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WEED FLORA OF *GLADIOLUS* FIELDS IN DISTRICT KASUR, PAKISTAN

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ABSTRACT

District Kasur is the hub of *Gladiolus* cultivation in Punjab, Pakistan. Field surveys from 12 localities of the district were undertaken during 2005-06 and 2006-07 to study the distribution of various weed species in *Gladiolus* fields. Sixty weed species belonging to 24 angiospermic families were found growing in the fields of *Gladiolus. Ageratum conyzoides* L., *Amaranthus viridis* L., *Coronopus didymus* (L.) Sm., *Chenopodium album* L., *Chenopodium murale* L., *Convolvulus arvensis* L., *Cypreus rotundus* L., *Cynodon dactylon* Pers., *Poa annua* L., *Oxalis corniculata* L., *Rumex dentatus* L., *Melilotus parviflora,* L. *Cenchrus pennisetiformis* Hochest and *Eragrostis poaeoides* Beauv. were found to be the most prevalent weed species occurring in 90% or more studied areas during one or the other growing season. Frequently occurring weeds with absolute frequency above 40% were *C. didymus, C. arvensis, R. dentatus, C. pennisetiformis* and *C. dactylon. R. dentatus* was found to be the most frequently occurring and densely populated weed species with absolute frequency of 57% and absolute density of 1.2 during 2006-07 growing season. Other densely populated weed species with absolute density above 0.50 were *A. conyzoides, C. didymus, C. arvensis, C. rotundus, Euphorbia prostrate, C. pennisetiformis* and *C. dactylon.*

Key words: Absolute frequency, Angiospermic, Density, Gladiolus, Weed species.

INTRODUCTION

Weed populations continue to persist in agricultural fields despite repeated application of weed control practices and pose a recurrent and ubiquitous threat to agricultural productivity. Weeds are the rivals of the crops in the sense that the requirements of the both are identical in respect to soil, space, light water, mineral salts and air for the manufacture of food substances and growth (Al-Yemeny, 1999, Zhao *et al.,* 2006**;** Dunbabin, 2007). Besides competing for light, nutrients, moisture and space, many weeds also exhibit allelopathic effects against susceptible crops (Khanh *et al.,* 2005; Belz *et al.,* 2007; Javaid *et al.,* 2007) and depress crop growth by secreting toxic substances from their living and decaying parts (Singh *et al*., 2005; Evidente *et al.,* 2007). Weeds may also act as hosts of diverse crop pests (Oudejan, 1984).

Agriculture in the Punjab province is mainly confined to the cultivation of few major conventional crops including wheat, rice, cotton and sugar cane. However, growers in some parts of the Punjab, Pakistan have switched over to alternative crops like floriculture. *Gladiolus,* one of the members of family Iridaceae, has emerged as a primary floriculture crop in Pakistan. Many hybrids of *Gladiolus* are commercially cultivated by the growers of Punjab. District Kasur in hub of cultivation of floriculture crops especially *Gladiolus* in the province. Being a newly emerging floral crop, little is known about the weed flora associated with G*ladiolus.* Weed surveys are useful for determining the occurrence and importance of weed species in crop production systems (Frick and Thomas, 1992). Documenting the kinds of weed species and its relative distribution facilitates the establishment of priorities for research and extension services (Mc Closky *et al.,* 1998). Keeping in view this objective, field surveys of *Gladiolus* growing areas of district Kasur were conducted during 2005-06 and 2006-07 to collect information on the presence and distribution of different weed species in *Gladiolus* fields of the area.

