

**FLORISTIC COMPOSITION AND ECOLOGICAL PREVALENCE OF
THE WEED SPECIES GROWING IN WHEAT AND SUGAR
CANE FIELDS OF DISTRICT CHARSADE, KHYBER
PAKHTUNKHWA, PAKISTAN**

Naila Inayat^{1*}, Asad Ullah and Abdur Rashid

ABSTRACT

A total of 43 weed species belongs to 17 families and 39 genera were collected from wheat and sugarcane fields. Among them 3 genera and 3 species were monocot and 36 genera and 40 species were dicot. Family Asteraceae was the leading family represented by 11 genera (28.2%) and 12 species (27.9%). Brassicaceae, Caryophyllaceae, Papilionaceae having 4 genera (10.3%) and 4 species (9.3%) each. Poaceae having 3 genera (7.7%) and 3 species (6.97%), Polygonaceae having 2 genera (5.12%) and 3 species (6.97%). While the remaining families having 1 genera (2.6%) and 1 species (2.33%) each. According to lifeform classification Therophytes were the major lifeform class (93%) and Hemicryptophytes were 4.7% and Chamaephytes were 2.3%. Leaf size classification shows that Microphylls (37.2%) were the major leaf size class followed by Leptophylls (30.2%), Nannophylls (16.3%) and Mesophylls (16.3%). The weed species are competing with crops for nutrients, space, light and interfere by inhibiting nutrients uptake by the plants thus resulting in to considerable decrease in crop productivity.

Key words: Charsadda, hemicryptophyte, nannophylls, Pakistan, sugar cane fields, therophytes.

Citation: Inayat, N., A. Ullah and A. Rashid. 2014. Floristic composition and ecological prevalence of the weed species growing in wheat and sugar cane fields of district Charsadda, Khyber Pakhtunkhwa, Pakistan. *Pak. J. Weed Sci. Res.* 20(3): 405-415.

INTRODUCTION

Charsadda is a town and headquarters of Charsadda District, in the Pakhtunkhwa province. It is situated at an altitude of 276 m (908 ft.) and lies 29 km from the Peshawar. District Charsadda lies between 34°03' and 34°38'N latitudes and 71°28' and 71°53'E longitudes. It covers an area of 996 km² and situated at extreme end of the monsoon

¹Centre of Plant Biodiversity, University of Peshawar, Pakistan

*Corresponding author's email: nailainayt@yahoo.com

and the temperature is severe and extreme. Charsadda is a part of the fertile plain of Peshawar valley. The major crops of the area are sugarcane, tobacco, wheat, rice, maize, vegetable and orchards and various weed species are distributed in these crops. Weed is a plant growing where it is not desired or any plant that is objectionable and interferes with man's activities or welfare or a more complete definition can perhaps be "Weeds are plants growing in places where, and at time when, man wants either some other plants to grow or no plant to grow at all" (Tanveer and Asghar, 2003). It has been noticed that some weeds are poisonous and injurious to animals e.g. blue pimpernel, sun spurge and Johnson grass (Marti *et al.*, 1990). Weeds are a supplement feed for farm animals e.g. *Convolvulus arvensis*, *Melilotus indica*, *Phalaris minor* and *Vicia sativa* (Tanveer and Asghar, 2003). Weed reduces the yield by competing with crop plants for different environmental resources. It is said that with each kg of weeds produced, one kg of wheat grains is reduced (Rao, 1992). Wild onion bulbs and wild mustard seed lower the wheat grain quality. Creeping thistle, Bermuda grass and common purslane release allelochemicals which inhibit germination of wheat (Khalid and Shad, 1987). Khan *et al.* (2012 and 2013) reported that weeds greatly reduce the agricultural productivity due to competition. The CO₂ consumption is higher in most of the weeds as compared to cultivated crops due to relatively more leaf area of weeds (Arnon, 1987). The percent yield losses of wheat and sugarcane due to weeds in Pakistan is 17-35% for wheat and 25-35% for sugarcane. Critical weed period of weed-crop competition in wheat is 4-6 weeks after sowing (Nayyar *et al.*, 1994) and for sugarcane it is 4-8 weeks after sowing (Makhdoom, 1988). Generally, 1 kg of weed biomass corresponds to a loss of 1 kg in crop plants biomass (Rao, 2000). It is evident from the weeds studies that the weeds are not only resulting in to low quality crop but it is considerably decreasing the biomass and productivity of the crops.

