



COMPARISON OF DIVERSITY OF WEED SPECIES FROM ORGANIC AND FERTILIZED FARMS FROM DISTRICT FEROZPUR, PUNJAB, INDIA

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ABSTRACT-----

Present study was conducted for documentation of weed species in rice and wheat crop fields of Ferozpur, Punjab (India) during the year 2023. Eighty six (86) weed species belonging to 75 genera and 28 families recorded from rice and wheat crop fields during kharif and rabi season. Weed species were recorded from organic and fertilizers farm of the study area. During present investigation 57 species documented rice crop fields whereas 40 species from wheat crop fields. Family Poaceae is dominant represented with 13 species followed by Asteraceae (11), Euphorbiaceae and Fabaceae (7 species each), Solanaceae (5), Amaranthaceae, Convolvulaceae, Cyperaceae, Malvaceae (4 species each). This study informs about the availability of weed species in the study area and aware about the effect of chemical fertilizers on the diversity of weeds.

KEY WORDS- Flora, Weedicides, Angiosperm, Inventorizations, Crop, Rice, Wheat-----

INTRODUCTION

Weed is a plant which grows wild and competes with crop plants for various needs (Kumar and Duggal (2017). They affect the quality and yield of the concerned crops. These species have high potential to grow even under unfavorable conditions. They develop some special modifications such as thick cuticle, sunken stomata and waxy coating to retain water during drought stress (Ram and Gupta, 1997).

Weed species varies from crop to crop and season to season. In organic farming there are lot of weed species as compared to fertilized farming due to huge use of chemical fertilizers and weedicides.

Some reports (Singh and Singh, 2019; Singh and Singh, 2020; Sidhu and Singh, 2020; Sidhu and Singh, 2021a, Sidhu and Singh 2021b; Singh and Sidhu, 2022; Dhillon et al., 2023a; Dhillon et al., 2023b; Singh et al., 2023a; Singh et al., 2023b; Sharma et al., 2023) are available about the floristic and diversity of weed species from the state of Punjab, India but information about weed species in comparison form between organic farms and fertilized farms is yet not available. Keeping this in view present study was planned for documentation of weed species from different localities of district Ferozpur (Punjab).

MATERIALS AND METHODS

Study Area

Punjab state is present in northwest part of India with area 50362 Km². The state is divided into three regions *i. e.* Majha, Malwa and Doaba. Malwa is the largest zone which lies south to river Sutlej and bordered by Majha and Doaba zone of Punjab on north, Pakistan on west, Haryana and Rajasthan on South and Himachal Pradesh and Haryana on East west. District Ferozpur (Malwa region) was considered for present investigation.

Survey and Documentation of weed species

Regular field visits were conducted for documentation of different organic and normal crops during kharif and rabi season in the year 2023. Plant samples were collected for identification and preparation of Herbarium and Herbarium sheets were deposited in the Herbarium, Biology Lab, Sangat Sahib Bhai Pheru Khalsa Senior Secondary School, Faridkot, Punjab, India with Accession number KSF 131 to 180.

Identification

The collected plant specimens were identified on the basis of available literature (Kumar and Duggal, 2017; Singh and Singh, 2019; Singh and Singh, 2020; Sidhu and Singh, 2020; Sidhu and Singh, 2021 a, Sidhu and Singh 2021b; Singh and Sidhu, 2022; Dhillon et al., 2023a; Dhillon et al., 2023b; Singh et al., 2023a; Singh et al., 2023b; Sharma et al., 2023) and online herbaria such as Janaki Ammal Herbarium (www.iiim.res.in), Kew Herbarium Catalogue-



Kew Garden (apps.kew.org) and Botanical Survey of India Herbarium (bsi.gov.in) were also consulted for identification of species.

RESULTS AND DISCUSSION

A total of 86 weed species belonging to 75 genera and 28 families recorded from rice and wheat crop fields during kharif and rabi season in the district Ferozpur, Punjab, India during the year 2023 (Table. 1.). Weed species were recorded from organic and fertilizers farm (Table.2.). During present investigation 57 species documented rice crop fields whereas 40 species from wheat crop fields. Family Poaceae is dominant represented with 13 species followed by Asteraceae (11), Euphorbiaceae and Fabaceae (7 species each), Solanaceae (5), Amaranthaceae, Convolvulaceae, Cyperaceae, Malvaceae (4 species each).

