

IDENTIFICATION OF COMMON WEEDS AND ITS DISTRIBUTION PATTERN IN WHEAT FIELDS OF FR BANNU, KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

Identification of weeds is a prerequisite for an effective weed management strategy in an area. In a preliminary study in this regard, ninety three species of 82 genera belonging to 34 families were identified as weeds of wheat fields of FR Bannu. The surveys were conducted during 2009-10 in district Bannu. Out of the 34 weed families, there were four monocot families (having 13 genera & 14 species) and 30 families were dicots (including 69 genera & 79 species). The most important family in terms of abundance and most number of species infesting wheat crop was Asteraceae with 13 genera and 15 species; followed by Poaceae (10 genera & 11 species), Papilionaceae (7 genera & 7 species), Boraginaceae (4 genera & 6 species), Brassicaceae (6 genera & 6 species), Amaranthaceae (3 genera & 4 species), Polygonaceae (3 genera & 4 species), Solanaceae (4 genera & 4 species), Euphorbiaceae (1 genus & 3 species), Zygophyllaceae (3 genera & 3 species), Apiaceae (2 genera & 3 species), Caryophyllaceae (2 genera & 2 species), Chenopodiaceae (2 genera & 2 species), Convolvulaceae (1 genus & 2 species), Cucurbitaceae (2 genera & 2 species), Plantaginaceae (1 genus & 2 species). The rest of the families were represented by only one species each. According to the oosting scale, *Cynodon dactylon* was the most abundant weed species in wheat fields followed by *Asphodelus tenuifolius*, *Astragalus hamosus*, *Convolvulus arvensis*, *Euphorbia oblongata*, *Euphorbia helioscopia*, *Psammogeton biternatum*, *Silene vulgaris* and *Trigonella corniculata* which were reported as significantly reducing wheat yields in the locality.

Key words: Distribution, FR Bannu, occurrence, weeds, wheat

INTRODUCTION

Wheat (*Triticum aestivum*) belongs to family poaceae, widely cultivated as a staple food crop producing good yields per unit area. The popularity of foods made from wheat flour creates a large demand for the grains production, even in economies with significant food surpluses. Wheat normally needs 180 days between planting and

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harvest, depending upon climate, seed type, and soil conditions (winter wheat lies dormant during winter freeze). Optimal crop management requires that the farmers should have a detailed and good understanding of each stage of development in the growing plants. In particular, spring fertilizers, herbicides, fungicides, growth regulators are typically applied only at specific stages of plant development.

Wheat is rich in carbohydrate and amazingly provides daily requirement of energy. It has a wide range of culinary uses, for making of breads, pasta and cakes and fermentation of alcoholic beverages. Wheat contains Manganese, Phosphorus, Magnesium and Selenium in very large quantities. It is rich in Zinc, Copper, Iron and Potassium. Vitamins like B₆, Niacin, Thiamin, Folate, Riboflavin and Pantothenic Acid. Vitamin E and Vitamin K are also present in small amounts. Any plant occurring at wrong place is known as weed. The concept of weeds as unwanted plants was born when man started to deliberately grow plants for their food.

Weeds are strong competitors to cereal crops because of their profuse growth in different environmental conditions. That weed which shows best growth always acts as best competitor and tends to dominate the crop. Weeds decrease crop yields by competing for water, nutrients, space and light.

Some weeds are allelopathic which further aggravate the losses in crop yields. Earlier on the weeds of wheat fields from Peshawar (Hussain *et al.*, 1985), Hazro (Hussain *et al.*, 1998), 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) were reported. Generally, one kilogram of weed biomass corresponds to a loss of one kilograss in crop biomass (Rao, 2000).

Bannu Division including F.R. Bannu, located in Khyber Pakhtunkhwa province of Pakistan, is surrounded in North by the Tribal Areas and in the East by Karak district; while in the South by Lakki Marwat. The total area of the district including FR Bannu is 1227 square kilometers.

Most of the areas of FR Bannu are arid and rainfall dependant. However, some parts of Baka Khel area are irrigated with canals from Tochi river while canals from Baran Dam irrigate some areas of Mamman Khel. Our study was aimed at documenting an inventory of the weed species that infest wheat crop in the experimental area, which may provide an idea for future strategies for weed management in wheat crop in light of the findings.

