

SURVEY OF WEED FLORA IN TRANSPLANTED RICE IN KRISHNA AGROCLIMATIC ZONE OF ANDHRA PRADESH, INDIA

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ABSTRACT

Weed survey was conducted during Kharif 2009-10 and 2011-12 to study the weed flora in transplanted rice in Krishna zone of Andhra Pradesh, India. The survey revealed that a total of 55 species, of which 11 grasses, 6 sedges, 38 broad leaf weeds belonging to 31 families were infested in transplanted rice. Among the weeds, Echinochloa colona was the most dominating weed with Importance Value Index (IVI) of 27.14 followed by Eclipta alba (21.53), Cyperus rotundus (19.35) and Marsilea quadrifolia (18.63). Among the families, Poaceae was found to be the largest family representing 11 species followed by Cyperaceae with 6 species.

Key words: Weed survey, transplanted rice, importance value index, India.

INTRODUCTION

Weed flora and its composition in a crop is influenced by the type of cultivation, spacing, time or season of cultivation, soil type, soil P^H, climatic conditions such as rainfall, temperature, cultivation practices like irrigation, tillage systems, application of fertilizer and weed management. In Krishna delta, transplanted rice is the major cereal crop which is infested with a wide array of weed flora consisting of grasses, sedges and broad leaf weeds. These weeds effectively compete with the crop for nutrients, water, space and reduce the yield ranging from 12 to 51 % (Rao and Singh, 1998; Mukharjee and Singh, 2005; Halder and Patra, 2007). Due to shortage of labor and increased labor wages, farmers are using various pre and post emergence herbicides like oxadiargyl, butachlor, pyrazosulfuron ethyl, pretilachlor, 2,4-D and bispyribac sodium etc. to control diverse weed flora in different stages.

In fact, chemical weed control is very cheap compared to manual weeding. In past, though some isolated attempts have been made to survey weeds associated with rice (Singh and Rao, 1978; Raju and Reddy, 1999; Pragada and Venkaiah, 2012) do not give an idea of changes in weed flora with time. Therefore, there is every need to study the changes in weed flora to determine their composition due

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to continuous use of herbicides in order to improve their method of weed control in transplanted rice. Keeping this in view, the present survey was undertaken to have some detailed information about the weeds associated in transplanted rice crop in Krishna Agro climatic zone of Andhra Pradesh, India.

MATERIALS AND METHODS

In India, Andhra Pradesh is the fifth largest state with an area of 2,75,905 sq.km with 23 districts. The state is grouped in 9 agroclimatic zones and Krishna Agroclimatic zone is one among them comprising three districts viz., Krishna, Guntur and Prakasam. The Krishna zone of Andhra Pradesh is geographically situated between 14° 57' to 17° 9' N latitude and 78° 45' to 81° 33' E longitude. The climate of the zone is sub tropical with an annual average rainfall of 888 mm with bimodal distribution. Survey of weed flora of transplanted rice of Krishna Agro climatic zone comprising Krishna, Guntur and Prakasam districts of Andhra Pradesh, India was conducted during kharif seasons of 2009-10 to 2011-12. For recording observations on the weed flora, a stop was made after every 10 km on the selected route in different districts of the Zone. The location for recording composition and density of various weed species was selected about 200 meters away from the road. Species wise weed counts were made from five spots in the crop field using the list count quadrat method suggested by Mishra (1968) and Raju (1997). Data were analyzed to determine density (D), frequency (F), Relative density (Re. D), Relative frequency (Re. F) and Importance Value Index (IVI) as per the method used by Kim and Moody (1980), Raju *et al.* (1995), and Behera *et al.* (1999). Pooled data from individual districts pertaining to percent of and number of families were represented graphically (Figure 1 and 2). Further, the three years data obtained from all the three districts were pooled and the mean was calculated and presented in Table-1.

RESULTS AND DISCUSSION

Weed survey in the three districts viz., Krishna, Guntur and Prakasam indicated that broad leaf weeds comprised major share followed by grasses and sedges (Figure 1). These weeds belong to 22, 23 and 20 families respectively, in Krishna, Guntur and Prakasam districts (Figure 2). In all the three districts, Poaceae is the single largest family with more number of weeds than all other families.

