

DETERMINATION OF WEED COMMUNITIES IN WHEAT (*TRITICUM AESTIVUM* L.) FIELDS OF DISTRICT SUKKUR

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Abstract

A survey of weed communities was carried out in wheat fields of district Sukkur during 1999-2000. Forty-five weed species belonging to 16 angiospermic families are reported from the study area. Five weed communities viz: 1) *Lathyrus-Fumaria-Melilotus* in Bhit of Noor Shah, 2) *Alhagi-Spergula-Convolvulus* in Kandhra, 3) *Spergula-Chenopodium-Spinacia* in Pano Aqil, 4) *Polygonum-Melilotus-Medicago* in Rohri and 5) *Medicago-Coronopus-Melilotus* in Saleh Pat were recognized during this period. Furthermore *Alhagi-Rumex-Phalaris* in Bhit of Noor Shah, *Polygonum-Polypogon-Rumex* in Kandhra, *Alhagi-Melilotus-Lepidium* in Pano Aqil, *Lathyrus-Fumaria-Coronopus* in Rohri and *Chenopodium-Echinops-Vaccaria* in Saleh Pat were found second communities in these areas.

The dominant weed species of these communities in various capacities were *Lathyrus aphaca* L., *Fumaria indica* (Hausk.) Pugsely., *Alhagi maurorum* Medic., *Spergula arvensis* L., *Convolvulus arvensis* L., *Polygonum plebejum* R.Br., *Sonchus oleraceus* L., *Medicago minima* (L.) Grufb., *Medicago polymorpha* L., *Melilotus indica* (L.) All., *Chenopodium album* L., *Chenopodium murale* L., *Rumex dentatus* L., *Coronopus didymus* (L.) Smith., *Echinops echinatus* Roxb., *Vaccaria pyramidata* Medik., *Spinacia oleracea* L., *Phalaris minor* Retz., *Polypogon fugax* Nees ex Steud. and *Lepidium sativum* Linn. *Grangea maderaspatana* Poir. is reported for the first time as a weed in Pakistan.

Introduction

Wheat (*Triticum aestivum* L.) is the most important of all the grain cereals as regards to both the total area sown and the annual production (Arnan, 1972). It is cultivated throughout the world over an area of about 232 million hectares with its production of 5905.15 million tons (Pradhan, 1995). In Pakistan, it is cultivated on about 8,376,500 hectares with its production of 16,907,400 tons (Anon., 1997).

There are many reasons responsible for low yield of wheat in Pakistan such as poor planning, poor land preparation, use of inappropriate wheat variety, use of poor quality of seeds, low seeding rate, inappropriate use of fertilizers, water logging and salinity, less or non availability of irrigation water at critical crop stage, insect infestation, plant diseases and poor weed management. Among all these factors, poor weed management is a serious threat to wheat productivity as weeds not only reduce 15-50% yield of crop (Gill *et al.*, 1979) but also deteriorate quality of crop. Weeds are undesired plant species growing in domesticated crops. They compete with crop mainly for light, nutrients, water and carbon dioxide (Anderson, 1983). They consume 3-4 times more nitrogen, potassium and magnesium than a weed free crop (Schwerzel & Thomas, 1971). Muzik (1970) reported that weed species cause greater loss than either insects or plant diseases. Weeds remain dormant and viable for 30-40 years and hard seed coat of the seeds can resist adverse climate, diseases and soil conditions (Oudejan, 1994).

Keeping in view such constant threat to wheat crop, present study was carried out in district Sukkur in order to check the effects of weeds on the crop. There does not appear to be any previous report on weeds of wheat crop of this area. The present paper reports the identification of weed species and their importance values, which are based on density

and frequency of each weed species and their communities resulted from these analytical values. These findings will be helpful in the recognition of serious weeds in this area.