MATERIALS AND METHODS

Regular field visits were conducted at four different localities of District Charsadda having an area of 996 km² during March-July, 2012 viz. Rajjar, Turangzai, Shaedan and Baborashaka in the blooming period. Weeds were collected from the wheat and sugarcane fields, dried, pressed and preserved for about three weeks to get them moisture free. The newspapers were changed daily till the plants were fully dried. At the same time, the plants were numbered and tagged with data, locality and other characteristics of species. Photographs were taken by using Sony Digital camera. The scientific names, common names, family, life form and leaf size of each species were

recorded (Table-2). The weed species were classified following - (Tanveer and Asghar, 2003). The collected specimens were mounted on standard herbarium sheets. Identification was carried out with the help of available literature (Stewart, 1972; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2013 and Cope, 1982). Voucher specimen numbers were assigned to the specimens and were deposited in the Herbarium of Center of Plant Biodiversity, University of Peshawar (UPBG).

RESULTS AND DISCUSSION

Forty three weeds species were collected belonging to 17 different families, in which one was monocot and 16 were dicots. Poaceae was presented by 3 genera and 3 species. The remaining 16 families have 36 genera and 40 species. Family Asteraceae was the leading one with 11 genera (28.2%) and 12 species (27.9%). Followed by Brassicaceae, Caryophyllaceae, Papilionaceae having 4 genera (10.3%) and 4 species (9.3%) each. Poaceae having 3 genera (7.7%) and 3 species (6.97%), Polygonaceae 2 genera (5.12%) and 3 species (6.97%), and the remaining families were presented by 1 genera (2.6%) and 1 species (2.33%) each. The finding agree with (Malik and Hussain, 1990, Rashid *et al.*, 1998, Murad *et al.*, 1995, Nasir *et al.*, 2002, Shah *et al.*, 2006; Ullah and Rashid, 2007; Sher and Khan, 2007; Hussain *et al.*, 2009; Hadi *et al.*, 2009a; Hadi *et al.*, 2009b and Shah and Hussain, 2011). All these workers have shown almost similar floristic composition of the weed flora for various crops and some of the species are of common distribution specifically in the case of wheat. The lifeform classification (Table-2) shows that 40 species were Therophytes (93%), 2 were Hemicryptophyte (4.7%) and 1 was Chamaephytes (2.3%). The result agrees with those of (Malik and Hussain, 1990, Nasir *et al.*, 2002, Shah *et al.*, 2006 and Shah *et al.*, 2008). Leaf size spectra (Table-2) indicate the dominance of Microphylls with 16 species (37.2%), Leptophylls with 13 species (30.2%), Mesophylls and Nannophylls each with 7 species (16.3%). The finding agrees with (Murad *et al.*, 1995, Sher and Khan, 2007) who concluded that most species of weeds have small leaf size.

Presences of weeds were recorded in various varieties of wheat and most of the weeds like *Convolvulus arvensis* L., *Coronopus didymus* (L.) Sm., *Sisymbrium irio* L., *Stellaria media* (L.) Vill., *Anagalli sarvensis* L. and *Silybum marianum* (L.) Gaertner, *Capsella bursa-pastoris* (L.) Medick., *Euphorbia helioscopia* L., *Fumaria indica* Pugsley (Plate-1 and Fig. 4), *Melilotus indica* L., *Rumex dentatus* L., *Sisymbrium irio* L., *Sonchus arvensis* L., *Sonchus asper* (L.) Hill. (Plate-1 and Fig. 5), and many others are invariably known weeds of wheat fields from other partsof the country .The present findings agree

with many other researcher like Hussain *et al.* (1985), Hussain *et al.* (2004), Qureshi and Bhatti (2001), Jakkar *et al.* (2005), Mohammad *et al.* (2005), Shah and Khan (2006), Marwat *et al.* (2006), Akhtar and Hussain (2007), Shah *et al.* (2008) who reported the same floristic composition from wheat fields. While some work has been carried out in Peshawar by Hussain *et al.* (1985), in Kotli by (Malik and Hussain, 1990) and in Chitral by Hussain *et al.* (2004).

