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Diversity and Ecological characteristics of Weed Flora in Maize and Wheat crops of Tehsil Sarai Naurang, Lakki Marwat, Pakistan

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SUMMARY

The weed flora in agricultural ecosystems plays a significant role in shaping crop productivity and ecosystem balance. The present study aimed to investigate the diversity and ecological characteristics of weed species infesting maize and wheat crops in Tehsil Sarai Naurang, Lakki Marwat, Pakistan. A total of 93 species were found in which 22 (23.65%) species were monocots and 71(76.34%) species were dicots. The plant species were belonged to 31 families and 77 genera. The monocots had 2 (6.45%) families with 22 (23.65%) species, others belonged to dicots with 29 (93.54%) families and 71(76.34%) species. Among monocots the leading family was Poaceae with 20 (21.50%) weed species followed by Cyperaceae with 2(2.15%) weeds species. Among dicots the leading families were Asteraceae contained 9 (9.67%) weeds species, Solanaceae 8 (8.60%) species, Amaranthaceae 7(7.52%) species, Euphorbiaceae 6 (6.46%) and Chenopodiaceae had 5 (5.37%) species. The ecological study was conducted in which weed flora were classified into various biological classes. The major habit class was herbs with 87 (93.54%) weed species, weeds with shruby character were 5 (5.37%) species and tree had only 1 (1.07%) species. The most common categories regarding life forms were Therophytes with 70 (75.26%) species, Hemicryptophytes with 10 (10.75%) species, Geophytes with 7 (7.52%) species, Chamaephytes and Nanophanerophytes with 3 (3.22%) species. The major classes regarding leaf sizes were Microphyll 33 (35.48%) species, Mesophyll with 22 (23.65%) species, Nanophyll with 20 (21.50%) species, and Macrophyll with 13 (13.97%) species and Leptophyll with 5 (5.37%) weed species. In study area 9 (9.57%) species were collected at pre-reproductive stage, 78 (82.97%) species at reproductive stage and 7 (7.44%) species were at the stage of post-reproductive. The most common weed waere *Alhagi maurorum*, *Chenopodium* species, *Convolvulus arvensis*, *Cyperus rotundus*, *Cynodon dactylon*, *Desmostachya bipinnata*, *Eragrostis minor*, *Conyza canadensis*, *Parthenium hysterophorus*, *Sonchus asper*, *Amaranthus* species and *Euphorbia* species were common in the research area. Weeds often compete with cultivated crops for resources and must be eradicated before flowering and fruiting to prevent seed dispersal and proliferation. Effective weed management strategies, including timely eradication and adoption of integrated weed management practices, should be incorporated into agricultural policies to minimize yield losses and promote sustainable crop production.

Keywords: Ecology, ecological features, maize, weeds, wheat, serai naurang

INTRODUCTION

Weeds are the unwanted plants growing everywhere particularly with crops (Dangwal, 2011). Weed reduce production, cause increase in amount of farming practices and also disturb the fertility of land even reduce water flow in the canals during irrigation (Iqbal, 2015). Weeds contest for many reasons with crops for nutrients, light, moisture and soil (Rajcan, 2001). Weed decrease the market value by reducing harvest and deterioration of crops. Weeds cause massive crop failure over huge areas and perhaps the ever-present group of crop pests. These crops pests deteriorates the quality of yield and reduce it for tremendous level (Arif, 2006). Weeds contests with crops for many reasons as for moisture, available nutrients and other same resources like light and space (Khan, 2004).

Maize is the third main crop after wheat (Kaur, 2019), accounts for 4.8% of the whole harvested zone and 3.5% of the value of agricultural output in Pakistan (Khan, 2014). This crop has fundamental importance in human food, having value in livestock feed and also provide raw materials for industries (Kumar, 2013) Weed threat has been a main and problematic factor in maize crops (Olorunmaiye, 2009). Weeds decrease yield production of maize. Weeds exhibit limited duration of life span, dormancy of seed, long term of persistence, rapid germination of seeds, tolerance of stresses, and adaptation with environment. It reduce production, cause increase in amount of farming practices and also disturb the fertility of land even reduce water flow in the canals during irrigation (Iqbal, 2015). Weed invasion can effect global production of crops and also the economy of Pakistan (Afridi, 2015). The management of weeds had direct effect on the growth succession of maize because the ability of maize is quite low for competition (Ghanizadeh, 2014). Such crop is habitually characterized by complex flora of weeds as broad leaved wild plants and grasses (Baghestani 2007; Pannacci, 2014.) Diversity and weed covers are close in all aspects of life like level of fertilization and the type of species. The composition of weeds is also determines by the supply of water. Seriously the Maize crops are sensitive to this threat and production may reach 30% where strong growing occurs (Lehoczky 2014).

Wheat (*Triticum aestivum* L.) is a member of Poaceae and a major crop worldwide (Ma, 2005). About 2% of worldwide wheat supply is due to Pakistan and its play a vital role in producing high product of wheat in top ten countries (Qureshi, 2009). Weeds cause momentous annual and local yield loss in rice-wheat system (Harrington 1992). Different studies have been directed on wild flora of weeds in wheat from many areas of Pakistan (Waheed, 1992). In Pakistan yearly loss in wheat grains is because of weeds and could be resulting to more than 28 billion rupees (Hassan and Marwat, 2001).

MATERIAL AND METHODS

District Lakki Marwat covering an area of 3164 km^2, is situated in the southern part of Khyber Pakhtunkhwa and it is predominantly rain-fed with little irrigated area. The area is located at 32°49'30.0864"N latitude, 70°47'1.1508"E longitude and has an altitude of 275 meters. Tehsil Lakki Marwat, Tehsil Ghazni Khel and Tehsil Sarai Naurang are the three tehsils of the District. Sarai Naurang consists of many villages and town (khan *et al.,* 2013). Sarai Naurang is located at a distance of 14 miles in south from the Bannu city. City of Serai Naurang is the main center of trade and communication for people. The commercial agricultural products include tropic fruits,

rice, wheat, water melons and different kinds of vegetables (Calvino-Cancela, 2011). In summer season the temperature could reach up to 45°C while in winter it is 0°C. Usually the average rain fall of this area is 82 mm. The level of humidity during summer season is very low. In the month of July and August rainfall usually occurs (GOP. 1998).

