

ECOLOGY OF WEEDS IN WHEAT CROPS OF KALASH VALLEY, DISTRICT CHITRAL, HINDUKUSH RANGE, PAKISTAN

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ABSTRACT

The present study was conducted during the year 2014 to record the weed flora of wheat crops in three localities (Bumburet, Rumbor and Birir) of historical Kalash valley, district Chitral. For the first time, a total of 59 weed species were recorded from the investigated area belonging to 51 genera and 25 families. Family Asteraceae was dominant with 10 species (16.94%) followed by Poaceae with 8 species (13.55%). Brassicaceae had 6 species (10.17%) while Caryophyllaceae, Chenopodiaceae and Fabaceae were with 4 species (6.78%) each. The remaining families were represented by 2 or less species each. Life form classes showed that 48 species (81.35 %) were therophytes, 6 (10.17%) were geophytes and 5 (8.47%) species were hemicryptophytes. Leaf size spectra revealed that mesophylls was leading group with 16 (27.11%) species followed by microphylls 15 (25.42%), nannophylls 13 (22.03%), macrophylls 11 (18.64%), aphyllous 2 (3.38%) and leptophylls and megaphylls had one (1.70 %) species each. Similarly, phenologically 45 (76.27%) species were at reproductive stage, 11 (18.64%) in post-reproductive stage and 3 (5.08%) in pre-reproductive stage. The consistency classes were determined to know the percentage distribution of the species. The present findings provided baseline information about the weeds of the area and might be helpful for proper management and control of these weeds.

Key words: Ecological characters, weeds, wheat crop, Kalash valley, Pakistan.

Citation: Hadi, F. and M. Ibrar. 2015. Ecology of Weeds in Wheat crops of Kalash valley, District Chitral, Hindukush Range, Pakistan. Pak. J. Weed Sci. Res. 21(3): 425-433.

INTRODUCTION

District Chitral is located to extreme north-east of Pakistan within 35° 15' 06" to 36° 55' 32" north latitude and 71° 11' 32" to 73° 51' 34" east longitude (Anonymous, 1998). Chitral is the land of

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great diversity having over a dozen of different cultures and languages spoken by the inhabitants from at least 4,000 years. The present study area the Kalash valley is situated in district Chitral and consists of three sub valleys viz: Bumburet, Rumbor and Birir. The Kalash people have an indigenous and unique culture and are considered to be the descendants of Alexander the Great (Hadi & Ibrar, 2014).

The present study was conducted to record the weed species growing in the wheat fields of Kalash valley. Wheat (*Triticum aestivum* L.) is cultivated in the foothills and is a major crop and source of food for Kalash people. The present study is the first ever attempt to record the weed flora of Kalash valley, district Chitral. Many workers have contributed in weed study of other parts of Chitral and Pakistan i.e. Hussain *et al.* (2004) recognized three weed communities in the wheat fields of Tehsil Mastuj, Chitral. Hadi *et al.*, (2014) reported 31 weed species along with ethnomedicinal uses from Rech valley, Chitral. Shah *et al.* (2014) worked out the weeds of wheat crop of Mastuj valley, Chitral and reported 52 species. Similarly, Marwat *et al.*, 2008; Shah *et al.*, 2008; Hadi *et al.*, 2009; Hussain *et al.*, 2009; Waheed *et al.*, 2009; Marwat *et al.*, 2013; Ullah & Rashid 2013; Inayat *et al.* 2014; Khan *et al.* 2014 and Ullah *et al.* 2014 studied weeds of different crops from different parts of the country.

MATERIALS AND METHODS

The wheat fields of all the three sub valleys viz: Bumburet, Rumbor and Birir were investigated during the year 2014 to study the weeds flora. The ecological characteristics of the weeds were recorded in field and the weeds were collected, pressed and identified with the help of different volumes of Flora of Pakistan (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2013). The life form and leaf-size classes were identified after Raunkiaer (1934) and Hussain (1989).

