	II
22.	<i>Calotropis procera</i> (willd.) R. Br.	Asclepiadaceae	-	-	-	II
23.	<i>Carduus argentatus</i> L.	Asteraceae	IV	-	-	III
24.	<i>Carthamus persicus</i> Willd	<u>Asteraceae</u>	=	=	=	III
25.	<i>Carthamus tinctorius</i> L.	<u>Asteraceae</u>	=	=	=	I
26.	<i>Celosia argentea</i> L.	Amaranthaceae	-	-	-	I
27.	<i>Cenchrus ciliaris</i> L.	Poaceae	-	III	-	-
28.	<i>Centaurea iberica</i> Spreng.	<u>Asteraceae</u>	=	=	=	I
29.	<i>Centaurium pulchellum</i> (Sw.) Druce	Gentianaceae	-	-	-	I
30.	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae	I	-	-	-
31.	<i>Chenopodium album</i> L.	Chenopodiaceae	III	II	-	-
32.	<i>Chenopodium murale</i> L.	Chenopodiaceae	III	II	-	III
33.	<i>Chrozophora plicata</i> (Vahl) A. Juss. ex Spreng	Euphorbiaceae	-	II	-	-
34.	<i>Cirsium arvense</i> (L.) Scop	Asteraceae	IV	II	II	III
35.	<i>Cistanche tubulosa</i> (Shehenk.) Wight.	Orobanchaceae	-	-	-	I
36.	<i>Citrullus colocynthis</i> (L.) Shred.	Cucurbitaceae	-	II	-	II
37.	<i>Convolvulus arvensis</i> L.	Convolvulaceae	III	III	II	IV
38.	<i>Convolvulus spicatus</i> Hallier F	Convolvulaceae	II	-	-	I
39.	<i>Conyza bonariensis</i> (L.) Cronquist	Asteraceae	III	III	III	II
40.	<i>Corchorus depressus</i> (L.) Stocks	Tiliaceae	I	III	III	-
41.	<i>Croton bonplandianus</i> Bat.	Euphorbiaceae	-	II	-	-
42.	<i>Cymbopogon distense</i> Schutt.	Poaceae	-	-	-	-
43.	<i>Cynodon dactylon</i> (L.) Pers	Poaceae	V	V	IV	V
44.	<i>Cyperus rotundus</i> L.	Cyperaceae	IV	IV	IV	III
45.	<i>Datura alba</i> Nees.	Solanaceae	-	II	II	III
46.	<i>Dichanthium annulatum</i> Forssk	Poaceae	V	III	II	-
47.	<i>Digera muricata</i> (L.) Mart	Amaranthaceae	-	III	III	-
48.	<i>Dinebra retroflexa</i> (Vahl) Panzer	Poaceae	-	III	III	-
49.	<i>Echinochloa crus-galli</i> (L.) P. Beauv	Poaceae	V	III	III	-
50.	<i>Echinops echinatus</i> L.	Asteraceae	II	-	-	I
51.	<i>Eclipta alba</i> (L.) Hassk.	Asteraceae	V	-	-	-
52.	<i>Eleusine indica</i> (L.) Gaertn	Asteraceae	IV	IV	-	-
53.	<i>Enneapogon avrnuceus</i> (Lindl.) C. E. Hubbard	Poaceae	V	-	-	-
54.	<i>Eragrostis pilosa</i> (L.) P. Beauv.	Poaceae	-	III	-	II
55.	<i>Eruca sativa</i> Mill.	Brassicaceae	-	-	-	I
56.	<i>Erythraea ramosissima</i> DC, Prodr	Gentianaceae	II	-	-	-
57.	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	III	II	II	IV
58.	<i>Euphorbia oblongata</i> Griseb.	Euphorbiaceae	-	-	-	IV
59.	<i>Euphorbia prostrata</i> Ait.	Euphorbiaceae	-	III	III	III
60.	<i>Fagonia cretica</i> L.	Zygophyllaceae	-	-	-	II
61.	<i>Farsetia jacquemontii</i> (Hook.f. & Thoms.) Jafri	Brassicaceae	-	-	-	III

