International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 8, Issue 51, 2016, pp.-2221-2223.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

WEED CHARACTERS AND INDICES OF TRANSPLANTED RICE AS INFLUENCED BY DIFFERENT WEED MANAGEMENT PRACTICES

SURESHKUMAR R.[1]*, DURAIRAJ NALLIAH S.[2], MARIMUTHU S.[3] and MUTHUKUMAR M.[4]

[1-3]Department of Agronomy, AC & RI, Coimbatore, Tamil Nadu Agricultural University, Tamil Nadu, 641 003, India
[2]Department of Agronomy, AC & RI, Killikulam, Tamil Nadu Agricultural University, Tamil Nadu, 628 252, India
[4]Department of Agricultural Entomology, AC & RI, Coimbatore, Tamil Nadu Agricultural University, Tamil Nadu, 641 003, India
*Corresponding Author: Email-suresh2k589@gmail.com

Received: July 13, 2016; Revised: July 30, 2016; Accepted: August 01, 2016; Published: October 27, 2016

Abstract- During *rabi* season (2011-2012) a field trial was conducted at Agricultural College and Research Institute, Killikulam, Tamil Nadu as part of M.Sc., research programme. The experiment was consisted of 12 treatments laid out in randomized block design with replicated thrice. The treatments comprised of application of pre-emergence herbicides *viz.,* butachlor 50 % EC @ 1.25 kg/ha, oxadiargyl 80 % WP @ 70 g/ha, bensulfuron methyl 0.6 % + pretilachlor 6 % GR @ 660 g/ha, metsulfuron methyl 10 % + chlorimuron ethyl 10 % WP @ 4 g/ha on 3 DAT along with post-emergence herbicide 2, 4-D Na salt @ 1.25 kg/ha or hand weeding on 35 DAT. In addition, the hand weeding twice, rotary weeding twice, weed free and weedy check treatments for comparison. The weed flora of *Cynodon dactylon*, *Echinochloa crus-galli, Echinochloa colona, Cyperus difformis*, *Cyperus iria*, *Cyperus rotundus*, *Marsilea quadrifolia*, *Ammania baccifera*, *Commelina benghalensis* and *Eclipta prostrata* were observed. It has been learned through experiment results that pre-emergence application of bensulfuron methyl + pretilachlor at 660 g/ha on 3 DAT with one hand weeding on 35 DAT recorded significantly higher grain yield (6710 kg/ha), lower weed population (31.33 No. /m^2) and their dry weight (37.80 kg/ha), higher weed control efficiency (91.76%), weed control index (99.06%) and lower weed index (1.32).

Keywords- Rice, Butachlor, Weed management.

Citation: Sureshkumar R., et al., (2016) Weed Characters and Indices of Transplanted Rice as Influenced by Different Weed Management Practices. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 8, Issue 51, pp.-2221-2223.

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Introduction

Rice, the stable food of more than a half of the world's population mostly from Asian countries. Rice is grown in as much as 114 countries across the world, in an area of 150 M ha, which constitute nearly 11 per cent of the world's cultivated land. Weeds are responsible for heavy yield losses in rice, to the extent of complete crop loss under extreme conditions. Out of the losses due to various biotic stresses, weeds are known to account for nearly one-third. Thus weed management would continue to play a key role to meet the growing food demands of increasing population in India. Weeds grow profusely in the rice fields and reduce crop yields drastically. In normal course yield loss will be 15-20%, however in severe cases the yield losses can be more than 50 %, depending on intensity of weeds [3]. Manual weeding although effective and most common practice of weed control in transplanted rice, raising cost of labour and their non-availability also lead to the search for alternative methods [7]. Herbicides offer the most effective, economical and practical way of weed management [4]. In view of this information, a field experiment was carried out to evaluate the effective and economic weed management as well as higher crop productivity in transplanted rice during *rabi* season.

