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WEED COMMUNITIES IN THE WHEAT FIELDS OF MASTUJ, DISTRICT CHITRAL, PAKISTAN

Farrukh Hussain[1], Ali Murad[1] and Mufakhirah Jan Durrani[2]

ABSTRACT

Three weed communities, viz: 1.Mentha-Setaria-Convolvulus in Kargin and in Chapari, 2. Mentha-Silene-Hordeum in Khuz and 3. Convolvulus-Hordeum-Trifolium in Brep were recognized in the wheat fields of Tehsil Mastuj, District Chitral, during July 1993. Based on Importance value-Constancy index, ten top most weeds in decreasing order of importance are Mentha royleana Benth., Convolvulus arvensis L., Hordeum spontaneum C. Koch., Trifolium repens L, Solanum nigrum L., Setaria viridis (L.) P. Beauv., Galium aparine L.,Avena barbata Polt ex Link, Mentha longifolia L. and Polygonum convolvulus Linn. Majority of species were in constancy class II (65 Sp., 72.22%).

Key words: Chitral Weed communities Importance Value Constancy Index.

INTRODUCTION

Wheat is globally important cereal crop including Pakistan. It was grown on 8.46 million hectares during 2003 (Hassan *et. al.* 2003) in Pakistan ranging from sea level to high altitudes. The per hectare yield is lower in Pakistan than other countries. Weeds are one of the major constraints in wheat production as they reduce productivity due to competition (Zimdhal, 1980), allelopathy (Hussain, 1983), by providing habitats for pathogens and thus severing as alternate host for various insects and fungi and increase harvesting costs (Rao, 1983). Decrease in the yield of crops due to weed infestation has been well documented (Saeed *et al.*, 1977; Mehmood, 1987; Shad *et al.*, 1986; Ansari, 1977). Losses in wheat yield due to weeds amount to more than 28 billion at national level and Rs. 2 billion in NWFP (Hassan *et al.*, 2003). Weeds ecologically become important when their population and growth level reaches to a certain minimum threshold in the field. Every weed therefore would not be important if it does not suppress the crop growth. The knowledge regarding the population dynamics, occurrence and herbage cover (growth) is important in ecologically identifying problem weeds of an area. Ghafoor *et al.* (1987) recognized ten most serious weeds in Pakistan. Weeds of wheat fields from Peshawar valley (Hussain *et al.*, 1985 a), Quetta (Hussain *et al.*, 1985 b), Hazro (Hussain *et al.*, 1988), Bannu (Shinwari *et al.*, 1988), Kotli (Malik and Hussain, 1990), Attock (Shinwari *et al.*, 1990), Bagh (Khan, 1992) and Mayar-Jandool, Dir (Ayaz *et al.*, 1993) have been reported. Hassan *et al.* (2003) reported *Phalaris minor, Anagallis arvensis, Poa annua, Cirsium arvense, Convolvulus arvensis, Ammi visnaga, Chenopodium album, Fumaria indica, Carthamus oxycantha, Euphorbia helioscopia, Medicago denticulata, Melilotus indica, Silybum marianum, Rumex crisps* and *Galium aparine* to be the most important weeds of wheat fields in NWFP. However, little work has been done on the community establishment of weeds. The only available references are those of Hussain *et al.* (1988), Khan (1992) and Ayaz *et al.* (1993). Weed communities give a better idea about over all relationship of the most common and dominant weed species in relation to habitat and accompanying species.

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1 Department of Botany, University of Peshawar, Peshawar – Pakistan.

2 Department of Botany, University of Balochistan, Quetta- Pakistan.

Mastuj is a remote less explored area lying at an altitude of 2500-2600 m with arid temperate to sub alpine climate. Wheat is grown on small scale where some suitable soil is available. The soils are mostly nutrient deficient, gravely and stony. The only available references on the weeds from this area are those of Murad *et al.* (1995, 1996), Hussain *et al.* (1994) and Hussain & Murad (2004). The present paper, therefore, reports the weeds, their communities and ecological status based on importance values and frequency-constancy index. The findings would be of help in recognizing the most serious weeds in the area for future intensive studies in wheat-weed management.