62.	<i>Filago pyramidata</i> L.	Asteraceae	-	-	-	II
63.	<i>Fumaria parviflora</i> Lamarck	Fumariaceae	I	-	-	II
64.	<i>Galium tricornes</i> Stokes	Boraginaceae	II	II	-	III
65.	<i>Helianthus annuus</i> L.	Asteraceae	I	-	-	-
66.	<i>Heliotropium crispum</i> Desf.	Boraginaceae	-	II	-	-
67.	<i>Heliotropium europaeum</i> (F. & M.) Kazmi	Boraginaceae	-	III	-	II
68.	<i>Heliotropium strigosum</i> Willd.	Boraginaceae	-	-	-	I
69.	<i>Hibiscus trionum</i> L.	Malvaceae	I	-	-	-
70.	<i>Hyoscyamus niger</i> L.	Solanaceae	-	-	-	II
71.	<i>Hypecoum pendulum</i> L.	Papaveraceae	-	-	-	III
72.	<i>Ifloga spicata</i> Forssk.	Asteraceae	-	-	-	II
73.	<i>Iris lactea</i> Pallas	Iridaceae	-	II	III	-
74.	<i>Lactuca serriola</i> L.	Asteraceae	-	III	III	-
75.	<i>Lathyrus aphaca</i> Linn.	Papilionaceae	I	-	-	III
76.	<i>Launaea angustifolia</i> (Desf.) Kuntze	Asteraceae	-	-	-	III
77.	<i>Launaea procumbens</i> Pravin Kawale	Asteraceae	II	-	-	III
78.	<i>Leptochloa panicea</i> (Retz) Ohwi	Poaceae	V	IV	-	-
79.	<i>Linum corymbulosum</i> Reichenb.	Linaceae	-	-	-	II
80.	<i>Malcolmia Africana</i> (L.) R.Br.	Brassicaceae	-	-	-	III
81.	<i>Malva neglecta</i> Wallr	Malvaceae	-	-	-	II
82.	<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	II	II	III	-
83.	<i>Medicago polymerpha/ sativa</i> L.	Papilionaceae	III	-	-	III
84.	<i>Melilotus parviflora/ indica</i> (L) All	Papilionaceae	III	-	-	III
85.	<i>Nerium indicum</i> Mill.	Apocynaceae	-	-	-	I
86.	<i>Neslia apiculata</i> Fisch.	Brassicaceae	-	-	-	II
87.	<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae	II	III	II	-
88.	<i>Nonea philistaea</i> Boiss.	Boraginaceae	-	-	-	III
89.	<i>Nonea pulla</i> (L.) DC.	Boraginaceae	-	-	-	II
90.	<i>Oligomeris linifolia</i> (Vahl.) Macbride	Resedaceae	-	II	II	III
91.	<i>Onosma chitralicum</i> I. M. Johnston	Boraginaceae	-	-	-	III
92.	<i>Oxalis corniculata</i> L.	Oxalidaceae	IV	II	I	-
93.	<i>Oxyria digyna</i> (L.) Hill	Polygonaceae	-	-	-	III
94.	<i>Parthenium hysterophorus</i> L.	Asteraceae	IV	III	III	II
95.	<i>Pegnum harmala</i> L.	Zygophyllaceae	-	-	-	III
96.	<i>Phalaris minor</i> Retz	Poaceae	IV	-	-	III
97.	<i>Phyla nodiflora</i> Linn	Verbenaceae	III	-	-	-
98.	<i>Phyllanthus niruri</i> L.	Euphorbiaceae	III	-	-	-
99.	<i>Physalis angulata</i> L	Solanaceae	III	-	-	-
100.	<i>Plantago lanceolata</i> L.	Plantaginaceae	II	-	I	III
101.	<i>Plantago ovate</i> Forssk	Plantaginaceae	-	-	-	II
102.	<i>Poa botryoides</i> (Trin. ex Griseb.) Kom.	Poaceae	-	III	III	-
103.	<i>Poe bulbosa</i> L.	Poaceae	III	-	-	III
104.	<i>Polygonum barbatum</i> L.	Polygonaceae	IV	-	-	-
105.	<i>Polygonum biaristatum</i> Aitch and Hemsl	Polygonaceae	III	-	-	III
106.	<i>Polygonum plebejum</i> R.Br	Polygonaceae	II	-	-	III
107.	<i>Portulaca oleracea</i> L.	Aizaaceae	II	II	-	II
108.	<i>Psammogeton biternatum</i> Edgew.	Apiaceae	-	-	-	IV
109.	<i>Ranunculus muricatus</i> L.	Ranunculaceae	II	II	-	III
110.	<i>Ricinus communis</i> Linn.	Euphorbiaceae	II	-	-	-
111.	<i>Rumex dentatus</i> (Meisn)Rech.f	Polygonaceae	III	-	-	III
112.	<i>Sacharum arundinaceum</i> H. K. F	Poaceae	-	-	-	I
113.	<i>Salvia plebeia</i> R.Br	Lamiaceae	II	-	-	-
114.	<i>Setaria pumila</i> (Poir.) Poam	Poaceae	II	-	II	II
115.	<i>Sida cardifolia</i> L.	Malvaceae	II	-	-	-

