Pak. J. Weed Sci. Res., 22(2): 263-267, 2016

ECOLOGICAL CHARACTERISTICS OF WEEDS OF ONION CROP OF UNIVERSITY OF PESHAWAR BOTANICAL GARDEN, DISTRICT NOWSHERA, PAKISTAN

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ABSTRACT

Present research was carried out to enlist the weed flora in the fields of Onion (Allium cepa L.). Twenty one species of weeds of 11 families were documented. Asteraceae was the leading family with 5 species (23.80%), followed by Poaceae and Brassicaceae each with 3 species (14.28%) and Caryophyllaceae with 2 species (9.52%). The remaining famillies had one species each. Biological spectra indicated that therophytes (18 species 85.71%), geophytes (2 species 9.52%) and hemicryptophytes (1 species, 4.76%) were the life-form classes. Leaf-size spectra showed that nanophylls were leading leaf size class with 11 species (52.38%), followed by macrophylls (5 species. 32.80%), and mesophylls (3 species 14.28%). Leptophylls and microphylls had 1 species (4.76%) representation. Phenological studies showed that 71.42% weeds were in reproductive stage and 28.57% were in vegetative stage. Weeds offer competition with cultivated plants and must be eradicated to enhance the productivity.

Key words: *Allium cepa*, botanical garden, ecology, weeds.

Citation: Haq, Z.U., B. Gul, S.M. Shah, A. Razaq and H. Raza. 2016. Ecological characteristics of weeds of onion crop of University of Peshawar Botanical Garden, district Nowshera, Pakistan. Pak. J. Weed Sci. Res. 22(2): 263-267.

INTRODUCTION

University of Peshawar Botanical Garden is situated at Azakheil, District Nowshera, between 34o -15`and 34o-31' N latitude and 71.33 to 44 E longitudes at an altitude of 290 m. The onion crop (*Allium cepa* L.) was cultivated in a specific area of 2 acre during January, 2013. Weeds grow in every crop including vegetables that cause great loss in the yields of crop and vegetables due to competition and allelopathy. Weeds causes problem during harvesting and seed purification. Weeds flora varies due to climate, altitude, edaphic factors, topography and

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agronomic practices. Thus it becomes of primary importance to identify and know the ecological characters of weeds (Hadi *et al.,* 2009). Weeds affect the precious crop and reduce its productivity so for any ecological management, the proper identification and assessment of flora has always been a pre-requisite (Shah and Hussain, 2011). Hadi *et al*. (2011) reported 30 weeds species of 14 famillies from rice fields of Botanical Garden. Poaceae was dominant family with 7 species. Therophytes and nanophylls were the leading life-form and leaf-size classes. Shah and Hussain (2011) reported 23 species of weeds from sunflower crops of Botanical Garden. Hussain *et al. (*1982) reported the weeds of tobacco fields; Subhan *et al.* (1985) of rice and maize and Akhtar and Hussain (2007) of wheat field. This is the first attempt to record the weeds present in the field of *Allium cepa* growing in the Botanical Garden. The finding will help for future quantification, identification and proper management of weeds in the crop under reference.

MATERIALS AND METHODS

Field studies were conducted during March 2013, to record the weeds in the field of *Allium cepa*. Weeds were classified into various life-form and leaf-size classes after Raunkiaer (1934) and Hussain (1989). Phenologically plants were classified into reproductive and vegetative stages. The collected plants were properly pressed, dried and mounted on Herbarium sheets and the voucher specimens were deposited at Herbarium of Center of Plant Biodiversity, University of Peshawar.

Plant species were identified with the help of Flora of Pakistan (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991: Ali and Qaiser, 1993-2013).

RESULTS AND DISCUSSION

21 species of 11 families were recorded as weeds from onion fields of Botanical Garden (Table-1). Asteraceae was the leading family with 5 species (23.80%), followed by Poaceae and Brassicaceae each with 3 species (14.28%) and Caryophyllaceae with 2 species (9.52%). The remaining families had one species each. Life-form spectra (Table 2) showed that therophytes had (18 species 85.71%), geophytes (2 species 9.52%) and hemicryptophytes (1 species 4.76%). The findings agree with those of Hussain *et al.* (2004) and Akhtar and Hussain (2007), who also observed dominance of therophytic weeds in cultivated fields. Leaf-size spectra (Table 2) exhibited that nanophylls were leading leaf-size class (11 species 52.38%), followed by macrophylls (5 species 32.80%) and mesophylls (3 species 14.28%). Leptophylls and microphylls had (1 species. 4.28%) representation.

