Reprint ISSN 1923-7766 (Web Version)

International Journal of Experimental Agriculture

(Int. J. Expt. Agric.)

Volume: 5	Issue: 3	September 2015

Int. J. Expt. Agric. 5(3): 28-33 (September 2015)

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ISSN-1923-7766 (Online)
Int. J. Expt. Agric. 5(3):28-33(September 2015)

PERFORMANCE OF *BORO* RICE cv. BRRI dhan29 AS INFLUENCED BY METHODS OF WATER MANAGEMENT AND WEEDING

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Accepted for publication on 25 August 2015

ABSTRACT

Pramanik TK, Karim MM, Islam MA, Khan SZ, Salam MA (2015) Performance of *Boro* rice cv. BRRI dhan29 as influenced by methods of water management and weeding. *Int. J. Expt. Agric.* 5(3), 28-33.

The present experiment was conducted at farmers' field during the period from January to June 2013 to study the yield performance of *Boro* rice cv. BRRI dhan29 as influenced by methods of water management and weeding. The experiment comprised two factors; factor A: water management *viz*. Farmers' practice - (M_1), AWD (Alternate wetting and drying) - (M_2), SRI (System of rice intensification) - (M_3) and Continuous flooding - (M_4); Factor B: weed management *viz.* No weeding -(W_0), Two Hand weedings at 20 and 40 DAT - (W_1), Application of herbicide Pyrazosulfuron-ethyl (Manage 10WP) - (W_2) and Application of herbicide Pyrazosulfuron-ethyl (Manage 10WP) + One hand weeding at 40 DAT - (W_3). Nine weed species belonging to five families infested the experimental plots. The highest grain yield was observed in SRI method which was statistically identically with AWD and Continuous flooding methods. The highest number of effective tillers hill^{-1}, highest number of grains panicle^{-1} and 1000-grain weight were observed in the plot with application of herbicide Pyrazosulfuron-ethyl, although the highest grain yield was obtained in treatment application of herbicide Pyrazosulfuron-ethyl + One hand weeding (HW) at 40 DAT. The highest grain yield was obtained from the interaction of AWD and application of herbicide Pyrazosulfuron-ethyl + one HW at 40 DAT which was statistically identical with AWD and application of herbicide Pyrazosulfuron-ethyl. From the results of the study it may be concluded that cultivation of *Boro* rice with AWD method and application of Pyrazosulfuran-ethyl herbicide + one hand weeding at 40 DAT appears as the best combination for obtaining higher yield of *Boro* rice in Boira village of Mymensingh district.

***Key words**: BRRI dhan29, AWD, SRI, weeding, yield*

INTRODUCTION

Rice is the vital food for more than two billion people in Asia and four hundreds millions of people in Africa and Latin America (IRRI 2010). The people in Bangladesh depend on rice as staple food and have tremendous influence on agrarian economy of the country. About 77.07% of cropped area of Bangladesh is used for rice production, with annual production of 33.54 million tons from 11.52 million hectares of land (BBS 2013). Transplant *Boro* rice covers 54.97% of total area and contributes to 41.34% of total rice production in the country (BBS 2011). The average yield of rice in Bangladesh is around 2.92t ha^{-1} (BBS 2013), which is very much lower than that of the highest ranking country namely China is 12.9 t ha^{-1} (IRRI 2010). The increasing rate of population is 1.34% (BBS 2011) and decreasing rate of agricultural land by 1% per annum (Hussain *et al*. 2006) limit the horizontal expansion of rice area. Since it is not possible to have horizontal expansion of rice area so rice yield per unit area should be increased to meet this ever increasing demand of food in the country. To overcome this situation increment of rice production per unit area is only the alternative to bring self-sufficiency in food production.

Increasing water scarcity is also a force to shift in rice production to more water abundant delta areas. And, in water shortage areas, irrigation regimes of alternate wetting and drying may come to predominate alongside a shift to non-rice dry land crops. In the face of this troubling reality, the International Rice Research Institute (IRRI) has developed several water saving technologies to help farmer cope better with water scarcity in their paddy fields. IRRI has developed AWD (Alternate wetting and drying) Technology. AWD is a water-saving technology that farmers can apply to reduce their water use in irrigated fields. SRI system of rice intensification also another water saving technologies development by International Rice Research Institute (IRRI).