MaterialsandMethods

During rabi season (2011-2012) a field trial was conducted at Agricultural College and Research Institute, Killikulam, Tamil Nadu. The experimental place is geographically located in the southern part of Tamil Nadu at 8°46' N latitude and 77° 42' E longitudes at an altitude of 40 meters above mean sea level. The soil of the experimental site was sandy clay loam in texture and pH was normal (7.02). The soil was low in nitrogen (245.0 kg/ha), medium in phosphorus (18.5 kg/ha) and potassium (234.0 kg/ha). The organic content was medium (0.58%) in range. Rice variety ADT (R) 47 with the duration of 118 days was used as test variety, transplanted with a spacing of 25 cm x 25 cm. Experiments consisting 12 treatments i.e. T1- PE Bensulfuron methyl 0.6% + Pretilachlor 6% GR (Londax Power) @ 660 g/ha on 3 DAT + PoE 2,4-D Sodium salt (Fernaxone) @ 1.25 kg/ha on 35 DAT, T2- PE Metsulfuron methyl 10% + Chlorimuron ethyl 10% WP (Almix) @ 4 g/ha on 3 DAT + PoE 2,4-D Sodium salt (Fernaxone) @ 1.25 kg/ha on 35 DAT, T3- PE Oxadiargyl 80% WP (Topstar) @ 70 g/ha on 3 DAT + PoE 2,4-D Sodium salt (Fernaxone) @ 1.25 kg/ha on 35 DAT, T4- PE Butachlor 50% EC @ 1.25 kg/ha on 3 DAT + PoE 2,4-D Sodium salt (Fernaxone) @ 1.25 kg/ha on 35 DAT, T5- PE Bensulfuron methyl 0.6% +Pretilachlor 6% GR (Londax Power) @ 660 g/ha on 3 DAT + Hand weeding on 35 DAT, T6- PE Metsulfuron methyl 10% + Chlorimuron ethyl 10% WP (Almix) @ 4 g/ha on 3 DAT + Hand weeding on 35 DAT, T7- PE Oxadiargyl 80% WP (Topstar) @ 70 g/ha on 3 DAT + Hand weeding on 35 DAT, T8- PE Butachlor 50% EC @ 1.25 kg/ha on 3 DAT + Hand weeding on 35 DAT, T9- Hand weeding on 15 and 35 DAT, T10- Rotary weeding on 15 and 35 DAT, T11- Weed free plot, T12- Control was laid out in randomized block design and replicated thrice. The data of total weed density (No. /m^2) was recorded from 0.5 X 0.5 m^2 quadrant and weed dry weight were recorded at 55 DAT. The observed data were subjected to square root transformation using the formula $\sqrt{x}$ + 0.5, since the data on weed density and dry weight showed high variation and the statistical analysis was done as per the procedures given by

Gomez and Gomez [2]. The Indices of Weed control efficiency [Eq-1] [5], weed control index [Eq-2] [6] and weed index [Eq-3] [1] were calculated as per the standard formulae.

Eq-1 Weed Control Efficiency (WCE)

$$\text{WCE}\ (\%) = \frac{\text{Wpc} - \text{Wpt}}{\text{Wpc}} \times 100$$

Where,

Wpc = Weed density in the control plot (No. /m^2)

Wpt = Weed density in the treated plot (No. /m^2)

Eq-2 Weed Control Index (WCI)

$$\text{WCI}\ (\%) = \frac{\text{Wdc} - \text{Wdt}}{\text{Wdc}} \times 100$$

Where,

Wdc = Dry weight of weeds in control plot (kg/ha)

Wdt = Dry weight of weeds in treated plot (kg/ha)

Eq-3 Weed Index (WI)

$$\text{WI}\ (\%) = \frac{\text{X} - \text{Y}}{\text{X}} \times 100$$

Where,

X = Yield from weed free plot (kg/ha)

Y = Yield from treated plot (kg/ha)

Results

In the experimental field *Cynodon dactylon, Echinochloa crus-galli* and *Echinochloa colona* under grasses, *Cyperus difformis, Cyperus rotundus* and *Cyperus iria* under sedges and *Ammania baccifera, Commelina benghalensis, Eclipta prostrata* and *Marsilea quadrifolia* under broad-leaved weeds were observed. Pre-emergence application of bensulfuron methyl + pretilachlor at 660 g/ha on 3 DAT with one hand weeding on 35 DAT recorded significantly lower weed density (31.33 No. /m^2) and their dry weight (37.80 kg/ha). Whereas unweeded check recorded significantly higher weed density (380.33 No. /m^2) and dry weight (4016.28 kg/ha) [Table-1].