Material and Methods

Five wheat growing sites viz.:1) Bhit of Noor Shah, 2) Kandhra, 3) Pano Aqil, 4) Rohri and 5) Saleh Pat, all within radius of 10-15 Km of district Sukkur were surveyed during 1999-2000. The plants were identified with the help of authentic available literature (Jafri, 1966; Nasir & Ali, 1972-1997; Stewart, 1972). Relative density and percentage frequency were calculated for each weed species.

Fifty quadrats were randomly selected from all sites, containing each quadrat of 2x2 m in size. The community was named after the first three dominant. Local inhabitants were interviewed to get local names of these weeds Weed species were categorized on the basis of their highest value.

Results and Discussion

During survey, five weed communities were recognized in wheat fields of district Sukkur during 1999-2000 a number of 45 weed species belonging to 16 angiospermic families are reported from the study areas. Five weed communities viz:1) *Lathyrus-Fumaria-Melilotus* in Bhit of Noor Shah, 2) *Alhagi-Spergula-Convolvulus* in Kandhra, 3) *Spergula-Chenopodium-Spinacia* in Pano Aqil, 4) *Polygonum-Melilotus-Medicago* in Rohri and 5) *Medicago-Coronopus-Melilotus* in Saleh Pat were recognized during this period (Table 1). Furthermore *Alhagi-Rumex-Phalaris* in Bhit of Noor Shah, *Polygonum-Polypogon-Rumex* in Kandhra, *Alhagi-Melilotus-Lepidium* in Pano Aqil, *Lathyrus-Fumaria-Coronopus* in Rohri and *Chenopodium-Echinops-Vaccaria* in Saleh Pat were found second communities in these areas.

The dominant weed species of these communities in various capacities were *Lathyrus aphaca* L., *Fumaria indica* (Haussk.) Pugsely., *Alhagi maurorum* Medic., *Spergula arvensis* L., *Convolvulus arvensis* L., *Polygonum plebejum* R.Br., *Sonchus oleraceus* L., *Medicago minima* (L) Grufb., *Medicago polymorpha* L., *Melilotus indica* (L.) All., *Chenopodium album* L., *Chenopodium murale* L., *Rumex dentatus* L., *Coronopus didymus* (L.) Smith., *Echinops echinatus* Roxb., *Vaccaria pyramidata* Medik., *Spinacia oleracea* L., *Phalaris minor* Retz., *Polypogon fugax* Nees ex Steud. and *Lepidium sativum* Linn. The communities and their dominants were almost similar to each other. The similarity between the sites was probably due to similar type of loamy soils.

The total number of weeds in Kandhra were more than other areas during this period (Table 1.). The weed species with high percentage of density and frequency might exert competitive and allelopathic stress to reduce growth and yield of associated crop (Hussain, 1983). Weeds with low importance value cannot be underestimated in their importance.

Weeds are divided into three groups i.e., surpassing, a underneath and climbing weeds on the basis of their height (Table 2 & 3). Surpassing weeds are long or equal in size of wheat crop. They have rapid growth rate than the crop and consume much more habitat resources than the crop. These plants spread over the wheat crop and as a result, the cropped plants become chlorotic and weak hence produce stressed environment for the growth of the crop.

Table 1. Important values of weeds in wheat crop of District Sukkur.