The maize and wheat crops cultivated localities with topographic and landscape variation were selected for the collection of weed flora. Different Nine localities with maize and wheat cultivation areas include Serai Naurang, Mama Khel, Sheikh Quli khan, Takhti khel, Kotkashmir, Baist khel, Abu Smand Baigokhel, Marmandi Azim and Ghandi Khan Khel were surveyed. Plants were collected from selected maize and wheat fields. In first step the specimen were dehydrated and then fixed on herbarium sheets for identification with the support of Flora of Pakistan and many other literature (Nasir and Ali, 2003; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2021). Identified weed specimen were placed in the herbarium of the Centre of Plant Biodiversity for future references.

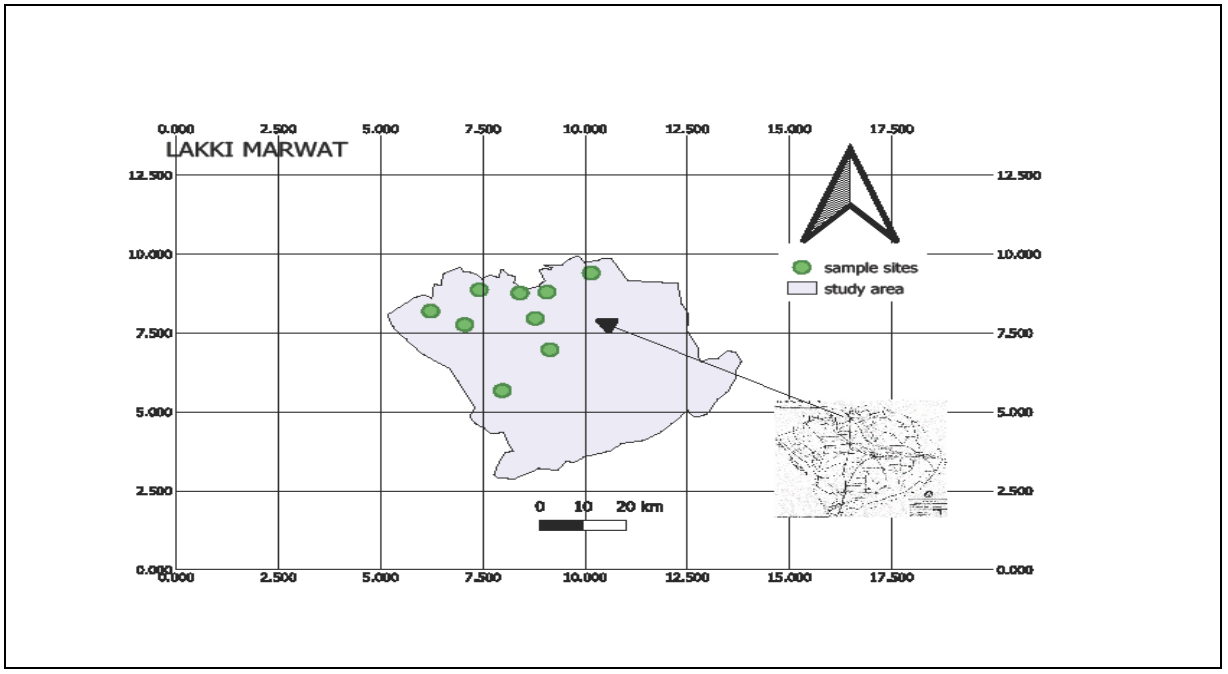


Figure 1: Study area/location. Source: GIS Lab. University of Peshawar

Ecological characteristics

Habit classes

The habit of weeds species were determined and catagorised species into herbs, shrubs and trees classes (Khan, 2019-2020).

Life form classes

Raunkiaer (1934) grouped plant species into life forms classes on the basis of location of perennating buds. Life forms groups were made in which weeds species were classified into different classes such as therophytes, chamaephytes, hemicryptophytes, geophytes and nanophanerophytes (Khan, 2019-2020).

Leaf size classes

Leaf sizes of weed plants were also noted in which species were enlisted into differenrt categories such as leptophyll, nanophyll, microphyll, mesophyll and macrophyll. Raunkiaerian (1934) leaf size diagram was used in the field for rapid data collection (Khan, 2019-2020; Shah, 2014).

Phenological classes

Phenology was also studied where weeds were classified into various stages such as pre-reproductive, reproductive and post-reproductive (Shah *et al.,* 2014).

RESULTS AND DISCUSSION

Floristic Diversity

The present study revealed 93 plants which were typical weeds in the study area of Tehsil Serai Naurang, Lakki Marwat (Table 1) (Figure 3). Total 93 angiosperm species were collected in which 22 (23.65%) species were monocots and 71(76.34%) species were dicots. The plant species belonged to 31 families and 77 genera. Monocots had 2 (6.45%) families with 22 (23.65%) species and others belonged to dicot with 29 (93.54%) families and 71(76.34%) species (Table 1) (Figure 2).

Among monocots the leading family was Poaceae with 20 (21.50%) weeds species followed by Cyperaceae with 2(2.15%) weeds species. Among dicots the leading family was Asteraceae with 9 (9.67%) weeds species, followed by Solanaceae 8 (8.60%) species, Amaranthaceae 7(7.52%) species, Euphorbiaceae 6 (6.46%), Chenopodiaceae had 5 (5.37%) species, Papalionaceae and Polygonaceae possessed 4 (4.30%) species each. Zygophyllaceae had 3(3.22%) species. Aizoaceae, Brassicaceae, Tiliaceae and Malvaceae had 2(2.15%) species each. Apocynaceae, Apiaceae, Asclepiadaceae, Boraginaceae, Caryophyllaceae, Capparidceae, Convolvulaceae, Cucurbitaceae, Fumariaceae, Lamiaceae, Mimosaceae, Oxalidaceae Plantaginaceae, Primulaceae, Ranunculaceae, Scrophulariaceae and Verbenaceae had 1(1.07%) species each (Table.4).

Weeds in Maize (*Zea mays* L.)