Weed survey data pooled from the three districts of the Krishna Agroclimatic Zone revealed that transplanted rice crop was infested with a total of 55 weed species, of which 11 grasses, 6 sedges, 38 broad leaf weeds belonging to 31 families.

Table-1. Dominant weed flora in Transplanted rice crop of Krishna zone (Pooled data of 3 yrs).

S.No.	Name of the plant	Family	Density	RD	Freq.	RF	IVI
1	<i>Echinochloa colona</i> (L.) Link	Poaceae	1.45	29.50	0.51	24.77	27.14
2	<i>Eclipta alba</i> (L.)	Asteraceae	1.78	22.17	0.45	20.89	21.53
3	<i>Cyperus rotundus</i> L.	Cyperaceae	1.46	19.48	0.42	19.22	19.35
4	<i>Marsilea quadrifolia</i> L.	Marsileaceae	1.29	20.44	0.39	16.82	18.63
5	<i>Paspalum conjugatum</i> Berg.	Poaceae	1.39	19.56	0.37	17.50	18.53
6	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	1.22	17.56	0.40	18.80	18.18
7	<i>Lemna minor</i> L.	Lemnaceae	1.78	20.82	0.31	15.00	17.91
8	<i>Cyanotis axillaris</i> (L.) Sweet	Commelinaceae	0.73	16.50	0.41	17.74	17.12
9	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	0.73	14.63	0.37	15.79	15.21
10	<i>Lippia nodiflora</i> (L.) Greene	Verbenaceae	0.62	14.11	0.38	16.30	15.21
11	<i>Alternanthera sessilis</i> (L.) R. Br.	Amaranthaceae	0.80	13.15	0.38	15.91	14.53
12	<i>Commelina benghalensis</i> L.	Commelinaceae	0.58	13.33	0.33	14.37	13.85
13	<i>Phyllanthus niruri</i> Linn.	Euphorbiaceae	0.59	12.95	0.35	14.53	13.76
14	<i>Ludwigia parviflora</i> L.	Onagraceae	1.15	11.96	0.32	13.07	12.52
15	<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	0.36	10.60	0.32	13.90	12.25
16	<i>Leptochloa chinensis</i> (L.) Nees	Poaceae	0.54	10.91	0.32	13.22	12.06
17	<i>Monochoria vaginalis</i> (Burm. f.) Presl	Pontederiaceae	0.48	13.22	0.25	10.57	11.90
18	<i>Cyperus iria</i> L.	Cyperaceae	1.82	10.92	0.31	12.61	11.77
19	<i>Pistia stratiotes</i> L.	Araceae	1.65	13.55	0.16	7.62	10.58
20	<i>Bergia capensis</i> L.	Elatinaceae	0.45	7.06	0.26	10.86	8.96
21	<i>Cyperus difformis</i> L.	Cyperaceae	0.85	8.06	0.22	9.27	8.66
22	<i>Echinochloa crus-galli</i> (L.) P. Beauv. s galli	Poaceae	0.36	7.81	0.20	9.09	8.45
23	<i>Panicum repens</i> L.	Poaceae	0.93	5.40	0.23	8.45	6.92
24	<i>Trianthema portulacastrum</i> L.	Aizoaceae	0.40	6.51	0.17	5.04	5.78
25	<i>Dinebra retroflexa</i> (Vahl) Panzer	Poaceae	0.28	3.96	0.23	7.37	5.66
26	<i>Azolla pinnata</i> R. Br.	Azollaceae	0.51	7.49	0.08	3.15	5.32
27	<i>Ammannia baccifera</i> L.	Lythraceae	0.23	3.56	0.15	5.78	4.67
28	<i>Portulaca oleracea</i> L.	Portulacaceae	0.70	5.80	0.17	3.35	4.57
29	<i>Typha latifolia</i> L.	Typhaceae	0.73	6.32	0.04	1.31	3.81
30	<i>Aponogeton natans</i> (L.) Engl. & Kr.	Aponogetanaceae	0.31	4.58	0.09	2.78	3.68
31	<i>Fimbristylis miliacea</i> (L.) Vahl	Cyperaceae	0.11	4.27	0.07	3.03	3.65
32	<i>Euphorbia virgata</i> Waldst. Et Kit.	Euphorbiaceae	0.29	3.14	0.13	3.50	3.32
33	<i>Cyperus haspan</i> L.	Cyperaceae	0.16	3.54	0.07	3.03	3.28
34	<i>Cardanthera uliginosa</i> (L.F.) Buch.Ham.	Acanthaceae	0.27	3.24	0.09	2.87	3.06