MATERIALS AND METHODS

The specimens were collected and preserved according to the standard protocols of Smith, 1971. Specimens were pressed in a plant press, which consisted of a wooden frame (for rigidity), corrugated cardboard ventilators (to allow air to flow through the press), blotter paper (to absorb moisture), and folded newspaper (to contain the plant material). The pressed plants were thoroughly dried prior to storage and preserved for identification. The identification of unknown plant material was accomplished with the use of dichotomous keys; published plant descriptions, illustrations and photographs; and comparison with properly identified herbarium specimens present in various areas of the country. The use of microscope was helpful for the observation of many diagnostic features. The results were rechecked and compared with literature of Leenhouts, 1968; Nasir and Ali, 1971-95; Wazir *et al.*, 2004. The present study was conducted during 2009-2010 in wheat growing season. Local farmers were also interviewed for their view point about the problematic weeds which occurred in wheat crops.

Weeds species distribution

Distribution of plant species was calculated by using Oosting Scale (Oosting, 1956). This method is used for the distribution and to find out the abundance of the species in the area.

Table-1. Oosting Scale (OS).

I	Very Rare
II	Rare
III	Infrequent
IV	Abundant
V	Very abundant

RESULTS AND DISCUSSION

The basic purpose of this study was to explore the weed flora in wheat crop for future weed management strategies. In wheat crop, there were found 82 genera and 93 species belonging to 34 families of weeds (Table-2). Among the 34 families, there were about 4 families of monocots (having 13 genera and 14 species) and 30 families of dicots (having 69 genera and 79 species).

On one hand this study helped us identify the weeds that posed danger to the wheat crop of the study area; and on the other hand, the listing of the weeds can become a good part of the weed taxonomy at the same time. A given weed identified as noxious in one area may not pose a threat in another area, even if it may be established in both the areas.

Local farmers should have scientific informations so that many weed control strategies could be developed in order to control the growth and spread of the problematic weeds. Pre-plant and post harvest weed control measures should be taken on immediate basis in order to reduce the weed growth in arable lands. These weed control measures reduce the yield losses in current crops and seeds contamination in the crops seeds and harness fresh deposition in the weed seed bank.

The most important family in terms of species representation was Asteraceae having 13 genera and 15 species. Asteraceae was though closely followed by Poaceae with 10 genera and 11 species, and then by Papilionaceae (7 genera and 7 species), Boraginaceae (4 genera and 6 species), Brassicaceae (1 genus and 1 specie), Amaranthaceae (3 genera and 4 species), Polygonaceae (3 genera and 4 species), Solanaceae (4 genera and 4 species), Euphorbiaceae (1 genus and 3 species), Zygophyllaceae (3 genera and 3 species), Apiaceae (2 genera and 2 species), Caryophyllaceae (2 genera and 2 species), Chenopodiaceae (2 genera and 2 species), Cucurbitaceae (2 genera and 2 species), Convolvulaceae (1 genus and 2 species), and Plantaginaceae (1 genus and 2 species). However the families of Aizoaceae, Apocynaceae, Asclepiadaceae, Asphodelaceae, Cyperaceae, Fumariaceae, Gentiaceae, Liniaceae, Malvaceae, Nyctaginaceae, Orchidaceae, Orobanchaceae, Papaveraceae, Primulaceae, Ranunculaceae, Resedaceae, Rubiaceae and Verbenaceae had only one genus representing a single species infesting wheat fields of the target area.

Percentage-wise data of weeds in wheat crops

As far as percentage data of the weeds representing various families are concerned, the highest percentage of occurrence in wheat crops was of Asteraceae (16.129%) as given in Table-3. Similarly, the percentage of weeds infesting wheat was 11.827% in Poaceae. The rest of the families had percentages of weeds infestation as Papilionaceae (7.526%), Boraginaceae and Brassicaceae (6.451%), Amaranthaceae, Polygonaceae and Solanaceae (4.301%), Euphorbiaceae and Zygophyllaceae (3.225%), Apiaceae, Caryophyllaceae, Chenopodiaceae, Convolvulaceae, Cucurbitaceae and Plantaginaceae (2.150%). However, each of the rest of the families i.e. Aizoaceae, Apocynaceae, Asclepiadaceae, Asphodelaceae, Cyperaceae, Fumariaceae, Gentianaceae, Linaceae, Malvaceae, Nyctaginaceae, Orchidaceae, Orobanchaceae, Papveraceae, Primulaceae, Ranunculaceae, Resedaceae, Rubiaceae and Verbenaceae had only 1.075% of weeds infestation (Table-3).

Table-2. List of weeds of wheat crop.