Weed is one of the most important agricultural pests. Infestation of weed is one of the most important causes for low yield of rice. In Bangladesh, weed infestation reduces the grain yield by 70-80% in *Aus* rice (early summer), 30-40% for transplanted *Aman* (autumn) rice and 22-36% for modern *Boro* (winter) rice cultivars (Mamun 1990; BRRI 2008). Production cost of rice increases due to increase in weed control cost. The prevailing climatic and edaphic conditions are very much favorable for luxuriant growth of numerous species of weeds that strongly compete with rice plant. The present weed management system which is done manually is laborious, time consuming, expensive and cannot be done in time due to various reasons (Ahmed *et al*. 2005). High competitive ability of weeds exerts a serious negative effect on crop production causing significant losses in crop yield. Poor weed control is one of the major factors for yield reduction in rice, the extent of which depends on type of weed flora and their intensity of infestation. Yield losses due to weed infestation are greater than the combined losses of insect pests and diseases. Mechanical weeding and herbicides are the alternative to hand weeding. Herbicides are effective in controlling weeds alone or in combination with hand weeding (Ahmed *et al*. 2005). Herbicides in combination with hand weeding would help to obtain higher crop yield with less efforts and cost (Prasad and Raffy, 1995; Sathyamoorthy *et al*. 2004). The best weeding regime need to be found out with a view to reducing losses due to weed infestation and thus getting maximum yield. A few works on the productivity of transplant *Boro* rice and weed growth due to water management and weeding regimes have been done in our country. In view of the above facts this piece of work was carried out (i) to see the effect of different water management practices on the performance of *Boro* rice (ii) to observe the effect of different weed management practices on the performance of *Boro* rice (iii) to see the effect of interaction (if any) of methods of water management and weeding on the performance of *Boro* rice and to develop sustainable weed management strategies for *Boro* rice cultivation.

MATERIALS AND METHODS

The experiment was conducted under University Community Bridging Project funded by British Council where Department of Agronomy of BAU actively took part in the sub-project located at Boira village, Mymensingh. As a part of the above mention project the present experiment was conducted at farmers' field during the period from January to June 2013 to study the performance of *Boro* rice cv. BRRI dhan29 as influenced by methods of water management and weeding. The experiment was laid out in a randomized complete block design (RCBD) with three replications. The size of unit plot was 4 m × 2.5 m. The experiment comprised two factors, factor A: water management *viz*. Farmers' practice - ($M_{1)}$, AWD (Alternate wetting and drying) - (M_2), SRI (System of rice intensification) - (M_3) and Continuous flooding - (M_4) and factor B: weed management *viz.* No weeding - (W_0), Two Hand Weeding (HW) at 20 and 40 DAT - (W_1), Herbicide Pyrazosulfuron-ethyl (Manage 10WP) - (W_2) and Herbicide Pyrazosulfuron-ethyl (Manage 10WP) + One HW at 40 DAT - (W_3). The land was fertilized with 300-100-120-100-10 kg ha^{-1} urea, triple superphosphate, muriate of potash, gypsum and zinc sulphate, respectively. All the fertilizers except urea was applied in the unit plots at the time of final land preparation; while urea was top-dressed in there equal splits at 15, 30 and 45 DAT. Forty five-day old healthy seedlings of BRRI dhan29 were transplanted on 3rd February 2013 with a spacing 25 cm × 15 cm. The intercultural operations were done as and when necessary for ensuring proper growth and development of the rice. For measurement of plant height (cm), number of total tillers plant^{-1}, number of effective tillers plant^{-1}, number of non-effective tillers plant^{-1}, number of total grains panicle^{-1}, number of filled grains panicle^{-1}, number of sterile spikelets panicle^{-1}, weight of 1000- grain (g), grain yield (t ha^{-1}), straw yield (t ha^{-1}) and harvest index (%) five randomly selected hills were used. Five hills were randomly selected and cut from each unit plot during harvest to collect respective data on yield and yield contributing character. The crop was harvested on 25, 30 May and 6 June 2013. The rice plant was then threshed and cleaned and they yield of both grain and straw were recorded. Grain yield was then recorded at 14% moisture content and converted t ha^{-1}. The collected data were analyzed statistically with the ANOVA technique and the mean differences were adjudged by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Nine weed species belonging to five families infested the experimental field. Local name, scientific name, family, morphological type and life cycle of the weed in the experimental plot have been presented in (Table 1).