Phenological data was observed in the field and the plants were classified into pre-reproductive (vegetative), reproductive (flowering) and post-reproductive (fruiting) stages. Similarly, the consistency class was determined for percentage distribution of species. Five classes were determined showing maximum distribution in class-V and minimum in Class-I.

RESULTS AND DISCUSSION

The present study is the first ever record of weeds flora of Kalash valley, district Chitral. 59 species were recorded belonging to 51 genera and 25 families. Out of these families dicots were represented by 22 families, monocots by 2 and pteridophytes by one family only. Asteraceae was the leading family with 10 species (16.94

%) followed by Poaceae with 8 species (13.55 %). Brassicaceae had 6 species (10.17 %) while Caryophyllaceae, Chenopodiaceae and Fabaceae had 4 species (6.78 %) each. Apiaceae, Euphorbiaceae, Plantaginaceae and Polygonaceae were represented by 2 (3.39%) species each. The remaining families Equisetaceae, Juncaceae, Amaranthaceae, Cannabinaceae, Convolvulaceae, Cuscutaceae, Fumariaceae, Lamiaceae, Malvaceae, Onagraceae, Oxalidaceae, Portulacaceae, Ranunculaceae, Rubiaceae and Solanaceae had one (1.70%) species each (Table-1). Life form spectra showed that 48 species (81.35%) were therophytes, 6 (10.17%) were geophytes and 5 (8.47%) were hemicryptophytes. Leaf size spectra revealed that mesophylls was leading group with 16 (27.11%) species followed by microphylls 15 (25.42%), nannophylls 13 (22.03%), macrophylls 11 (18.64%), aphyllous 2 (3.38%) and leptophyll and megaphyll with one (1.70 %) species each (Table-2). Phonological data showed that 45 (76.27%) species were at reproductive stage (flowering), 11 (18.64%) in post-reproductive stage (fruiting) and 3 (5.08%) in pre-reproductive stage (vegetative) (Table-2). *Ammi visnaga*, *Chenopodium album*, *Chenopodium ambrosoides*, *Coriandrum sativum*, *Malva neglecta* and *Setaria viridis* are specific to wheat fields of Bumburet valley. *Bromus confinis*, *Equisetum ramosissimum* and *Oxalis corniculata* were reported from Rumbor valley only and *Dicanthium annulatum* and *Polygonum aviculare* are present in Birir valley only. The remaining 48 weeds species are present in more than one locality of Kalash valley (Table-1). Consistency class determines the percentage distribution of each species in the valley. 18 species have minimum distribution in the entire area and fall in consistency class-I. 16 species were present in consistency class-II while 10 species each were present in consistency class-III and IV. Similarly, 5 species had maximum distribution in the wheat fields and were grouped in consistency class-V.

Weeds are not desirable in the crops due to their allelopathic and competitive nature and they also provide habitats for other harmful living organisms. All these factors affect the development and per acre production of crops. Therefore, weeds need proper identification and agronomic practices to reduce their growth in the fields to increase the production of crop.

Table-1. Floristic composition, Life-form, Leaf-size, Phenology and consistency of weeds in Wheat crops in Kalash valley, district Chitral, Hindukush range, Pakistan

