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Influence of Different Irrigation Regimes and Weed Control Measures on Weeds of Lowland Transplanted Rice during *Boro* Season

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ABSTRACT

Rice (Oryza sativa L.) is one of the most important staple foods for the people of Southeast Asia including India. Rice is consequently the most important agricultural ecosystem and present and future food security of the country mostly depends on it. A field experiment was conducted at Balindi research complex of Bidhan Chandra Krishi Viswavidyalaya during boro season of 2012-13 and 2013-14, to study the influence of different irrigation regimes and weed control measures on performance of lowland transplanted rice during boro season. The field experiment was laid out in split plot design with different irrigation regimes (I_1-Continuous submergence of 5±2 cm; I_2-Rotational water supply 4days on 3 days off; I_3- Rotational water supply 3days on 2 days off; I_4- Rotational water supply 2days on 1day off; I_5-Continuous saturation) in main plots and weed management practices (W_1-Unweeded check; W_2-Weed-free check; W_3-Pretilachlor 50 EC 500 g a.i. ha^{-1} on 1 DAT + hand weeding on 40 DAT; W_4-Bispyribac sodium 10 SC 30 g a.i. ha^{-1} on 20 DAT + hand weeding on 40 DAT; W_5-Hand weeding twice on 20 and 40 DAT) in sub plots with three replications. The predominant weed species prevalent in the experimental field were composite in nature and among them Cyperus difformis, Echinochloa colona, Echinochloa formosensis, Marsilea quadrifoliata, Alternanthera philoxeroides were the most predominant weeds. Among the herbicidal treatments, pre-emergence application of pretilachlor 50 EC 500 g a.i. ha^{-1} at 1 DAT + HW at 40 DAT was recorded low weed density, dry weight and higher weed control efficiency (81.8 and 82.4%) values were recorded with Pretilachlor 50 EC 500 g a.i. ha^{-1} on 1 DAT + hand weeding on 40 DAT at 30 & 60 DAT, respectively.

Key words: *Rice, Weeds, Irrigation regimes, Boro season*

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important staple foods for the people of Southeast Asia including India. Rice contributes 43% of the total food grain production and 46% of the cereal production of the country. Rice is consequently the most important agricultural ecosystem and present and future food security of the country mostly depends on it.

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Rice area in our country is about 43 million ha with production of 101 million tonnes in the year 2012[1]. Decreasing water availability for agriculture threatens the productivity of irrigated rice ecosystem, ways must be sought to save irrigation water and maintain potential yield of rice[2]. The success of water saving irrigation methods implementation for reducing water losses through seepage and percolation, since the hydrostatic pressure can significantly reduced compared to continuously flooded irrigation field[3]. Yield reductions caused by uncontrolled weed growth throughout a crop season have been estimated to be from 44 to 96%, depending on the rice culture[4].Integration of chemical and manual weeding becomes essential for effective management of weeds and for increasing water use efficiency. Therefore pre-emergence and new post-emergence herbicides were tested alone and in combination with manual weeding to develop an effective and viable weed management practice along with different irrigation regimes in lowland transplanted rice during *boro* season.

MATERIALS AND METHODS

Field experiment was conducted in the Balindi Research Complex of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur during *boro* season (December to May) of 2012-2014. The farm is located in the New Alluvial Zone of West Bengal at 22° 57′ N latitude, 88° 32′ E longitude and at an altitude of 9.75 m above mean sea level. The soil of the experimental field was deep clayey with moderate drainage. Composite soil samples were collected prior to the experiment and analyzed for various physical and chemical characteristics. The soil fertility status was medium in available nitrogen (290 & 282 kg ha^{-1}), high in available phosphorus (45 & 42 kg ha^{-1}) and high in available potassium (380 & 374 kg ha^{-1}), respectively during 2012-13 & 2013-14. The pH of the soil was 6.53.

The field experiment was laid out in split plot design with different irrigation regimes (I_1-Continuous submergence of 5±2; I_2-Rotational water supply 4days on 3 days off; I_3-Rotational water supply 3days on 2 days off; I_4- Rotational water supply 2days on 1day off; I_5-Continuous saturation) in main plots and weed management practices (W_1-Unweeded check; W_2-Weed-free check; W_3-Pretilachlor 50 EC 500 g a.i. ha^{-1} on 1 DAT + hand weeding on 40 DAT; W_4-Bispyribac sodium 10 SC 30 g a.i. ha^{-1} on 20 DAT + hand weeding on 40 DAT; W_5-Hand weeding twice on 20 and 40 DAT) in sub plots with three replications.Weed species present in the experimental plots were identified at flowering stage from unweeded check plot. Weeds were sampled in each plot at every 30 days interval up to maturity stage of the crop from randomly taken three quadrates of 0.25 m^2, counted and dried to constant weights at 70°C in hot air oven. Weed density and dry weight of grasses, sedges and broadleaved weeds were expressed as number m^{-2} and g m^{-2} respectively. Weed control efficiency was worked out on the basis of weed dry matter recorded in each treatment using the formula suggested by Sankaran and Mani[5].