Sixteen (16) weed species such as *Abutilon indicum*, *Alternanthera philoxeroides*, *Amaranthus viridis*, *Boerhavia diffusa*, *Cannabis sativa*, *Cenchrus ciliaris*, *Cynodon dactylon*, *Cyperus rotundus*, *Datura innoxia*, *Lantana camara*, *Launaea nudicaulis*, *Oxalis corniculata*, *Parthenium hysterophorus*, *Ricinus coimmunis*, *Solanum americanum*, *Verbesina enceloides* recorded from both the crop i.e. rice and wheat crop fields (organic and fertilized crop) (Table.3.).

Singh and Singh (2019) documented 31 angiosperm weed species member of 25 genera and 11 families from rice crop fields of selected localities from district Fatehgarh Sahib, Punjab, India. Out of 31 species, 15 weeds are dicots which belongs to families Potulaceae, Lythraeae, Asteraceae, Solanaceae, Scrophulariaceae, Amaranthaceae, Polygonaceae, Euphorbiaceae and 16 species are monocot which belongs to families Commeliaceae, Cyperaceae and Poaceae. They recorded *Parthenium hysterophorus* weed on the edges of the crop fields. According to Singh and Singh (2020) *Chenopodium album* is common weed species of wheat crop field is commonly used as a vegetable (Saag) in Fatehgarh Sahib, Punjab.

Table. 1. List of weed species found in kharif crops crops

S. No.	Botanical Name	Family	Habit	Life form
1.	<i>Abutilon indicum</i> (L) Sweet	Malvaceae	S	P
2.	<i>Achyranthes aspera</i> L.	Amaranthaceae	H	P
3.	<i>Ageratum houstonianum</i> Mill	Asteraceae	H	A
4.	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	H	A
5.	<i>Amaranthus viridis</i> L.	Amaranthaceae	H	A
6.	<i>Ammannia multiflora</i> Roxb.	Lythraceae	H	A
7.	<i>Anagallis arvensis</i> L.	Primulaceae	H	A
8.	<i>Artemisia scoparia</i> Waldst & Kitam	Asteraceae	H	A
9.	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	H	P
10.	<i>Calotropis procera</i> (Aiton) Dryand	Asclepiadaceae	S	P
11.	<i>Cannabis sativa</i> L.	Cannabaceae	H	P
12.	<i>Cenchrus ciliaris</i> L.	Poaceae	H	A
13.	<i>Chenopodium album</i> L.	Chenopodiaceae	H	A
14.	<i>Chenopodium murale</i> L.	Chenopodiaceae	H	A
15.	<i>Cleome viscosa</i> L.	Cleomeaceae	H	A
16.	<i>Commelina benghalensis</i> L.	Commelianaceae	H	A
17.	<i>Convolvulus arvensis</i> L.	Convolvulaceae	H	A
18.	<i>Convolvulus prostratus</i> Forrsk.	Convolvulaceae	H	A
19.	<i>Coronopus didymus</i> (L.) Sm.	Brassicaceae	H	A
20.	<i>Croton bonplandianus</i> Baill.	Euphorbiaceae	H	A
21.	<i>Cucumis callosus</i> (Rottler) Cogn.	Cucurbitaceae	H	A
22.	<i>Cynodon dactylon</i> (L.) Pers	Poaceae	H	P
23.	<i>Cyperus compressus</i> L.	Cyperaceae	H	A
24.	<i>Cyperus difformis</i> L.	Cyperaceae	H	A
25.	<i>Cyperus iria</i> L.	Cyperaceae	H	A
26.	<i>Cyperus rotundus</i> L.	Cyperaceae	H	P
27.	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	H	A
28.	<i>Datura innoxia</i> Mill.	Solanaceae	S	A
29.	<i>Desmostachya bipinnata</i> (L.) Stapf	Poaceae	H	A
30.	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	H	A
31.	<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	H	A