Eighty (80) weed plants belonged to 25 families and 60 genera were found in the fields of maize crops. Leading family was Poaceae with 19 (23.75%) weeds species, Asteraceae was represented by 8 (10%) species, Solanaceae and Amaranthaceae had 7 (8.75%) species each, Euphorbiaceae had 6 (7.5%) species, Chenopodiaceae had 5 (6.25%) species, Polygonaceae possessed 4 (5%) species, Zygophyllaceae had 3 (3.75%) species. Aizoaceae, Cyperaceae, Malvaceae and Tiliaceae had 2 (2.5%) species each. Apocynaceae, Asclepiadaceae, Boraginaceae, Brassicaceae, Capparidaceae, Convolvulaceae, Cucurbitaceae, Lamiaceae, Mimosaceae, Oxalidaceae, Papalionaceae, Plantaginaceae and Verbenaceae were represented by 1 (1.25%) species each.

Weeds in Wheat (*Triticum aestivum* L.)

Total 31weed plants belonged to 19 families and 29 genera were collected in fields of wheat crops. The leading families represented by Poaceae and Papalionaceae with 4 (12.9%) species each, Asteraceae and Solanaceae had 3 (9.67%) species each, Chenopodiaceae and Polygonaceae had 2 (6.45%) species each. Apiaceae, Asclepiadaceae, Brassicaceae, Caryophyllaceae, Convolvulaceae, Euphorbiaceae,

Fumariaceae, Lamiaceae, Plantaginaceae, Primulaceae, Ranunculaceae, Scropholariaceae and Tiliaceae were represented by 1(3.22%) species each

Ecological characteristics of weeds flora

Habit classes

The weed flora was classified into various habit classes as herbs, shrubs and trees. The major class was herbs with 87 (93.54%) weed species, weeds with shrub characters were 5 (5.37%) species and tree had only 1 (1.07%) species (Table. 2) (Figure. 5).

Life form classes

The most common category regarding life form was Therophytes with 70 (75.26%) species, Hemicryptophytes with 10 (10.75%) species, Geophytes with 7 (7.52%) species, Chamaephytes and Nanophanerphytes with 3 (3.22%) species each (Table. 2) (figure. 6).

Leaf size classes

The major classes regarding leaf size were Microphyll with 33 (35.48%) species, Mesophyll 22 (23.65%) species, Nanophyll 20 (21.50%) species, Macrophyll 13 (13.97%) species and Leptophyll with 5 (5.37%) weed species (Table. 2) (Figure.7).

Phenological stages

In study area 9 (9.57%) species were collected at Pre-reproductive stage, 78 (82.97%) species at Reproductive stage and 7 (7.44%) species were at the stage of Post-reproductive (Table.2) (Figure. 8).

Table 1: Floristic composition and Ecological characteristics of weed flora of Sarai Naurang, Pakistan

Sr.#	Family/Botanical names	Ecological characteristics			
		Habit	Life form	Leaf size	Phenology
A.	**Monocots**				
1.	**Cyperaceae**				
1	*Cyperus rotundus* L.	H	G	Mes	S2
2	*Cyperus esculentus* L.	H	G	Mic	S2
2.	**Poaceae**				
3	*Acrachne racemosa* (Roxb.) Lindl. ex Chiov.	H	Th	Mac	S3
4	*Avena fatua* L.	H	Th	Mic	S2
5	*Brachiaria remosa* (L.) Stepf.	H	Th	Mes	S2
6	*Brachiaria reptans* L.	H	Th	Mic	S2
7	*Cenchrus ciliaris* L.	H	H	N	S2
8	*Cenchrus longispinus* (Hack.) Fern.	H	H	Mic	S2
9	*Cymbopogon citratus* (DC.) Stapf	H	H	Mac	S1
10	*Cymbopogon martini* (Roxb.) Wats.	H	H	Mac	S2

11	*Cynodon ductylon* (L.) Pers.	H	H	N	S2
12	*Desmostachya bipinnata* (L.) Stepf.	H	H	Mes	S3
13	*Dichanthium annulatum* (Forssk.) Stapf	H	H	Mes	S2
14	*Ductyloctenium aegyptium* (L.) Willd.	H	Th	Mic	S2
15	*Echinochloa colonum* (L.) Link.	H	Th	Mic	S2
16	*Eragrotus minor* (L.) Wolf.	H	Th	N	S2
17	*Imperata cylindrica* (L.) P.Beauv.	H	H	Mes	S2
18	*Leptochloa panacea* (Retz.) Ohwi.	H	Th	Mic	S2
19	*Paspalum dilatatum* Poir.	H	H	Mes	S2
20	*Phalaris minor* Retz.	H	Th	Mes	S2,
21	*Phragmites karka* Retz.) Trin. ex Steud.	H	G	Mac	S1
22	*Sorghum halepense* (L.) Pers.	H	Th	Mic	S2
B.	**Dicot**				
3.	**Aizoaceae**				
23	*Portulaca oleracea* L.	H	Th	N	S2
24	*Trianthema portulacastrum* L.	H	Th	N	S2
4.	**Amaranthaceae**				
25	*Achyranthes aspera* L.	H	Th	Mic	S2
26	*Aerva javanica* (Burm.f.) Shult.	H	Ch	Mic	S2
27	*Alternanthera sessilis* (L.)R.Br. ex Dc.	H	Th	N	S2
28	*Amaranthus spinosus* L.	H	Th	Mic	S2
29	*Amaranthus viridis* L.	H	Th	Mic	S2
30	*Bassia indica* All.	H	Th	Mic	S1
31	*Digera muricata* (L.) Mart.	H	Th	Mic	S2
5.	**Apiaceae**				
32	*Foeniculum vulgare* Mill.	H	Th	Mic	S2
6.	**Asclepiadaceae**				
33	*Calotropis procera* (Alton.) W.T Alton.	H	Th	Mac	S2
7.	**Apocynaceae**				
34	*Nerium oleander* L.	S	NP	Mes	S2
8.	**Asteraceae**				
35	*Cirsium arvense* (L.) Scop.	H	Th	Mac	S2
36	*Conyza canadensis* L.	H	Th	Mic	S2