S.No.	Name of the plant	Family	Density	RD	Freq.	RF	IVI
35	<i>Parthenium hysterophorus</i> L.	Asteraceae	0.18	1.78	0.13	2.99	2.39
36	<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae	0.11	1.73	0.09	2.98	2.35
37	<i>Dactyloctenium aegyptium</i> (L.) Beauv	Poaceae	0.10	2.02	0.08	2.59	2.31
38	<i>Cleome viscosa</i> L.	Capparaceae	0.16	2.05	0.07	2.38	2.21
39	<i>Physalis minima</i> L.	Solanaceae	0.16	2.16	0.07	2.22	2.19
40	<i>Asteracantha longifolia</i> (Schum.) Heine	Acanthaceae	0.07	1.45	0.07	2.56	2.01
41	<i>Panicum psilopodium</i> Trin.	Poaceae	0.11	1.54	0.07	2.38	1.96
42	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	0.09	0.77	0.07	1.96	1.36
43	<i>Ischaemum rugosum</i> Trin.	Poaceae	0.02	1.23	0.02	1.39	1.31
44	<i>Achyranthes aspera</i> L.	Amaranthaceae	0.04	0.58	0.04	2.02	1.30
45	<i>Stemodia viscosa</i> Roxb.	Scrophulariaceae	0.02	0.85	0.02	1.59	1.22
46	<i>Oxalis corniculata</i> L.	Oxalidaceae	0.04	0.49	0.04	1.48	0.99
47	<i>Cyperus kyllingia</i> Endl.	Cyperaceae	0.22	0.90	0.04	1.06	0.98
48	<i>Potamogeton pectinatus</i> L.	Potamogetonaceae	0.04	0.62	0.04	1.23	0.93
49	<i>Corchorus trilocularis</i> L.	Tiliaceae	0.02	0.65	0.02	1.11	0.88
50	<i>Digera arvensis</i> Forsk.	Amaranthaceae	0.02	0.79	0.02	0.85	0.82
51	<i>Croton bonplandianum</i> Baill.	Euphorbiaceae	0.04	0.42	0.02	1.11	0.77
52	<i>Hydrocotyle asiatica</i> (L.) Urb.	Apiaceae	0.11	0.45	0.04	1.06	0.75
53	<i>Nasturtium indicum</i> (L.) Hiern	Brassicaceae	0.09	0.36	0.04	1.06	0.71
54	<i>Ocimum canum</i> Sims	Lamiaceae	0.07	0.27	0.04	1.06	0.66
55	<i>Nymphaea stellata</i> L.	Nymphaceae	0.09	0.13	0.02	0.74	0.43

Note: D = Density, RD = Relative Density, F = Frequency, RF = Relative Frequency, IVI = Importance Value Index

A complete list of weeds along with density, frequency and Importance value index (IVI) is given in Table-1. Poaceae is the largest family representing 11 weed species, followed by Cyperaceae (6), Amaranthaceae and Euphorbiaceae each with 3 species and all the remaining 27 families represented with 1 to 2 species only. Among all the weeds, *Echinochloa colona* is the most dominating weed with IVI of 27.14 followed by *Eclipta alba* (21.53), *Cyperus rotundus* (19.35), *Marsilea quadrifolia* (18.63) etc. Further, among the sedges, *Cyperus rotundus* continues to be the most dominant weed followed by *Cyperus difformis* and *Cyperus iria*. Among the broad leaf weeds *Eclipta alba* is the most dominant weed followed by *Marsilea quadrifolia*. It was also observed that fern weed *Azolla pinnata* infested some parts which can be utilized as cattle feed.