Materials and Methods

Four wheat growing localities of Mastuj viz: 1. Kargin, 2. Chapari, 3. Khuz and 4. Brep, all within a radius of 15 km from each other were quantitatively sampled during July-August, 1993. The density, frequency and herbage cover of every weed species was determined in 10 randomly selected fields using $1m^2$ quadrat in duplicate in each of the sites following Hussain (1989). The importance value for each species was calculated, which was changed to Average importance value (AIV) for each species for all the sites. Weeds were classified into constancy classes. Importance Value-Constancy Index (IVCI) was computed by using formula AIV x Constancy class value. Based on the IVCI weeds were assigned ecological status. The nomenclature followed is that of Flora of Pakistan (Nasir and Ali, 1971-1995; Ali and Qaiser, 1995-2004).

Results And Discussion

There were 90 weed species in the wheat fields, which have been listed in decreasing order of Importance Value Constancy Index (IVCI) [Table-1] with varying ecological status. Based on the importance values, three plant communities viz.1.*Mentha-Setaria-Convolvulus* in Kargin and in Chapari, 2. *Mentha-Silene-Hordeum* in Khuz and 3. *Convolvulus-Hordeum-Trifolium* in Brep, were recognized in the wheat fields of Tehsil Mastuj, District Chitral during July, 1993.

The data indicates that the communities and their dominants were almost similar, except that their phytosociological status among the communities changed. In all, six species appeared as the dominants in various communities. However, based on Importance value-Constancy index (Table-1), the ten top most important weeds in decreasing order of importance were *Convolvulus arvensis* (IVCI= 105), *Hordeum spontaneum* (IVCI=83.8), *Trifolium repense* (IVCI=53.8), *Solanum nigrum* (IVCI=52.5), *Setaria viridis* IVCI=45), *Galium aparine* (IVCI=37), *Mentha royleana* (IVCI=33), *Avena barbata* (IVCI=30) and *Mentha longifolia* (IVCI=29). They were followed by *Polygonum convolvulus* (IVCI=25), *Silene conoidia* (IVCI=24.8), *Glycrhiza glabra* (IVCI=22), *Lepidium apetlium*, *Epilobium hirsutum*, *Artemesia scoparia*, *Centaurium meyeri*, *Alloteropsis crimicina* and *Chenopodium album* having IVCI in between 12 to 25 (Table 1). All these above mentioned weeds were considered as serious weeds because of high IVCI value. Such weeds need to be controlled with a combination of manual and chemical methods. Some of these weeds such as *Chenopodium*, *Cynodon*, *Convolvulus* and *Setaria* etc. have been successfully controlled by application of chemical in rapeseeds (Marwat *et. al.*, 2003).

Some of the weeds had higher importance value at one or two sites only and exerted a local pressure. When an over situation was assessed using AIV and constancy value then the situation changed with respect to those species which were recorded in one or two localities. The species with the IVCI values, therefore show overall high density

and better herbage cover and spread more uniformly in the area. The high IVCI value of weeds might be due to the reasons that such weeds are either perennial, produce more viable seeds or reproduce vegetatively that make them more competitive and tolerable to the existing conditions. Seeds of *Poa*, *Setaria*, *Melilotus* and *Medicago* are very minute with hard testa that helps them survive for long time in the field. The nature of seed coat and shape of seeds play important role in the survival of species and their management. Weeds such as Mentha and *Trifolium* that also reproduce through underground suckers resist eradication due to aggressive vegetative spread, more competitive and long survival time.