Weeds are one of the major constraints to high yield in sugarcane production in Pakistan some important weeds in sugarcane fields found in the research area were *Anagallis arvensis* L. (Plate 1. and Fig. 1.), *Chenopodium album* L. (Plate 1. and Fig. 6.), *Cirsium arvense* (L.) Scop., *Ranunculus muricatus* L. (Plate 1. and Fig. 3.), *Convolvulus arvensis* L. (Plate 1. and Fig. 2.), *Coronopus didymus* (L.) Sm. (Plate 1.). Same finding were also concluded by Khan *et al.* (2012 in Sugarcane fields of Bannu and Qureshi (2004) in sugarcane fields of Sukkhar.

Table-1. Life form and leaf size of weeds of wheat and sugarcane fields of District Charsadda, Khyber Pakhtunkhwa Pakistan.

Life form class			
S. No.	Lifeform class	No. of species	%age
1.	Therophytes	40	93%
2.	Hemicryptophytes	2	4.7%
3.	Chamaephytes	1	2.3%
Leaf class			
S. No.	Leaf class	No. of species	%age
1.	Microphylls	16	37.2%
2.	Leptophylls	13	30.2%
3.	Nannophylls	7	16.3%
5.	Mesophylls	7	16.3%

Plate No. 1



1. *Anagallis arvensis* L.



2. *Convolvulus arvensis* L.



3. *Ranunculus muricatus* L.



4. *Fumaria indica* (Hauskn.)



5. *Sonchus asper* (L.) Hill.



6. *Chenopodium album* L. Pugsley.

Table-2. Checklist showing family, genus, species, lifeform and leaf size of weeds of wheat and sugarcane fields of District Charsadda, Pakistan

S#	Family	Genus	Specie	English Name	Local Name	Life form	Leaf size
A. Monocot							
1.	Poaceae	<i>Phalaris</i> L.	<i>P. minor</i> Retz. Naila, 01 (UPBG)	Little seed canary grass	Ghondoky/ Dumbighass	Th	N
		<i>Poa</i> L.	<i>P. annual</i> L. Naila, 02 (UPBG)	Annual meadow grass	Barikghass/ wakha	Th	L
		<i>Avena</i>	<i>A. sativa</i> L. Naila, 03 (UPBG)	Oat	Jamdar	Th	Mic
B. Dicot							
2.	Apiaceae	<i>Scandix</i> L.	<i>S. pecten-veneris</i> L. Naila, 04 (UPBG)	Shepherd's needle	Kali ziri	Th	L
3.	Asteraceae	<i>Artemisia</i> L.	<i>A. vulgaris</i> L. Naila, 05 (UPBG)	Mugwort	Tarkha	Ch	Mic
		<i>Centaurea</i> L.	<i>C. iberica</i> Trev ex Spring. Naila, 06 (UPBG)	Centaurea	Kareeza	Th	Mic
		<i>Cirsium</i> Mill.	<i>C. arvense</i> L. Naila, 07 (UPBG)	Canada thistle	Laih/kareza	Th	Mic
		<i>Conyza</i> Less.	<i>C. canadensis</i> (L.) Cronq. Naila, 08 (UPBG)	Horseweed	Janglihaloon	Th	L
		<i>Launaea</i> Cass.	<i>L. procumbens</i> L. Naila, 09 (UPBG)	Creeping Launaea	Kareza	H	L
		<i>Lactuca</i> L.	<i>L. sativa</i> L. Naila, 10 (UPBG)	Lettuce	Shodapai	Th	Mes
		<i>Matricaria</i> L.	<i>M. recutita</i> L. Naila, 11 (UPBG)	Chamomile	Babuna	Th	L
		<i>Parthenium</i> L.	<i>P. hysterophorus</i> L. Naila, 12 (UPBG)	Santa Maria Feverfew	ZangaleyTar kha	Th	Mes
		<i>Sonchus</i> L.	<i>S. arvensis</i> L. Naila, 13 (UPBG)	Field snow thistle	Kareza	Th	Mic
	<i>S. asper</i> (L.) Hill. Naila, 14 (UPBG)	Leaved sow thistle	Diamidodak/ kareza	Th	Mes		

