

An Investigation of Weeds in the Wheat Crops in Tehsil Paharpur District Dera Ismail Khan

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AN INVESTIGATION OF WEEDS IN THE WHEAT CROPS IN TEHSIL PAHARPUR DISTRICT DERA ISMAIL KHAN

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ABSTRACT

Weed infestation is a serious problem for crop yield. It causes a huge yield loss. A comprehensive study to investigate the main wheat weeds within Tehsil Pharpur (Dhakki, Headbilot, Dhupsari, Malakheil, Kalapani, Laar, Rakh Bandkura) in the Dera Ismail Khan region was conducted during the 2020-21 harvest. About 21 species were collected and the weeds competed with the wheat crop for nutrients, water, and light and disrupted the wheat crop. Data was collected in a weed growth phase and a quadratic method was used. Homophobic (RD), relative frequency (RF), relative coefficient (RCC), and value index (IVI) were recorded. It was determined that the most problematic weeds in this area were *Chenopodium album*, *Medicago polymorpha*, *Lathyrus aphaca*, *Rumex dentatus*, *Polygonum plebeium*, *Mazus japonicus*, *Oxallis corniculata*, *Fumaria indica*, *Sonchus asper*, *Emex spinose*, *Galium aparine*, *Melilotus parviflora*, *Anagallis arvensis*, *Viccia sativa*, *Euphorbia helioscopia*, *Chenopodium murale*, *Launea procumbens*, *Phyllanthus maderaspatensis*, *Scirpus maritimus*, *Beta maritima*.

Keywords: Wheat crop, weeds, phytosociology, relative frequency, quadratic method.

INTRODUCTION

Wheat crop is the world's first economic crop and has nutritional importance in the economy and policy of most countries. More than 35 % of the world's population depend on this crop for their food (Jeber and Khaeim, 2019). Due to its many geographical locations, high yields, as well as the overall trade and grain industry, is known as the "King of Cereals". Wheat is one of the major crops in the irrigated areas of Tehsil Pharpur and in other baran areas in Dera Ismail Khan.

Weeds are one of the organisms that interfere with plant growth. (Argüelles and March, 2021). Weeds are not required due to its competitive and allelopathic behavior as well as providing hazardous habitats. Weeds infestation poses huge threat to agricultural crop production systems and their management in modern agriculture. It is imperative to reduce yield

losses and ensure food security (Gurmani, Khan et al., 2021). Weeds are among the major reasons decreasing crop productivity in wheat-based cropping systems. Weeds offer significant hurdles in sustainable agricultural production. Weeds interfere with crop production practices and incur significant yield and quality losses. Several agronomic practices are required to create favourable environment for different crops in modern agricultural systems; however, these activities favour weed proliferation (Shahzad et al., 2021). Yields of wheat can be increased by agronomic practices including weed control. However, authentic identification and distribution are most needed earlier in weed management. Weeds from the wheat fields of various parts of the country, Dir (Hussain et al., 1993) Sukkar (Qureshi and Bhatti, 2001), Chitral (Hussain et al., 2004), Peshawar (Khan and Marwat, 2006), Swat (Akhtar and Hussain 2007) Rahim Yar Khan

and Toba Tek Singh (Qureshi, Waheed et al. 2009) are already reported. This study provides details on weed variety in the wheat crop within Tehsil Paharpur district Dera Ismail Khan (DIKhan).

On account of huge yield losses, weed infestation is a serious threat to wheat crops throughout the country. A comprehensive survey to find out the major weeds in the wheat, in Tehsil Pharpur of Dera Ismail Khan was carried out during the crop season of 2020-21. Wheat fields at seed farms of Rakhbandkurai and adjacent farmer's fields to each seed farm will be investigated. Data was collected at the peak growth stage of weeds and the quadratic method was used to record relative density (RD), relative frequency (RF), relative Dominance (RDM), and importance value index (IVI).