MATERIALS AND METHODS

Field surveys of different *Gladiolus* growing areas in district Kasur were conducted during the growing season of 2005-06 and 2006-07. Twelve localities including Punjabi Saoda, Kacha Paka, Ganda Singh, Usman Wala, Ghahlan, Chunian, Nizampura, Jagowal, Patoki Railway Station, Pattoki Bypass, Pattoki Nurseries and Changa Manga were selected for this study. At each of the 12 localities, 5 fields were selected for study. Sampling was done randomly using 1 meter square quadrate. Data regarding prevalence, absolute and relative frequency, and absolute and relative density of weeds were calculated using ollowing formulas:

$$\text{Prevalence (\%)} = \frac{\text{Number of sites at which a species occurs}}{\text{Total number of sites}} \times 100$$

$$\text{Absolute frequency (\%)} = \frac{\text{Number of quadrates in which a species occurs}}{\text{Total number of quadrate}} \times 100$$

$$\text{Relative frequency (\%)} = \frac{\text{Absolute frequency value for a species}}{\text{Total absolute frequency values for all species}} \times 100$$

$$\text{Absolute density} = \frac{\text{Total No. of individuals of a species in all quadrates}}{\text{Total number of quadrate}}$$

$$\text{Relative density (\%)} = \frac{\text{Absolute density for a species}}{\text{Total absolute density for all species}} \times 100$$

RESULTS AND DISCUSSION

In the present study, 60 weed species belonging to 24 angiospermic families were found growing in G*ladiolus* fields. Maximum number of species (14) belonged to family Poacea followed by Asteraceae (8) Chenopodicaeae (4), Euphorbiaceae (4), Amaranthaceae (3), Papillinaceae (3) and Solanaceae. Two species belonged to each of the Caryophyllaceae, Polygonaceae and Scrophulariaceae families. One species each belonged to the rest of the families viz., Asclepiadaceae, Brassicaceae, Convolvulaceae, Cyperaceae, Fumariaceae, Geraniaceae, Nyctaginaceae, Plumbaginaceae, Oxalidaceae, Primulaceae, Ranunculaceae and Verbenaceae and Zygophyllaceae (Table 1 and 2).

Out of 60 weed species recorded in *Gladiolus* fields of district Kasur, only eight weed species namely *A. conyzoides, C. arvensis, C. didymus, C. rotundus, C. pennisetiformis, M. parviflora, O. corniculata* and *R. dentatus* were found growing in all the 12 localities surveyed areas showing 100% prevalence during one or the other growing season. The other most prevalent weeds with above 80% prevalence were *Chenopodium album L., C. murale, M. parviflora, C. dactylon, Conyza. ambigua, Parthenium hysterophorus, Croton sparsiflorus, Boerhaavia diffusa, Dactyloctenium aegyptium, Digitaria timorensis, Eleusine indica, Poa annua, Mazus rugosus, Veronica agrestis* and *Verbena officinalis* (Table 1 and 2).

The most frequently occurring weed in the fields of the surveyed areas was *R. dentatus* with absolute frequency (AF) of 55 and 57%, and relative frequency (RF) of 6.68 and 4.88 during 2005-06 and 2006-07, respectively. The other frequently occurring weeds with AF of 40% or above were *C. didymus, C. arvensis, C. rotundus, C. pennisetiformis. A. conyzoides, C. album, C. murale, Euphorbia prostrate, Medicago polymorpha, M. parviflora, D. aegyptium, P. annua, Verbena officinalis, Veronica agrestis, Eleusin indica, Digitaria timorensis* and *M. parviflora.* Since this study comprised only on the survey on weed distribution in *gladioulus* fields, the quality and yield losses in *Gladiolus* due to infestation of these weeds are not known However, the frequently occurring species viz. *R. dentatus, P. annua, C. didymus, C. arvensis* and *M. parviflora* in this study are known to cause heavy yield losses due to competition for nutrients, water, and space and sometimes through the release of allelochemicals (Siddiqui and Bajwa, 2001). It is likely that these weeds may cause similar losses in *Gladiolus* yield and quality. Since *Gladiolus* is being cultivated in the fields where wheat cultivation was in practice for a long time so most of the wheat weeds were found in these fields. In the present study *Parthenium hysterophorus (*an alien weed) was found only with 16 and 18% AF in the two growing seasons (Table 1and 2). However, it is most likely that in future this aggressive alien weed may become one of the problematic weeds of the area due to its high reproductive potential, fast growth rate, allelopathic nature (Dagar *et al*., 1976; Navie *et al*., 1996; Singh *et al*., 2005; Javaid *et al*., 2009) and suitable field conditions as *Gladiolus* is cultivated on ridges with sufficient plant to plant distance.