		<i>Silybum Adanson</i>	<i>S. marianum</i> (L.) Gaertner Naila, 15 (UPBG)	Gaertner Milk thistle	Kandiali/ kareza	Th	Mes
		<i>Taraxacum</i> L.	<i>T. officinale</i> Weber. Naila, 16 (UPBG)	Dandelion	ZeerGulay	Th	Mic
4.	Brassicaceae	<i>Capsella</i> Medik.	<i>C. bursa-pastoris</i> (L.) Medik. Naila, 17 (UPBG)	Shepherd's purse	Chamberaka	Th	Mic
		<i>Coronopus</i> J.	<i>C. didymus</i> (L.) Smith Naila, 18 (UPBG)	Swine cress	Skhabbotay	Th	L
		<i>Eruca</i> Mill.	<i>E. sativa</i> Mill. Naila, 19 (UPBG)	Arugula	Aroka	Th	Mic
		<i>Sisymbrium</i> L.	<i>S. irio</i> L. Naila, 20 (UPBG)	London rocket	Khubkalan/ Alam	Th	N
5.	Cannabaceae	<i>Cannabis</i> L.	<i>C. sativa</i> L. Naila, 21 (UPBG)	Marijuana	Bang	Th	Mic
6.	Caryophyllaceae	<i>Arenaria</i> L.	<i>A. serpyllifolia</i> Bourg. Naila, 22 (UPBG)	Thyme leaf/ sandwort	–	Th	L
		<i>Cerastium</i> L.	<i>C. glomeratum</i> Thuill. Naila, 23 (UPBG)	Sticky mouse-ear/ Chickweed	–	Th	N
		<i>Spergula</i> L.	<i>S. arvensis</i> L. Naila, 24 (UPBG)	Spergula/ Sand weed	Kallribooti	Th	L
		<i>Stellaria</i> L.	<i>S. media</i> (L.) Vill. Naila, 25 (UPBG)	Chickweed	Phullanbooti	Th	N
7.	Chenopodiaceae	<i>Chenopodium</i> L.	<i>C. album</i> L. Naila, 26 (UPBG)	Goose foot	Bathu	Th	Mic
			<i>C. ambrosioides</i> L. Naila, 27 (UPBG)	Wormseed	Sarmey	Th	Mic
			<i>C. foliosum</i> (Moench) Asch. Naila, 28 (UPBG)	Leafy goosefoot	Angoor	Th	L
8.	Convolvulaceae	<i>Convolvulus</i> L.	<i>C. arvensis</i> L. Naila, 29 (UPBG)	Field bindweed	Lehli/prewata	Th	Mic
9.	Euphorbiaceae	<i>Euphorbia</i> L.	<i>E. helioscopia</i> L. Naila, 30 (UPBG)	Sunspurge	Chhatridodak / mandaro	Th	N
10.	Fumariaceae	<i>Fumaria</i> L.	<i>F. indica</i> Pugsley Naila, 31 (UPBG)	Fumitory	Shahtra/papra	Th	L

11.	Papaveraceae	<i>Papaver</i> L.	<i>P. rhoeas</i> L. Naila, 32 (UPBG)	Common poppy	Redigul	Th	Mic
12.	Papilionaceae	<i>Lotus</i> L.	<i>L. corniculatus</i> L. Naila, 33 (UPBG)	Birds foot Trefoil	Korkamanay	Th	L
		<i>Lathyrus</i> L.	<i>L. odoratus</i> L. Naila, 34 (UPBG)	Sweet pea	prewata	Th	Mes
		<i>Melilotus</i> (L.) Mill.	<i>M. indica</i> L. Naila, 35 (UPBG)	Sweet clover	Lewanay/Senggi	Th	Mic
		<i>Vicia</i> L.	<i>V. sativa</i> L. Naila, 36 (UPBG)	Common vetch	Kharawara/Rewari	Th	N
13.	Plantaginaceae	<i>Veronica</i> L.	<i>Veronica anagallis-aquatica</i> L. Naila, 37 (UPBG)	Water speedwell	ShenGulay	Th	Mic
14.	Polygonaceae	<i>Polygonum</i> L.	<i>P. aviculare</i> L. Naila, 38 (UPBG)	Knotweed, Prostrate	Bandakay	Th	L
			<i>P. plebejum</i> R. Brown Naila, 39 (UPBG)	Knotweed	Adranak	H	N
		<i>Rumex</i> L.	<i>R. dentatus</i> L. Naila, 40(UPBG)	Dock	Shalkha/Jan glipalak	Th	Mes
15.	Primulaceae	<i>Anagallis</i> L.	<i>A. arvensis</i> L. Naila, 41(UPBG)	Blue pimpernel	Mangotegul/billibooti	Th	L
16.	Ranunculaceae	<i>Ranunculus</i> L.	<i>R. muricatus</i> L. Naila, 42(UPBG)	Rough seed butter cup	Ghorsumbi	Th	Mes
17.	Urticaceae	<i>Urtica</i> L.	<i>U. dioica</i> L. Naila, 43 (UPBG)	Nettle, Stinging	Seezonkay	Th	Mic