116.	<i>Silene vulgaris</i> (Moench) Garcke,	Caryophyllaceae	-	-	-	IV
117.	<i>Sisymbrium irio</i> L.	Brassicaceae	-	-	-	III
118.	<i>Solanum nigrum</i> L.	Solanaceae	I	-	-	-
119.	<i>Solanum surattense</i> Burm. F	Solanaceae	I	II	-	III
120.	<i>Sonchus asper</i> (L.) Hill	Asteraceae	III	II	I	III
121.	<i>Sorghum halepense</i> (L.) Pers	Poaceae	IV	III	III	-
122.	<i>Spergula fallax</i> (Lowe) E. H. L. Krause	Caryophyllaceae	-	-	-	II
123.	<i>Taraxacum officinale</i> F.H Wiggers	Asteraceae	II	-	-	III
124.	<i>Torilis nodosa</i> (L.) Gaertn.	Apiaceae	II	-	-	II
125.	<i>Tribulus terrestris</i> L.	Zygophyllaceae	-	IV	-	III
126.	<i>Trichosanthes dioica</i> Roxb	Cucurbitaceae	-	-	-	II
127.	<i>Trigonella corniculata</i> (L.) Linn.	Papilionaceae	-	-	-	IV
128.	<i>Typha orientallis</i> C.Presl	Typhaceae	II	-	-	-
129.	<i>Verbena officinalis</i> L.	Verbenaceae	II	-	II	III
130.	<i>Veronica agrestis</i> L.	Plantaginaceae	II	-	-	-
131.	<i>Vicia hirsute</i> (L) S.F. Gray.Nat.	Papilionaceae	III	-	-	III
132.	<i>Withania coagulans</i> Dunal.	Solanaceae	-	-	-	II
133.	<i>Withania somnifera</i> L.	Solanaceae	IV	II	-	-
134.	<i>Xanthium strumarium</i> L.	Asteraceae	III	-	I	-
135.	<i>Zeuxine strateumatica</i> (L.) Schlechter	Orchidaceae	-	-	-	I

Key: S= Sugarcane, M= Maize, R=Rice, W= Wheat, _ = Absence of weed,

Class I=Very Rare, Class II=Rare, Class III=Infrequent, Class IV=Abundant, Class V=Very abundant

Table-2. Percentage of different weed species families.