37	*Eclipta alba* (L.)L.	H	Th	Mic	S2
38	*Parthenium hysterophorus* L.	H	Th	Mes	S2
39	*Sonchus arvensis* L.	H	Th	Mac	S2
40	*Symphyotrichum subulatum* (Michx.) G.L. Nesom.	H	Th	Mes	S2
41	*Taraxacum officinale* (L.) Weber ex F.H.Wigg.	H	Th	Mes	S2
42	*Verbesina encelioides* (Cav.) Benth. & Hook.f. ex A.Gray.	H	Th	Mic	S2
43	*Xanthium strumarium* L.	H	Th	Mac	S2
9.	**Boraginaceae**				
44	*Heliotropium europaeum* L.	H	Th	Mic	S2
10.	**Brassicaceae**				
45	*Brassica campestris* L.	H	Th	Mac	S2
46	*Coronopus didymus* L.	H	Th	Mic	S3
11.	**Caryophyllaceae**				
47	*Stellaria media* (L.) Vill.	H	Th	N	S2
12.	**Chenopodiaceae**				
48	*Chenopodium album* L.	H	Th	N	S2
49	*Chenopodium vulvaria* L.	H	Th	N	S2
50	*Chenopodium murale* L.	H	Th	N	S3
51	*Chenopodium ambrosioides* L.	H	Th	Mac	S2
52	*Suaeda aegyptica* (Hassen). Zohry	S	Th	N	S2
13.	**Capparidaceae**				
53	*Cleome viscosa* L.	H	Th	Mic	S2
14.	**Convolvulaceae**				
54	*Convolvulus arvensis* L.	H	Th	Mic	S2
15.	**Cucurbitaceae**				
55	*Citrullus colocynthis* (L.) Schrad.	H	Th	Mes	S2
16.	**Euphorbiaceae**				
56	*Chrozophora tinctoria* (L.) A.Juss	H	Th	Mic	S2
57	*Coroton bonplandianum* L.	H	Th	N	S2
58	*Euphorbia helioscopia* L.	H	Th	N	S3
59	*Euphorbia indica* Lam.	H	Th	Mes	S2
60	*Euphorbia prostrata* Aiton.	H	Th	L	S2
61	*Ricinus communis* L.	S	NP	Mac	S1
17.	**Fumariaceae**				
62	*Fumaria indica* L.	H	Th	Mic	S2

18.	**Lamiaceae**				
63	*Mentha longifolia* (L.) Huds.	H	G	Mic	S2
19.	**Malvaceae**				
64	*Malvastrum coromandelianum* (L.) Garcke.	H	Th	Mes	S2
65	*Malva parviflora* L.	H	Th	Mic	S2
20.	**Mimosaceae**				
66	*Prosopis juliflora* (Sw.) DC.	T	NP	N	S2
21.	**Oxalidaceae**				
67	*Oxalis corniculata* L.	H	Th	L	S2
22.	**Papilionaceae**				
68	*Alhegi marrurum* Medik.	H	Th	L	S2
69	*Lathyrus aphaca* L.	H	Th	Mic	S2
70	*Medicago polymorpha* L.	H	G	N	S2
71	*Vicia sativa* L.	H	Th	N	S2
23.	**Plantaginaceae**				
72	*Plantago lanceolata* L.	H	Th	Mes	S2
24.	**Polygonaceae**				
73	*Polygonum barbatum* (Michx.) Small.	H	Th	Mic	S2
74	*Rumex crispus* L.	H	G	Mes	S2
75	*Polygonum aviculare* L.	H	Th	L	S2
76	*Rumex dentatus* L.	H	G	Mac	S1
25.	**Primulaceae**				
77	*Anagallis arvensis* L.	H	Th	N	S2
26.	**Ranunculaceae**				
78	*Ranunculus muricatus* L.	H	Th	Mic	S2
27.	**Scrophulariaceae**				
79	*Veronica biloba* L.	H	Th	N	S2
28.	**Solanaceae**				
80	*Datura innoxia* Mill.	H	Th	Mes	S2
81	*Datura stramonium* L.	H	Th	Mes	S1
82	*Nicotiana plumbaginifolia* Viv.	H	Th	Mac	S1
83	*Physalis peruviana* L.	H	Th	Mes	S2
84	*Solanum sarrachoides* Sendtn.	H	Th	Mes	S2
85	*Solanum xanthocarpum* L.	H	Th	Mes	S2
86	*Withania coagulense* (Stocks) Dunal.	S	Ch	Mic	S1

87	*Withania somnifera* (L.) Dunal.	S	Ch	Mic	S2
29.	**Tiliaceae**				
88	*Corchorus olitorius* L.	H	Th	Mic	S2
89	*Corchorus hirtus* L.	H	Th	Mic	S2
30.	**Verbenaceae**				
90	*Verbena officinalis* L.	H	Th	Mes	S2
31.	**Zygophyllaceae**				
91	*Fagonia indica* L.	H	Th	L	S2
92	*Peganum harmala* L.	H	H	N	S1
93	*Tribulus terrestris* L.	H	Th	N	S3

Keys: Maize=M, Wheat=W, Herb=H, Therophyte=Th, Hemicryptophytes=H, Chamaephyte =Ch, Geophyte=G, Nanophanerophytes=NP, Microphyllous= Mic, Mesophyllous= Mes, Nanophyllous= N, Macrophyllous= Mac, Leptophyllous= L, Pre-reproductive = S1, Reproductive = S2, Post-reproductive = S3

Table.2: Summary of Ecological characteristics of weeds flora of Maize and Wheat crops of Sarai Naurang, Pakistan

Sr.#	Ecological parameters	No. of species	Percentage
A.	**Habit**		
I.	Herbs	87	93.54%
II.	Shrubs	5	5.37%
III.	Trees	1	1.07%
	Total	**93**	**100%**
B.	**Life form classes**		
I.	Therophytes	70	75.26%
II.	Hemicryptophytes	10	10.75%
III.	Geophytes	7	7.52%
IV.	Chamaephytes	3	3.22%
V.	Nanophanerophytes	3	3.22%
	Total	**93**	**100%**
C.	**Leaf size classes**		
I.	Microphyll	33	35.48%
II.	Mesophyll	22	23.65%
III.	Nanophyll	20	21.50%
IV.	Macrophyll	13	13.97%
V.	Leptophyll	5	5.37%
	Total	**93**	**100%**
D.	**Phenological stages**		
I.	Pre-reproductive	9	9.67%