S.No.	Plant's name	Family	Local name	Voucher specimen No. WWFRB
1.	<i>Aerva javanica</i> (Burm. f.) Juss.	Amaranthaceae	Kharvorrha	1a
2.	<i>Alopecurus nepalensis</i> Trin. ex Steud.	Poaceae	Ozhakaye	2a
3.	<i>Alhagi maurorum</i> Medic.	Papilionaceae	Thunda	3a
4.	<i>Anagallis arvensis</i> L.	Primulaceae	Peze nanya gul	4a
5.	<i>Amaranthus blitoides</i> S. watson	Amaranthaceae	Ranzukka	1b
6.	<i>Amaranthus viridis</i> L.	Amaranthaceae	Ranzukka	1c
7.	<i>Aristida adscensionis</i> L.	Poaceae	Thor lummi	2b
8.	<i>Aristida cyanantha</i> Nees ex Steud.	Poaceae	Speen lummi	2c
9.	<i>Arnebia hispidissima</i> (Lehm.) A. DC.	Boraginaceae	Unknown	5a
10.	<i>Asphodelus tunifolius</i> Caven.	Asphodelaceae	Piozakai	6a
11.	<i>Astragalus hamosus</i> L.	Papilionaceae	Aezai	3b
12.	<i>Atriplex stocksii</i> Boiss.	Chenopodiaceae	Unknown	7a
13.	<i>Avena fatua</i> L.	Poaceae	Karyana	2d
14.	<i>Boerhavia procumbens</i> Banks ex Roxb.	Nyctaginaceae	Pandrawash	8a
15.	<i>Brassica tournefortii</i> Gouan	Brassicaceae	Pari woeri	9a
16.	<i>Calendula officinalis</i> L.	Asteraceae	Zer gul	10a
17.	<i>Calotropis procera</i> (willd.) R. Br.	Asclepiadaceae	Spalmuka	11a
18.	<i>Carduus argentatus</i> L.	Asteraceae	Aghzekaye	10b
19.	<i>Carthamus persicus</i> Willd	Asteraceae	Conzali	10c
20.	<i>Carthamus tinctorus</i> L.	Asteraceae	Catasoorra	10d
21.	<i>Celosia argentea</i> L.	Amaranthaceae	Palash gul	1d
22.	<i>Centaurea iberica</i> Spreng.	Asteraceae	Konzalla	10e
23.	<i>Centaurium pulchellum</i> (Sw.) Druce	Gentianaceae	Unknown	12a
24.	<i>Chenopodium murale</i> L.	Chenopodiaceae	Toor sormai	7b
25.	<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	Aghzikaye	10f
26.	<i>Cistanche tubulosa</i> (Shehenk.) Wight.	Orobanchaceae	Kherghurn	13a
27.	<i>Citrullus colocynthis</i> (L.) Shred.	Cucurbitaceae	Maraghinya	14a
28.	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Perwatie	15a
29.	<i>Convolvulus spicatus</i> Hallier f	Convolvulaceae	Perwatie	15b
30.	<i>Conyza bonariensis</i> (L.) Cronquist	Asteraceae	Shpelaye	10g
31.	<i>Cymbopogon distense</i> Schutt.	Poaceae	Surgurai	2e
32.	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Barawa	2f