Table 1. Infesting weed species found growing in the experimental plots in transplant *Boro* rice

Sl. No.	Local name	Scientific name	Family	Morphological type
1	Angta	*Paspalum scrobiculatum* L.	Gramineae	Grass
2	Shama	*Echinochloa crusgalli* (L.) P. Beauv.	Gramineae	Grass
3	Arail	*Leersia hexandra* Swartz	Gramineae	Grass
4	Anguli gash	*Digitaria sanguinalis* L.	Gramineae	Small leaved
5	Panikachu	*Monochoria vaginalis* (Burm. F.) C. Presl	Pontederiaceae	Broad leaved
6	Panilong	*Ludwigia hyssopifolia* (G. Don) Exell	Onagraceae	Broad leaved
7	Sabuj Nakphul	*Cyperus difformis* L.	Cyperaceae	Sedge
8	Chechra	*Scirpus juncoides* Roxb.	Cyperaceae	Sedge
9	Malancha	*Alternathera philoxeroides* L.	Araceae	Broad leaf

Effect of water management on the performance of *Boro* rice

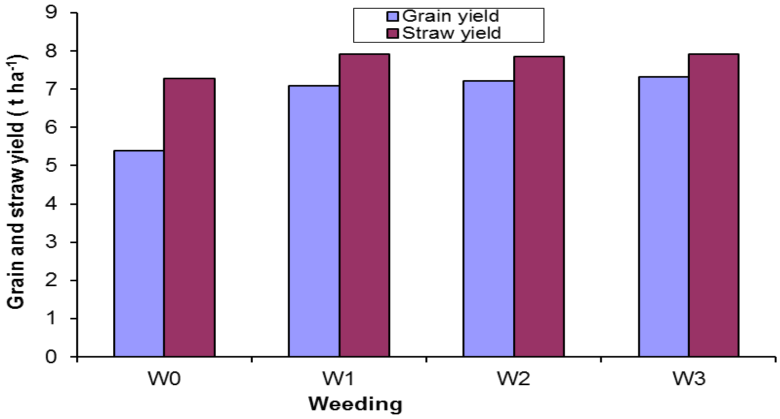
Plant height varied significantly among the different water management practices (Table 2). The tallest plant (96.21 cm) was found in M_3 (SRI) treatment. The shortest plant (93.00 cm) was found in M_4 (Continuous flooding) treatment (Table 2). The highest number of total tillers (19.10) and effective tillers (16.92) hill^{-1} was observed in M_3 (SRI) treatment and the lowest number of total (13.50) and effective tillers (12.35) hill^{-1} was observed in M_1 (Farmers' practice) treatment. The longest panicle (25.31 cm) was recorded in M_4 (Continuous flooding) treatment and the shortest panicle (23.95 cm) was recorded in M_1 (Farmers' practice) treatment (Table 2). Number of grains panicle^{-1} was not significantly influenced by different water management practices. Numerically the highest number of grains panicle^{-1} (163.7) was observed in M_4 (Continuous flooding) treatment and the lowest one was found (160.00) in M_3 (SRI) treatment (Table 2). Weight of 1000-grain was not significantly influenced by different water management practices of *Boro* rice. Numerically the heaviest number of 1000-grain (22.81 g) was found in M_1 (Farmers' practices) treatment and the lowest one was found (22.58 g) in M_4 (Continuous flooding) treatment (Table 2). Different water management practices had significant on grain yield. The higher grain yield (7.02 t ha^{-1}) was obtained in M_3 (SRI) treatment and the lowest grain yield (6.22 t ha^{-1}) was obtained in M_1 (Farmers' practice) treatment (Fig. 3). The increased yield might be due to higher number of grains $panicle^{-1}$ and heaviest 1000-grain weight. Straw yield was significantly influenced by water management. The highest straw yield (8.07 t ha^{-1}) was found in M_4 (Continuous flooding) treatment and the lowest one (7.45 t ha^{-1}) was found in M_1 (Farmers' practice) treatment (Fig. 1).

