



Floristic composition of weeds in mixed winter crop on Gujar lake's margins in Uttar Pradesh

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Weeds are posing a serious problem in winter crop. Floristic composition in such habit represents the kind of weed species that occur in the particular agro ecosystem. In contrast, lake margins are specialized terrestrial habitats that are characterized by slight sloping topography, host of agricultural operations mainly during winter season due to cyclic inundation or submergence and some time extreme dry conditions due to scarcity of rainfall in rainy season, and extremely dry condition in summer. The sites are usually cultivated every year during winter season for mixed crop of wheat and mustard (*Rabi*). Lake margins are literally passing through critical phase of ecological transition and are being converted into 'weed bowls' at alarming rate leading to swampification (Sinha and Jha 2008). Various workers have given accounts of weed flora production and competition in certain agro-ecosystems (Soni and Ambasht 1977, Singh and Ambasht 1986). There is still paucity of information of such kind of study on a lake margin.

The study was carried out near 'Gujar Tal' (24p 6'-25p 5' N and 80-82p E longitude) in the North western region of Jaunpur (Uttar Pradesh) 28 km to the west of Khetasarai market. The study site (50×200m) was of 5-15p slope. The texture of soil was more or less sandy clay loam (0-10 cm) and clay loam at two depths (10-20 and 20-30cm), pH of soil varied from 7.8 to 8.0 in the respective three depths and soil moisture 14.79 to 19.30% (Singh *et al.* 2010). The climate is typically monsoonic with three different season's *viz.*, summer, rainy and winter. The total annual rainfall from April, 2008 to March, 2009 was 1346.8 mm out of which 1295.4 mm was in rainy season. But rainfall during winter cropping period was 2 and 1.2 mm in the respective months of January and February, 2009.

After the flood-water receded, ploughing was done at the study site in the second week of November, 2008. Wheat (*Triticum aestivum*, variety 'Malvi 234') and mustard (*Brassica campestris* variety 'Varuna' Type, 59) were sown together by applying 32 kg nitrogen and 23 kg phosphorous/ha.

Floristic composition and quantitative characters study was done by transect method through 50×50 cm quadrat laid at every one meter alternative segments from top upland to lower lake margins at bimonthly intervals as recommended by Hanson and Churchill (1965) and Muller Dombois and Ellenberg (1974) by using following formulae:

$$F = \frac{\text{Number of quadrats in which species occurs}}{\text{Total number of quadrats sampled}} \times 100$$

$$D = \frac{(F = \text{Frequency})}{\text{Total number of quadrats sampled}} \times 100$$

(D = Density)

$$\text{Basal cover} = \text{Average basal area} \times \text{density}$$

$$\text{Average basal area} = \pi r^2 \text{ cm}$$

(Where r is radius of stem at emergent point)

The collected weeds were identified by using floras of Bor (1958), Srivastava (1976) and Sanni *et al.* (2010). The collected plant materials have been deposited in the Herbarium of Botany Deptt. of T.D. College Jaunpur (U.P.).

The weed species encountered during mixed winter cropping at bimonthly intervals are listed (Table 1). There were total 36 and 39 weed species recorded on the two sampling dates *i.e.* 28th Dec., 2008 and 27th Feb., 2009. The maximum number of weeds was of Poaceae followed by Asteraceae and others. Among these weed species, some were present throughout the cropping period. Some appeared at later stage of crop and few showed shorter life cycle. The maximum frequency (65 and 72%), density (54.19 and 99.80/m²) and basal cover (1.084 and 2.994 cm²/m²) was of *Cynodon dactylon* followed by *Cyperus rotundus* with its peak frequency (55 and 41%), density (12.04 and 10.92/m²) and basal cover (0.241 and 0.328 cm²/m²) on the two respective sampling dates. It clearly indicates that these weeds have flourished well by vegetative propagation and by their competitive ability in comparison to other weeds. It provided a clue to species diversity in a community and each species that has its own range of ecological amplitude which indicate the condition of the habitat.

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Table 1. Floristic composition, frequency, density and basal cover of herbaceous weeds and mixed winter crop

