PUNE RESEARCH WORLD ISSN 2455-359X
AN INTERNATIONAL JOURNAL OF INTERDISCIPLINARY STUDIES VOL 2, ISSUE 2

PHYTOSOCIOLOGY OF CROP WEEDS IN RICE FIELDS OF ANANTAPURAM DISTRICT, ANDHRA PRADESH, INDIA

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ABSTRACT

Agrestals are weeds of aralde lands compete with crops for space, water, light and mineral nutrients and thereby affecting the crop productivity. They are able to grow in adverse habitats and easily invade agricultural fields, which are very fertile and a favourite ground for their colonization. Weeds have higher contents of nutrients than crop plants, they grow faster and absorb nutrients more efficiently. Depending on the degree of competition, weeds reduce crop yields by 10-25% in tropical countries like India, the yield loss has been estimated to the tune of 30%. Besides affecting the yield of crops, weeds can affect the quality of crops. Heavy infestation with perennial weeds can make the land less suitable for cultivation. It is prominent to note that the presence of weeds in herbaceous crops like rice infliect major losses. The key objective of the study is provision of a complete Phytosociological attributes of rice field weeds in Anantapuram district.

Key words: Agrestals, Crop productivity, Weed loss, Phytosociological attributes.

INTRODUCTION

A weed is a plant 'Out of Place' or a plant growing where it is not wanted. While al weeds are unwanted plants, all unwanted plants may not be weeds. From the point of agro-ecological systems, those plants which are competing with agricultural crops and having short vegetative phase and high reproductive output are termed as weeds. They are able to grow in adverse habitats and easily invade agricultural fields. Enormous seed production and power of vegetative propagation make them immortal in agro-ecosystems. While some of them are obligatory to crop fields, others are facultative, also seen in other habitats. Weed-crop competition is critical in obtaining optimum crop yields because of a greater competing ability of weeds than the crops. Weeds deplete large quantities of mineral nutrients and moisture more efficiently than the crop plants and thrive better over the crops.

With the introduction of several economically important Plants, Seeds of many obnoxious weeds also got mixed up and firmly established on the new soil and spread rapidly in different areas. Despite of using modern mechanical methods, weeds are still posing major problems for the success of weeds is attributed for their biodiversity. The effective use of control measures, whether cultural or Chemical, requires an appreciation of the biological characteristics of the weeds concerned. For weeds, especially those reproduce by seeds the time of their germination, fruit-setting is an important aspect from the point of their control. Hence, correct identification of the weed species and knowledge on Phytosociological attributes of the same are of Primary concern in weed control measures.

The weeds of rice crop encountered during the four phases of study i.e, Pre-plough, 15 days, 45 days and 60 days. All the quantitative characters, abundance, density, frequency were determined for all the weed species encoutntered during four phases of the crop.

MATERIALS AND METHODS:

The Phytosociological studies were adopted for the weeds of Paddy (Oryza sativa L.) fields. The rice variety of with a duration of 110-115 days was selected for the Phytosociological investigation. Three field sites with in a radius of 5 Km were identified. All the weeds encountered in the sample plots were carefully collected and identified. Random quadrate method was adopted for studying Phytosociological attributes of weeds. In each field site, five quadrates of 50 cm^2 were laid down and hence a sum of 15 quadrates. The quadrates were laid down four times for each crop based on their Phenology and crop duration. All the plant species encountered in quadrates were listed.

The Phytosociological attributes abundance, density, frequency and their relative values and Importance value Index (IVI) are calculated following the Principles of Curtis and Mc Intosh (1950), Misra(1968) and Mueller – Dombois and Ellenberg(1974).

$$\textbf{Abundance} = \frac{\text{Total number of individuals of each species}}{\text{Total number of sampling units in which species occurred}}$$

$$\textbf{Density} = \frac{\text{Total number of individuals in all sampling units}}{\text{Total number of sampling units studied}}$$

$$\textbf{Frequency (\%)} = \frac{\text{Number of sampling units in which species occur}}{\text{Total number of sampling units}} \times 100$$

Importance Value Index = Relative Density + Relative Frequency + Relative Dominance

$$\text{Relative value} = \frac{\text{Value of individual species}}{\text{Total values of all species}}$$

RESULTS AND DISCUSSION:

In the present study, a total of 25 plant taxa were identified as weeds in the paddy fields of the study area. All the weed species ere recorded from 15 quadrates combining all phases of crop cycle. 22 species were known to encounter during pre-plough phase of the crop. During the second phase 11 species were seen in all the quadrates. While after 45 and 60 days, 5 and 13 weed species were recorded respectively.