MATERIALS AND METHODS

The study was conducted during the crop season (February / March) 2020-2021 to determine the availability of weed varieties in wheat crops in various areas of Tehsil Pharpur District Dera Ismail Khan. Paharpur is a regional town of Dera Ismail Khan in Khyber Pakhtunkhwa, Pakistan. It is located at 32 ° 6'8N 70 ° 58'12E and has a height of 173 meters (570 feet). The area of this tehsil is 408600 acre. Flora of Paharpur is rich in diversity of wild species in both summer and winter seasons. Paharpur was chosen as a research site because it has a different soil texture from the rest of the district. The soil texture is sandy so species composition is also different.

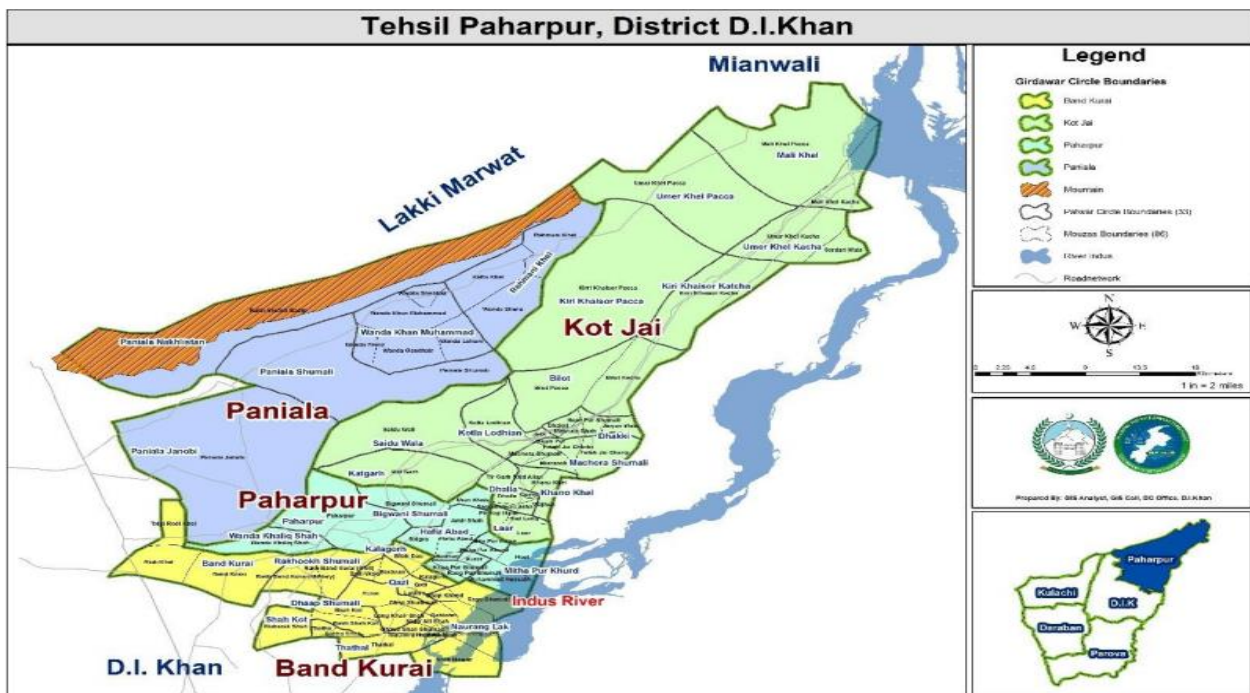


Figure 1: Map of District Dera Ismail Khan.

Relative density, relative frequency, relative dominance and importance value index were calculated using the following formulae as suggested by Odum (Odum and Barrett 1971)

$RD = \frac{\text{Number of weeds of particular spp. in a quadrat}}{\text{Total number of all weeds in that quadrat}} * 100$

RF = Number of quadrats in which a particular species occurs/Total number of quadrats thrown * 100

Relative dominance = Dominance (cover) of a species X 100

The total dominance of all the species

IVI = RD + RF + RDM

RESULTS AND DISCUSSION

Weed Survey in the Field of Wheat at Location Dhakki

The data was recorded for Relative Density (RD), Relative Frequency (RF), relative Dominance (RDM), and Importance value index (IVI) of various weeds during the survey was determined (Table 1). The result revealed that IVI of *Polygonum plebium* was the highest i.e. 108.44 % as compared to others species. *Polygonum plebium* also exhibited maximum RD (42.79 %), RF (22.86 %), and RDM (42.79 %). *Lathyrus aphaca* ranked second with an IVI value of 54.29 %. It was followed by *Rumex dentatus* with an IVI value of 51.63 %. It was followed by other less abundant species i.e. *Lathyrus aphaca*, *Medicago polymorpha*, *Chenopodium album* with IVI values of 39.73, 35.28, and 24.45 respectively.