S.No	Family	No of plants	% age
1.	Asteraceae	20	54.1
2.	Poaceae	19	51.4
3.	Amaranthaceae	8	21.6
4.	Boraginaceae	8	21.6
5.	Solanaceae	8	21.6
6.	Brassicaceae	7	18.9
7.	Euphorbiaceae	7	18.9
8.	Papilionaceae	7	18.9
9.	Malvaceae	5	13.5
10.	Polygonaceae	5	13.5
11.	Chenopodiaceae	4	10.8
12.	Plantaginaceae	3	8.1
13.	Zygophyllaceae	3	8.1
14.	Apiaceae	2	5.4
15.	Asclepiadaceae	2	5.4
16.	Caryophyllaceae	2	5.4
17.	Convolvulaceae	2	5.4
18.	Cucurbitaceae	2	5.4
19.	Gentianaceae	2	5.4
20.	Verbenaceae	2	5.4
21.	Aizaaceae	1	2.7
22.	Apocynaceae	1	2.7
23.	Cyperaceae	1	2.7

24.	Fumariaceae	1	2.7
25.	Iridaceae	1	2.7
26.	Lamiaceae	1	2.7
27.	Linaceae	1	2.7
28.	Nyctaginaceae	1	2.7
29.	Orchidaceae	1	2.7
30.	Orobanchaceae	1	2.7
31.	Oxalidaceae	1	2.7
32.	Papaveraceae	1	2.7
33.	Primulaceae	1	2.7
34.	Ranunculaceae	1	2.7
35.	Resedaceae	1	2.7
36.	Tiliaceae	1	2.7
37.	Typhaceae	1	2.7