Keys: Life-form classes: 1. H = Hemicryptophytes, 2. Th= Therophytes, 3. Ch= Chamaephytes.

Leaf-size classes: 1. L = Leptophylls, 2. Mic = Microphylls, 3. Mes. = Mesophylls, 4. N = Nannophylls.

REFERENCES CITED

- Arnon, F. 1987. Physiological Principles of Dry land Crop Production. Physiological aspects of Dry land Farming. Oxford and IBH Publishing Co. Pvt. Ltd. NewDelhi. India. 118.
- Ali, S.I. and M. Qaiser. 1993-2003. Flora of Pak. Nos. 194-214. Department of Botany, Karachi University, Karachi.
- Ali, S.I. and Y.J. Nasir. 1989-1991. Flora of Pak. Nos. 191-193. Department of Botany, Karachi University, Karachi.
- Akhtar, N. and F. Hussain. 2007. Weeds of wheat fields of village Qambar, District Swat, Pakistan. *Pak. J. Pl. Sci.* 13 (1): 31-35.
- Cope, T.A. 1982. Poaceae in Nasir and Ali,s Flora of Pakistan No. 143. Department of Botany, Karachi University, Karachi.
- Hadi, F., M. Naseem, S.M. Shah, A. Ullah and F. Hussain. 2009a. Prevalence and ecological characteristics of summer weeds in crop and vegetable fields of Botanical Garden Azakhel, University of Peshawar, Pakistan. *Pak. J. Pl. Sci.* 15(2): 101-105.
- Hadi, F., S.M. Shah, A. Ullah, S.G. Ali and F. Hussain. 2009b. Ecological Characteristics of Weeds in the Rice Fields of Botanical Garden Azakhel, University of Peshawar, Pakistan. *Pak. J. Pl. Sci.* 17(1): 51-54.
- Hussain, F., S.R. Chughtai and A.A. Dasti. 1985. Ecotaxonomic studies on the weeds of wheat fields in Peshawar valley. *Gomal. J. Res.* 5: 27-35.
- Hussain, F., A. Murad and M. J. Durrani. 2004. Weeds communities in the wheat field of Mastuj District Chitral, Pakistan. *Pak. J. Weed Sci. Res.* 10: 101-108.
- Hussain, F., S.M. Shah, F. Hadi and A. Ullah. 2009. Diversity and ecological characteristics of weeds of wheat fields of University of Peshawar Botanical Garden at Azakhel, District Nowshera, Pakistan. *Pak. J. Pl. Sci.* 15(4): 283-294.
- Jakhar, G.S., A.Q. Mahar, S.A. Abro and R. Qureshi. 2005. Weed communities of wheat crop under diverse edaphology of District Khairpur. *Pak. J. Bot.* 37: 709-714.
- Khalid, S. and R.A. Shad. 1988. Role of allelopathy in weed management. *Progress. Farm.* 7(I): 73-76.
- Khan, R., S.M. Wazir, Subhan, S. Ullah, H. Ullah, A. Farooq, F. Jaffar, Shazia, I.A. Shah and M. Kamal. 2012. Weed flora of sugarcane in District Bannu, Khyber Pakhtunkhwa, Pakistan. *Pak. J. Pl. Sci. Res.* 18(4):541-552.
- Khan, M.A., K. Ali, Z. Hussain and R.A. Afridi. 2012. Impact of maize-legume intercropping on weeds and maize crop. *Pak. J. Weed Sci. Res.* 18(1): 127-136.
- Khan, M.A., S. Kakar, K.B. Marwat and I.A. Khan. 2013. Differential