32.	<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	H	A
33.	<i>Echinochloa crus-galli</i> (L.) P.Beauv.	Poaceae	H	A
34.	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	H	A
35.	<i>Eragrostis tenella</i> (L.) P. Beauv	Poaceae	H	A
36.	<i>Erigeron bonariensis</i> L.	Asteraceae	H	A
37.	<i>Euphorbia heyneana</i> Spreng.	Euphorbiaceae	H	A
38.	<i>Euphorbia hirta</i> L.	Euphorbiaceae	H	A
39.	<i>Euphorbia prostrata</i> Aiton	Euphorbiaceae	H	A
40.	<i>Fumaria indica</i> (Hausskn.) Pugsley	Fumariaceae	H	A
41.	<i>Indigofera linnaei</i> Ali	Fabaceae	H	A
42.	<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	H	A
43.	<i>Ipomoea triloba</i> L.	Convolvulaceae	H	A
44.	<i>Lantana camara</i> L.	Verbenaceae	H	P
45.	<i>Lathyrus aphaca</i> L.	Fabaceae	H	A
46.	<i>Launaea nudicaulis</i> (L.) Hook. f.	Asteraceae	H	P
47.	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Onagraceae	H	A
48.	<i>Malva parviflora</i> L.	Malvaceae	H	A
49.	<i>Malvastrum coromandelianum</i> (Linn) Garcke	Malvaceae	H	A
50.	<i>Mazus pumilus</i> (Burm.f.) Steenis	Scrophulariaceae	H	A
51.	<i>Medicago polymorpha</i> L.	Fabaceae	H	A
52.	<i>Melilotus indicus</i> (L.) All.	Fabaceae	H	A
53.	<i>Mukia maderaspatana</i> (L.) M.Roem.	Cucurbitaceae	H	A
54.	<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae	H	A
55.	<i>Oxalis corniculata</i> L.	Oxalidaceae	H	P
56.	<i>Parthenium hysterophorus</i> L.	Asteraceae	H	P
57.	<i>Phalaris minor</i> Retz.	Poaceae	H	A
58.	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	H	A
59.	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Euphorbiaceae	H	A
60.	<i>Phyllanthus fraternus</i> G. L. Webster	Euphorbiaceae	H	A
61.	<i>Physalis angulata</i> L.	Solanaceae	H	A
62.	<i>Poa annua</i> L.	Poaceae	H	A
63.	<i>Polygonum plebeium</i> R. Br.	Polygonaceae	H	A
64.	<i>Polypogon monspeliensis</i> (L.) Desf	Poaceae	H	A
65.	<i>Portulaca oleracea</i> L.	Portulacaceae	H	A
66.	<i>Ricinus communis</i> L.	Euphorbiaceae	S	P
67.	<i>Rumex dentatus</i> L.	Polygonaceae	H	A
68.	<i>Senna occidentalis</i> (L.) Link	Fabaceae	S	A
69.	<i>Sesbania bispinosa</i> (Jacq.) W.Wight	Fabaceae	S	A
70.	<i>Setaria verticillata</i> (Linn.) P. Beauv.	Poaceae	H	A
71.	<i>Sida cordifolia</i> L.	Malvaceae	S	A
72.	<i>Sisymbrium irio</i> L.	Brassicaceae	H	A
73.	<i>Solanum americanum</i> Mill.	Solanaceae	H	A
74.	<i>Sonchus oleraceus</i> Wall	Asteraceae	H	A
75.	<i>Sorghum halepense</i> (L.) Pers.	Poaceae	H	A
76.	<i>Spergula arvensis</i> L.	Caryophyllaceae	H	A
77.	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	H	A
78.	<i>Trianthema portulacastrum</i> L.	Aizoaceae	H	A
79.	<i>Tribulus terrestris</i> L.	Zygophyllaceae	H	A
80.	<i>Tridax procumbens</i> (L.) L.	Asteraceae	H	A
81.	<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.f. ex A. Gray	Asteraceae	H	A
82.	<i>Vernonia cinerea</i> (L.) Less	Asteraceae	H	A
83.	<i>Vicia sativa</i> L.	Fabaceae	H	A
84.	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	S	P
85.	<i>Xanthium strumarium</i> L.	Asteraceae	S	P
86.	<i>Zaleya pentandra</i> (L.) C. Jeffrey	Aizoaceae	H	A

H= Herb; S= Shrub; P= Perennial; A= Annual



Table.2. List of families with number of genera and species.

