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WEED COMMUNITIES OF SUNFLOWER CROP IN SUKKUR AND KHAIRPUR, SINDH: AUTUMN ASPECT

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ABSTRACT

The survey of weed communities of sunflower crop was conducted in five sunflower growing areas of Sukkur and Khairpur districts during 2003. A total of 33 weed species belonging to 30 genera and 15 angiosperm families were recorded. Five weed communities viz.: 1) Cyperus-Eclipta-Brachiaria in Ghulam Qasim Jiskani (district Khairpur), 2) Dactyloctenium-Cyperus-Brachiaria in Kotedji (district Khairpur), 3) Trianthema-Cyperus-Brachiaria in Keti Pir Pagara (district Khairpur), 4) Cyperus-Dactyloctenium-Cucumis in Riazabad (district Sukkur) and 5) Cyperus-Euphorbia-Rhynchosia in Sangi (district Sukkur) were recognized. The most widespread weed species of these communities was Cyperus rotundus Linn. It was followed by Brachiaria eruciformis (J.E Smith) Griseb., Dactyloctenium aegyptium (L.) Willd, Trianthema portulacastrum Linn., Eclipta prostrata Ait., Euphorbia hirta Forsk., Rhynchosia minima (Linn.) DC. and Cucumis melo var. agrestis Naudin.

Key words: Sunflower, weed communities, autumn season, Khairpur, Sukkur

INTRODUCTION

Sunflower (*Helianthus annus* L.) is very important oilseed crop of the world. It is ranked one of the world's leading crops in terms of total production and world trade (Khoso, 1992). The edible oil plays a vital role in the economy of Pakistan. The country is deficient in edible oil and a large amount of foreign exchange is spent on oil imports. There is an increase of import from Rs.77 million in 1969-70 to Rs. 3900 million in 2002-03 (Shah *et al.*, 2005). Ahmad *et al*. (2002) reported that about 30% of the total needs are met from local production, while 70% comes from imports. The major share of the domestic production of edible oil comes from cottonseed, contributing

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67% of the local production and canola contributes 19.6%. The remaining 13.4% are contributed mainly by sunflower.

Sunflower is one of the four major oilseed crops (soybean, peanut, rapeseed and sunflower) grown for edible oil in the world. It is cultivated on about 23.31 million hectares all over the world with a production of 29.90 million tons. Major sunflower growing countries are Russia, United States, China, Argentina, France, Canada, Bulgaria, Rumania, Hungary and Turkey (Anonymous, 2008).

Sunflower was introduced in Pakistan in the early sixties but successfully grown since 1977 through extension and market facilities provided by Ghee Corporation of Pakistan (Meo *et al.*, 1999). Hamid *et al*. (1999) reported that over the years, sunflower has become an important crop for both farmers and consumers in Pakistan. Sunflower fits well in the local cropping system and is considered an important cash crop in many parts of the country. Although it is a high yielding, high oil content crop which gives high return to the farmers, no serious efforts have been made to increase the local production of sunflower. Consequently, the sunflower acreage declined from 144,191 ha in 1998-99 to 107,717 ha in 2002-03 and production from 194,544 to 128,531 tons during the same period (GOP, 2003).

The national yield of sunflower crop is about 1193.23 kg ha^{-1} (GOP, 2003) which is lower as compared with the world standards. The main reasons for this low productivity are the lack of quality seed, improper use of agro-technologies and absence of sound price incentives for the farmers. Within agricultural technologies, weed management is the most important and less noticeable factor. It is one of the major impediment including diseases, pest and climatic influences. They consume available moisture, nutrients and compete for space and sunlight with crop plants and result in yield reduction (Khan *et al.*, 2004). They are constant component of our agro-ecosystem and are controlled using alternative control method (Powell and Justum, 1993). Generally, it is observed that weed control is very crucial during the initial period of growing of all crop plants otherwise 65-75% yield can be lost (Nazir, 1994). Being a shallow rooted crop, the crop seedlings compete poorly with weeds resulting thinner and weaker plants.

Previously weed communities of sugarcane, tomato and wheat crop were reported by Qureshi *et al.* (2001a&b), Qureshi and Bhatti (2001a&b) and Qureshi (2001;2006) from the area under study. Likewise, various studies have been reported from different corners of the country (Hussain *et al.*, 2004; Memon, 2004; Jakhar *et al.*, 2005; Mohammad *et al.*, 2005; Naveed and Hussain, 2007). The objective of

this study was to identify weed species and their infestation in sunflower crop of the study area. The assessment of these values will be effective for recognizing the austerity of weed infestation and farm management aspects of studied crop.