- response of *Zea mays* L. in relation to weed control and different macronutrient combinations. *Sains Malaysiana*, 42(10): 1405-1411.
- Martin, J.H., W.H. Leonard and D.L. Stamp. 1990. Principles of field crop production. PP: 305.
- Makhdoom, M.U. 1988. Magnitude of weed problem in cotton. Training manual of improved weed management. NARC, Islamabad. 257-267.
- Malik, Z.H. and F. Hussain. 1990. Distribution of some weeds in the wheat fields of Kotli, Azad Kashmir. *Sarhad. J. Agric.* 6: 1-4.
- Murad, A., F. Hussain, Q. Marwat and Z. Muhammad. 1995. Floristic composition, lifeform and leaf size spectra of some weeds of wheat, maize and potato fields of Mastuj, District Chitral. *Pak. J. Pl. Sci.* 1: 153- 164.
- Mohammad, S.T., A. Cheema, Z. Bashir and R. Mehmood. 2005. Analytical characteristics of weeds of wheat crop of Tehsil Gojra, Toba Tek Singh, Pakistan. *Pak. J. Pl. Sci.* 52-56.
- Marwat, K. B., Z. Hussain, B. Gul, M. Saeed and S. Din. 2008. Survey on weed problem in Wheat crop in District Mardan. *Pak. J. Weed Sci. Res.* 12: 353-358.
- Nasir, E. and S. I. Ali. 1970-1989. Flora of Pak. Nos. 1-190. Deptt. Bot., Karachi Univ., Karachi. *Pak. Agric. Res. Council Islamabad*.
- Nasir, Z. A. and S. Sultan. 2002. Floristic, biological and leaf size spectra of weeds in gram, lentil, mustard and wheat field of District Chakwal. *Pak. J. Bio. Sci.* 5(7): 758-762.
- Nayyar, M.M., M. Shafi. M. L. Shah and T. Mehmood. 1995. Weed eradication duration studies in wheat. *In: Weed management for sustainable agriculture. Proceedings of 4th all Pakistan Weed Sci. Conference.* pp. 147-53. Rao, V.S. 1992. Principles of Weed Science. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.
- Qureshi, R. and G.R. Bhatti. 2001. Determination of weed community in wheat fields of District Sukkur. *Pak. J. Bot.* 33(1): 109-115.
- Qureshi, R. 2004. A quantitative account of weeds of sugarcane (*Saccharum officinarum*) crop in District Sukkur. Federal Seed Certification and Registration Dept., Govt. of Pakistan. Rahim Yar Khan. *Quarterly Science Vision* 9(1-2).
- Rao, V.S. 2000. Harmful effects caused by weeds. Principles of Weed Science. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi & Calcutta. 1.
- Rashid, A., S. Khan and F. Hussain. 1988. Distribution of some weeds in Turmeric fields of District Bannu. *Pak. J. Agric. Res.* 9(4): 566-560.

- Rao, V.S. 1992. Principles of Weed Science. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.
- Shah, G. M. and M. A. Khan. 2006. Checklist of noxious weeds of District Mansehra, Pakistan. *Pak. J. Weed Sci. Res.* 12(3): 213-219.
- Shah, S.M. and F. Hussain. 2011. Floristic diversity and ecological characteristics of weeds of sunflower crop of University of Peshawar Botanical Garden, Azakhel, District Nowshera, Pakistan. *Pak. J. Pl. Sci.* 17(2): 117-120.
- Sher, Z., Z. D. Khan. 2007. Floristic composition, life form and leaf spectra of the Vegetation of Chagharzai Valley, District Buner. *Pak. J. Pl. Sci.* 13(1):57-66.
- Shah, S. M. and F. Hussain. 2008. Ecology of wetlands of Akberpura District Nowshera, Pakistan. *Pak. J. Pl. Sci.* 14: 47-57.
- Stewart, R. R. 1972. An annotated catalogue of the Vascular Plants of West Pakistan and Kashmir, Fakhri Printing Press, Karachi.
- Tanveer, A. and A. Ali. 2003. Weeds and their control. Higher Education Commission Islamabad, Pakistan. Press Manager, H-9 Islamabad. 1-162.
- Ullah, A. and A. Rashid. 2007. Weeds and Livelihood in Mankial Valley, Hindukush Range, Pakistan. *Pak. J. Weed Sci. Res.* 13(1-2): 27-32.