Weed diversity in Chilly fields of Kurnool district, A.P., India

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ABSTRACT:

The study is aimed to enumerate the list of weeds occur in chilly fields of Kurnool district, A.P., India. It revealed the presence of 39 weeds that are distributed in 19 families. More species are identified from the family Euphorbiaceae(5). Phytosociological attributes for each species were calculated by using standard formulas. Cyperus rotundus (50.946) is the most important species followed by Digera muricata (20.691), Amaranthus viridis (17.659), Eclipta prostrata (16.744), Portulaca oleracea (10.212), Phyllanthus maderaspatensis (8.676), Merrimia gangetica (5.283) and Physalis minima (5.021). The frequency classes of them was also calculated and determined that they are showing heterogeneity in their distribution.

KEY WORDS: Weeds, Chilly fields, Frequency classes, Importance value, Phytosociology etc.

INTRODUCTION:

In an agro ecosystem, phyto sociological studies of weeds are utensils for monitoring that have been used to comprehend the weed community and the function of each population (Braun – Blanquet, 1979). Such studies allow numerous interpretations about a weed in each ecological instance by affording pragmatic variables about a weed in the population, such as its frequency, density, abundance and the importance of that particular weed in relation to the overall weed community(Erasmo et al. 2004; Adegas et al.2010). These studies endow with knowledge of dynamics and relative importance of a species in a particular phyto society or across phyto societies in crop – weed ecosystem. Discerning the sociological composition of weeds in crop fields is a prerequisite for its efficient management. If a farmer is familiar of a species which often appear in concert with another weed species, he should be eagle-eyed on the other species as well, when he visit his field and may think about choosing a herbicide which control both.

The detection of plants as weeds is plausibly as old as agriculture itself. Weeds take the largest part of environmental gradients and grow up as good competitor in the ecosystem. It is renowned that weeds have negative value but if they can grow properly can be renewed to useful for humankind. Weeds can take part in a constructive role by harboring insect natural enemies and pollinators; however the ramification surge from weeds harboring crop pests largely outweighs the profit they potentially afford. Maynard & Hochmuth (2007) indicated that exact recognition of the particular weed species is the primary step to control the problems weed enforce on agriculture.

There are meager studies on weeds of vegetable cultivating fields. Thus, we conducted a study on phyto sociological attributes of weeds in chilly fields of Kurnool district, A.P., India.

METHODOLOGY:

The present study is aimed to provide a record of weeds of chilly cultivar in Kurnool district. The vicinity was explored extensively and focused on weeds that impede with growth of chilly plants. Plant specimens were collected in both vegetative and reproductive stages. Every plant was collected in quadruplicates and every endeavor has been made to study the habit, habitat, flowering seasons and frequency of distribution of the species. The collected specimens were made into herbarium according to the methodology described by Santapau (1995) and Jain & Rao (1977). Every specimen was carefully studied regarding vegetative and reproductive features. Provisional identification was made following 'Flora of Presidency of Madras' (Gamble & Fischer, 1915-1935) and other regional floras. The number of individuals of each species was collected by laying 1m x 1m. quadrates randomly in selected chilly fields. By using that data, the phyto sociological attributes: abundance, density and frequency were calculated and their relative values and Importance Value Index (IVI) were calculated by the following principles of Curtis and Mclntosh,(1950), Misra, (1968), and Mueller-Dombois and Ellenberg, (1974).

$$\text{Frequency (\%)} = \frac{\text{Total number of quadrates in which the species occur}}{\text{Total number of quadrates studied}} \times 100$$

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates in which the species occurred}}$$

$$\text{Relative frequency} = \frac{\text{Frequency of individuals of a species}}{\text{Total frequency of all species}} \times 100$$

$$\text{Relative density} = \frac{\text{Density of individuals of a species}}{\text{Total density of all species}} \times 100$$

$$\text{Relative abundance} = \frac{\text{Abundance of individuals of a species}}{\text{Total abundance of all species}} \times 100$$

Importance Value Index = Relative density + Relative frequency + Relative abundance

Based on Raunkiaer, (1934), the frequency classes of weed species were determined. Accordingly there are 5 frequency classes, i.e. 'A' class with the species of frequency ranging from 1-20%; 'B' class 21-40%; 'C'class 41-60%; 'D' class 61-80% and 'E' class 81-100%. Further the weed community frequency patterns were compared with the

normal frequency pattern of Raunkiaer (A>B>C>=D<E). Based on the frequency pattern of the community, the homogeneity and heterogeneity of the vegetation was analyzed. If the values are high with respect to A, B, C and D, then the community is said to be heterogeneous where as higher values of E indicates the homogeneous nature. Based on the data provided in table -1, the family wise distribution of weeds was analyzed and given in table -3.