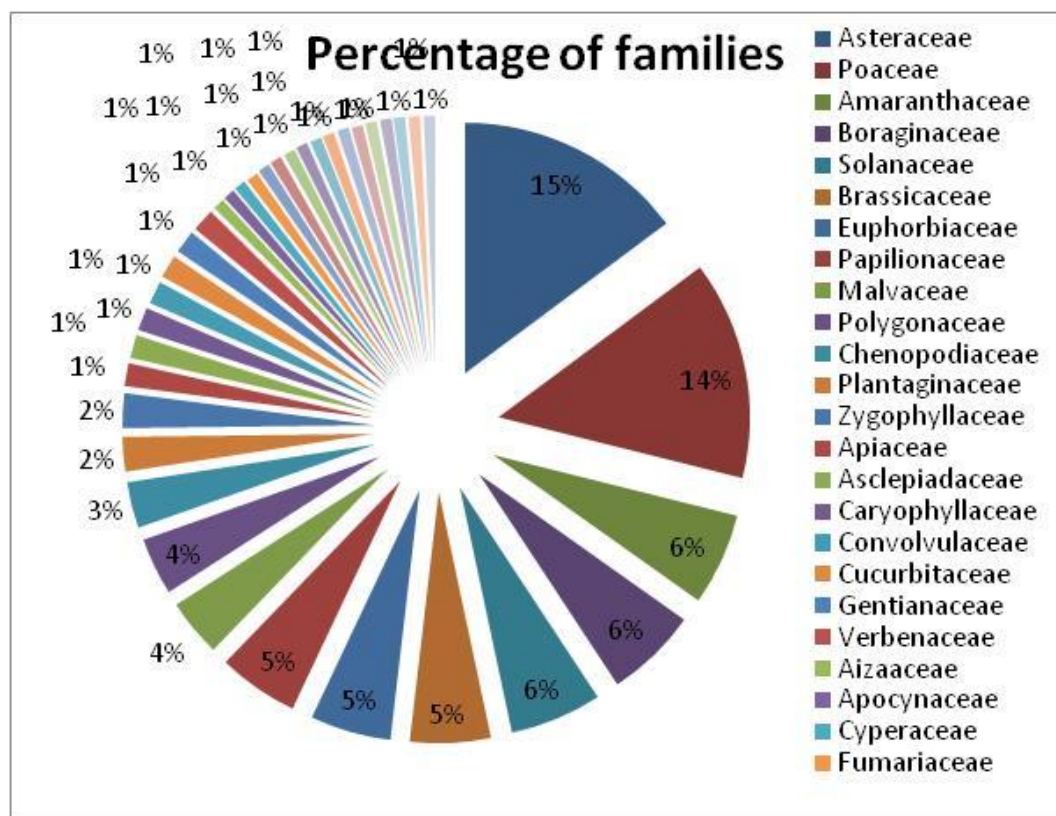


Fig.1 Percentage of weeds families in four major crops of distrikt Bannu.

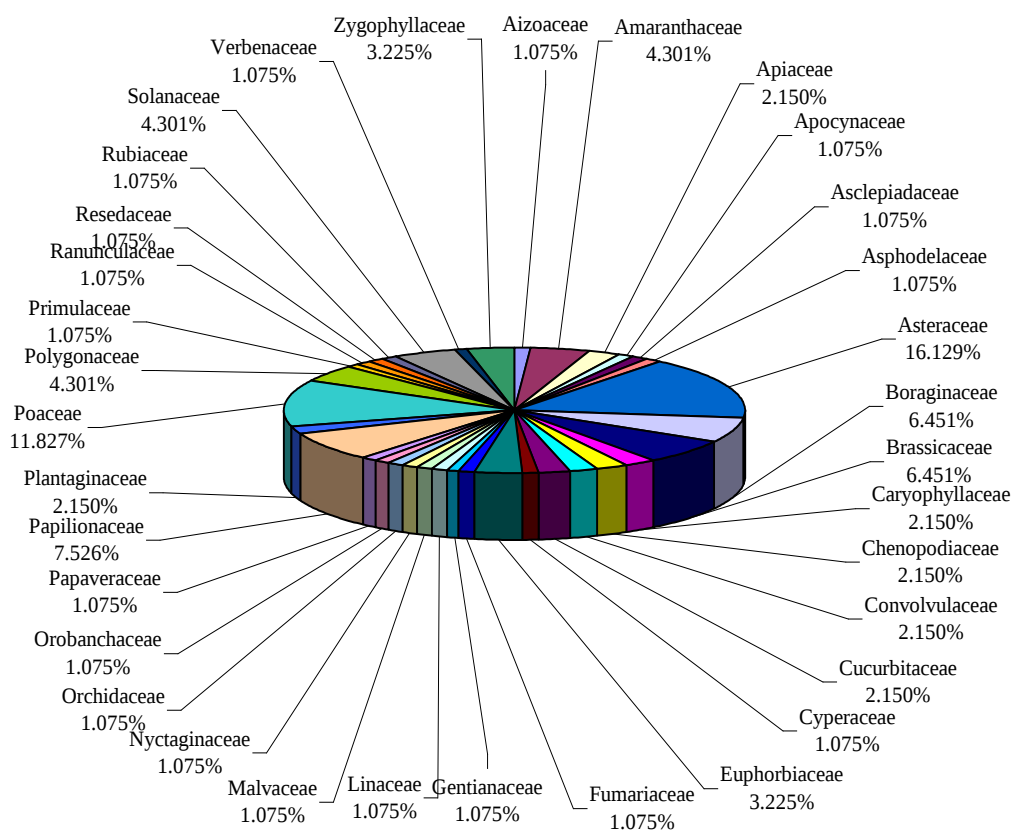


Fig.2. Family percentage data of weeds in wheat crops.