S.No.	Plant's name	Family	Local name	Voucher specimen No. WWFRB
33.	<i>Cyperus rotundus</i> L.	Cyperaceae	Delai	16a
34.	<i>Datura alba</i> Nees.	Solanaceae	Barbaka	17a
35.	<i>Echinops echinatus</i> L.	Asteraceae	Catasori	10h
36.	<i>Eragrostis pilosa</i> (L.) P. Beauv.	Poaceae	Khalipellai	2g
37.	<i>Eruca sativa</i> Mill.	Brassicaceae	Shersham	9b
38.	<i>Euphorbia oblongata</i> Griseb.	Euphorbiaceae	Murdor botti	18a
39.	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	Purparie	18b
40.	<i>Euphorbia prostrata</i> Ait.	Euphorbiaceae	Speni wana	18c
41.	<i>Fagonia cretica</i> L.	Zygophyllaceae	Spelaghzai	19a
42.	<i>Farsetia jacquemontii</i> (Hook.f. & Thoms.) Jafri	Brassicaceae	Melongay	9c
43.	<i>Filago pyramidata</i> L.	Asteraceae	Unknown	10i
44.	<i>Fumeria indica</i> Husskin	Fumariaceae	Sewa	20a
45.	<i>Galium tricorne</i> Stokes	Rubiaceae	Khwra shpazha	21a
46.	<i>Heliotropium europaeum</i> (F. & M.) Kazmi	Boraginaceae	Kharpunai	5b
47.	<i>Heliotropium strigosum</i> Willd.	Boraginaceae	Unknown	5c
48.	<i>Hypecoum pendulum</i> L.	Papaveraceae	Peray qajara	22a
49.	<i>Hyoscyamus niger</i> L.	Solanaceae	Badelbang	17b
50.	<i>Ifloga spicata</i> Forssk.	Asteraceae	Unknown	10j
51.	<i>Lathyrus aphaca</i> Linn.	Papilionaceae	Ghat mettarraye	3c
52.	<i>Launaea procumbens</i> Pravin Kawale.	Asteraceae	Piawarie	10k
53.	<i>Launaea angustifolia</i> (Desf.) Kuntze	Asteraceae	Piawarie	10L
54.	<i>Linum corymbulosum</i> Reichenb.	Linaceae	Unknown	23a
55.	<i>Malcolmia africana</i> (L.) R.Br.	Brassicaceae	Bashtha	9d
56.	<i>Malva neglecta</i> Wallr	Malvaceae	Peskie	24a
57.	<i>Medicago polymorpha</i> L.	Papilionaceae	Maklendye	3d
58.	<i>Melilotus indica</i> (L.) All.	Papilionaceae	Unknown	3e
59.	<i>Nerium indicum</i> Mill.	Apocynaceae	Gandarie	25a
60.	<i>Neslia apiculata</i> Fisch.	Brassicaceae	Unknown	9e
61.	<i>Nonea phillistaea</i> Boiss.	Boraginaceae	Shunstargi	5d
62.	<i>Nonea pulla</i> (L.) DC.	Boraginaceae	Shunstargi	5e
63.	<i>Oligomeris linifolia</i> (Vahl.) Macbride	Resedaceae	Unknown	26a
64.	<i>Onosma chitralicum</i> I. M. Johnston	Boraginaceae	Kakawvie	5f
65.	<i>Oxyria digyna</i> (L.) Hill	Polygonaceae	Tassavenye spazha	27a

S.No.	Plant's name	Family	Local name	Voucher specimen No. WWFRB
66.	<i>Parthenium hysterophorus</i> L.	Asteraceae	Kherbotta	10m
67.	<i>Pegnum harmala</i> L.	Zygophyllaceae	Sponda	19b
68.	<i>Phalaris minor</i> Retz.	Poaceae	Chagaa bashtha	2h
69.	<i>Plantago lanceolata</i> L.	Plantaginaceae	Speghol	28a
70.	<i>Plantago ovate</i> Forssk	Plantaginaceae	Speghol	28b
71.	<i>Poa bulbosa</i> L.	Poaceae	Bagastha	2i
72.	<i>Polygonum biaristatum</i> Aitch.& Hemsl.	Polygonaceae	Ghat bandkaye	27b
73.	<i>Polygonum plebejum</i> R. Br.	Polygonaceae	Sherghandhay	27c
74.	<i>Portulaca oleracea</i> L.	Aizoaceae	Verkhora	29a
75.	<i>Psammogeton biternatum</i> Edgew.	Apiaceae	Peray gajera	30a
76.	<i>Ranunculus muricatus</i> L.	Ranunculaceae	Zerri gul	31a
77.	<i>Rumex dentatus</i> (Meisn.) Rech.f.	Polygonaceae	Bashtha	27d
78.	<i>Sacharum arundinaceum</i> H. K. F	Poaceae	Kana	2j
79.	<i>Setaria pumila</i> (Poir.) Roem	Poaceae	Sherakaie	2k
80.	<i>Silene vulgaris</i> (Moench) Garcke,	Caryophyllaceae	Ghorakie	32a
81.	<i>Sisymbrium irio</i> L.	Brassicaceae	Zangli woeri	9f
82.	<i>Sonchus asper</i> (L.) Hill.	Asteraceae	Tharezha	10n
83.	<i>Solanum surattense</i> Burm.f.	Solanaceae	Marraghenye	17c
84.	<i>Spergula fallax</i> (Lowe) E. H. L. Krause	Caryophyllaceae	Baterwana	32b
85.	<i>Taraxacum officinale</i> F. H. Wiggers.	Asteraceae	Zyergualaye	10o
86.	<i>Torilis nodosa</i> (L.) Gaertn.	Apiaceae	Unknown	30b
87.	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Tap war aghzai	19c
88.	<i>Trichosanthes dioica</i> Roxb	Cucurbitaceae	Unknown	14b
89.	<i>Trigonella corniculata</i> (L.) Linn.	Papilionaceae	Spistherlia	3f
90.	<i>Verbena officinalis</i> L.	Verbenaceae	Unknown	33a
91.	<i>Vicia hirsuta</i> (L.) S.F.Gray, Nat	Papilionaceae	Mettarraye	3g
92.	<i>Withania coagulans</i> Dunal.	Solanaceae	Shapyanga	17d
93.	<i>Zeuxine strateumatica</i> (L.) Schlechter	Orchidaceae	Unknown	34a