Table: Weed Taxa of Paddy fields in Anantapuram District

Sl.No	Name of the Species	Family
1	Cleome viscosa	Cleomaceae
2	Portulaca quadrifida	Portulacaceae
3	Ammania baccifera	Lythraceae
4	A. multiflora	Lythraceae
5	Trianthema portulacastrum	Aizoaceae
6	Dentella repens	Rubiaceae
7	Eclipta prostrata	Asteraceae
8	Spaeranthus indicus	Asteraceae
9	Convoloulus arvensis	Convoloulaceae
10	Physalis minima	Solanaceae
11	Bacopa monnieri	Scrophulariaceae
12	Phyla nodiflora	Verbenaceae
13	Alternanthera sessilis	Amaranthaceae
14	Chrozophora rottleri	Euphorbiaceae
15	Croton bon-plandianum	Euphorbiaceae
16	Commelina benghalensis	Commelinaceae
17	Chloris inflata	Poaceae
18	Cynodon dactylon	Poaceae
19	Doctyloctenium aegyptium	Poaceae
20	Dichanthium annulatum	Poaceae
21	Echinochloa colona	Poaceae
22	E.crus-galli	Poaceae
23	Panicum repens	Poaceae
24	Paspalum paspaloides	Poaceae
25	Setaria pumila	Poaceae

Every specimen was carefully studies regarding vegetative and reproductive features. Provisional identification was made following "Flora of Presidency of Madras" (Gamble &

Fischer, 1915-1935) and other local floras. All the plant families are arranged in sequence following Bentham and Hooker's classification (1862-1883) with certain exceptions to accommodate recent modifications adopted after cronquist (1968).

Dentella repens is identified with maximum abundance value during the pre-plough period. Phyla nodiflora is the most abundant weed after 15 days, Eclipta prostrate after 45 days and chloris inflate is the most abundance after 60 days.

The analysis on distribution pattern of the weed species through abundance to frequency ratio revealed the following results. Of the 22 species recorded in pre-plough phase, 14 has shown contagious distribution, 7 species regular and one species with random distribution patterns. In the second phase, out of 11, 6 species have contagious distribution, 2 species random and 3 regular distribution. In the third phase, of the 5 species all shown contagious. After 60 days, out of 13 species, I have shown contagious, 4 regular and 2 with random distribution.

The IVI calculated for the individual weed species encountered in the paddy fields revealed interesting results. Echinochloa crus-galli is the most important species in the pre-plough phase followed by cynodon doctylon. After 15 days Echinochloa crus-galli appeared important followed by E.colona. E.crus-galli has become the most important weed, followed by E.colona are identified as the most important weed species even after 45 days and 60 days of the crop. From the results obtained, it is clearly established that exclusively aquatic weeds are appeared important in paddy fields.

The analysis on the frequency classes of the weed species encountered in paddy fields reveals that, in the first phase the frequency class A is represented by 18 species, out of 22 recorded followed by 2 species under B and C class. In second phase, A and B class represented with 5 species. In the third Phase, 3 in A and C classes. After 60 days, out of 13 species, 11 were under A, one each in B and C classes. No species in any of the phase D and E classes. From the results, it is clearly established that most of the weed species encountered fall under A, B and C frequency classes and hence the weed vegetation is relatively heterogenous.

Table: Frequency classes of Weed species

Frequency class	**Phase**			
	I	**II**	**III**	**IV**
A 01 – 20	18	5	3	11
B 21 – 40	2	5	-	1
C 41 – 60	2	1	2	1
D 61 – 80	-	-	-	-
E 81 – 100	-	-	-	-
	22	**11**	**5**	**13**