S#	Plant name	Local name	Localities			Life form	Leaf size	Phenology	Consistency class
			B	R	BR				
Pteridophyta									
1. Family Equisetaceae									
1.	<i>Equisetum ramossimum</i> Desf.		-	+	-	G	Ap	Rep	II
Monocotyledons									
2. Family Juncaceae									
2.	<i>Juncus articulata</i> L.		+	-	-	G	Mes	Rep	II
3. Family Poaceae									
3.	<i>Avena fatua</i> var. <i>glabrata</i> L.		+	-	+	Th	Mic	Post-rep	IV
4.	<i>Bromus confinis</i> L.		-	+	-	Th	Mac	Post-rep	II
5.	<i>Cynodon dactylon</i> (L.) Pers.		+	+	+	H	Mic	Rep	V
6.	<i>Dicanthium annulatum</i> Forssk.		-	-	+	H	Mic	Rep	I
7.	<i>Dactylis glomerata</i> L.		+	-	+	Th	Mac	Rep	II
8.	<i>Phragmites karka</i> (Retz.) Trin ex Steud.		+	+	-	G	Meg	Pre-rep	II
9.	<i>Poa annua</i> L.		+	+	+	Th	N	Rep	V
10.	<i>Setaria viridis</i> L.		+	-	-	Th	Mes	Rep	III
Dicotyledons									
4. Family Amaranthaceae									
11.	<i>Amaranthus viridis</i> L.		+	+	+	Th	Mes	Rep	II
5. Family Apiaceae									
12.	<i>Ammi visnaga</i> L.		+	-	-	Th	Mac	Pre-rep	I
13.	<i>Coriandrum sativum</i> L.		+	-	-	Th	Mac	Rep	I
6. Family Asteraceae									
14.	<i>Artemisia parviflora</i> Roxb.		+	+	+	Th	Mes	Rep	I
15.	<i>Artemisia scoparia</i> Waldst & Kit		+	+	-	H	Mic		I
16.	<i>Artemisia sacrorum</i> L.		+	+	+	H	Mic	Rep	I
17.	<i>Cichorium intybus</i> L.		+	+	+	Th	Mac	Rep	III

18.	<i>Cirsium arvense</i> (L.) Scop.		+	+	+	Th	Mac	Post-rep	II
19.	<i>Lactuca serriola</i> L.		+	+	+	Th	Mac	Rep	II
20.	<i>Matricaria chamomila</i> L.		+	+	+	Th	Mic	Rep	III
21.	<i>Sonchus asper</i> (L.) Hill.		+	+	+	Th	Mes	Rep	IV
22.	<i>Taraxacum officinale</i> Weber.		+	+	+	G	Mes	Post-rep	V
23.	<i>Xanthium strumarium</i> L.		+	+	+	Th	Mac	Rep	I
7. Family Brassicaceae									
24.	<i>Brassica campestris</i> L.		+	+	+	Th	Mac	Post-rep	IV
25.	<i>Capsella bursa-pastoris</i> (L.) Medic.		+	+	+	Th	Mic	Rep	V
26.	<i>Coronopus didymus</i> (L.) Sm.		+	+	+	Th	L	Post-rep	III
27.	<i>Eruca sativa</i> L.		-	+	+	Th	Mic	Pre-rep	II
28.	<i>Lepidium sativum</i> L.		+	+	+	Th	N	Rep	III
29.	<i>Neslia apiculata</i>		+	+	+	Th	Mic	Rep	III
8. Family Cannabinaceae									
30.	<i>Cannabis sativa</i> L.		+	+	+	Th	Mes	Rep	II
9. Family Caryophyllaceae									
31.	<i>Angelis arvensis</i> L.		+	+	+	Th	N	Rep	III
32.	<i>Silene conoidea</i> L.		+	+	-	Th	Mes	Post-rep	IV
33.	<i>Silene viscosa</i> L.		+	+	+	Th	Mes	Post-rep	I
34.	<i>Stellaria media</i> L.		+	+	+	Th	N	Post-rep	III
10. Family Chenopodiaceae									
35.	<i>Chenopodium album</i> L.		+	-	-	Th	Mes	Rep	II
36.	<i>Chenopodium botrys</i> L.		+	+	+	Th	Mes	Rep	II
37.	<i>Chenopodium ambrosioides</i> L.		+	-	-	Th	Mes	Rep	I
38.	<i>Chenopodium murale</i> L.		+	+	+	Th	N	Rep	I
11. Family Convolvulaceae									
39.	<i>Convolvulus arvensis</i> L.		+	-	-	Th	Mes	Rep	IV
12. Family Cuscutaceae									
40.	<i>Cuscuta reflexa</i> Roxb.		+	+	+	Th/P	Ap	Rep	III
13. Family Euphorbiaceae									
41.	<i>Euphorbia peplus</i> L.		-	+	-	Th	N	Rep	II