Some of the recorded weeds such as *Lolium* and *Avena* (Hussain *et al.*, 1987) and *Taraxacum* (Zebunisa, 1984) and *Cynodon dactylon* (Hussain and Khan, 1987) might allelopathically suppress the growth and yield of the susceptible crop. Weeds always compete with crops (Zimdhal, 1980). However, growth stages of weeds and crops, density of weeds and agronomic practices affect competitive capacity of weeds. Weeds with low importance values might not affect crops. The growing wheat generally over shadows such weeds. Small prostrate weeds might fail to compete for light with wheat. Ghafoor *et al.* (1987) placed *Convolvulus* among the 10 most important weeds in Pakistan, which also emerged as the most important weed of wheat in the investigated area. Khan *et al.* (2003) stated that *Avena*, *Phalaris*, *Poa annua*, *Chonopodium album* and *Gallium aparine* as the most competitive weeds of wheat in NWFP. Our findings agree with them as some of the same weeds have dominant status in the present case. Some grassy weeds such as *Avena*, *Lolium* and *Poa* are difficult to distinguish from wheat during early stage of growth. Climbing and twinning weeds such as *Convolvulus*, *Galium* and *Vicia* besides competing with wheat, might also distort wheat plant and reduce light availability by overgrowing it. Some of the weeds such as *Cynodon*, *Chenopodium*, *Setaria*, *Melilotus*, *Vicia*, *Conolvulus* and *Avena* etc. recorded at Mastaj have also been reported from other wheat growing areas of Pakistan. However, most the weeds present in this case have not been reported from low altitude wheat growing regions of Pakistan. The similarity in the occurrence of weeds depends upon the ecological amplitude of weed species with respect to climatic condition. The investigated area lies with in the arid temperate region with an altitude of 2500-2600m. Thus, only weeds with wide ecological range such as *Convolvulus arvensis*, *Coronopus didymus*, *Setaria*, *Chonopodium album*, *Galium aparine*, *Rumex* and *Cynodon dactylon* etc. might be present from the plains to high altitude area of Pakistan.

The ecological status of weeds in different sites and within the area as a whole depends upon time of survey, habitat, climatic conditions, growth stages of weeds and wheat and agronomic practices. The present study revealed that of the 90 recorded species, first 24 species (Table-1; Serial No. 1-24) were ecologically important as they have high IV and IVCI in the investigated area. A well-managed crop ensures higher yield. However, weeds persist even under best management as a result of seed reserve in the soil (Hussain *et al.*, 1989), contaminant seeds in wheat seeds, dissemination of weed seeds through water, wind and animals. The time of emergence of weed seedling might indicate about the future problem (Ogg & Dawson, 1984). The present study was confined to the identification of weeds and their spread in the area. Therefore, further study is required to understand the autecology of important weeds, to investigate the negative interaction of the weeds against wheat and to suggest the best suitable methods for their eradication.

Table-1. Importance Value and Average Importance values (AIV), Constancy and Importance value Constancy index (IVCI) of weeds in wheat fields of Tehsil Mastuj, District Chitral during July-August

S. No.	Weed species	Importance values and communities in 4 sites				AIV	Constancy class	IVCI
		Kargin MSC	Chapari MSC	Khuz MSH	Brep CHT			
1	*Mentha royleana* Benth.	31 a	34 a	33 a	15	28.25	5	141.3
2	*Convoluvlus arvensis* L.	24 c	24 c	15	21 a	21	5	105 0
3	*Hordeum spontaneum* C. Koch.	3	23	25 b	16 b	16.75	5	83.8
4	*Trifolium repens* L.	9	12	6	16 c	10.75	5	53.8
5	*Solanum nigrum* L.	9	12	12	9	10.5	5	52.5
6	*Setaria viridis* L.	29 b	31 b	-	-	15	3	45.0
7	*Galium aparine* L.	14	9	-	14	9.25	4	37.0
8	*Avena barbata* Polt. ex. Link.	9	-	12	9	7.5	4	30.0
9	*Mentha longifolia* L.	-	10	5	14	7.25	4	29.0
10	*Polygonum convolvulus Linn.*	3	8	5	4	5.0	5	25
11	*Silene conoidia* L.	-	-	27 c	6	8.25	3	24.8
12	*Glycyrrhiza glabra* L.	2	12	8	-	5.5	4	22.0
13	*Lepidium apetalum* H. & T .Willd.	7	3	-	8	4.5	4	18.0
14	*Epilobium hirsutum* L.	4	7	5	-	4.0	4	16.0
15	*Artemisia scoparia* Wald. ex. Kit.	-	10	-	11	5.25	3	15.8
16	*Alloteropsis crimicina* Linn.	-	10	10	-	5	3	15.0
17	*Centaurium meyeri* (Bunge) Druce.	4	6	5	-	3.75	4	15.0
18	*Chenopodium album* L.	9	-	8	-	4.25	3	12.8
19	*Cynoglossum glochidiatum* Wall. ex. Benth.	4	11	-	-	3.75	3	11.3
20	*Medicago denticulata* Linn.	5	-	8	-	3.25	3	9.8
21	*Clematis graveolens* Lindl.	2	3	3	-	2	4	8.0
22	*Sonchus asper* L.	-	-	16	-	4	2	8.0
23	*Capsella bursa-pastoris* L.	-	-	-	15	3.75	2	7.5
24	*Lolium persicum* Boiss.	-	-	14	-	3.5	2	7.0
25	*Cichorium intybus* L.	6	-	3	-	2.25	3	6.8
26	*Epilobium cylindricum* D. Don.	-	-	-	13	3.25	2	6.5
27	*Cynodon dactylon* (L.) Pers.	-	-	-	13	3.25	2	6.5
28	*Dactylorhiza hatagirea* D. Don.	-	-	13	-	3.25	2	6.5
29	*Aster altiacus* Walld.	-	12	-	-	3	2	6.0
30	*Ranunculus natans* C.A. Mey	-	-	-	12	3	2	6.0
31	*Sonchus arvensis* Boiss	11	-	-	-	2.75	2	5.5