RESULTS & DISCUSSION:

Abundance, Density, Frequency and their relative values for determining the distribution pattern and Importance Value Index (IVI) of the weeds encountered in chilly fields were provided in Table- 1**.** A total of 39 weed species (36 dicots, 3 monocots) were recorded from 100 quadrates of 1m.x 1m. combining four field sites. *Cyperus rotundus* (50.946) is the most important species followed by *Digera muricata* (20.691), *Amaranthus viridis* (17.659), *Eclipta prostrata* (16.744), *Portulaca oleracea* (10.212), *Phyllanthus maderaspatensis* (8.676), *Merrimia gangetica* (5.283) and *Physalis minima* (5.021).

Frequency of weed species:

The frequency classes of the weed species encountered in the study sites were analyzed. Further the frequency formula for each class also determined. The results obtained were presented in Table -2. The analysis on the frequency classes of weed species encountered in chilly crop field revealed the presence of A class with 37 species followed by 1 under B, and 1 under C. No single species under D and E out of 39 species. This result showing the heterogeneity of weed vegetation.

Table - 2. Frequency Classes of Weed Species

S.No.	Frequency class	No.of weeds
1.	A 1 to 20	37
2.	B 21 to 40	1
3.	C 41 to 60	1
4.	D 61 to 80	-
5.	E 81 to 100	-
6.	TOTAL	39

Frequency formulae - A>B=C

Family wise distribution of weeds:

It is revealed that the 39 weeds were distributed in 19 families. More number of species were from the family Euphorbiaceae (5) followed by Amaranthaceae and Fabaceae (4 in each); Caesalpiniaceae and Malvaceae (3 in each); Asteraceae, Convolvulaceae, Cyperaceae, Mimosaceae, Portulacaceae and Tiliaceae (2 in each); Aizoaceae, Capparidaceae, Commelinaceae, Cucurbitaceae, Menispermaceae, Poaceae, Sapindaceae and Solanaceae (1 in each) were renowned. It was indicated heterogeneity of the families of species occurred in the fields.

Table -3 showing family wise distribution of weeds

S.No.	Name of the family	No.of weeds
1.	Aizoaceae	1
2.	Amaranthaceae	4
3.	Asteraceae	2
4.	Caesalpiniaceae	3
5.	Capparidaceae	1
6.	Commelinaceae	1
7.	Convolvulaceae	2
8.	Cucurbitaceae	1
9.	Cyperaceae	2
10.	Euphorbiaceae	5
11.	Fabaceae	4
12.	Malvaceae	3
13.	Menisprmaceae	1
14.	Mimosaceae	2
15.	Poaceae	1
16.	Portulacaceae	2
17.	Sapindaceae	1
18.	Solanaceae	1
19.	Tiliaceae	2

Table -1 showing Phytosociological attributes of weeds in Chilly fields in Kurnool district, A..P., India

S.No	Plant Name	Family	A	D	F	R.A	R.D	R.F.	IVI
1.	*Abelmaschus ficulneus* (L.) Wight &Arn.	Malvaceae	2	0.25	12.5	0.008	0.24	1.36	1.608
2.	*Abutilon indicum* (L.) Sweet	Malvaceae	4	0.5	12.5	0.015	0.47	1.36	1.845
3.	*Acacia nilotica*(L.) Willd.	Mimosaceae	2.5	0.63	25.0	0.010	0.59	2.72	3.32
4.	*Achyranthes bidentata* blume	Amaranthaceae	1	0.13	12.5	0.004	0.12	1.36	1.484
5.	*Amaranthus viridis* L.	Amaranthaceae	15.45	10.63	68.75	0.059	10.12	7.48	17.659
6.	*Cassia pumila* Lam.	Caesalpiniaceae	4	0.25	6.25	0.015	0.24	0.68	0.935
7.	*Cassia tora* L.	Caesalpiniaceae	1	0.13	12.5	0.004	0.12	1.36	1.484
8.	*Cassia uniflora* Miller	Caesalpiniaceae	1	0.13	12.5	0.004	0.12	1.36	1.484
9.	*Cardiospermum halicacabum* L.	Sapindaceae	1	0.13	12.5	0.004	0.12	1.36	1.484
10.	*Celosia argentea* L.	Amaranthaceae	1.6	0.31	18.75	0.006	0.30	2.04	2.346
11.	*Cleome viscosa* L.	Capparidaceae	2	0.13	6.25	0.008	0.12	0.68	0.808
12.	*Clitoria ternatea*L.	Fabaceae	2	0.38	18.75	0.008	0.36	2.04	2.408
13.	*Cocculus hirsutus*(L.) Diels	Menisprmaceae	1	0.063	6.25	0.004	0.06	0.68	0.744
14.	*Commelina*	Commelinaceae	1	0.13	12.5	0.004	0.12	1.36	1.484