Weed Survey in the Field of Wheat at Location Headbilot

Vegetative analysis was carried out during survey in another field located at headbilot. It was recorded that *Oxalis corniculata* was the most abundantly occurring weed with highest importance value index (111.16). The relative density (39.29 %), relative frequency (24.39 %) and relative Dominance (47 %) of *Oxalis corniculata* were also highest in the field in comparison to other weed species (Table 2). *Medicago polymorpha* ranked second with an IVI value of 106.67. It was

followed by *R. dentatus*, *C. album*, *S. asper*, *F. indica* with IVI 33.43, 26.24, 13.38, 9.21 respectively (Table2).

Weed Survey in the Field of Wheat at Location Dhupsari

Chenopodium album was found the most abundant species in farmer's field located at Dhupsari with the highest IVI value of 1330.15. *C. album* also exhibited maximum RD (72 %), RF (33.33 %), and RDM (1227.09%) as compared to other weed species. *M. polymorpha* ranked second with an IVI value of 175.40. It was followed by *Emex spinose*, *R. dentatus*, *P. plebium* having IVI values 22.58, 13.99, and 11.67 respectively (Table 3).

Weed Survey in the Field of Wheat at Location Khanokheil

The weed survey was conducted at the random wheat field at Khanokheil. *Galium aparine* was found most abundant species with an IVI value of 158.5 and having maximum RD (56.49 %), RF (27.03 %), and RDM (75 %) values. *Anagallis arvensis* was second abundantly found species having an IVI value of 62.52. It was followed by *L. aphaca*, *Melilotus parviflora*, *O.corniculata*, *Viccia sativa*, *S. asper*, and *Fumaria indica* having IVI values of 35.85,16.72,12.96,9.11,6.9,6.45 respectively (Table 4).

Weed Survey in the Field of Wheat at Location Laar

The vegetative analysis was carried out in the field of Laar. The species found abundantly with IVI of 144.39 was *F. indica* and having maximum RD (51.78 %), RF (25.64 %), and RDM (67 %) values. *A. arvensis* ranked second with an IVI value of 79.31. It was further followed by species *Galium aparine*, *O. corniculata*, *Euphorbia helioscopia* having

Table 1: Importance of value index of species from Dhakki.

S. No	Plants	F	D	R.F	R.D	A	Cc	D	R.DM	IVI
1	<i>Polygonium plebium</i>	80	920	22.86	42.79	11.5	0.12	1.06	42.79	108.44
2	<i>Lathyrus aphaca</i>	50	430	14.29	20	8.6	0.09	0.37	20	54.29
3	<i>Rumex dentatus</i>	70	340	20	15.81	4.8	0.05	0.17	15.81	51.63
4	<i>Medicago polymorpha</i>	80	210	22.86	9.77	2.6	0.03	0.06	9.77	42.39
5	<i>Chenopodium album</i>	40	220	11.43	10.23	2.2	0.02	0.05	10.23	31.89
6	<i>Mazus japonicus</i>	30	30	8.50	1.40	1.5	0.02	0.00	1.40	11.36
	Total	350	2150	100	100	31.2	0.31	6.73	100	300

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index

Table 2: Showed the recorded species from Headbilot.