MATERIALS AND METHODS

Weeds data were collected from five sunflower cultivating localities viz.: 1) Gulam Qasim Jiskani, 2) Kotdeji (Oilseed section, Agricultural Research Sub-station), 3) Keti Pir Pagara in District Khairpur, 4) Riazabad and 5) Sangi (Sunflower Research Station) in District Sukkur during autumn season 2003. Weed species were identified with the help of various floristic materials (Jafri, 1966; Metthew, 1983; Nasir and Ali, 1972-1994; Ali and Qaiser, 1995-2003).

Fifty quadrates were randomly used from all sites each measuring $2x2m^2$ for density, frequency, and cover values. The data of weeds (density, frequency, and cover) were taken at mature stage using following formulas. The agronomic treatments were kept constant for each study sites. The recorded data were converted into relative density, frequency and cover for getting Importance Value Index (IVI). The communities were named having highest IVI of first three dominants (Qureshi and Bhatti, 2001a). Besides, constancy of weed species based on frequency percentage also recorded. Family importance values (FIV) were recorded to compare the relative contribution of each taxonomic family to weed species composition using following formula.

Frequency %	Number of quadrates in which a species occurred x 100 Total number of quadrates taken
Density %	Total number of individuals of a species in quadrates x 100 Total number of individuals of all the species in quadrate
Coverage / dominance %	Area covered by a species in a quadrate x 100 Total area covered by all the species
Relative Frequency %	Frequency value of a particular species x 100 Total frequency values for all the species
Relative Density %	Density of a particular species in a site x 100 Total density for all the species in that site
Coverage / Dominance %	Coverage / dominance of a particular species x 100 Total coverage / dominance for all the species within a stand
Importance value	Relative Density + Relative Frequency + Relative Coverage
Family Importance Value (FIV)	Number of species within family x 100 Total number of species in all families

Local names of each weed were recorded by interviewing the local people from the study area and are given in Table-1.

RESULTS AND DISCUSSION

The objective of this study was to identify weed species and their infestation in sunflower crop of the study area. For this purpose, study of weed communities of sunflower crop was carried out in five sunflower growing localities of Sukkur and Khairpur districts during 2003. A total of 33 weed species belonging to 30 genera and 15 angiospermic families were recorded from the study areas (Table-1). The highest number of species were recorded from Sangi (25 species) followed by Kotdeji (22), while rest of the localities possessed 21 species. Poaceae was found to be the most dominant family in the formation of weed flora of the studied crop with the percentage of (18.18) followed by Asteraceae (15.15%), Euphorbiaceae and Fabaceae (9.09%) (Fig.-1).

Weed communities

Five weed communities viz. 1) *Cyperus-Eclipta-Brachiaria* in Ghulam Qasim Jiskani (district Khairpur), 2) *Dactyloctenium-Cyperus-Brachiaria* in Kotdeji (district Khairpur), 3) *Trianthema-Cyperus-Brachiaria* in Keti Pir Pagara (district Khairpur), 4) *Cyperus-Dactyloctenium-Cucumis* in Riazabad (district Sukkur) and 5) *Cyperus-Euphorbia-Rhynchosia* in Sangi (district Sukkur) were determined (Table-1). Furthermore *Cynodon-Echinochloa-Trianthema* in Ghulam Qasim Jiskani, *Echinochloa-Cynodon-Trianthema* in Kotdeji, *Dactyloctenium-Cynodon-Echinochloa* in Keti Pir Pagara, *Trianthema-Echinochloa* in Riazabad and *Dactyloctenium-Cynodon-Trianthema* in Salehpat were found second communities in these areas. While the remaining weeds were lesser in number.

There were six dominant weeds within weed communities in sunflower crop of the study area (Fig.-2). These were *Brachiaria eruciformis, Cyperus rotundus, Cucumis melo* var. *agrestis, Dactyloctenium aegyptium, Eclipta prostrata, E. hirta, Rhynchosia minima* and *Trianthema portulacastrum.* It has also been observed that *Cyperus rotundus* was found the most dominant and widespread species in all weed communities (Fig.-2). It was followed by *Brachiaria eruciformis* that was found as dominant in three communities and *Dactyloctenium aegyptium* (dominant in 2 communities), whereas rest of the dominants were occasional.