$$WCE = \frac{\text{Dry weight of weeds in unweeded check} - \text{Dry weight of weeds in treatment plots}}{\text{Dry weight of weeds in unweeded check}} \text{ x}100$$

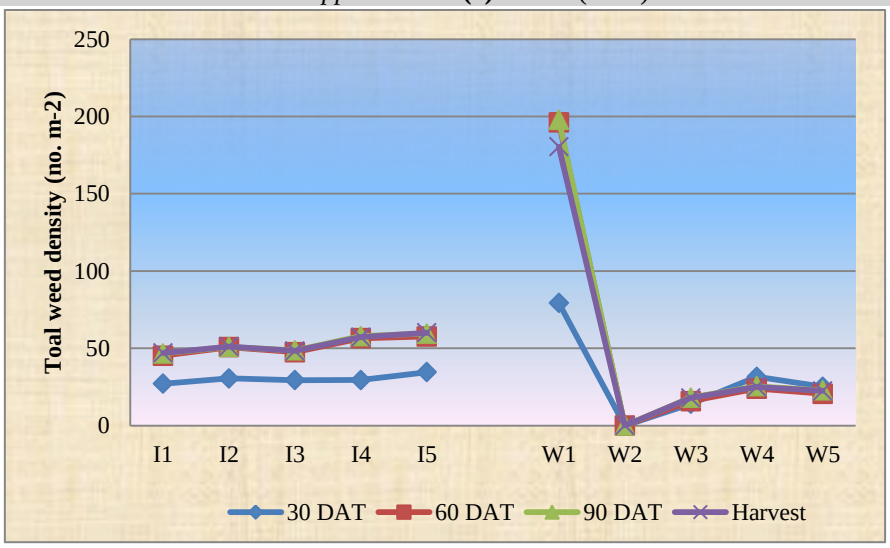

Fig. 1: Effect of different levels of irrigation and methods of weed control on total weeds density (no. m^{-2}) in rice

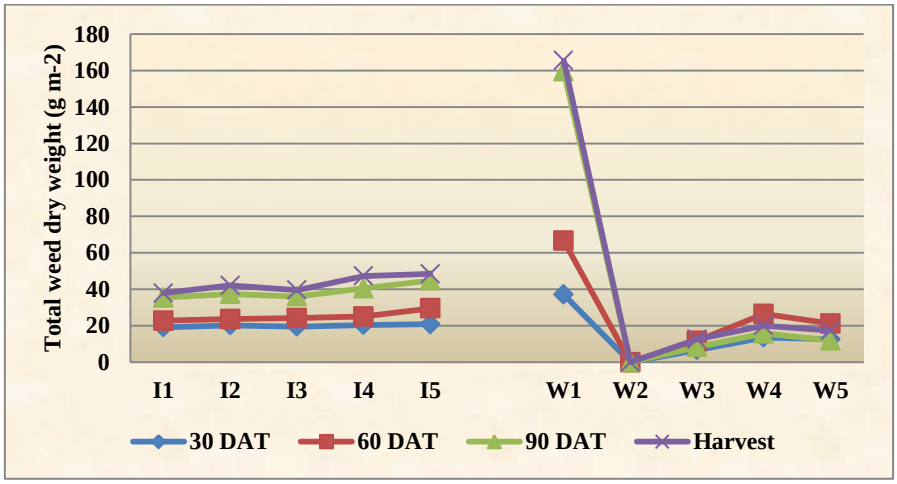

Fig. 2: Effect of different levels of irrigation and methods of weed control on total weeds dry weight (g m^{-2}) in rice

Table 1 Effect of different levels of irrigation and methods of weed control on WCE (%) in rice

Treatment	30 DAT			60 DAT		
	S_1	S_2	Mean	S_1	S_2	Mean
W_1	-	-	-	-	-	-
W_2	100	100	100	100	100	100
W_3	81.9	81.7	81.8	82.3	82.4	82.4
W_4	64.0	62.7	63.4	60.2	60.2	60.2
W_5	66.4	65.3	65.9	68.0	68.1	68.1

Continuous saturation irrigation along with PE pretilachlor at 1 DAT + hand weeding at 40 DAT treatment combination can be recommended for water scarcity areas of West Bengal, where practice of lowland transplanted rice during *boro* season is common.

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