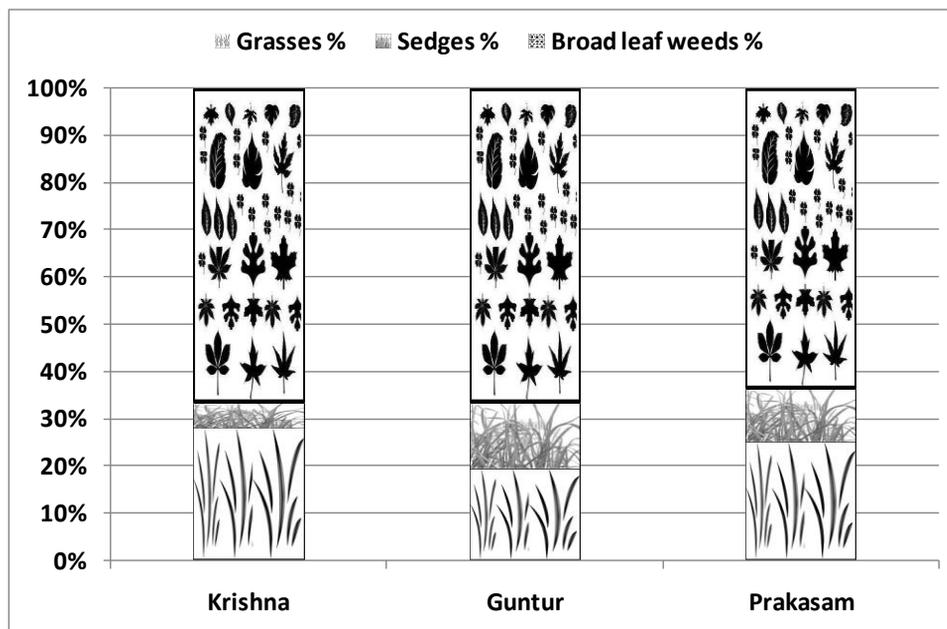


Figure 1. Composition of weed flora in different districts of Krishna zone.

CONCLUSION

From the above study, it can be concluded that weed flora in transplanted rice is mainly dominated by grassy weed like *Echinochloa colona*, which is having morphological similarity with rice particularly at the early stage and difficult to control, unless selective pre or post emergence herbicides are used. Further, the broadleaf weeds are also comprising as the largest group, which indicates importance of use of

selective post emergence broad spectrum herbicide like bispyribac sodium for effective control of major weeds in a single application. Thus, the information pertaining to weed flora will be useful in suggesting suitable weed control recommendation for this region.

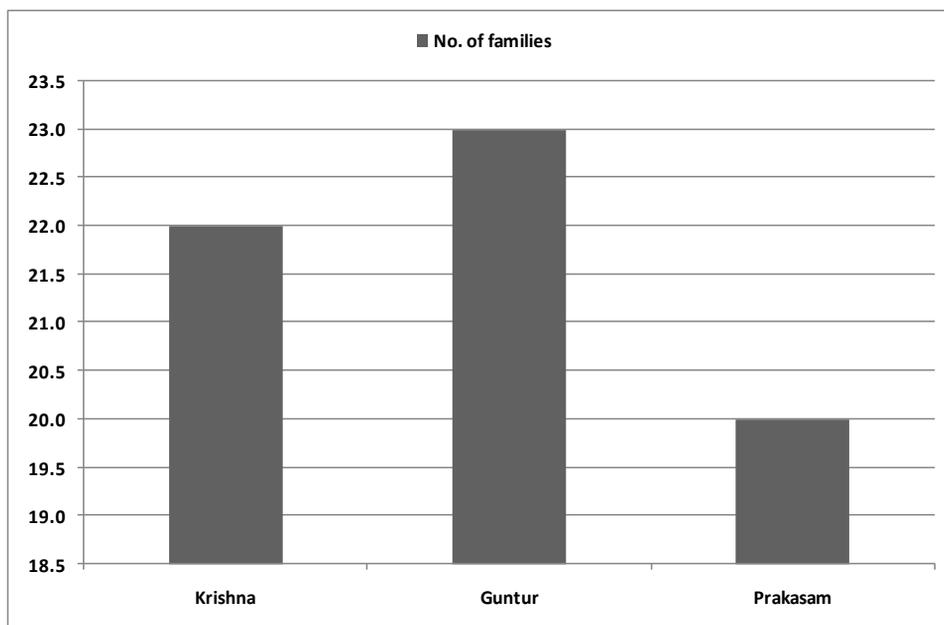


Figure 2. Weed distribution in No. of families in different districts of Krishna zone.

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