II.	Reproductive	78	83.87%
III.	Post-reproductive	6	6.45%
Total		**93**	**100%**

Table.3: Weed species in Maize and Wheat crops in Sarai Naurang, Pakistan

Sr. #	Clade/family/Botanical Names	Maize	Wheat
A.	**Angiosperm**		
a.	**Monocot**		
1.	**Cyperaceae**		
1	*Cyperus rotundus* L.	+	-
2	*Cyperus esculentus* L.	+	-
2.	**Poaceae**		
3	*Acrachne racemosa* (Roxb.) Lindl. ex Chiov.	+	-
4	*Avena fatua* L.	-	+
5	*Brachiaria remosa* (L.) Stepf.	+	-
6	*Brachiaria reptans* L.	+	-
7	*Cenchrus ciliaris* L.	+	-
8	*Cenchrus longispinus* (Hack.) Fern.	+	-
9	*Cymbopogon citratus* (DC.) Stapf	+	-
10	*Cymbopogon martini* (Roxb.) Wats.	+	-
11	*Cynodon ductylon* (L.) Pers.	+	+
12	*Dactyloctenium aegyptium* (L.) Willd.	+	-
13	*Desmostachya bipinnata* (L.) Stepf.	+	-
14	*Dichanthium annulatum* (Forssk.) Stapf	+	-
15	*Echinochloa colonum* (L.) Link.	+	+
16	*Eragrotus minor* (L.) Wolf.	+	-
17	*Imperata cylindrica* (L.) P.Beauv.	+	-
18	*Leptochloa panacea* (Retz.) Ohwi	+	-
19	*Paspalum dilatatum Poir.*	+	-
20	*Phalaris minor* Retz.	+	+
21	*Phragmites karka (Retz.) Trin.ex Steud.*	+	-
22	*Sorghum halepense* (L.) Pers.	+	-
b.	**Dicots**		
3.	**Aizoaceae**		
23	*Portulaca oleracea* L.	+	-
24	*Trianthema portulacastrum* L.	+	-
4.	**Amaranthaceae**		

25	*Achyranthes aspera* L.	+	-
26	*Aerva javanica* (Burm.f.) Shult.	+	-
27	*Alternanthera sessilis* (L.)R.Br. ex Dc.	+	-
28	*Amaranthus spinosus* L.	+	-
29	*Amaranthus viridis* L.	+	-
30	*Bassia indica* All.	+	-
31	*Digera muricata* (L.) Mart.	+	-
5.	**Apiaceae**		
32	*Foeniculum vulgare* Mill.	-	+
6.	**Asclepiadaceae**		
33	*Calotropis procera* (Alton.) W.T Alton	+	+
7.	**Apocynaceae**		
34	*Nerium oleander* L.	+	-
8.	**Asteraceae**		
35	*Cirsium arvense* (L.) Scop.	+	+
36	*Conyza canadensis* L.	+	-
37	*Eclipta alba* (L.)L.	+	-
38	*Parthenium hysterophorus* L.	+	+
39	*Sonchus arvensis* L.	+	-
40	*Symphyotrichum subulatum* (Michx.) G.L. Nesom	+	-
41	*Taraxacum.officinale* (L.) Weber ex F.H.Wigg.	-	+
42	*Verbesina encelioides* (Cav.) Benth.& Hook.f. ex A.Gray.	+	-
43	*Xanthium strumarium* L.	+	-
9.	**Boraginaceae**		
44	*Heliotropium europaeum* L.	+	-
10.	**Brassicaceae**		
45	*Brassica campestris* L.	+	-
46	*Coronopus didymus* L.	-	+
11.	**Caryophyllaceae**		
47	*Stellaria media* (L.) Vill.	-	+
12.	**Chenopodiaceae**		
48	*Chenopodium album* L.	+	+
49	*Chenopodium vulvaria* L.	+	-
50	*Chenopodium murale* L.	+	+
51	*Chenopodium ambrosioides* L.	+	-

52	*Suaeda aegyptica* (Hasselq). Zohry	+	-
13.	**Capparidaceae**		
53	*Cleome viscosa* L.	+	-
14.	**Convolvulaceae**		
54	*Convolvulus arvensis* L.	+	+
15.	**Cucurbitaceae**		
55	*Citrullus colocynthis* (L.) Schrad.	+	-
16.	**Euphorbiaceae**		
56	*Euphorbia helioscopia* L.	+	+
57	*Euphorbia prostrata* Aiton.	+	-
58	*Chrozophora tinctoria* (L.) A.Juss.	+	-
59	*Euphorbia indica* Lam.	+	-
60	*Coroton bonplandianum* L.	+	-
61	*Ricinus communis* L.	+	-
17.	**Fumariaceae**		
62	*Fumaria indica* L.	-	+
18.	**Lamiaceae**		
63	*Mentha longifolia* (L.) Huds.	+	+
19.	**Malvaceae**		
64	*Malvastrum coromandelianum* (L.) Garcke.	+	-
65	*Malva parviflora* L.	+	-
20.	**Mimosaceae**		
66	*Porosopis juliflora* (Sw.) DC.	+	-
21.	**Oxalidaceae**		
67	*Oxalis corniculata* L.	+	-
22.	**Papilionaceae**		
68	*Alhagi maurorum* Medik.	+	+
69	*Medicago polymorpha* L.	-	+
70	*Lathyrus aphaca* L.	-	+
71	*Vicia sativa* L.	-	+
23.	**Plantaginaceae**		
72	*Plantago lanceolata* L.	+	+
24.	**Polygonaceae**		
73	*Rumex dentatus* L.	+	+
74	*Polygonum barbatum* (Michx.) Small	+	-
75	*Rumex crispus* L.	+	+
76	*Polygonum aviculare* L.	+	-