Constancy of weeds

Cyperus rotundus was found to be the most frequent and constant weed in sunflower crop with the frequency percentage of 95

(Table-1). It was followed by *Cynodon dactylon, Trianthema portulacastrum, Dactyloctenium aegyptium,Echinochloa colona, E. crus-galli* and *Rhynchosia minima* with the frequency percentage ranging from 45-80%. Whereas, 18 species were found rare from the study area during the report period (Table-1).

Weeds decrease the crop yield by competing for water, nutrients, space and light; whereas, some weeds are also allelopathic and adversely affect crops (Shah and Khan, 2006). They compete for available N supply and light in the early growth stage (Coussens, 1996) and for soil moisture during grain filling reducing both vegetative dry matter and grain yield (Mason and Madin, 1996).

Weed communities (Table-1) with blend of species co-exist and share with crop plants the resources like light, nutrients, and space and hence cause loss of yield due to weaker plants growth of cultivated crop. Those weeds which are less in importance values are not significant in relation to the damage of crop.

Table-1. Importance Value Index (IVI) of weeds of Sunflower crop in autumn season in Khairpur and Sukkur districts.

Botanical Name	Local Name	Family	Importance Value Index/Locality					Freq. %
			G	K	KE	R	S	
Alhagi maurorum Medic.	Kandero	Fabaceae	---	9.29	---	4.76	6.5	35
Amaranthus viridis Linn.	Mariro	Amaranthaceae	4.25	---	6.25	4.2	3.25	40
Brachiaria eruciformis (J.E Smith) Griseb.	Basri	Liliaceae	43.1[c]	39.3[c]	41.18[c]	---	4.42	25
Conyza canadensis (L.) Cronquist.	Gidar Booti	Asteraceae	---	---	8.36	3.5	---	10
Corchorus aestuans Linn.	Datri	Tiliaceae	4.5	3.26	---	---	---	20
Corchorus tridens Linn.	Datri	Tiliaceae	6.25	4.59	6.21	---	5.28	35
Cucumis melo var. *agrestis* Naudin.	Mitero	Cucurbitaceae	---	9.78	6.25	41.3[c]	---	30
Cressa cretica Linn.	Oin	Convolvulaceae	---	4.52	---	---	3.25	30
Cynodon dactylon (L.) Stapf.	Chhabar	Poaceae	19.35	19.29	14.1	12.82	21.12	80
Cyperus rotundus Linn.	Kabah	Cyperaceae	65.2[a]	48.35[b]	49.2[b]	66.25[a]	59.12[a]	95
Dactyloctenium aegyptium (L.) Willd	Gandheer Gaah	Poaceae	---	54.24[a]	18.56	51.45[b]	27.32	55
Desmostachya bipinnta (L.) Stapf.	Drabh	Poaceae	---	9.49	10.23	---	6.58	30
Digera muricata Linn.	Lulur	Amaranthaceae	3.5	---	3.98	3.65	3.25	40
Digitaria ciliaris (Retz.) Koel.	--------	Poaceae	6.98	7.5	6.89	---	2.5	30
Echinochloa colona (L.) Link.	Sawari	Poaceae	15.64	19.87	11.98	21.45	11.23	50
Echinochloa crus-galli (L.) P.Beauv.	Sawari	Poaceae	---	8	9.45	16.25	3.15	45
Eclipta prostrata Ait.+	Daryahi Booti	Asteraceae	49.3[b]	6.98	5.28	---	---	30