Table-1 *Effects of weed management practices on weed characters and weed indices*

Treatments	Weed density (No. /m^2)	Weed Dry Weight (kg/ha)	Grain Yield (kg/ha)	WCE (%)	WCI (%)	WI (%)
T_1	8.64 (74.67)	27.60 (761.63)	5670	80.37	81.04	16.62
T_2	13.13 (172.33)	42.56 (1811.19)	4235	54.69	54.90	37.72
T_3	8.04 (64.67)	27.86 (776.04)	5405	83.00	80.68	20.51
T_4	9.61 (92.33)	31.22 (975.00)	5165	75.72	75.72	24.04
T_5	5.60 (31.33)	6.15 (37.80)	6710	91.76	99.06	1.32
T_6	7.26 (52.67)	7.61 (57.94)	5585	86.15	98.56	17.87
T_7	5.92 (35.00)	6.28 (39.50)	6200	90.80	99.02	8.82
T_8	8.19 (67.00)	8.74 (76.38)	5915	82.38	98.10	13.01
T_9	5.57 (31.00)	6.10 (37.20)	6000	91.85	99.07	11.76
T_{10}	6.81 (46.33)	7.52 (56.52)	5345	87.82	98.59	21.4
T_{11}	0.71 (0.00)	0.71 (0.00)	6800	100	100	-
T_{12}	19.50 (380.33)	63.37 (4016.28)	3450	-	-	49.26
SEd	0.38	1.13	272	NA	NA	NA
CD (p=0.05)	0.79	2.34	565	NA	NA	NA

*Figures in parentheses are original values and data were subjected to square root transformation. **NA**- Not Analyzed

Discussion

Higher weed control efficiency, weed control index and lower weed index were recorded with pre-emergence application of bensulfuron methyl + pretilachlor at 660 g/ha on 3 DAT with one hand weeding on 35 DAT which was followed by hand weeding twice at 15 and 35 DAT (WCE and WCI) and pre-emergence application of oxadiargyl at 70 g/ha on 3 DAT with one hand weeding on 35 DAT (WI) [Fig-1]. This might be due to the control of weeds at germination phase by pre-emergence application of herbicides and significant reduction at later growth stage as late germinating weeds were removed by hand weeding. The results were in line with the findings of [8] and [9].

Conclusion

Higher net return and B:C ratio was achieved with pre-emergence application of bensulfuron methyl + pretilachlor at 660 g/ha on 3 DAT with one hand weeding on 35 DAT. Pre-emergence application of bensulfuron methyl + pretilachlor at 660 g/ha on 3 DAT with one hand weeding on 35 DAT is a viable integrated weed management package for realizing higher net return through higher yield for transplanted rice and would play an important role in areas where labour is too expensive and time is a constraint.

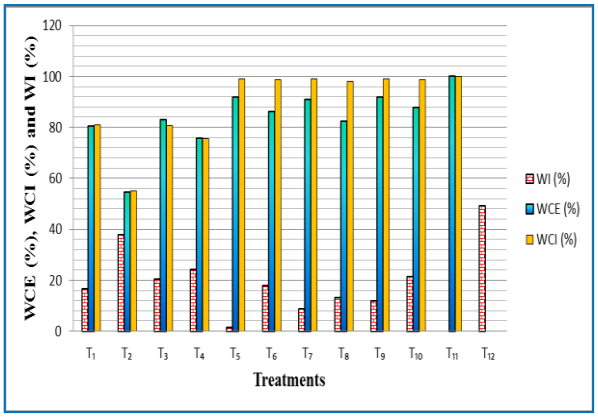

Fig-1 Weed Indices of rice as influenced by different weed management practices

Conflict of Interest: None declared

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