Plant species	Family	Frequency (%)		Density/m ²		Basal cover (cm/m ²)	
		Dec	Feb	Dec	Feb	Dec	Feb
<i>Alternanthera sessilis</i> (Linn.) Dc.	Amaranthaceae	2	4	0.09	0.26	0.004	0.018
<i>Amaranthus viridis</i> Linn.	Amaranthaceae	2	4	0.03	0.14	0.006	0.014
<i>Anagallis arvensis</i> Linn.	Primulaceae	47	36	3.21	2.95	0.225	0.018
<i>Avena sterilis</i> Linn. Var. <i>cultra</i>	Poaceae	2	3	0.03	0.07	0.002	0.005
<i>Blumea laciniata</i> (Rox.) Dc.	Asteraceae	3	5	0.14	0.21	0.011	0.025
<i>Brassica campestris</i> Linn.	Brassicaceae	98	76	7.03	2.08	0.913	0.437
<i>Chenopodium album</i> Linn.	Chenopodiaceae	52	43	2.12	2.09	0.170	0.200
<i>Chrozophora rotleri</i> A. Juss.	Euphorbiaceae	3	4	0.04	0.07	0.004	0.064
<i>Cynodon dactylon</i> (Linn.) Pers.	Poaceae	65	72	54.19	99.80	1.084	2.994
<i>Cyperus rotundus</i> Linn.	Cyperaceae	55	41	12.04	10.92	0.241	0.328
<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	21	19	3.20	1.30	0.064	0.039
<i>Eclipta prostrata</i> (Linn.) Linn.	Asteraceae	16	8	1.57	0.41	0.031	0.025
<i>Eragrostis atrovirens</i> (Desf.) Trin.	Poaceae	9	5	1.41	1.91	0.056	0.076
<i>Euphorbia thymifolia</i> Linn.	Euphorbiaceae	11	9	0.89	0.72	0.031	0.012
<i>Gnaphalium indicum</i> Linn.	Asteraceae	9	7	0.29	0.31	0.008	0.012
<i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	3	-	0.09	-	0.001	-
<i>Lathyrus sativus</i> Linn.	Fabaceae	8	4	0.24	0.18	0.013	0.011
<i>Launaea asplenifolia</i> Hk. F.	Asteraceae	6	10	0.16	0.29	0.006	0.015
<i>Linum usitatissimum</i> Linn.	Linaceae	8	5	0.19	0.14	0.009	0.018
<i>Lippia nodiflora</i> A. Rich.	Verbenaceae	6	4	1.43	1.01	0.057	0.051
<i>Melilotus indica</i> (L.) All. Fl.	Fabaceae	8	11	0.29	0.41	0.017	0.029
<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae	3	7	0.15	0.29	0.011	0.026
<i>Oryza rufipogon</i> Griff.	Poaceae	-	3	-	0.14	-	0.005
<i>Parthenium hysterophorus</i> Linn.	Asteraceae	7	14	0.29	1.47	0.012	0.074
<i>Paspalidium flavidum</i> (Retz.) A. Camus	Poaceae	-	9	-	1.10	-	0.209
<i>Phalaris minor</i> Retz.	Poaceae	17	14	1.10	1.61	0.022	0.029
<i>Polygonum barbatum</i> Linn.	Polygonaceae	3	4	0.24	0.19	0.006	0.005
<i>Polygonum plebeium</i> Linn.	Polygonaceae	-	4	-	0.43	-	0.017
<i>Polypogon monspeliensis</i> Linn.	Polygonaceae	4	3	0.02	0.09	0.006	0.004
<i>Potentilla supina</i> Linn.	Rosaceae	-	3	-	0.12	-	0.004
<i>Rumex dentatus</i> Linn.	Polygonaceae	9	13	0.56	0.76	0.050	0.076
<i>Salvia plebeia</i> R. Br. Linn.	Lamiaceae	7	1	0.25	0.02	0.004	0.008
<i>Solanum nigrum</i> Linn.	Solanaceae	3	5	0.08	0.10	0.004	0.008
<i>Triticum aestivum</i> Linn.	Poaceae	100	100	102.66	108.07	7.186	12.968
<i>Typha angustata</i> Linn.	Typhaceae	5	4	0.05	0.03	0.010	0.007
<i>Vaccaria pyramidata</i> Medik	Caryophyllaceae	4	3	0.10	0.08	0.015	0.014
<i>Verbascum chinense</i> Linn.	Scrophulariaceae	3	4	0.06	0.10	0.001	0.004
<i>Vicia hirsute</i> (Linn.) S.F. Gray	Fabaceae	3	4	0.05	0.14	0.001	0.005
<i>Volvulopsis nummularia</i> (Linn.) Roberty	Convolvulaceae	2	4	0.06	0.12	0.001	0.003
<i>Xanthium strumarium</i> Linn.	Asteraceae	1	3	0.03	0.05	0.002	0.007

SUMMARY

Floristic study and variation in frequency, density and basal cover of crop and weeds were studied at bimonthly intervals in a mixed wheat and mustard crop at Gujar lake margin in district Jaunpur (Uttar Pradesh). The total number of weed species recorded on 28th December, 2008 and 27th February, 2009 were 34 and 37, respectively. Maximum number of weeds was of Poaceae and followed by

Asteraceae. *Cynodon dactylon* was the most dominated weed. The maximum frequency (65 and 72%), density (54.19 and 99.80/m²) and basal cover (1.084 and 2.994 cm²/m²) were of *Cynodon dactylon* followed by *Cyperus rotundus*. It was mainly due to their vegetative mode of propagation and by their competitive ability in the favourable soil moisture, texture and nutrients conditions.

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