Table 1: Prevalence, frequency and density of weeds in *Gladiolus* fields of District Kasur during 2005-06.

Weed Species	Family	P (%)	AF (%)	RF (%)	AD	RD (%)
Ageratum conyzoides L.	Asteracaea	92	38	4.13	0.55	4.91
Cirsium arvense (L.) Scop.	″	58	15	1.13	0.17	1.51
Conyza ambigua DC.	″	75	21	2.08	0.27	2.41
Eclipta alba Hassk.	″	42	05	0.42	0.05	0.44
Lactuca dissecta D. Don	″	58	11	1.71	0.12	1.07
Parthenium hysterophorus L.	″	67	16	0.97	0.16	1.42
*Sonchus asper*Vill.	″	67	15	1.13	0.20	1.78
Xanthium strumarium L.	″	42	04	0.29	0.04	0.35
Achyranthes aspera L.	Amaranthaceae	58	12	1.09	0.15	1.33
Amaranthus viridis L.	″	83	17	1.27	0.16	1.42
A. spinosus L.		17	03	0.51	0.02	0.17
Calotropis procera Br.	Asclepiadaceae	33	03	0.51	0.03	0.26
Coronopus didymus (L.) Sm.	Brassicaceae	100	51	6.37	0.83	7.41

Stellaria media (L) VILL	Caryophyllaceae	58	12	1.20	0.11	0.98
Sagina apetala Ard.	″	50	05	0.42	0.05	0.44
Chenopodium album L.	Chenopodicaeae	83	20	1.91	0.24	2.14
C. ambrosioides L.	″	58	11	1.71	0.11	0.98
C. murale L.	″	92	18	1.80	0.22	1.96
Kochia indica Wight	″	17	02	0.09	0.01	0.08
Convolvulus arvensis L.	Convolvulaceae	100	46	4.97	0.65	5.80
Cypreus rotundus L.	Cyperaceae	92	38	4.57	0.44	3.92
Croton sparsiflorus Morong	Euphorbiaceae	25	03	0.51	0.02	0.17
Euphorbia pilulifera L.	″	50	07	0.53	0.05	0.44
E. prostrata L.	″	67	24	2.10	0.30	2.67
E. heliscopia L.		50	09	0.60	0.09	0.80
Fumaria indica Puysley	Fumariaceae.	42	05	0.38	0.06	0.53
Oxalis corniculata L.	Geraniaceae	83	37	4.26	0.49	4.37
Malva parviflora L.	Malvaceae	83	25	0.17	0.25	2.23
Malvestrum tricuspidatum A. Gray	″	75	17	1.27	0.15	1.33
Boerhaavia diffusa L.	Nyctaginaceae	50	11	1.71	0.13	1.16
Lathyrus aphaca L.	Papillionaceae	42	06	1.33	0.06	0.53
Medicago polymorpha L.	″	75	23	2.16	0.21	1.87
Melilotus parviflora L.	″	67	17	1.27	0.16	1.42
Plumbago zeylanica L.	Plumbaginaceae	50	10	0.86	0.10	0.89
Brachiaria ramose (L.) Stapf	Poaceae	50	13	0.92	0.13	1.16
Cenchrus pennisetiformis Hochest	″	75	32	3.74	0.50	4.46
Cynodon dactylon Pers.	″	92	34	4.26	0.39	3.48
Dactyloctenium aegyptium Beauv.	″	75	23	2.16	0.20	1.78
Dicanthium annulatum Stapf.	″	50	11	1.71	0.11	0.98
Digitaria timorensis (Kunth) Balansa	″	50	13	1.31	0.15	1.33
Eleusine indica Gaertn.	″	67	19	2.06	0.19	1.69
Eragrostis poaeoides Beauv.	″	67	19	1.51	0.22	1.96
Imperata cylindrica L.	″	67	15	1.13	0.15	1.33
Poa annua L.	″	100	32	3.56	0.35	3.12
Setaria glauca Beauv.	″	58	12	1.20	0.11	0.98
Setaria verticillata Beauv.	″	33	08	0.59	0.10	0.89
Sorghum helepense Pers.	″	33	06	1.33	0.05	0.44
Urochloa panicoides Beauv.	″	50	13	1.33	0.16	1.42
Anagallis arvensis L.	Primulaceae	42	06	0.41	0.05	0.44
Rumex dentatus L	Polygonaceae	100	55	6.68	0.50	4.46
Rumex nepalensis Spreng.	″	58	07	0.57	0.06	0.53
Ranunculus muricatus L.	Ranunculaceae	25	06	0.47	0.05	0.44
Ganophyllum falcatum Blume	Sapindaceae	42	05	0.42	0.05	0.44
Mazus rugosus Lour.	Scrophulariaceae	58	18	2.12	0.23	0.23
Veronica agrestis L.	″	67	20	1.91	0.23	2.05
*Nicotiana plumbaginifolia*Viviani	Solanaceae	58	11	1.71	0.10	0.89
Solanum nigrum L.	″	50	06	1.33	0.06	0.53
Solanum xanthocarpum Sch. & Wend.	″	33	04	0.36	0.04	0.35
Verbena officinalis L.	Verbenaceae	67	20	1.91	0.23	2.05
Tribulus terrestris L.	Zygophyllaceae	58	13	1.28	0.17	1.51