S. No	Plants	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Oxalis corniculata</i>	100	2660	39.29	24.39	26.6	0.27	47	44	111.16
2	<i>Medicago polymorpha</i>	100	2570	37.96	24.39	25.7	0.26	44	26.14	106.67
3	<i>Rumex dentatus</i>	80	680	10.04	19.51	8.5	0.09	4	106.67	33.43
4	<i>Chenopodium album</i>	60	550	8.12	14.63	9.1	0.09	3	3	26.14
5	<i>Sonchus asper</i>	40	200	2.95	9.76	5.0	0.05	1	1	13.18
6	<i>Sonchus asper</i>	30	110	1.62	7.32	3.6	0.04	0	47	9.21
	Total	410	6770	100	100	78.6	0.79	14.9	100	300

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index.

Table 3: IVI value of species recorded from Dhupsari.

S.no	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Chenopodium album</i>	100	3450	33.3	33.3	34.50	0.35	11.90	1104.3	1209.74
2	<i>Medicago polymorpha</i>	100	1130	33.3	33.3	11.30	0.11	1.28	118.48	175.4
3	<i>Emex spinosa</i>	40	90	13.3	13.3	2.25	1.20	1.08	7.55	22.76
4	<i>Rumex dentatus</i>	30	80	10	10	2.67	0.03	0.02	1.98	13.65
5	<i>Polygonium pelebium</i>	30	40	10	10	1.33	0.01	0.01	0.49	11.33
	Total	300	4790	100	100	119.75	1.70	14.28	1232.8	1432.8

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index

Table 4: Showed the recorded species from Khanokheil.

S.no	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Galium aparine</i>	100	4220	27.03	56.49	42.20	0.42	17.81	75	158.56
2	<i>Anagallis arvensis</i>	70	1800	18.92	24.10	25.71	0.26	4.63	20	62.52
3	<i>Melilotus parviflora</i>	30	440	8.11	5.89	14.67	0.15	0.65	3	16.72
4	<i>Oxalis corniculata</i>	30	280	8.11	3.75	9.33	0.09	0.26	1	12.96
5	<i>Viccia sativa</i>	30	70	8.11	0.94	2.33	0.02	0.02	0.1	9.11
6	<i>Sonchus asper</i>	20	100	5.41	1.34	5.00	0.05	0.05	0	6.95
7	<i>Fumaria indica</i>	20	70	5.41	0.94	3.50	0.04	0.02	0	6.45
	Total	370	7470	108.1	100	108.5	1.08	23.7	100.7	309.1

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index.

Table 5: showed the recorded species from Laar

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover,

S.no	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Galium aparine</i>	100	2660	39.29	24.39	26.6	0.27	7.08	44	111.16
2	<i>Oxalis corniculata</i>	100	2570	37.96	24.39	25.7	0.26	6.60		106.67
3	<i>Euphorbia helioscopia</i>	80	680	10.04	19.51	8.5	0.09	0.58		33.43
4	<i>Fumaria indica</i>	60	550	8.12	14.63	9.1	0.09	0.50	3	26.14
6	<i>Anagallis arvensis</i>	30	110	1.62	7.32	3.6	0.04	0.04	47	9.21
	Total	390	8730	100	100	100.48	1.00	30.5	100	300

D=Dominance, R.DM=Relative Dominance, IVI=Importance value index

Table 6: IVI of species recorded species from Malakheil.

S.no	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Anagallis arvensis</i>	100	1280	28.57	54.47	12.80	0.13	1.638	0.7371	156.76
2	<i>Fumaria indica</i>	80	520	22.86	22.13	6.50	0.07	0.338	0.1520	60.19
3	<i>Chenopodium album</i>	50	180	14.29	7.66	3.60	0.04	0.065	0.0291	24.86
4	<i>Spergula pentandra</i>	20	130	5.71	5.53	6.50	0.07	0.085	0.0380	15.05
5	<i>Medicago polymorpha</i>	30	80	8.57	3.40	2.67	0.03	0.021	0.0095	12.94
6	<i>Chenopodium murale</i>	30	30	8.57	1.28	1.00	0.01	0.003	0.0013	9.98
7	<i>Phyllanthus maderaspetansis</i>	10	80	2.86	3.40	8.00	0.08	0.064	0.280	9.14
8	<i>Launea procumbense</i>	20	30	5.71	1.28	1.50	0.02	0.005	0.0020	7.19
9	<i>Scripus maritimus</i>	10	20	2.86	0.85	2.00	0.02	0.004	0.0017	3.89
	Total	350	2350	100	100	78.6	0.45	14.9	1.00	300

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index.