25.	**Primulaceae**		
77	*Anagallis arvensis* L.	-	+
26.	**Ranunculaceae**		
78	*Ranunculus muricatus* L.	-	+
27.	**Scrophulariaceae**		
79	*Veronica biloba* L.	-	+
28.	**Solanaceae**		
80	*Datura innoxia* Mill.	+	+
81	*Datura stramonium* L.	+	-
82	*Nicotiana plumbaginifolia* Viv.	+	-
83	*Physalis peruviana* L.	+	-
84	*Solanum sarrachoides* Sendtn.	-	+
85	*Solanum xanthocarpum* L.	+	-
86	*Withania coagulans* (Stocks) Dunal	+	-
87	*Withania somnifera* (L.) Dunal.	+	+
29.	**Tiliaceae**		
88	*Corchorus olitorius* L.	+	-
89	*Chorchorus hirtus* L.	+	+
30.	**Verbenaceae**		
90	*Verbena officinalis* L.	+	-
31.	**Zygophyllaceae**		
91	*Fagonia indica* L.	+	-
92	*Peganum harmala* L.	+	-
93	*Tribulus terrestris* L.	+	-

Table.4: Species distribution within families with percentage values

Sr.#	Family	Total species	Percentage
1	Aizoaceae	2	2.15%
2	Amaranthaceae	7	7.52%
3	Apiaceae	1	1.07%
4	Apocynaceae	1	1.07%
5	Asclepiadaceae	1	1.07%
6	Asteraceae	9	9.67%
7	Boraginaceae	1	1.07%
8	Brassicaceae	2	2.15%
9	Caryophylaceae	1	1.07%
10	Chenopodiaceae	5	5.37%
11	Capparidaceae	1	1.07%
12	Convolvulaceae	1	1.07%
13	Cucurbitaceae	1	1.07%
14	Cyperaceae	2	2.15%
15	Euphorbiaceae	6	6.46%
16	Fumariaceae	1	1.07%
17	Lamiaceae	1	1.07%
18	Malvaceae	2	2.15%
19	Mimosaceae	1	1.07%
20	Oxalidaceae	1	1.07%
21	Papalionaceae	4	4.30%
22	Plantaginaceae	1	1.07%
23	Poaceae	20	21.50%
24	Polygonaceae	4	4.30%
25	Primulaceae	1	1.07%
26	Ranunculaceae	1	1.07%
27	Scropholariaceae	1	1.07%
28	Solanaceae	8	8.60%
29	Tiliaceae	2	2.15%
30	Verbenaceae	1	1.07%
31	Zygophylaceae	3	3.22%
Total		**93**	**100%**