The most densely populated weed with absolute density of 1.2, and relative density of 6.88% during growing seasons of 2006-07, respectively, was *R. dentatus.* Other densely populated weeds with AD of 0.50 or above were *A. conyzoides, C. didymus, C. arvensis, C. pennisetiformis, C. rotundus, E. prostrate* and *C. dactylon,* during one or the other growing season. There was slight variation in prevalence, frequency and density of different weeds in the two growing seasons (Table 1 and 2) which could be attributed to the variations in the environmental factors and difference in various cultural practices adopted by the farmers in the two growing seasons.

Table 2: Prevalence, frequency and density of weeds in *Gladiolus* fields of District Kasur during 2006-07.

Weed Species	Family	P (%)	AF (%)	RF (%)	AD	RD (%)
Ageratum conyzoides L.	Asteracaea	100	38	3.25	0.51	2.92
Cirsium arvense (L.) Scop.	″	42	11	0.94	0.06	0.34
Conyza ambigua DC.	″	84	23	1.96	0.25	1.43
Eclipta alba Hassk.	″	42	07	0.59	0.06	0.34
Lactuca dissecta D. Don	″	75	16	1.36	0.21	1.20
Parthenium hysterophorus L.	″	84	18	1.54	0.20	1.47
*Sonchus asper*Vill.	″	75	23	1.96	0.20	1.47
Xanthium strumarium L.	″	33	10	0.85	0.05	0.28
Achyranthes aspera L.	Amaranthaceae	42	02	0.17	0.09	0.51
Amaranthus viridis L.	″	84	18	1.54	0.21	1.20
A. spinosus L.		17	03	0.25	0.03	0.17
Calotropis procera Br.	Asclepiadaceae	33	04	0.34	0.04	0.22
Coronopus didymus (L.) Sm.	Brassicaceae	84	02	0.17	0.02	0.11
Stellaria media (L) VILL	Caryophyllaceae	75	20	1.71	0.31	1.77
Sagina apetala Ard.	″	33	06	0.51	0.05	0.28
Chenopodium album L.	Chenopodicaeae	92	21	1.79	0.28	1.60
C. ambrosioides L.	″	58	10	0.85	0.10	0.57
C. murale L.	″	84	23	1.96	0.23	1.31
Kochia indica Wight	″	33	04	0.34	0.05	0.28
Convolvulus arvensis L.	Convolvulaceae	92	37	3.16	0.71	4.07
Cypreus rotundus L.	Cyperaceae	100	48	4.10	0.85	4.87
Croton sparsiflorus Morong	Euphorbiaceae	84	02	0.17	0.02	0.11
Euphorbia pilulifera L.	″	58	16	1.36	0.17	0.97
E. prostrata L.	″	67	37	3.16	0.56	3.21
E. heliscopia L.	″	50	11	0.94	0.13	0.74
Fumaria indica Puysley	Fumariaceae.	50	10	0.85	0.10	0.57
Oxalis corniculata L.	Geraniaceae	100	33	2.82	0.42	2.40
Malvestrum tricuspidatum A. Gray	″	50	11	0.94	0.09	0.51