42.	<i>Euphorbia helioscopia</i> L.		+	+	+	Th	N	Post-rep	II
14. Family Fabaceae									
43.	<i>Lotus corniculatus</i> L.		+	+	+	Th	N	Rep	V
44.	<i>Medicago sativa</i> L.		+	+	+	H	N	Rep	II
45.	<i>Trifolium repens</i> L.		+	+	+	G	Mic	Rep	IV
46.	<i>Vicia sativa</i> L.		+	+	+	Th/Cl	Mic	Rep	IV
15. Family Fumariaceae									
47.	<i>Fumaria indica</i> (Hauskn.) H. N. Pugsley		+	+	+	Th	N	Rep	III
16. Family Lamiaceae									
48.	<i>Mentha longifolia</i> (L.) Huds.		+	+	+	Th	Mes	Rep	I
17. Family Malvaceae									
49.	<i>Malva neglecta</i> Wallr.		+	-	-	Th	Mes	Rep	I
18. Family Onagraceae									
50.	<i>Epilobium hirsutum</i> L.		+	+	+	Th	Mic	Rep	I
19. Family Oxalidaceae									
51.	<i>Oxalis corniculata</i> L.		-	+	-	Th	Mic	Rep	IV
20. Family Plantaginaceae									
52.	<i>Plantago lanceolata</i> L.		+	+	+	Th	Mac	Rep	I
53.	<i>Plantago major</i> Aitch.		+	+	+	G	Mes	Rep	I
21. Family Polygonaceae									
54.	<i>Polygonum aviculare</i> L.		-	-	+	Th	N	Rep	I
55.	<i>Rumex dentatus</i> L.		+	+	+	Th	Mac	Rep	I
22. Family Portulacaceae									
56.	<i>Portulaca oleracea</i> L.		+	+	+	Th	N	Rep	II
23. Family Ranunculaceae									
57.	<i>Ranunculus arvensis</i> L.		+	+	+	Th	Mic	Post-rep	I
24. Family Rubiaceae									
58.	<i>Gallium aparine</i> L.		+	+	+	Th	N	Rep	IV
25. Family Solanaceae									
59.	<i>Solanum nigrum</i> L.		+	+	+	Th	Mic	Rep	IV

Table-2. Life-form, leaf-size and phenology of weeds flora of wheat crops of Kalash valley, District Chitral, Pakistan

S #	Parameters	Number of weed species	Percentage
I.	Life-form classes		
1.	Therophytes	48	81.35
2.	Geophytes	06	10.17
3.	Hemicryptophytes	05	08.47
II.	Leaf-size classes		
1.	Mesophylls	16	27.11
2.	Microphylls	15	25.42
3.	Nanophylls	13	22.03
4.	Macrophylls	11	18.64
5.	Aphyllous	2	03.38
6.	Leptophylls	1	01.70
7.	Megaphylls	1	01.70
III.	Phonological classes		
1.	Reproductive stage (Flowering)	45	76.27
2.	Post-reproductive stage (Fruiting)	11	18.64
3.	Pre-reproductive stage (Vegetative)	03	05.08
IV.	Consistency classes		
1.	I	18	30.51
2.	II	16	27.11
3.	III	10	16.95
4.	IV	10	16.95
5.	V	5	08.47

Key: B = Bumburet, R = Rumbor, BR = Birir

Life-form classes: Th. Therophytes. G. Geophytes. H. Hemicryptophytes

Leaf-size classes: L. Leptophylls. N. Nanophylls. Mic. Microphylls. Mes. Mesophylls, Mac. Macrophylls. Meg. Megaphylls. Ap. Aphyllous

Phenological classes: Pre-rep. Pre-reproductive, Rep. Reproductive, Post-rep. Post-Reproductive

CONCLUSION

The conclusion of the present study is that Asteraceae, Poaceae and Brassicaceae families have maximum number of species and mostly the species are annuals (Therophytes) in Kalash valley of Chitral, Pakistan. Thus, proper pre-reproductive management of these weeds can reduce weeds distribution and will increase the yield of wheat in the area.

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