Table 2. Performance of water management on yield contributing characters of *Boro* rice cv. BRRI dhan29

Method of water management	**Plant height (cm)**	**Total tillers $hill^{-1}$ (no.)**	**Length of panicle (cm)**	**Grains $panicle^{-1}$ (no.)**	**1000-grain weight (g)**	**Harvest index (%)**
Farmers' practice (M_1)	94.07ab	13.50c	23,95b	160.90	22.81	44.92b
AWD (M_2)	94.85ab	15.13b	24.53b	162.10	22.72	47.41a
SRI (M_3)	96.21a	19.10a	24.45b	160.00	22.78	47.20a
Continuous flooding (M_4)	93.00b	14.bc	25.31a	163.7	22.58	45.77b
CV (%)	3.06	10.69	3.56	2.90	1.06	2.69
Level of significance	**	**	**	NS	NS	**

In a column, values having similar letters or without do not differ significantly whereas values with dissimilar letters differ significantly as per DMRT

**= Significant at 1% level of probability, NS= Non significant



M_1= Farmers' practice, M_2= AWD (Alternate wetting and drying),
M_3= SRI (System of rice intensification) and M_4= Continuous flooding

Fig. 1. Grain and Straw yield (t ha^{-1}) as influenced by water management in *Boro* rice

Effect of weeding regimes on the performance of *Boro* rice

Plant height was significantly influenced by different weeding practices. The tallest plant (94.85 cm) was found in W_2 (application of herbicide Pyrazosulfuron-ethyl) treatment. The shortest plant (94.28 cm) was found in W_0 (No weeding) treatment (Table 3).

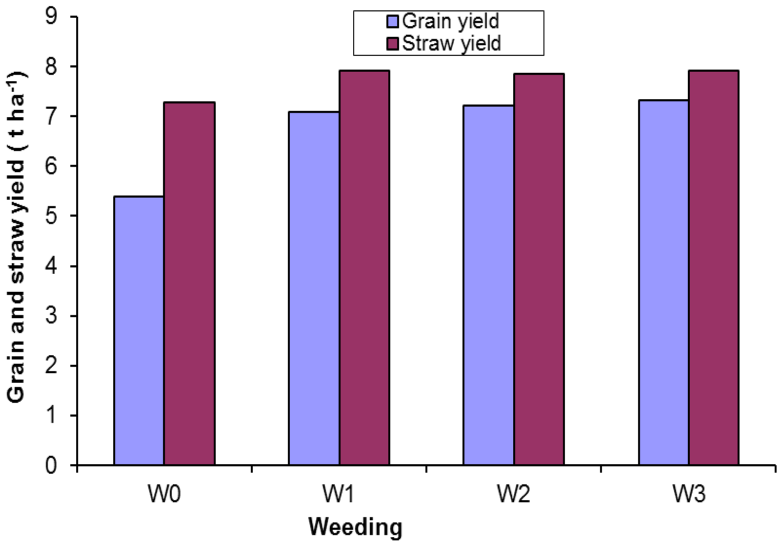
Table 3. Performance of weed management on yield contributing characters of *Boro* rice cv. BRRI dhan29

Weed management	**Plant height (cm)**	**Total tillers $hill^{-1}$ (no.)**	**Effective tillers $hill^{-1}$ (no.)**	**Length of panicle (cm)**	**Grains $panicle^{-1}$ (no.)**	**1000-grain weight (g)**	**Harvest index (%)**
No weeding (Control) (W_0)	94.28	12.35b	1.28	21.43b	151.20c	22.24b	42.48b
HW at 20 and 40 DAT (W_1)	94.32	16.23a	1.10	25.36a	161.40b	22.85a	47.04a
Pyrazosulfuron-ethyl (Manage) (W_2)	94.85	16.63a	2.13	25.57a	164.60b	22.92a	47.70a
Pyrazosulfuron-ethyl + One HW at 40 DAT (W_3)	94.68	16.52a	1.05	25.87a	169.50a	22.88a	48.08a
CV (%)	3.06	10.69	28.01	3.56	2.90	1.06	2.69
Level of significance	**	**	NS	**	**	NS	**