Frequency Formulae

I A>B>C>D>E

II A>B>C>D=E
III A>B<C>D=E
IV A>B=C>D=E

TABLE : PHYTOSOCIOLOGICAL ATTRIBUTES OF RICE CROP WEEDS - 1

S. No.	Name of the Species	Pre-Plough				15 days				45 days				60 days			
		TNI	A	D	F	TNI	A	D	F%	TNI	A	D	F%	TNI	A	D	F%
1	*Cleome viscosa*	4	1	0.3	27	-	-	-	-	-	-	-	-	-	-	-	-
2	*Portulaca quadrifida*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
3	*Ammannia baccifera*	3	1.5	0.2	13	6	1.5	0.4	27	-	-	-	-	3	1.5	0.2	13
4	*Ammannia multiflora*	-	-	-	-	4	2	0.3	13	-	-	-	-	2	1	0.1	13
5	*Trianthema portulacastrum*	5	1.7	0.3	20	-	-	-	-	-	-	-	-	-	-	-	-
6	*Dentella repens*	1	1	0.1	6.7	2	1	0.1	13	-	-	-	-	-	-	-	-
7	*Eclipta prostrata*	2	1	0.1	13	6	1.5	0.4	27	2	1	0.1	6.7	4	2	0.3	13
8	*Spaeranthus indicus*	1	1	0.1	6.7	-	-	-	-	2	1	0.1	6.7	1	1	0.1	6.7
9	*Convolvulus arvensis*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
10	*Physalis minima*	4	2	0.3	13	-	-	-	-	-	-	-	-	-	-	-	-
11	*Bacopa monnieri*	1	1	0.1	6.7	2	1	0.1	13	-	-	-	-	2	1	0.1	13
12	*Phyla nodiflora*	6	1.2	0.4	33	4	2	0.3	13	-	-	-	-	-	-	-	-
13	*Alternanthera sessilis*	3	1.5	0.2	13	4	1.3	0.3	20	-	-	-	-	5	1.7	0.3	20
14	*Chrozophora rottleri*	4	1.3	0.3	20	-	-	-	-	-	-	-	-	-	-	-	-
15	*Croton bon-plandianum*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
16	*Commelina benghalensis*	-	-	-	-	5	1	0.3	33	-	-	-	-	4	1.3	0.3	20
17	*Chloris inflata*	2	1	0.1	13	-	-	-	-	-	-	-	-	2	2	0.1	6.7
18	*Cynodon dactylon*	8	1	0.5	53	6	1	0.4	40	3	1.5	0.2	13	2	1	0.1	13
19	*Dactyloctenium aegyptium*	4	2	0.3	13	-	-	-	-	-	-	-	-	-	-	-	-
20	*Dichanthium annulatum*	2	2	0.1	13	-	-	-	-	-	-	-	-	-	-	-	-
21	*Echinochloa colonum*	2	1	0.1	13	8	1.3	0.5	40	10	1.3	0.7	53	8	1.3	0.5	40
22	*Echinochloa crus-galli*	10	1.3	0.7	53	10	1.3	0.7	53	12	1.5	0.8	53	10	1.3	0.7	53
23	*Panicum repens*	2	1	0.1	13	-	-	-	-	-	-	-	-	1	1	0.1	6.7
24	*Paspalum paspaloides*	1	1	0.1	6.7	-	-	-	-	-	-	-	-	-	-	-	-
25	*Setaria pumila*	-	-	-	-	-	-	-	-	-	-	-	-	2	1	0.1	13

TNI = Total Number of Individuals
A = Abundance
D = Density
F = Frequency

S. No.	Name of the Species	Pre-Plough				15 days				45 days				60 days			
		TNI	A	D	F	TNI	A	D	F%	TNI	A	D	F%	TNI	A	D	F%
1	*Cleome viscosa*	4	1	0.3	27	-	-	-	-	-	-	-	-	-	-	-	-
2	*Portulaca quadrifida*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
3	*Ammannia baccifera*	3	1.5	0.2	13	6	1.5	0.4	27	-	-	-	-	3	1.5	0.2	13
4	*Ammannia multiflora*	-	-	-	-	4	2	0.3	13	-	-	-	-	2	1	0.1	13
5	*Trianthema portulacastrum*	5	1.7	0.3	20	-	-	-	-	-	-	-	-	-	-	-	-
6	*Dentella repens*	1	1	0.1	6.7	2	1	0.1	13	-	-	-	-	-	-	-	-
7	*Eclipta prostrata*	2	1	0.1	13	6	1.5	0.4	27	2	1	0.1	6.7	4	2	0.3	13
8	*Spaeranthus indicus*	1	1	0.1	6.7	-	-	-	-	2	1	0.1	6.7	1	1	0.1	6.7
9	*Convolvulus arvensis*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
10	*Physalis minima*	4	2	0.3	13	-	-	-	-	-	-	-	-	-	-	-	-
11	*Bacopa monnieri*	1	1	0.1	6.7	2	1	0.1	13	-	-	-	-	2	1	0.1	13
12	*Phyla nodiflora*	6	1.2	0.4	33	4	2	0.3	13	-	-	-	-	-	-	-	-
13	*Alternanthera sessilis*	3	1.5	0.2	13	4	1.3	0.3	20	-	-	-	-	5	1.7	0.3	20
14	*Chrozophora rottleri*	4	1.3	0.3	20	-	-	-	-	-	-	-	-	-	-	-	-
15	*Croton bon-plandianum*	3	1	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-
16	*Commelina benghalensis*	-	-	-	-	5	1	0.3	33	-	-	-	-	4	1.3	0.3	20
17	*Chloris inflata*	2	1	0.1	13	-	-	-	-	-	-	-	-	2	2	0.1	6.7
18	*Cynodon dactylon*	8	1	0.5	53	6	1	0.4	40	3	1.5	0.2	13	2	1	0.1	13
19	*Dactyloctenium aegyptium*	4	2	0.3	13	-	-	-	-	-	-	-	-	-	-	-	-
20	*Dichanthium annulatum*	2	2	0.1	13	-	-	-	-	-	-	-	-	-	-	-	-
21	*Echinochloa colonum*	2	1	0.1	13	8	1.3	0.5	40	10	1.3	0.7	53	8	1.3	0.5	40
22	*Echinochloa crus-galli*	10	1.3	0.7	53	10	1.3	0.7	53	12	1.5	0.8	53	10	1.3	0.7	53
23	*Panicum repens*	2	1	0.1	13	-	-	-	-	-	-	-	-	1	1	0.1	6.7
24	*Paspalum paspaloides*	1	1	0.1	6.7	-	-	-	-	-	-	-	-	-	-	-	-
25	*Setaria pumila*	-	-	-	-	-	-	-	-	-	-	-	-	2	1	0.1	13

TNI = Total Number of Individuals
A = Abundance
D = Density
F = Frequency

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