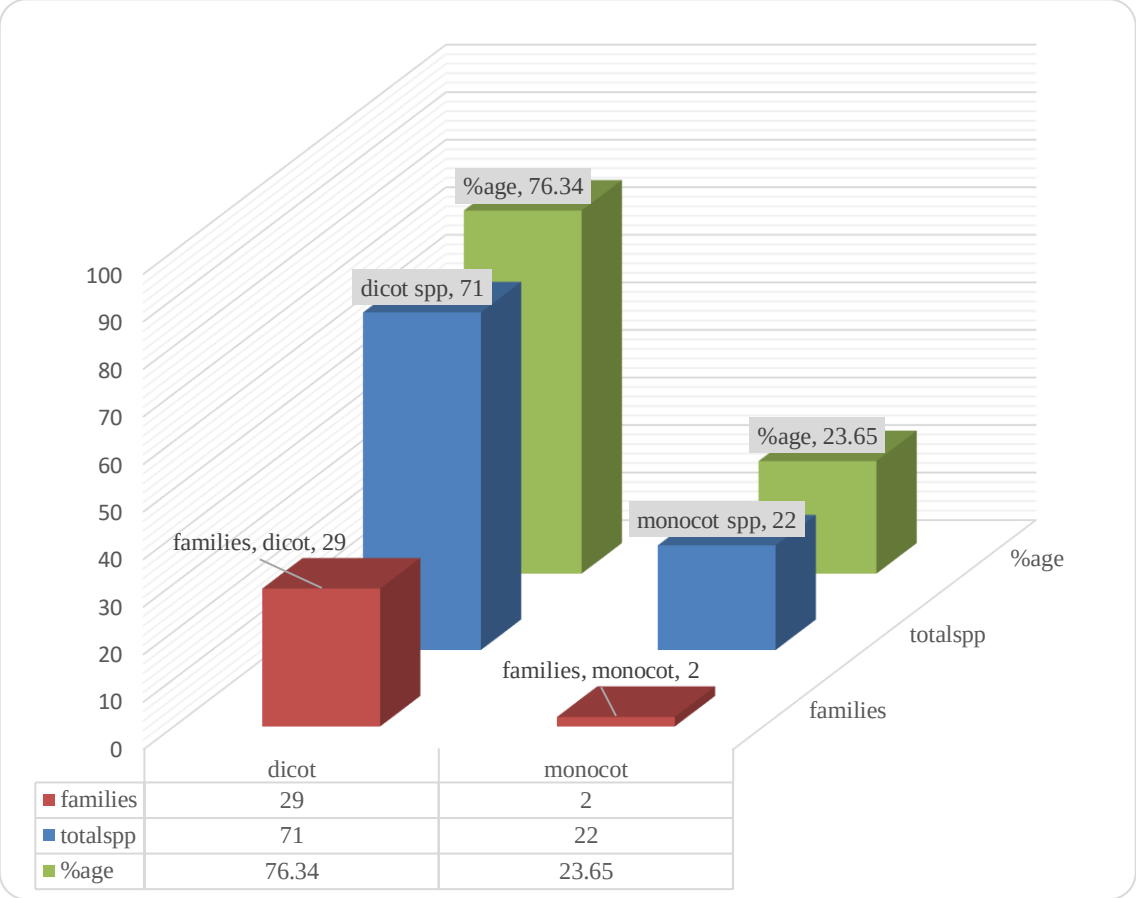


Figure. 2: Total species of weeds flora of maize and wheat crops

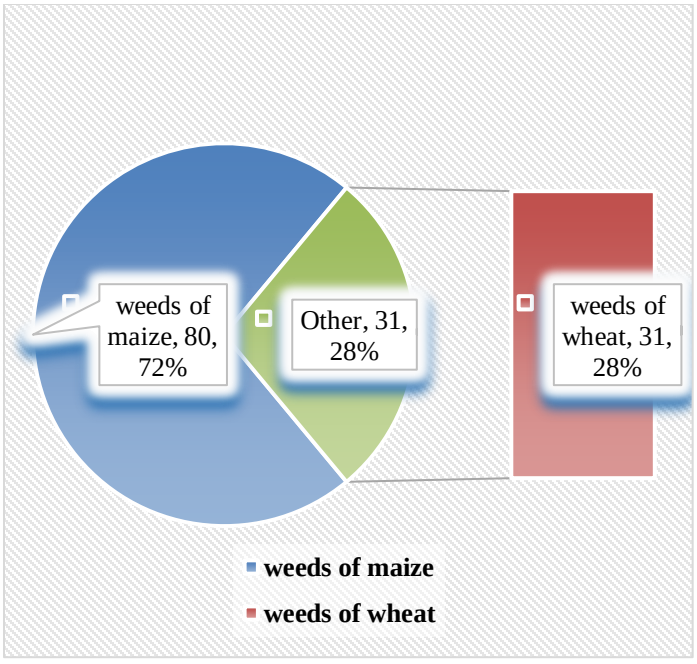


Figure 3: %age weeds in maize and wheat fields

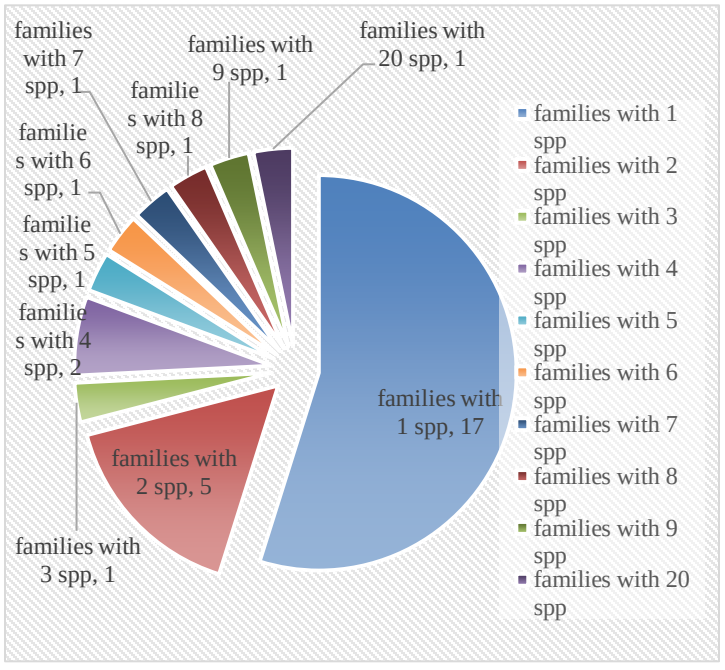


Figure 4: Families with number of weeds species

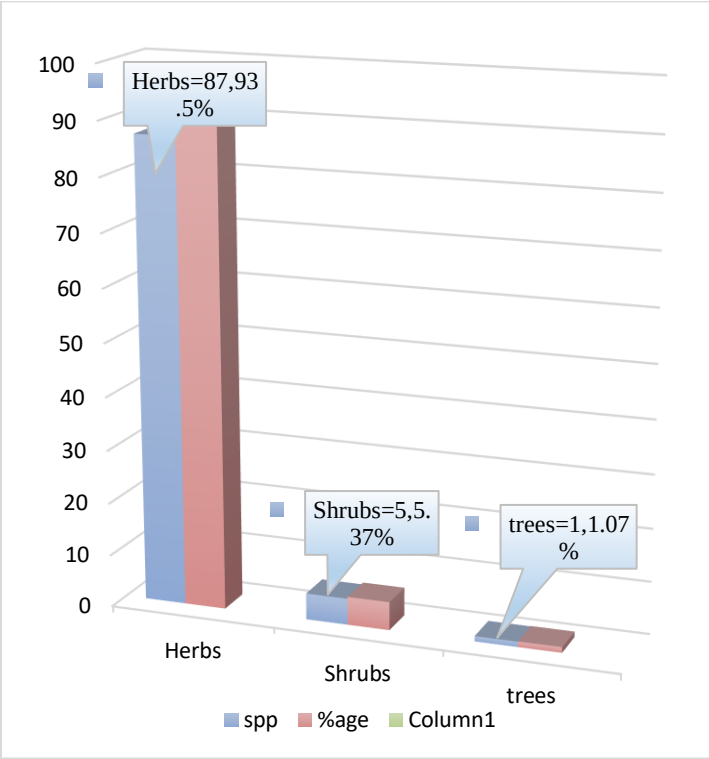
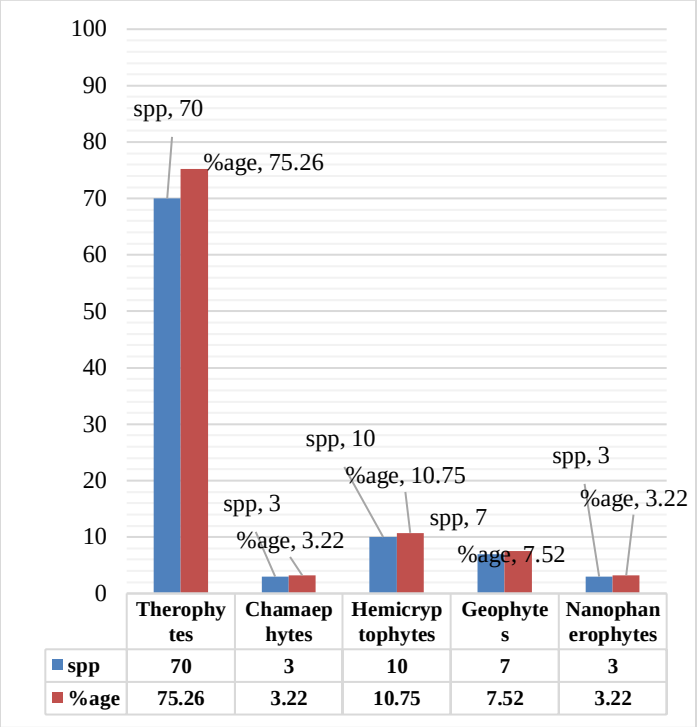
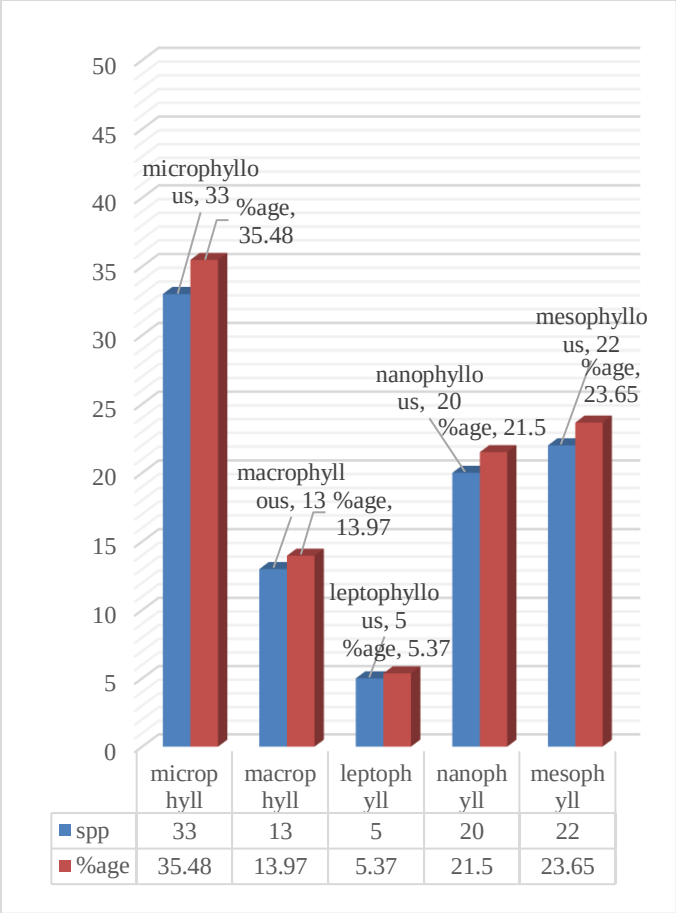