Malva parviflora L.	Malvaceae	84	23	1.96	0.23	1.31
Boerhaavia diffusa L.	Nyctaginaceae	84	18	1.54	0.20	1.47
Lathyrus aphaca L.	Papillionaceae	33	06	0.51	0.05	0.28
Medicago polymorpha L.	″	58	13	1.11	0.14	0.80
Melilotus parviflora L.	″	100	34	2.91	0.37	2.12
Plumbago zeylanica L.	Plumbaginaceae	75	10	0.85	0.10	0.57
Brachiaria ramose (L.) Stapf	Poaceae	75	13	1.11	0.14	0.80
Cenchrus pennisetiformis Hochest	″	100	49	4.19	0.93	5.33
Cynodon dactylon Pers.		92	43	3.68	0.55	3.15
Dactyloctenium aegyptium Beauv.	″	84	37	3.16	0.49	2.81
Dicanthium annulatum Stapf.	″	75	18	1.54	0.21	1.20
Digitaria timorensis (Kunth) Balansa	″	84	22	1.88	0.22	1.26
Eleusine indica Gaertn.	″	84	28	2.39	0.34	1.95
Eragrostis poaeoides Beauv.	″	92	31	2.65	0.44	2.52
Imperata cylindrica L.	″	67	18	1.54	0.18	1.02
Poa annua L.	″	84	31	2.65	0.35	2.00
Setaria glauca Beauv.	″	75	20	1.71	0.31	1.77
Setaria verticillata Beauv.	‘	33	05	0.42	0.05	0.28
Sorghum helepense Pers.	″	33	05	0.42	0.04	0.22
Urochloa panicoides Beauv.	″	84	19	1.62	0.20	1.47

Anagallis arvensis L.	Primulaceae	58	07	0.59	0.09	0.51
Rumex dentatus L	Polygonaceae	100	57	4.88	1.20	6.88
Rumex nepalensis Spreng.	″	50	05	0.42	0.03	0.17
Ranunculus muricatus L.	Ranunculaceae	50	14	1.19	0.16	0.91
Ganophyllum falcatum Blume	Sapindaceae	33	04	0.34	0.05	0.28
Mazus rugosus Lour.	Scrophulariaceae	84	27	2.31	0.32	1.83
Veronica agrestis L.	″	84	26	2.22	0.33	1.89
*Nicotiana plumbaginifolia*Viviani	Solanaceae	50	13	1.11	0.13	0.74
Solanum nigrum L.	″	58	12	1.02	0.12	0.68
Solanum xanthocarpum Sch. & Wend.	″	50	05	0.42	0.04	0.22
Verbena officinalis L.	Verbenaceae	84	26	2.22	0.33	1.89
Tribulus terrestris L.	Zygophyllaceae	75	21	1.79	0.30	1.72

P: Prevalence, AF: Absolute frequency, RF: Relative frequency, AD: Absolute density, RD: Relative density.

From the results of the present study it is concluded that *R. dentatus, C. album, C. murale, M. parviflora, M. polymorpha, C. didymus* and *P. annua* were common in the *Gladiolus* fields of district Kasur. It is, therefore, recommended to take measures to manage these weeds in the commercial fields of *Gladiolus* to improve quality and yield of this precious and popular cut-flower.

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