In a column, values having common letter(s) or without letter do not differ significantly whereas values with dissimilar letters differ significantly as per DMRT

**= Significant at 1% level of probability, NS= Non significant

The highest number of total tillers hill^{-1}(16.63) was observed in W_2 (application of herbicide Pyrazosulfuron-ethyl treatment. Treatments W_1 (Two hand weeding at 20 DAT and 40 DAT), W_3 (application of herbicide Pyrazosulfuron-ethyl + one hand weeding at 40 DAT) were statistically identical. The lowest number of (12.35) total tillers hill^{-1} was observed in W_0 (No weeding) treatment (Table 3). The highest number of effective tillers hill^{-1}(15.10) was produced by W_2 (Herbicide Pyrazosulfuron-ethyl (Manage) only) treatment, while the lowest number of effective tillers hill^{-1}(10.98) was produced by W_0 (No weeding) treatment (Fig. 2). Panicle length was significantly affected by weeding regime. The longest panicle (25.87 cm) was observed in W_3 (Herbicide Pyrazosulfuron-ethyl + One hand weeding at 40 DAT) treatment and the shortest one (21.43 cm) was observed in W_0 (No weeding) treatment (Table 3). Number of grains panicle^{-1} was significantly influenced by different weed management practices. The highest number of grains panicle^{-1}(169.50) was produced by W_3 (Herbicide Pyrazosulfuron-ethyl + One hand weeding at 40 DAT) treatment, while the lowest one (151.20) was produced by W_0 (No weeding) treatment. In this study W_3 (Herbicide Pyrazosulfuron-ethyl + One hand weeding at 40 DAT) treatment produced the highest number of grains panicle^{-1} which might be attributed due to vigorous growth of rice plant because of no competition with weed (Table 3). Weight of 1000-grain was not significantly affected by weeding regime. However, numerically the highest weight of 1000-grain (22.92 g) was recorded in W_2 (Herbicide Pyrazosulfuron-ethyl treatment (Table 3). Grain yield was significantly influenced by different weed management practices. The highest grain yield (7.33 t ha^{-1}) was produced by W_3 (Herbicide Pyrazosulfuron-ethyl + one HW at 40 DAT) treatment followed by W_2 (Herbicide Pyrazosulfuron-ethyl) (7.22 t ha^{-1}) treatment, while the lowest grain yield (5.38 t ha^{-1}) was produced by W_0 (No weeding) treatment (Fig. 4). The weeds compete with the crop for nutrient, water, air, sunlight and space. The increased yield was contributed in W_3 (application of herbicide Pyrazosulfuron-ethyl + one HW at 40 DAT) treatment by higher number of effective tiller hill^{-1} and higher number of grains panicle^{-1} over no weeding treatment. These might be due to the fact that the W_3 (Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) treatment kept the rice field weed free and soil was well aerated which facilitated the crop for absorption of greater amount of plant nutrients, moisture and greater reception of solar radiation for better growth. Straw yield was significantly influenced by different weeding regimes. The highest straw yield (7.92 t ha^{-1}) was observed in W_1 (Two hand weedings at 20 and 40 DAT) treatment which was statistically identical with W_3 (Herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) (7.92 ha^{-1}) treatment and the lowest straw yield (7.28 ha^{-1}) was observed in W_0 (No weeding) treatment (Fig. 2).



W_0= No weeding (Control), W_1= HW at 20 and 35 DAT, W_2= Herbicide Pyrazosulfuron-ethyl (Manage), W_3= Herbicide Pyrazosulfuron-ethyl (Manage) + One HW at 40 DAT

Fig. 2. Grain and Straw yield (t ha^{-1}) as influenced by weed management in *Boro* rice

Interaction effect of methods of water management and weeding

The effect of interaction between water management and weeding was not significant for plant height (Table 4).