Table 7: Showed the recorded species from Kalapani.

S. No	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Anagallis arvensis</i>	90	2910	32.14	60.75	32.33	0.32	9.41	82	175
2	<i>Medicago polymorpha</i>	50	650	17.86	13.57	13.00	0.13	0.85	7	39
3	<i>Sonchu asper</i>	50	630	17.86	13.15	12.60	0.13	0.79	7	38
4	<i>Fumaria indica</i>	50	320	17.86	6.68	6.40	0.06	0.20	2	26
5	<i>Galium aparine</i>	40	280	14.29	5.85	7.00	0.07	0.20	2	22
	Total	280	4790	100	100	71.3	0.79	11.45	100	300

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index.

Table 8: Showed the recorded species from Rakh Bandkurai.

S.no	Plants name	F	D	R.F	R.D	A	C	Do	R.DM	IVI
1	<i>Anagallis arvensis</i>	40	330	40.00	73.33	8.25	0.08	0.272	91.0	204.3
2	<i>Medicago polymorpha</i>	40	100	40.00	22.22	2.50	0.03	0.025	8.4	70.6
3	<i>Beta maritima</i>	10	10	10.00	2.22	1.00	0.01	0.001	0.3	12.6
4	<i>Chenopodium album</i>	10	10	10.00	2.22	1.00	0.01	0.001	0.3	12.6
	Total	100	450	100	100	12.7	0.13	0.299	100	300

*F=Frequency, D=Density, R.F=Relative frequency, R.D=Relative density, A=Abundance, C=Canopy cover, D=Dominance, R.DM=Relative Dominance, IVI=Importance value index.

an IVI value of 40.74, 24.32, 11.24 respectively (Table 5).

Weed Survey in the Field of Wheat at Location Malakheil

A field at Malakheil was surveyed and it was determined that abundant weed of that field was *Anagallis arvensis* with the highest importance value index of 156.76 and also exhibited maximum RD (54.47%), RF (28.57%), and RDM (0.737176795) as compared to other weed species. *F. indica* ranked second having an IVI value of 60.19. It was followed by other species having lower IVI values as compared to the above species, those species are *C. album*, *Spergula pentandra*, *M. polymorpha*, *Chenopodium murale*, *Phyllanthus maderaspetansis*, *Launea procumbense*, *Scirpus maritimus* having 24.86,15.05,12.94,9.14,7.19,3.895 respectively (Table 6).

Weed Survey in the Field of Wheat at Location Kalapani

Anagallis arvensis found the most abundant species in the field at Kalapani with an IVI of 175. *Medicago polymorpha* ranked second having IVI (39) and also exhibited maximum RD (60.75), RF (32.14), and RDM (82) as compared to other weed species. It was followed by species *Sonchus asper*, *Fumaria indica*, *Galium aparine* having IVI values of 38, 26, and 22 respectively. (Table7).

Weed Survey in the Field of Wheat at Location Rakh

At last rakh bandkurai was surveyed and it was found that less frequent species were found there. *Anagallis arvensis* was the abundant species having the highest value of 204.3 and also exhibited maximum RD

(73.33), RF (40.00), and RDM (91.0) as compared to other weed species. *Medicago polymorpha* ranked second with an IVI value of 74.0. It was followed by *Beta maritima* and *Chenopodium album* with the same important value index of 13.7. (Table 8)

CONCLUSION

The Current research showed that there has been a significant difference in the balance, frequency, density coefficients, and finally, in the value of the number of different weed species in different areas of the study area. It is concluded that the identified weeds are harmful to wheat plants because they share nutrients, moisture and light. These weeds adversely affect the yield of wheat crops. The conclusion should consist of the novality of work.

AUTHORS CONTRIBUTION

Nazish Akhtar and Samreen Afzal contributed to design research and analysis of the result.

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest.

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