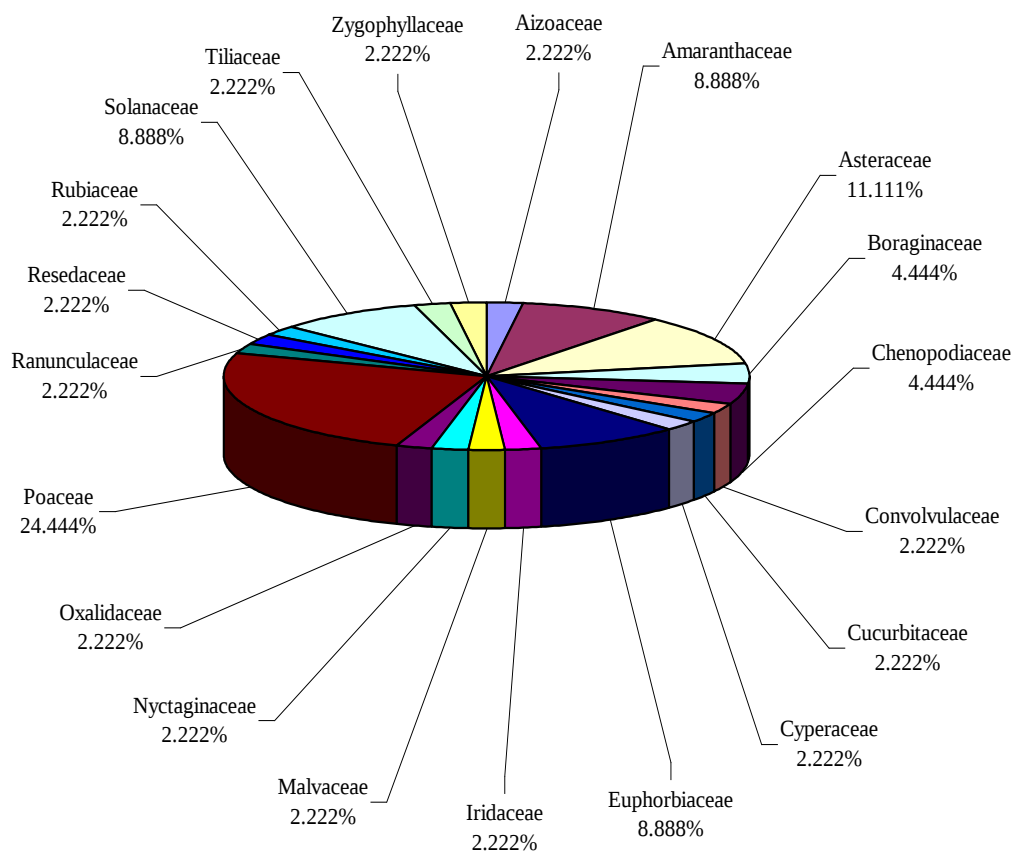


Fig.3. Family percentage data of weeds in maize crops.