(Contd..... P-105)

S. No.	Weed species	Importance values and communities in 4 sites				AIV	Constancy class	IVCI
		Kargin	Chapari	Khuz	Brep			
		MSC	MSC	MSH	CHT			
32	*Launaea polyclada* (Boiss) Burkill.	2	5	-	-	1.75	3	5.3
33	*Coriandrum sativum* L.	-	10	-	-	2.5	2	5.0
34	*Gnaphalium thomsonii* Hk. f.	-	10	--	-	2.5	2	5.0
35	*Lactuca orientalis* Boiss.	-	-	-	10	2.5	2	5.0
36	*Astragalus gilgitensis* Ali.	-	4	2	-	1.5	3	4.5
37	*Thymelaea passerina* L.	-	-	-	9	2.25	2	4.5
38	*Vicia sativa* L.	-	-	-	9	2.25	2	4.5
39	*Verbascum erianthumm* Benth.	-	9	-	-	2.25	2	4.5
40	*Cirsium argyacanthum* D.C.	-	-	8	-	2.0	2	4.0
41	*Nasturtium officinale* R. Br.	-	8	-	-	2	2	4.0
42	*Carum carvi Linn.*	-	-	-	7	1.75	2	3.5
43	*Hyparrhenia hirta* (L.) Stapf.	-	7	-	-	1.75	2	3.5
44	*Lactuca tatarica* L.	-	-	7	-	1.75	2	3.5
45	*Parnassia cabulica* Planch.	-	7	-	-	1.75	2	3.5
46	*Polygonum aviculare* L.	6	-	-	-	1.5	2	3.0
47	*Arenaria serpyllifolia* L	6	-	-	-	1.5	2	3.0
48	*Astragalus corrugatus* Bertol.	-	-	-	5	1.25	2	3.0
49	*Conyza Canadensis* L.	-	6	-	-	1.5	2	3.0
50	*Minuartia hybrida* Vill.	6	-	-	-	1.5	2	3.0
51	*Arnebia hispidissima A.D. C*	-	-	-	5	1.25	2	2.5
52	*Bidens tripertita* L.	-	-	-	5	1.25	2	2.5
53	*Geranium pratense* L.	-	5	-	-	1.25	2	2.5
54	*Lotus corniculatus* L.	5	-	-	-	1.25	2	2.5
55	*Setaria intermedia* Roem	-	-	5	-	1.25	2	2.5
56	*Artemisia maritime* L.	-	-	-	4	1	2	2.0
57	*Atriplex canescens* James.	-	-	-	4	1.0	2	2.0
58	*Capparis spinosa* L.	-	-	4	-	1.0	2	2.0
59	*Chenopodium ambrosioides* L.	-	-	4	-	1.0	2	2.0
60	*Clematis orientalis* L.	-	4	-	-	1.0	2	2.0
61	*Coronopus didymus (L.)* SM.	4	-	-	-	1.0	2	2.0
62	*Echinochloa crus-galli* (L.) Beauv.	-	-	-	4	1.0	2	2.0
63	*Ischaemum timorense* Kunth.	-	-	4	-	1.0	2	2.0
64	*Papaver somniferum* L.	-	-	-	4	1	2	2.0
65	*Plantago major* Aitch.	4	-	-	-	1.0	2	2.0
66	*Polygonum barbatum* Linn.	-	-	4	-	1.0	2	2.0