S. No.	Botanical name	B	K	P	R	S	Freq. %
1.	<i>Alhagi maurorum</i> Medik.	25.23	50.50*	38.75	---	---	60
2.	<i>Anagalis arvensis</i> Linn.	3.5	7.58	---	3.20	---	56
3.	<i>Asphodelus tenuifolius</i> Cavan.	---	9.5	---	---	10.50	40
4.	<i>Avena fatua</i> Linn.	1.2	2.5	3.45	1.25	5.83	73
5.	<i>Brassica campestris</i> Linn.	1.53	---	1.45	3.25	2.97	31
6.	<i>Chenopodium album</i> Linn.	4.29	---	50.75**	3.20	---	64
7.	<i>Chenopodium ambrioides</i> Linn.	2.9	---	---	1.25	---	38
8.	<i>Chenopodium murale</i> Linn.	1.29	---	15.71	---	22.50	35
9.	<i>Cirsium arvensis</i> (L.) Scop.	---	1.28	---	1.29	---	20
10.	<i>Convolvulus arvensis</i> Linn.	2.5	40.50***	25.75	---	7.50	74
11.	<i>Coronopus didymus</i> (L.) Smith.	---	---	---	18.20	40.75**	30
12.	<i>Cressa cretica</i> Linn.	---	1.29	---	---	2.30	20
13.	<i>Cynodon dactylon</i> (L.) Pers.	3.29	1.29	2.30	4.50	1.50	79
14.	<i>Cyperus rotundus</i> Linn.	---	2.45	3.40	2.15	3.50	43
15.	<i>Desmostachya bipinnata</i> (L.) Stapf.	1.5	3.26	4.26	1.54	1.75	80
16.	<i>Echinops echinatus</i> Roxb.	---	---	---	2.50	12.50	45
17.	<i>Eclipta prostrata</i> (L.) Linn.	---	---	---	2.42	1.94	78
18.	<i>Eragrostis minor</i> Host.	---	3.45	---	6.25	1.75	30
19.	<i>Eruca sativa</i> Mill.	1.2	3.28	---	---	6.42	10
20.	<i>Euphorbia prostrata</i> Ait.	1.31	---	0.95	1.30	2.10	10
21.	<i>Fumaria indica</i> (Haussk.) Pugsely.	47.30**	2.49	18.79	---	---	21
22.	<i>Grangea maderaspatana</i> Poir.	10.32	---	9.20	33.15	---	45
23.	<i>Heliotropium europaeum</i> Linn.	---	---	---	11.30	5.30	39

Table 1. (Cont.)

24.	<i>Lathyrus aphaca</i> Linn.	60.56*	2.50	7.50	30.15	10.26	25
25.	<i>Lepidium sativum</i> Linn.	---	---	28.45	---	1.23	20
26.	<i>Leptochloa panicea</i> (Retz.) Ohwi.	2.35	1.65	---	3.21	7.35	33
27.	<i>Lolium temulentum</i> Linn.	3.2	1.50	2.50	---	2.75	34
28.	<i>Medicago minima</i> (L.) Grubb.	---	---	---	40.15***	---	35
29.	<i>Medicago polymorpha</i> Linn.	---	---	---	---	72.15*	20
30.	<i>Melilotus alba</i> Medick ex Desr.	1.61	1.20	1.25	1.50	1.45	20
31.	<i>Melilotus indica</i> (L.) All.	37.91***	9.45	34.78	58.15**	33.17***	87
32.	<i>Phalaris minor</i> Retz.	20.2	23.10	10.23	3.70	2.14	43
33.	<i>Phragmites karka</i> (Retz.) Trin.	---	---	28.15	10.50	---	30
34.	<i>Phyla nodiflora</i> (L.) Green.	1.5	1.78	---	---	2.16	20
35.	<i>Polygonum plebejum</i> R.Br.	---	35.78	---	78.71*	10.13	45
36.	<i>Polypogon fugax</i> Nees ex Steud.	7.92	29.71	4.50	3.20	---	49
37.	<i>Ranunculus muricatus</i> Linn.	---	---	---	2.31	1.95	15
38.	<i>Rumex dentatus</i> Linn.	23.15	28.14	4.50	1.96	3.14	65
39.	<i>Solanum nigrum</i> Linn.	2.50	1.95	---	2.65	1.25	20
40.	<i>Sonchus oleraceus</i> Linn.	18.90	---	3.65	---	4.50	31
41.	<i>Spergula arvensis</i> Linn.	---	48.50**	78.13*	---	6.26	35
42.	<i>Spinacia oleracea</i> Linn.	1.26	2.50	40.73***	---	---	30
43.	<i>Vaccaria pyramidata</i> Medik.	---	---	---	---	11.29	15
44.	<i>Vicia hirsuta</i> Linn.	169	2.13	---	---	1.50	19
45.	<i>Vicia sativa</i> Linn.	---	3.50	1.26	---	---	14

*, ** and *** indicates 1st, 2nd and 3rd dominant weed species in the area.