S. No.	Family	Genera	Species
1.	Aizoaceae	2	2
2.	Amaranthaceae	4	4
3.	Asclepiadaceae	1	1
4.	Asteraceae	11	11
5.	Brassicaceae	2	2
6.	Cannabaceae	1	1
7.	Caryophyllaceae	2	2
8.	Chenopodiaceae	2	3
9.	Cleomeaceae	1	1
10.	Convolvulaceae	2	4
11.	Cucurbitaceae	2	2
12.	Cyperaceae	1	4
13.	Euphorbiaceae	4	7
14.	Fabaceae	7	7
15.	Fumariaceae	1	1
16.	Lythraceae	1	1
17.	Malvaceae	4	4
18.	Nyctaginaceae	1	1
19.	Onagraceae	1	1
20.	Oxalidaceae	1	1
21.	Poaceae	13	13
22.	Polygonaceae	2	2
23.	Portulacaceae	1	1
24.	Primulaceae	1	1
25.	Scrophulariaceae	1	1
26.	Solanaceae	5	5
27.	Verbenaceae	2	2
28.	Zygophyllaceae	1	1
	Total	75	86

Table.3. Distribution of weed species in rice and wheat crop fields.

S. No.	Botanical Name	Rice		Wheat	
		Organic Farm	Fertilized Farm	Organic Farm	Fertilized Farm
1.	<i>Abutilon indicum</i> (L.) Sweet	+	+	+	+
2.	<i>Achyranthes aspera</i> L.	+	-	+	-
3.	<i>Ageratum houstonianum</i> Mill	-	-	+	-
4.	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	+	+	+	+
5.	<i>Amaranthus viridis</i> L.	+	+	+	+
6.	<i>Ammannia multiflora</i> Roxb.	+	-	-	-
7.	<i>Anagallis arvensis</i> L.	-	-	+	+
8.	<i>Artemisia scoparia</i> Waldst & Kitam	-	-	+	-
9.	<i>Boerhavia diffusa</i> L.	+	+	+	+
10.	<i>Calotropis procera</i> (Aiton) Dryand	+	-	+	+
11.	<i>Cannabis sativa</i> L.	+	+	+	+
12.	<i>Cenchrus ciliaris</i> L.	+	+	+	+
13.	<i>Chenopodium album</i> L.	-	-	+	-
14.	<i>Chenopodium murale</i> L.	-	-	+	-
15.	<i>Cleome viscosa</i> L.	+	-	-	-
16.	<i>Commelina benghalensis</i> L.	+	-	-	-
17.	<i>Convolvulus arvensis</i> L.	-	-	+	-
18.	<i>Convolvulus prostratus</i> Forrsk.	-	-	+	-
19.	<i>Coronopus didymus</i> (L.) Sm.	-	-	+	+
20.	<i>Croton bonplandianus</i> Baill.	+	-	-	-
21.	<i>Cucumis callosus</i> (Rottler) Cogn.	+	-	-	-