(Contd.... (P-106)

S No.	Weed species	Importance values and communities in 4 sites				AIV	Constancy class	IVCI
		Kargin MSC	Chapari MSC	Khuz MSH	Brep CHT			
67	*Polygonum nepalense* Meiss	-	-	-	4	1.0	2	2.0
68	*Potentilla omithopoda* Tausch	-	-	-	4	1.0	2	2.0
69	*Salvia aegyptiaca* L.	-	-	-	4	1.0	2	2.0
70	*Silene arenosa* L.	-	-	-	8	2	2	2.0
71	*Artemisia rutifolia* Steph ex Sprang	-	-	-	3	0.75	2	1.5
72	*A. linearifolia A D C*	-	-	-	3	0.75	2	1.5
73	*Astragalus chlorostachys* L.	-	-	-	3	0.75	2	1.5
74	*Cannabis sativa* L.	-	-	3	-	0.75	2	1.5
75	*Cosmos bipinnatus* Cav.	-	3	-	-	0.75	2	1.5
76	*Cypenpedium cordigerum* D. Don	3	-	-	-	0.75	2	1.5
77	*Lolium rigidum* Guad	3	-	-	-	0.75	2	1.5
78	*Malcolmia cabulica* L.	-	-	-	3	0.75	2	1.5
79	*Otostegia limbata* Benth	-	-	-	3	0.75	2	1.5
80	*Polygonum chinensis* L.	3	-	-	-	0.75	2	1.5
81	*Pulicana gnaphaloides* Boiss	3	-	-	-	0.75	2	1.5
82	*Artemisia brevifolia* Wall.	2	-	-	-	0.5	2	1.0
83	*Astragalus subumbellatus* Klotzsch	-	-	-	2	0.5	2	1.0
84	*Crepis thomsonii* Babe	2		-	-	0.5	2	1.0
85	*Eragrostis nigra* Nees ex Steud	-	2	-	-	0.5	2	1.0
86	*Malva parviflora* L.	2	-	-	-	0.5	2	1.0
87	*Matricaria chamomila* L.	2	-	-	-	0.5	2	1.0
88	*Scrophularia scopana* Penn	-	2	-	-	0.5	2	1.0
89	*Taraxacum officinale* L.	2	-	-	-	0.5	2	1.0
90	*Melilotus indica* (L.) All	-	-	1	-	0.25	2	0.5

* Weeds have been arranged in descending order of IVCI in the Table

(Key to communities MSC= *Mentha-Setaria-Convolvulus*; MSH= *Mentha-Silene-Hordeum*; CHT= *Convolvulus-Hordeum-Trifolium communities*) *a,b* and *c*, respectively first, second and third dominant species with in each community/site.

References Cited

Ali, S.I. & M. Qaiser (eds). 1995-2004. Flora of Pakistan. Department of Botany, University of Karachi.

Ansari, N.N.N. 1977. To study the impact of the use of herbicides to control the weeds for the increased agricultural production. Final. Tech. Rep. Fg. Pa. 248 Deptt. of Botany and Plant Breeding. Sindh Agric. University Tandojam.

Ayaz, F. Hussain and Z.H. Malik, 1993. Distribution and Population of weeds in the wheat fields of Mayar -Jamdool, district Dir. Sci. Khyber 6 (1): 43-57.

Ghafoor, A. Rashid, A. Shad and Altaf Sher. 1987. Ten most important weeds of Pakistan. Progressive Farming 7 (1): 17 - 20.

Hassan, G., B. Faiz, K.B. Marwat and M. Khan. 2003. Effects of planting methods and tank mixed herbicides on controlling grassy and broad leaf weeds and their effects on wheat cv Fakhr-e-Sarhad. Pak. J. Weed Sci. Res., 9:1-11.

Hussain, F. 1983. Biochemical inhibition - a less understood ecological factor in agro ecosystem. Progressive Farming 3: 33 - 37.

Hussain, F., S.R.Chaghtai, A.A. Dasti. 1985 a. Studies on weeds of wheat fields in Quetta. Pak. J. Agri. Res. 6: 1-7.