	benghalensis L.								
15.	*Corchorus capsularis* L.	Tiliaceae	1.3	0.25	18.75	0.005	0.24	2.04	2.285
16.	*Corchorus trilocularis* L.	Tiliaceae	6.3	1.19	18.75	0.024	1.13	2.04	3.194
17.	*Cucurbita pubescens* Willd.	Cucurbitaceae	4	1.25	31.25	0.015	1.19	3.40	4.605
18.	*Cyperus rotundus* L.	Cyperaceae	129.8	48.69	37.5	0.496	46.37	4.08	50.946
19.	*Cyanotis discolor*	Cyperaceae	1	0.063	6.25	0.004	0.06	0.68	0.744
20.	*Digera muricata* (L.) Martt.	Amaranthaceae	13.38	11.68	87.5	0.051	11.12	9.52	20.691
21.	*Echinochloa colonum* (L.) Link.	Poaceae	3	1.88	6.25	0.011	1.75	0.68	2.441
22.	*Eclipta prostrata* (L.) L.	Asteraceae	16.6	10.38	62.5	0.064	9.88	6.80	16.744
23.	*Euphorbia hirta* L.	Euphorbiaceae	3	0.75	25.0	0.012	0.71	2.72	3.442
24.	*Euphorbia indica* Lam.	Euphorbiaceae	1.6	0.5	31.25	0.006	0.47	3.40	3.876
25.	*Euphorbia thymifolia* L.	Euphorbiaceae	3.25	0.81	25.0	0.012	0.77	2.72	3.502
26.	*Indigofera barberi* Gamb.	Fabaceae	1	0.063	6.25	0.004	0.06	0.68	0.744
27.	*Ipomoea sepiaria* Koen. Ex Roxb.	Convolvulaceae	1.6	0.31	18.75	0.006	0.30	2.04	2.346
28.	*Malvastrum coromondelianum* (L.) Garcke	Malvaceae	2	0.13	6.25	0.008	0.12	0.68	0.808
29.	*Merrimia gangetica* (L.) Cut.	Convolvulaceae	3.33	1.25	37.5	0.013	1.19	4.08	5.283
30	*Mimosa pudica* L.	Mimosaceae	1	0.06	6.25	0.004	0.05	0.68	0.734
31	*Parthenium hysterophorus* L.	Asteraceae	2	0.38	18.75	0.008	0.35	2.04	2.398
32	*Phaseolus aconitifolius* Jacq.	Fabaceae	1.66	0.31	18.75	0.006	0.29	2.04	2.336
33	*Phyllanthus amarus* Schum.	Euphorbiaceae	4.8	1.5	31.25	0.018	1.42	3.40	4.838
34	*Phyllanthus maderaspatensis* L.	Euphorbiaceae	6.75	3.38	50.0	0.026	3.21	5.44	8.676
35	*Physalis minima* L.	Solanaceae	5.4	1.69	31.25	0.021	1.60	3.40	5.021
36	*Portulaca oleracea* L.	Portulacaceae	5.7	3.56	62.50	0.022	3.39	6.80	10.212
37	*Portulaca quadrifida* L.	Portulacaceae	4.0	0.75	18.75	0.015	0.71	2.04	2.765
38	*Rhynchosia minima* (L.) DC.	Fabaceae	1	0.06	6.25	0.004	0.06	0.68	0.744
39	*Trianthema portulacastrum* L.	Aizoaceae	1	0.19	18.75	0.004	0.18	2.04	2.224
	TOTALS		261.32	104.87	918.75				

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