Table 4. Performance of interaction between water management and weeding on yield contributing characters of *Boro* rice cv. BRRI dhan29

Interaction of water management × weeding	Plant height (cm)	Total tillers hill^{-1} (no.)	Effective tillers hill^{-1} (no.)	Length of panicle (cm)	Grains panicle^{-1} (no.)	1000-grain weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Harvest index (%)
M_1W_0	93.73	10.87hi	9.33f	20.70f	150.50e	22.45c-e	4.87f	6.85d	41.52e
M_1W_1	96.30	13.67fgh	13.27cde	24.83de	157.20de	23.01a-b	6.49c	7.92ab	44.44cd
M_1W_2	92.10	15.20d-g	13.67b-e	24.77de	164.90bcd	23.01a-b	6.73bc	7.59a-d	46.01bc
M_1W_3	94.17	14.27efg	13.13de	25.48b-e	170.80ab	22.77a-d	6.77bc	7.42b-d	47.71ab
M_2W_0	96.23	10.40i	9.53f	21.02f	150.90e	22.14ef	5.23ef	6.95cd	42.95de
M_2W_1	93.53	15.47def	14.20b-e	24.87de	165.50bcd	22.64b-d	7.21ab	7.55a-d	48.87e
M_2W_2	94.90	16.93cde	15.93a-d	26.27a-d	163.90bcd	22.94ab	7.63a	7.94ab	49.00a
M_2W_3	94.73	17.73bcd	16.47abc	25.97a-e	168.20abc	23.14a	7.66a	8.02ab	48.83a
M_3W_0	96.60	16.00c-f	13.93b-e	21.73f	151.50e	22.42de	5.82d	7.58a-d	43.43de
M_3W_1	95.90	21.00a	18.93a	24.57e	162.50bcd	23.04ab	7.40a	8.03ab	47.96ab
M_3W_2	97.07	18.93abc	16.73ab	24.77de	161.70cd	22.91a-c	7.41a	7.86ab	48.91a
M_3W_3	95.27	20.47ab	18.07a	26.73ab	164.30bcd	22.75a-d	7.46a	7.85ab	48.90a
M_4W_0	92.83	12.13ghi	11.13ef	22.28f	151.80e	21.95f	5.60de	7.74a-c	42.03e
M_4W_1	91.53	14.80d-g	13.93b-e	27.17a	160.30cd	22.70a-d	7.21ab	8.18ab	46.91ab
M_4W_2	93.07	15.47def	14.07b-e	26.48abc	168.10abc	22.83a-d	7.14ab	7.96ab	47.27ab
M_4W_3	94.57	13.60fgh	12.67de	25.30b-e	174.6a	22.84a-d	7.41a	8.41ab	46.86ab
CV (%)	3.06	10.69	12.09	3.56	2.90	1.06	4.67	5.83	2.69
Level of significance	NS	**	*	*	*	*	*	*	*

In a column, values having common letter(s) or without letter do not differ significantly whereas values with dissimilar letters differ significantly as per DMRT

*= Significant at 1% level of probability, **= Significant at 1% level of probability, NS= Non significant

There was significant variation in total tillers hill^{-1} due to interaction between water management and weeding. The highest number of total tillers hill^{-1} (21.00) was produced in M_3W_1 (SRI × application of herbicide Pyrazosulfuran-ethyl + one HW at 40 DAT) treatment, while the lowest number of total tillers hill^{-1}(10.40) was produced in M_2W_0 (Herbicide Pyrazosulfuran-ethyl × no weeding) treatment (Table 4). Significant variation was found in number of effective tillers hill^{-1} due to interaction between water management and weeding. The highest number of effective tillers hill-1 (18.93) was produced in M3W1 (SRI × Two HW at 20 and 40 DAT) treatment, while the lowest number of effective tillers hill-1(9.33) was produced in M1W0 (Farmers' practices × No weeding) treatment (Table 4). Panicle length was significantly affected by interaction of water management and weeding. The longest panicle (27.17 cm) was observed in $M_4 W_1$ (Continuous flooding × Two HW at 20 and 40 DAT) treatment and the shortest one (20.70 cm) was found in M_1W_0 (Farmers' practices × No weeding) treatment (Table 4). Number of grains panicle^{-1} was significantly influenced by different methods of water management and weeding. The highest number of grains panicle^{-1} (174.6) was produced by M_4W_3 (Continuous flooding × Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) treatment, while the lowest number of grains panicle^{-1} (150.50) was produced by M_1W_0 (Farmers' practices × No weeding) treatment (Table 4). Weight of 1000-grain was significantly affected by water management and weeding. The highest weight of 1000 grains (23.14 g) was recorded in M_2W_3 (AWD × Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) treatment. The lowest weight of 1000 grains (21.95 g) was recorded in M_4W_0 (Continuous flooding × No weeding) treatment (Table 4). Grain yield was significantly influenced by different methods of water management and weeding. The highest grain yield (7.66 t ha^{-1}) was produced by M_2W_3 (AWD × Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) treatment, while the lowest grain yield (4.87 t ha^{-1}) was produced by M_1W_0 (Farmers' practices × No weeding) treatment. Treatments M_2W_2 (AWD × Application of Pyrazosulfuron-ethyl), M_3W_3 (SRI × Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT), M_3W_2 (SRI × Application of herbicide Pyrazosulfuron-ethyl) were statistically identical. The integrated approach like herbicides + hand weeding performed better than herbicides or hand weeding alone, such as application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT. The lowest grain yield ha-1 was found in the no weeding practices might be due to the poor performance of yield contributing characters like number of effective tillers hill-1 and grains panicle-1 (Table 4). Straw yield was significantly influenced by the interaction of water management and weeding. The highest straw yield (8.41 t ha^{-1}) was produced by M_4W_3 (Continuous flooding × Application of herbicide Pyrazosulfuron-ethyl + One HW at 40 DAT) treatment, while the lowest straw yield (6.85 t ha^{-1}) was produced by M_1W_0 (Farmers' practice × No weeding) treatment (Table 4).