Phenological studies showed that 71.42% plant species were in reproductive stage and remaining 28.57% were in vegetative stage. Since annuals survive only through seeds therefore, these might be controlled better than perennial weeds by suppressing their flowering and fruiting stages. However, even under best managment weeds seeds persist due to their longevity and long viability in the soil (Hussain *et al.,* 2009). Onion is usually used as a chopped or slice, or fresh as in salads as well as used in dishes as a spice (Baloch. 1994). Clay, alluvial, sandy loam and muck are the best soil types suited for onion cultivation. A soil of pH 6.0 to 7.0 is recommended for the production of onion crop (Baloch, 1994). The average yield of onion in Pakistan is very low as compared to other leading countries due to many factors one of the main limiting factor is weeds infestation (Ghafoor, 2004). Weeds compete with onion for nutrients, soil moisture, space and light (Singh *et al*., 2006). They considerably reduce the yields, quality and value of the crop through increased production and harvesting costs. Weeds compete with crop plants at very early growth stages. Weeds also harbor insect, pests and diseases-causing organisms (Singh *et al*., 2006). The losses caused by weeds have been estimated to be much higher than those caused by insect's pest and dieases. Generally the yields of crop are reduced by 30 to 60 % due to weeds infection (Hussain, 1983). Numerous research trials have shown that many herbicides can be used effectively to control weeds in onion (Jilani *et al*., 2003; Thakral *et al*., 2003; Ghafoor, 2004; Marwat *et al*., 2005). We can increase the production of crops by removing weeds at their initial stages or by using less dangerous herbicides and weedicides.

Table-1. Floristic composition, life -form, leaf –size and phenology of weeds of *Allium cepa* grown in Botanical Garden, Azakheil, District Nowshera, Pakistan

Division	Family	S.#	Species	Life Form	Leaf Size	Phenology
Monocotyledon	Poaceae	1.	*Cynodon dactylon* (L.) Pers	H	Mic	V
		2.	*Alopecurus mysoroides* L.	Th	Mac	R
		3.	*Phragmites karka* Retz.	G	Mes	V
Dicotyledon	Amaranthaceae	4.	*Amaranthus viridis* L.	Th	N	R
	Asteraceae	5,	*Cnicus benedicta* L.	Th	Mes	V
		6.	*Helianthus annus* L.	Th	Mac	R
		7.	*Matricaria chamomile* L.	Th	N	R
		8.	*Sonchus arvensis* (Dc.)Krip.	Th	Mac	R
	Brassicaceae	9.	*Brassica campestris* L,	Th	Mac	R
		10.	*Coronopus didymus* L.	Th	L	R
		11.	*Raphanus sativus* L.	Th	Mac	R

	Caryophyllaceae	12.	*Spergula arvensis* L.	Th	N	R
		13.	*Stellaria media* L.	Th	N	R
	Chenopodieceae	14.	*Chenopodium album* L.	Th	N	R
	Eurphobiaceae	15.	*Euphorbia helioscopia*	Th	N	R
	Linaceae	16.	*Linum usitatissium* L.	Th	N	R
	Papilionaceae	17.	*Melilotus officinale* L.	Th	N	R
		18.	*Trifolium resupinastum* L.	Th	N	V
	Polygonaceae	19.	*Polygonium plebijum* L.	Th	N	V
		20.	*Rumex dentatus* L.	G	Mes	V
	Scrophulariacea	21.	*Anagillis arvensis* L.	Th	N	R

Keys: life-form classes. Th. Therophytes, G. Geophytes, H. Hemicryptophytes; **Leaf-size classes.** L. Leptophylls, N. Nanophylls, Mic. Microphylls, Mes. Mesophylls, Meg. Megaphylls; **Phenology.** R. Reproductive, V. Vegetative.

Table-2. Summary of life -form, leaf –size and phenology of weeds of *Allium cepa* grown in Botanical Garden, Azakheil, District Nowshera, Pakistan.

S.No	Class	Parameters	No. of Species	Percentage
1.	A.	Therophytes	18	85.71%
2.	Life-form	Geophytes	2	9.52%
3.	classes	Hemicryptophytes	1	4.76%
1.	B.	Nanophylls	11	52.38%
2.	Leaf- Size	Macrophylls	5	32.80%
3.	Classes	Mesophylls	3	14.28%
4.		Microphylls	1	4.76%
5.		Leptophylls	1	4.76%
1.	C.	Reproductive	15	71.42%
2.	Phenological Stages	Vegetative	6	28.57%

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