Figure 5: Habit of weeds in study area



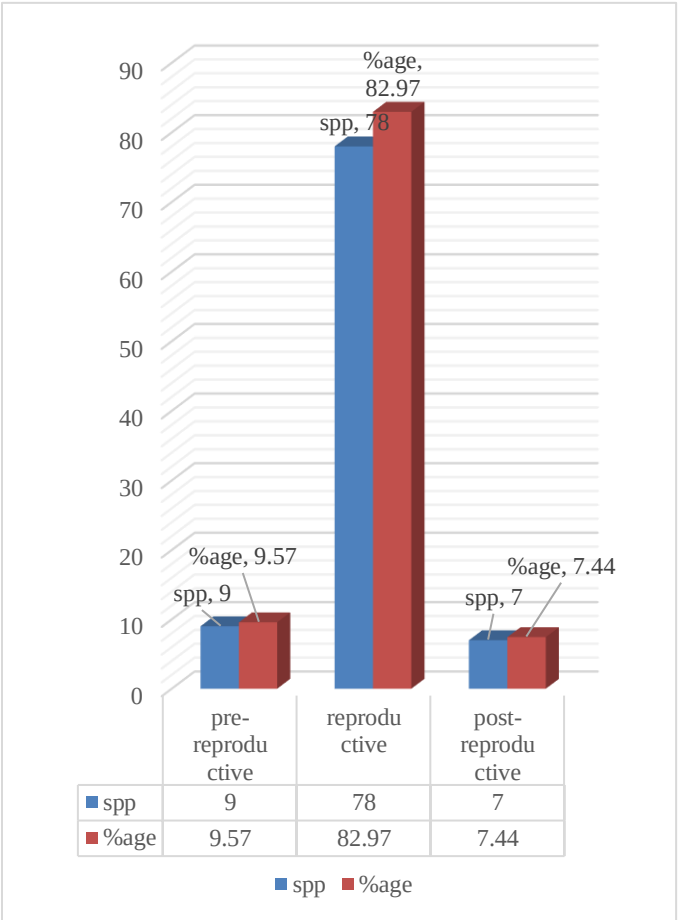
	Therophytes	Chamaephytes	Hemicryptophytes	Geophytes	Nanophanerophytes
spp	70	3	10	7	3
%age	75.26	3.22	10.75	7.52	3.22

Figure 6: Life form classes of weeds flora



	microphyll	macrophyll	leptophyll	nanophyll	mesophyll
spp	33	13	5	20	22
%age	35.48	13.97	5.37	21.5	23.65

Figure 7. Leaf size classes



	pre-reproductive	reproductive	post-reproductive
spp	9	78	7
%age	9.57	82.97	7.44

Figure 8. Phenology of weeds flora

CONCLUSION

The conducted study was similar to previous studies performed in other research regions. Some of the remarkable research studies on weeds comparised in agreement with our findings and outcomes (Khan *at al.,* 2020; Bajwa, 2016; Bano, 2016). Futher, the floristic composition and ecological study conducted and listed 165 plant species from Tehsil Razar, district Swabi (Khan, 2018). Similar study carried by Hayat, (2019) from kohe safaid range and recorded 654 species. Similarly, 154 plant species of Karkhasa range land in Balochistan and enlisted the floristic composition, ecological characteristics (Hussain, 2020) and same research carried out in Pashat Valley in district Bajaur (Anjum, 2020).

Twenty nine (29) weed species from the crop of maize were also collected (Bajwa, 2016). The same study was conducted and collected fifty-two (52) weed from wheat crop were collected and dominant families were Asteraceae, Papilionaceae and Poaceae respectively (Shah, 2014).

Our study was quite similar to the study of Khan *at al.* (2020) and Khan, (2019-2020), where they showed habits classes (herbs, shrubs, trees) of the plants and documented 162 medicinal plant species in which most of plants were herbaceous, shrubby, creepers and trees. Life forms classes were made in which the dominant class was therophyte. They conducted the same study and categorize the plants on the basis of leaf size, the dominant class was class mesophyll.

Similarly, the phenological classes were made (Shah *et al.,* 2014) in which 46 plant species were in reproductive stage (S2), five in post-reproductive stage (S3) and one species was in pre-reproductive stage (S1).

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