22.	<i>Cynodon dactylon</i> (L.) Pers	+	+	+	+
23.	<i>Cyperus compressus</i> L.	+	-	-	-
24.	<i>Cyperus difformis</i> L.	+	-	-	-
25.	<i>Cyperus iria</i> L.	+	-	-	-
26.	<i>Cyperus rotundus</i> L.	+	+	+	+
27.	<i>Dactyloctenium aegyptium</i> (L.) Willd.	+	+	-	-
28.	<i>Datura innoxia</i> Mill.	+	-	+	-
29.	<i>Desmostachya bipinnata</i> (L.) Stapf	+	-	-	-
30.	<i>Dichanthium annulatum</i> (Forssk.) Stapf	-	-	+	-
31.	<i>Digera muricata</i> (L.) Mart.	+	+	-	-
32.	<i>Digitaria sanguinalis</i> (L.) Scop.	+	+	-	-
33.	<i>Echinochloa crus-galli</i> (L.) P.Beauv.	+	+	-	-
34.	<i>Eclipta prostrata</i> (L.) L.	+	+	-	-
35.	<i>Eragrostis tenella</i> (L.) P. Beauv	+	-	-	-
36.	<i>Erigeron bonariensis</i> L.	-	-	+	-
37.	<i>Euphorbia heyneana</i> Spreng.	+	-	-	-
38.	<i>Euphorbia hirta</i> L.	+	-	-	-
39.	<i>Euphorbia prostrata</i> Aiton	+	-	-	-
40.	<i>Fumaria indica</i> (Hauuskn.) Pugsley	-	-	+	-
41.	<i>Indigofera linnaei</i> Ali	+	-	-	-
42.	<i>Ipomoea pes-tigridis</i> L.	+	-	-	-
43.	<i>Ipomoea triloba</i> L.	+	-	-	-
44.	<i>Lantana camara</i> L.	+	-	+	-
45.	<i>Lathyrus aphaca</i> L.	-	-	+	+
46.	<i>Launaea nudicaulis</i> (L.) Hook. f.	+	-	+	-
47.	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	+	-	-	-
48.	<i>Malva parviflora</i> L.	-	-	+	+
49.	<i>Malvastrum coromandelianum</i> (Linn) Garcke	-	-	+	-
50.	<i>Mazus pumilus</i> (Burm.f.) Steenis	+	+	-	-
51.	<i>Medicago polymorpha</i> L.	-	-	+	+
52.	<i>Melilotus indicus</i> (L.) All.	-	-	+	+
53.	<i>Mukia maderaspatana</i> (L.) M.Roem.	+	-	-	-
54.	<i>Nicotiana plumbaginifolia</i> Viv.	-	-	+	+
55.	<i>Oxalis corniculata</i> L.	+	+	+	+
56.	<i>Parthenium hysterophorus</i> L.	+	+	+	+
57.	<i>Phalaris minor</i> Retz.	-	-	+	+
58.	<i>Phyla nodiflora</i> (L.) Greene	+	+	-	-
59.	<i>Phyllanthus amarus</i> Schumach. & Thonn.	+	-	-	-
60.	<i>Phyllanthus fraternus</i> G. L. Webster	+	-	-	-
61.	<i>Physalis angulata</i> L.	+	+	-	-
62.	<i>Poa annua</i> L.	-	-	+	+
63.	<i>Polygonum plebeium</i> R. Br.	-	-	+	-
64.	<i>Polypogon monspeliensis</i> (L.) Desf	-	-	+	+
65.	<i>Portulaca oleracea</i> L.	+	+	-	-
66.	<i>Ricinus communis</i> L.	+	+	+	+
67.	<i>Rumex dentatus</i> L.	-	-	+	+
68.	<i>Senna occidentalis</i> (L.) Link	+	-	-	-
69.	<i>Sesbania bispinosa</i> (Jacq.) W.Wight	+	+	-	-
70.	<i>Setaria verticillata</i> (Linn.) P. Beauv.	+	+	-	-
71.	<i>Sida cordifolia</i> L.	+	-	+	-
72.	<i>Sisymbrium irio</i> L.	-	-	+	+
73.	<i>Solanum americanum</i> Mill.	+	+	+	+
74.	<i>Sonchus oleraceus</i> Wall	-	-	+	+
75.	<i>Sorghum halepense</i> (L.) Pers.	+	+	-	-
76.	<i>Spergula arvensis</i> L.	-	-	+	+
77.	<i>Stellaria media</i> (L.) Vill.	-	-	+	+
78.	<i>Trianthema portulacastrum</i> L.	+	+	-	-
79.	<i>Tribulus terrestris</i> L.	+	-	-	-



80.	<i>Tridax procumbens</i> (L.) L.	+	+	-	-
81.	<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.f. ex A. Gray	+	+	+	+
82.	<i>Vernonia cinerea</i> (L.) Less	-	-	+	-
83.	<i>Vicia sativa</i> L.	-	-	+	+
84.	<i>Withania somnifera</i> (L.) Dunal	-	-	+	-
85.	<i>Xanthium strumarium</i> L.	+	-	-	-
86.	<i>Zaleya pentandra</i> (L.) C. Jeffrey	+	-	-	-

+ = Present; - = Absent

CONCLUSION

Documentation of weed species provides information about the weed flora of particular region. This information also informs about the threatened weed species which are effected by different types of fertilizers. Exploration of angiosperm weed diversity of any crop field of particular region is need of the hour, therefore present study was planned for preparation of database about availability of weed species in rice and wheat crop fields.

This study will be useful for researchers, plant breeders and weed scientists for additional information about occurrence of weed specie in investigated crops.

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