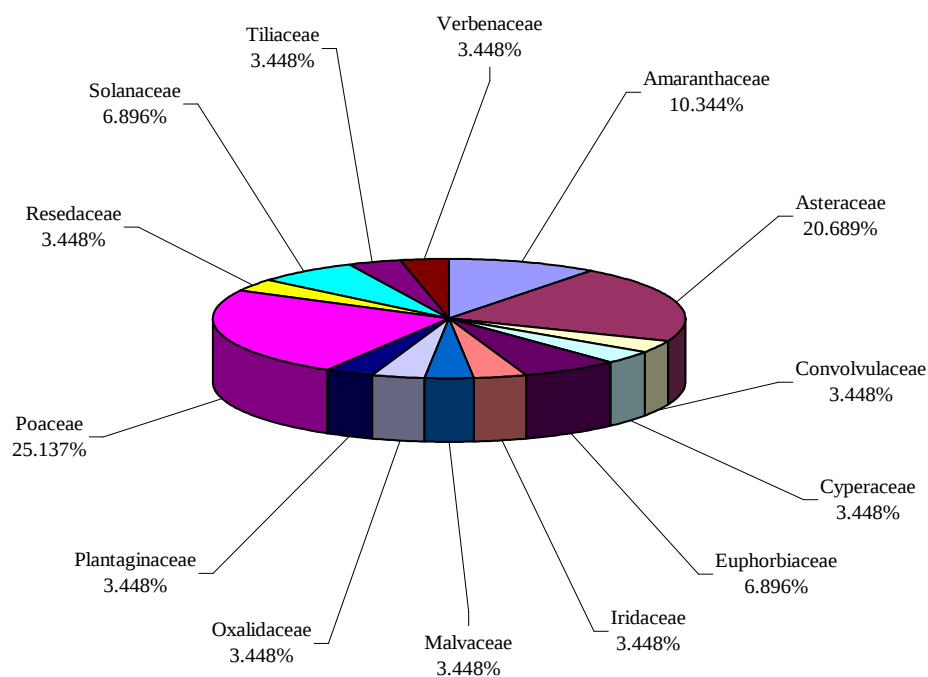


Fig:4. Family percentage data of weeds in rice crops.

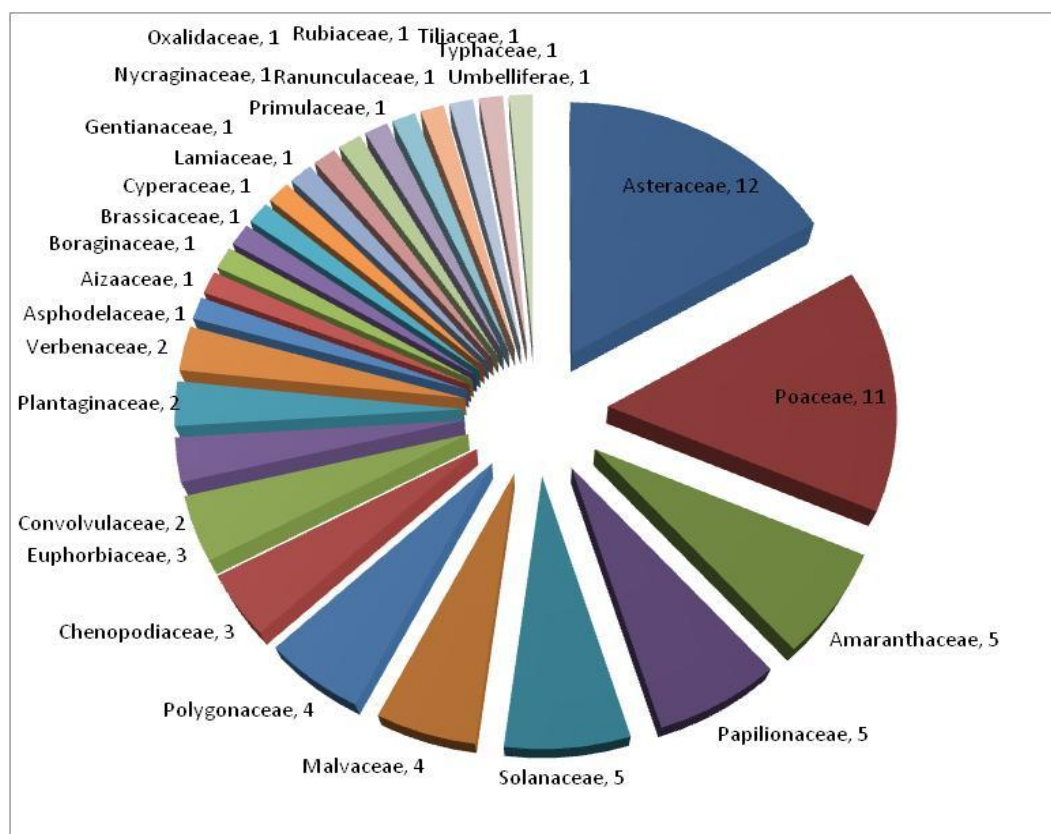


Fig.5 Percentage of weeds families in Sugarcane field of district Bannu.

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