Hussain, F., K.B. Marwat and K. Ahmad. 1985b. Ecotaxonomic studies on the weeds of wheat fields in Peshawar valley. Gomal University J. Res. 5: 27-35.

Hussain, F., S.R. Chaghtai and Q. Marwat. 1987. Distribution of some weeds in apple orchards of Quetta. Pak. J. Agric. Res. 8 (3): 260-265.

Hussain, F. and T.W. Khan. 1987 Allelopathic effects of *Cynodon dactylon*. Pak. J. Weed Sci. Res. 1: 8-18.

Hussain, F., M.Z. Qureshi and S. Shaukat, 1988. Studies on some weeds in the wheat fields of Hazro, District Attock. Sarhad J. Agric. 4 (2): 199 - 207.

Hussain, F., M.Z. Qurashi and S. Shaukat. 1989. Some weed seed reserve in the cultivated fields of Hazro, District Attock. Pak. J. Agric.Res. 10 (3): 273-278.

Hussain, F. 1989. Field and Laboratory Manual of Plant Ecology. University Grants Commission, Islamabad, pp. 155-156.

Hussain, F., A. Murad and Q. Marwat. 1994. Distribution and population of weeds in in the maize fields of Mastuj, District Chitral. Pak. J. Weed Sci. Res. 7(1-2) 42-48.

Hussain, F. and A. Murad. 2004. Weed communities in the potato fields of Musatuj. Sci. Khyber (in press).

Khan, I., G. Hassan, M.A. Khan and M.I. Khan. 2003. Efficacy of some new herbicidal molecules on weed density and yield component of wheat. Pak. J. Weed Sci. Res. 9:141-145.

Khan, M.K. 1992. Studies on the weed communities in the wheat and Maize fields of Bagh, Azad Kashmir. M.Sc. Thesis Botany Deptt., University of Azad Kashmir, Muzaffarabad.

Malik, Z.H. and F. Hussain. 1990. Weeds in the corn fields of Muzaffarabad, Azad Kashmir. Sarhad J. Agric. 27 (1): 49-55.

Mehmood, T.Z. 1987. Role of weed management in agriculture. Progressive Farming:36-41.

Marwat, K.B., Z.Hussain, I.A.Khan and B. Gul. 2003.Impact of weed management on rapeseed. Pak. J. Weed Sci. Res. 9: 209-214.

Murad, A., F. Hussain, Q. Marwat and Z. Mohammed. 1995. Floristic composition, life form and leafsize spectra of some weeds of wheat, maize and potato fields of Mustuj, District Chitral.Pak. J. Pl. Sci. 1: 153-164.

Murad, A., F. Hussain, Z. H. Malik and K. M. Aslam. 1996.Weed communities in maize fields of Tehsil Mustuj, District Chitral. Peshawar Univ. Teacher's Assoc. J. 3:7-17.

Nasir, E. & S.I. Ali (eds). 1971-1995). Flora of Pakistan. National Herbarium, NARC, Islamabad.

Ogg, A.G. Jr. and J.H. Dawason. 1984. Time of emergence of eight weeds species. Weed Sci. 32: 327-335.

Rao, V.S. 1983. Principles of Weed Science. Oxford publishing Co. New Delhi. pp. 540.

Saeed, S.A., M. Saddiq and N.A. Ahmad. 1977. Biology of Farm Weeds. Proj. Rep. pp. 1-76. University of Agriculture, Faisalabad.

Shad, R.A., H.I. Javed and M.Q. Chatta. 1986. Weeds of Maize and their control. Maize Production Manual, Pakistan Agricultural Research Council, Islamadbad, pp. 31-34.

Shinwari, Z.K. and I.K. Wazir. 1988. A Check-list to the weeds of wheat fields in Bannu district. Pak. J. Agric. Res. 9 (4): 561 - 574.

Shinwari, Z.K., S. Gorsi and M.R. Awan. 1990. Taxonomic study on the weeds of wheat fields of Attock district. Pak. J. Weed Sci. Res. 3: 31-41.

Zebunisa. 1984. Germination and allelopathic behavior of *Taraxacum officinale* Linn. M.Sc. Thesis Botany Deptt., University of Peshawar.

Zimdhal, R.L. 1980. Weed - crop competition. A Review. International Plant Protection Center, Oregon State University, U.S.A. pp. 196.