B = Bhit of Noor Shah, K = Kandhira, P = Pano Aqil, R = Rohri and S = Saleh Pat.

Table 2. List of surpassing weeds.

S. No.	Botanical name	Local name	Family
1.	<i>Alhagi maurorum</i> Medik.	Kandero	Fabaceae
2.	<i>Avena fatua</i> Linn.	Banak	Poaceae
3.	<i>Brassica campestris</i> Linn.	Sarianh	Brassicaceae
4.	<i>Chenopodium album</i> Linn.	Chil	Chenopodiaceae
5.	<i>Cirsium arvensis</i> (L.) Scop.	Kandero	Asteraceae
6.	<i>Desmostachya bipinnata</i> (L.) Stapf.	Drabh	Poaceae
7.	<i>Echinops echinatus</i> Roxb.	Wadi Kandero	Asteraceae
8.	<i>Heliotropium europeum</i> Linn.	Uth Charo	Boraginaceae
9.	<i>Lepidium sativum</i> Linn.	Aahri	Brassicaceae
10.	<i>Lolium temulentum</i> Linn.	Cheeno Gaah	Poaceae
11.	<i>Phalaris minor</i> Retz.	Dhanak	Poaceae
12.	<i>Phragmites karka</i> (Retz.) Trin.	Naro, Wado Narr	Poaceae
13.	<i>Polypogon fugax</i> Nees ex Steud.	Nor Puchk	Poaceae
14.	<i>Rumex dentatus</i> Linn.	Jhangi Palak	Polygonaceae
15.	<i>Solanum nigrum</i> Linn.	Kanwal	Solanaceae
16.	<i>Sonchus oleraceus</i> Linn.	Bhattar	Asteraceae
17.	<i>Spinacia oleracea</i> Linn.	Palak	Chenopodiaceae
18.	<i>Vaccaria pyramidata</i> Medik.	Taklo Gaah	Caryophyllaceae

The surpassing weeds like *Avena fatua*, *Phalaris minor*, *Polypogon fugax*, *Lolium temulentum*, *Chenopodium album*, *Cirsium arvense*, *Sonchus oleraceus*, *Rumex dentatus* and *Spinacia oleracea* matured and harvested along with the wheat, resulted in dissemination/mixing of their seeds with wheat grain. The seedling stage of these weeds possess morphological similarities to wheat. The seeds of *Rumex dentatus* and *Spinacia oleracea* are winged with hard outer coat which resist adverse climate, diseases and soil condition. They emerge again when environment becomes favourable.

The underneath weeds are below the height of the crop plants (Table 3). The weed species like *Anagalis arvensis*, *Medicago minima*, *M. polymorpha*, *Melilotus* spp., and *Spergula arvensis* are densely populated weed species and comes underneath weeds. These weeds mature early before the crop and shed their seeds into the soil. Each of these weeds produces 500-5000 seeds per plant. These seeds will emerge as a huge population in the coming next year. Therefore, weeds show high stress and allelopathic effects on crop and thus check the growth and yield of associated crop.

Grangea maderaspatana is reported for the first time as a weed in Pakistan. This weed is spreading at an alarming rate in wheat crop with greater loss of yield due to serious competition in rice cultivated areas of Rohri.

Phragmites karka, *Convolvulus arvensis*, *Alhagi maurorum*, *Cynodon dactylon*, *Cyperus rotundus* and *Desmostachya bipinnata* are perennial weeds and very difficult to control due to the propagation by tillers, rhizomes, bulbs, corns and stolens.