CONCLUSION

From the results of the study suggested that cultivation of *Boro* rice with AWD method and application of Pyrazosulfuran-ethyl herbicide + one HW at 40 DAT appears to be the best combination for obtaining higher yield of *Boro* rice. It is expected that the outcome achieved through this field experiment would be disseminated among the farmers of the project area through community involvement and this would help the farmers in solving their problem duly.

REFERENCES

Ahmed GJU, Bhuiyan MKA, Riches CR, Mortimer M, Jhonson D (2005) Farmer's participatory studies of integrated weed management system for intensified lowland. Proceeding of the 8th Biennial Agronomy Convention. *Bangladesh Agron. J*., 5, 31-32.

BBS (Bangladesh Bureau of Statistics) (2011) Statistical Year Book of Bangladesh, Bur. Stat., Stat. Div., Min. Plan., Govt. People's Repub. Bangladesh, Dhaka. pp. 32-37.

BBS (Bangladesh Bureau of Statistics) (2013) Statistics Division, Ministry of Planning. Govt. People's Repub. Bangladesh. pp. 125-127.

BRRI (Bangladesh Rice Research Institute) (2008) Annual Report for 2007. Bangladesh Rice Res. Inst. Joydevpur, Bangladesh. pp. 28-35.

Gomez KA, Gomez AA (1984) Statistical Procedure for Agricultural Research. 2nd Ed. John Wiley and Sons. New York. pp. 643-645.

Hussain MM, Alam MS, Islam MA, Rashid MM, Islam MF, Rashid MA, Razzaque MS, Mamin MSI, Islam MR, Kabir H, Parvin S, Mukul HR (2006) In: Baqui, M.A. (eds). In Proc. Twenty First BRRI-DAE Joint Workshop. Bangladesh Rice Res. Inst. Joydebpur, Gazipur, Bangladesh September 19-21, 2006. pp. 1-3.

IRRI (International Rice Research Institute) (2010) Rice Yield by Country and Geographical Region. World Rice Statistic. Intl. Rice Res. Inst., Los Banos, Laguna Philippines. pp. 1-8.

Mamun AA (1990) Weeds and their control: A review of weed control in a flood prone village of Bangladesh. JSARD Pub. No. 17. JICA (Japan Intl. Co-operation Agency). Dhaka, Bangladesh. pp. 28-29, 129 and 165.

Prasad K, Raffy A (1995) Effect of integrated weed management on weed growth nutrient uptake, economics and energetics in rainfed upland rice (*Oryza sativa*). *India J. Agril. Sci*., 65(4), 260-264.

Sathyamoorthy NK, Mahendran S, Babu R, Ragavan T (2004) Effect of integrated weed management practices on total weed dry weight, nutrient removal of weeds in rice-rice wet seedbed system. *J. Agron*., 3(4), 263-266.