Table-3. Percentage and distribution of weeds belonging to various families infesting wheat crop in F.R. Bannu.

S.No	Family	Genus	Species	Percentage	Oosting Scale	Seeds
1.	Aizoaceae	1	1	1.075%	I	Dicot
2.	Amaranthaceae	3	4	4.301%	III	-do-
3.	Apiaceae	2	2	2.150%	II	-do-
4.	Apocynaceae	1	1	1.075%	I	-do-
5.	Asclepiadaceae	1	1	1.075%	I	-do-
6.	Asphodelaceae	1	1	1.075%	I	Monocot
7.	Asteraceae	13	15	16.129%	V	Dicot
8.	Boraginaceae	4	6	6.451%	IV	-do-
9.	Brassicaceae	6	6	6.451%	IV	-do-
10.	Caryophyllaceae	2	2	2.150%	II	-do-
11.	Chenopodiaceae	2	2	2.150%	II	-do-
12.	Convolvulaceae	1	2	2.150%	II	-do-
13.	Cucurbitaceae	2	2	2.150%	II	-do-
14.	Cyperaceae	1	1	1.075%	I	Monocot
15.	Euphorbiaceae	1	3	3.225%	III	Dicot
16.	Fumariaceae	1	1	1.075%	I	-do-
17.	Gentianaceae	1	1	1.075%	I	-do-
18.	Linaceae	1	1	1.075%	I	-do-
19.	Malvaceae	1	1	1.075%	I	-do-
20.	Nyctaginaceae	1	1	1.075%	I	-do-
21.	Orchidaceae	1	1	1.075%	I	Monocot
22.	Orobanchaceae	1	1	1.075%	I	Dicot
23.	Papaveraceae	1	1	1.075%	I	-do-
24.	Papilionaceae	7	7	7.526%	IV	-do-
25.	Plantaginaceae	1	2	2.150%	II	-do-
26.	Poaceae	10	11	11.827%	V	Monocot
27.	Polygonaceae	3	4	4.301%	III	Dicot
28.	Primulaceae	1	1	1.075%	I	-do-
29.	Ranunculaceae	1	1	1.075%	I	-do-
30.	Resedaceae	1	1	1.075%	I	-do-
31.	Rubiaceae	1	1	1.075%	I	-do-
32.	Solanaceae	4	4	4.301%	III	-do-
33.	Verbenaceae	1	1	1.075%	I	-do-
34.	Zygophyllaceae	3	3	3.225%	III	-do-
Total	34	82	93	--		
No.						

Distribution pattern in wheat crop

The distribution pattern of the weeds in wheat crop of the area surveyed has been presented in Table-3. According to the Oosting scale, 1956, the weed *Cynodon dactylon* was observed to be most abundantly infesting the wheat fields in the locality. Though the list in Table-3 is self explanatory, the weeds *Asphadelus tenuifolius*, *Astragalus hamosus*, *Convolvulus arvensis*, *Euphorbia oblongata*, *Euphorbia helioscopia*, *Psammogeton biternatum*, *Silene vulgaris* and *Trigonella corniculata* were the rest of abundantly occurring weeds in wheat crop. On the other hand, the weeds such as *Avena fatua*,

Carduus argentatus, *Carthamus persicus*, *Chenopodium murale*, *Cirsium arvense*, *Euphorbia prostrata*, *Galium tricornis*, *Hypochaeris pendulum*, *Lathyrus aphaca*, *Launaea angustifolia*, *L. procumbens*, *Malcomia africana*, *Medicago polymorpha*, *Melilotus indica*, *Nonea philistaea*, *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* were found to be problematic but infrequent weeds in the wheat crop of the area under investigation.

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