Climbing weeds like *Convolvulus arvensis* and *Lathyrus aphaca* climb over wheat crop and cause difficulty in harvest. Weeds cause difficulty in making cultural operations, harvesting and threshing due to prickly nature such as *Alhagi maurorum* and *Cirsium arvense*. Perennial grasses and sedges reduce more yield than annual species and grasses tend to do more damage than broad leaf weeds (Oudejan, 1994).

Table 3. List of underneath climbing weeds.

S. No.	Botanical name	Local name	Family
1.	<i>Anagalis arvensis</i> Linn.	Billi Buti	Primulaceae
2.	<i>Asphodelus tenuifolius</i> Cavan.	Basri	Liliaceae
3.	<i>Chenopodium ambrioides</i> Linn.	Gadah Chill	Chenopodiaceae
4.	<i>Chenopodium murale</i> Linn.	Jhil	Chenopodiaceae
5.	<i>Convolvulus arvensis</i> Linn.	Naro	Convolvulaceae
6.	<i>Coronopus didymus</i> (L.) Smith.	Gajar Gaah	Brassicaceae
7.	<i>Cressa cretica</i> Linn.	Oin	Convolvulaceae
8.	<i>Cynodon dactylon</i> (L.) Pers.	Chhabbar	Poaceae
9.	<i>Cyperus rotundus</i> Linn.	Kabbah	Cyperaceae
10.	<i>Eclipta prostrata</i> (L.).	Daryahi Booti	Asteraceae
11.	<i>Eragrostis minor</i> Host.	Makhni	Poaceae
12.	<i>Eruca sativa</i> Mill.	Janbho	Brassicaceae
13.	<i>Euphorbia prostrata</i> Ait.	Kheera Wal	Euphorbiaceae
14.	<i>Fumaria indica</i> (Haussk.) Pugsely.	Shahtaro	Fumaricaceae
15.	<i>Grangea maderaspatana</i> Poir.	---	Asteraceae
16.	<i>Lathyrus aphaca</i> Linn.	Jhangli Matri	Fabaceae
17.	<i>Leptochloa panicea</i> (Retz.) Ohwi.	Kalar Gaah	Poaceae
18.	<i>Medicago minima</i> (L.) Grufb.	Lusani	Fabaceae
19.	<i>Medicago polymorpha</i> Linn.	Lusani	Fabaceae
20.	<i>Melilotus alba</i> Medick ex Desr.	Sinjh	Fabaceae
21.	<i>Melilotus indica</i> (L.) All.	Sinjh	Fabaceae
22.	<i>Phyla nodiflora</i> (L.) Green.	Bukkan	Verbinaceae
23.	<i>Polygonum plebejum</i> R.Br.	Kheer Wal	Polygonaceae
24.	<i>Ranunculus muricatus</i> Linn.	----	Ranunculaceae
25.	<i>Spergula arvensis</i> Linn.	Uthi Gaah	Caryophyllaceae
26.	<i>Vicia hirsuta</i> Linn.	Andhri Matri	Fabaceae
27.	<i>Vicia sativa</i> Linn.	Andhri Matri	Fabaceae

Weeds harbour insects, pest and diseases and thus act as a reservoir of infection for cultivated crop plants (Shah & Hussain, 1988; Oudejan, 1994). Weeds like *Rumex dentatus*, *Convolvulus arvensis*, *Melilotus* spp., *Launaea nudicaulis* and *Chenopodium album* are good host of White Fly (*Bemisa tabaci*), which is carrier of leaf curl virus (Khaskheli, 2000). This insect also sucks the water and nutrients from plants.

The types of weeds and their critical competition vary with soil, temperature, geographical location, altitude, tillage system, cultivation practices, water management and control measures (Oudejan, 1994). Weeds can grow in well-managed agro-climate due to the better forbearance and easy dispersal by wind irrigated or rain water, birds, animals, man, farm yard manure and agricultural implements. But if cultural practices like hoeing, weeding and effective use of chemicals is carried out then we can keep them under control.

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