Botanical Name	Local Name	Family	Importance Value Index/Locality					Freq. %
			G	K	KE	R	S	
Euphorbia hirta Forsk.	Kheer Wal	Euphorbiaceae	6.5	---	---	4.58	43.14[b]	30
Euphorbia prostrata Ait.	Kheera Wal	Euphorbiaceae	5.25	---	9.34	5.6	2.45	20
Fimbristylis dichotoma (L.) M. Vahl.	Kaluro	Cyperaceae	---	---	---	---	7.26	10
Ipomoea aquatica Forsk.	Sarial Naro	Convolvulaceae	8.9	---	---	---	9.28	30
Launaea procumbens (Roxb) Ramayya & Rajagopal.	Bhattar	Asteraceae	4.52	---	---	5.35	---	20
Oxystelma esculentum (L.f.) R.Br.	Phuli	Asclepiadaceae	---	---	4.31	3.54	---	10
Phyla nodiflora Linn.	Bukkan	Verbinaceae	4.93	9.9	6.38	---	7.63	30
Phyllanthus fraternus Wabster.	Hazar Dani	Euphorbiaceae	4.45	5.45	---	4.5	4.37	30
Physalis minima Linn.	Khat Mithro	Solanaceae	4.5	---	5.61	4.23	---	30
Portulaca oleraceae Linn.	Lonak	Portulacaceae	---	4.29	6.21	4.58	---	35
Rhynchosia minima (L.) DC.	Matri	Fabaceae	7.58	3.96	5	3.45	38.26[c]	45
Sesbania bispinosa (Jacq.) W.F. Wight.	Jantur	Fabaceae	5.32	5.25	---	---	6.47	30
Solanum nigrum Linn.	Kaanwal	Solanaceae	6.5	6.9	---	4.65	3.35	35
Sonchus oleraceus Linn.	Bhattar	Asteraceae	3.45	---	---	4.56	3.5	30
Trianthema portulacastrum Linn.	Waaho	Aizoaceae	15.45	11.9	65.23[a]	29.33	13	80
Xanthium indicum J.Koening.	Bhurt	Asteraceae	4.58	7.89	---	---	4.32	30

Various types of weeds and their severe competition vary with soil temperature, geographical locations, altitude, tillage system and cultivation practices, water management and controlling measures.

Deep rooted weeds like *Alhagi maurorum, Cressa cretica, Cynodon dactylon, Cyperus rotundus, Desmostachya bipinnata, Launaea procumbense, Phyla nodiflora* and *Digitaria ciliaris* can severely damage the crop since sunflower is shallow rooted crop. Their roots deeply penetrate into the soil and consume large quantities of minerals and water hence resulting ingreater losses of yield. According to Oudejan (1994), perennial grasses and sedges reduce more yield than annual species and broad leaved weeds in any cultivated crop.

This paper reports the biology of weeds present in sunflower crop of the studied areas. The work shows proper identification of weeds and their infestation that could be useful for farmer and agriculturists for their control. It is recommended that further research should be launched for controlling of their populations in the reported areas.

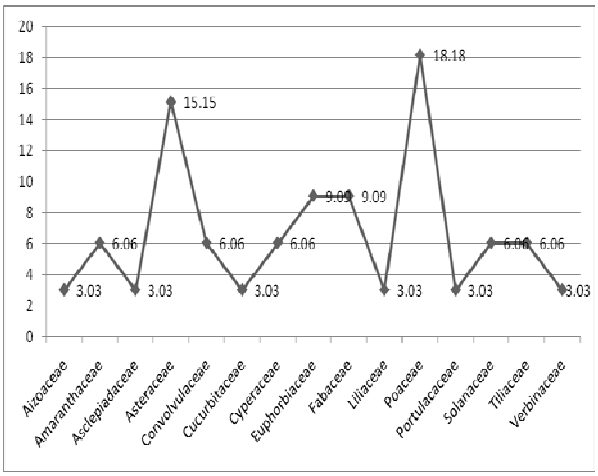

Fig.-1. Family Importance Value of the weed flora of sunflower

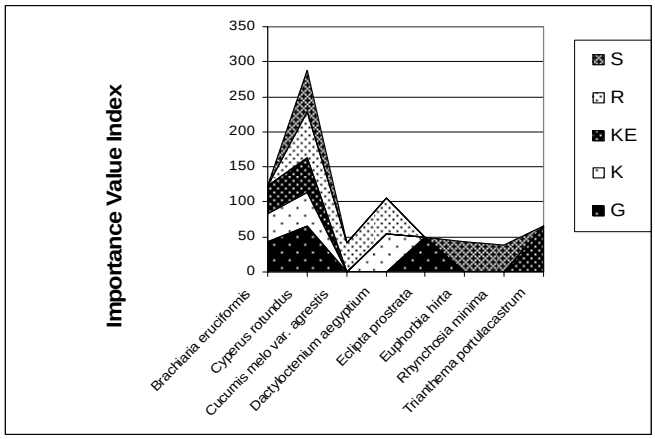

Fig.-2. Importance Value Index (IVI) of the weed communities of sunflower crop

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