Journal of crop and weed **2**(1) : 64-67 (2005)

Herbicidal and cultural method of weed management in transplanted rice (*Oryza sativa* l.) during *boro* season

H. BANERJEE, M. SAHA, S. PAL, S. MAITI AND S. KUNDU

Department of Agronomy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia – 741252

ABSTRACT

A field experiment was conducted to study the effect of different methods of weed management (herbicidal and chemical) in transplanted rice (*Oryza sativa* L.) during *boro* seasons of 2002-03 and 2003-04 at the Regional Research Sub-Station (RRS), Chakdaha, Nadia, West Bengal. The experiment was laid out in a Randomizd Block Design (RBD) having twelve treatments replicated thrice. The data revealed that weed free check produced significantly higher grain (5.10 t/ha) and straw yield (7.31 t/ha) which, however, were statistically at par with two hand weedings at 20 and 40 DAT. (4.95 and 7.20 t/ha, respectively) and Bensulfuron-methyl + Butachlor @ 0.05 + 0.938 kg a.i./ha as PE (4.82 and 6.95 t/ha, respectively). Phytotoxicity symptoms on rice crop were studied and it was observed that none of the herbicidal treatments showed any types of phytotoxic symptoms on rice crops at 1 to 10 days after application of herbicide. Pre-emergence application of Bensulfuron-methyl + Butachlor @ 0.05 + 0.938 kg a.i./ha proved beneficial for successful cultivation of paddy during *boro* season in the gangetic plains of West Bengal.

Key words : Weed management, rice, boro season

Infestation of heterogeneous weed flora in rice fields is one of the serious limitations in the rice production. Since most of the associated weeds in the rice fields are C_4 plants, they are more vigorous and aggressive to compete for nutrients, moisture, space and sun light with rice crop and thus create an extremely adverse environmental condition which results in poor growth of crop owing to low yields. The reduction in yield of transplanted rice is estimated to the tune of 14-45% due to weed infestation depending on the soil type, rainfall and season (Pillai and Rao, 1974). Keeping the above facts in view, a study was undertaken with the objective of comparing different herbicidal and cultural method of weed management practices for efficient and sustainable weed management in transplanted rice during *boro* season.

MATERIALS AND METHODS

The field experiment was conducted at the Regional Research Sub-Station (RRS) Chakdaha, Nadia, West Bengal during *boro* seasons of 2002-2003 and 2003-2004. The soil of the experimental field was clay loam in texture and neutral in reaction (pH 7.1). The experiment was laid out in a randomised block design (RBD) having twelve treatments (Table 1) replicated thrice. Rice variety used in the experiment was IET 4786 (Satabdi). Forty (40) days old seedlings were transplanted on 1st and 3rd February during 2003 and 2004 respectively. The recommended fertilizers for transplanted rice (120 : 60 : 60 kg N, P_2O_5 and K_2O/ha) were applied to all treatments through urea, single super phosphate and muriate of potash. Full quantity of phosphorus and potash and one third quantity of nitrogen was applied as basal prior to transplanting. Remaining quality of nitrogen was applied in two equal splits, first half at the time of tillering and remaining half at panicle initiation stage. Data pertaining to weed population and weed biomass were recorded using 25 cm x 25 cm quadrate at 30, 60 and 90 DAT and data on yield components and yields were taken at harvest.

RESULTS AND DISCUSSION

The dominant weed flora recorded in the experimental field consisted of *Echinochloa crusgalli, Leersia hexandra, Cyperus iria, C. rotundus, Fimbristylis miliacea, Monochoria vaginalis, Marsilea quadrifoliata, Ludwigia parviflora* and *Ammania baccifera*.

Effect on weeds

It is evident from Table 1, 2 and 3 that all weed control treatments (herbicidal and cultural) caused reduction in weed population and weed biomass and increased the weed control efficiency as compared to weedy check. The data revealed that

Table 1 Treatment details for weed control in transplanted trial *boro* rice (2002-03 and 2003-04)

Sl. No.	Treatments	Concentra- tions (%)	Dosage (kg a.i./ha)	Time of application (DAT)
1.	Butachlor	50 EC	0.938	3-5
2.	Pretilachlor	"	0.50	3-5
3.	Pretilachlor	"	0.75	"
4.	Bensulfuron-methyl	60 DF	0.04	"
5.	Bensulfuron-methyl	"	0.05	"
6.	Bensulfuron-methyl + Butachlor	60 DF + 50 EC	0.04 + 0.0938	"
7.	Bensulfuron-methyl + Butachlor	"	0.05 + 0.938	"
8.	Bensulfuron-methyl	60 DF	0.05	20-25
9.	Bensulfuron-methyl	"	0.06	20-25
10.	Weed free check	-	-	-
11.	Two hand weedings	-	-	20 & 40
12.	Non -weeded control	-	-	-

lowest weed dry biomass of 2.50, 6.00 and 9.32 g/m^2 (at 30, 60 and 90 DAT, respectively) was recorded with weed free check which was closely followed by the treatments the two hand weedings at 20 and 40 DAT and Bensulfuron-methyl + Butachlor @ 0.05 + 0.938 kg a.i./ha as PE. Rao *et al* (1997) opined in the same way. Among the herbicidal treatments, application of Bensulfuron-methyl+Butachlor @ 0.05 + 0.938 kg a.i./ha as PE has given lowest dry weights (3.10, 8.14 and 10.31 g/m^2 at 30, 60 and 90 DAT, respectively) and recorded maximum weed control efficiency (75.21%). The next best herbicidal treatment for effective weed control was the application of Bensulfuron methyl + Butachlor @ 0.04 + 0.938 kg a.i./ha as PE.

Effect on crop

The weed free check produced significantly higher grain yield (5.10 t/ha) and straw yield (7.31 t/ha) which however were statistically at par with two hand weedings at 20 and 40 DAT (4.95 and 7.20 t/ha, respectively) and Bensulfuron-methyl + Butachlor @ 0.05 + 0.938 kg a.i/ha as PE (4.82 and 6.95 t/ha, respectively). Similar kind of result was also obtained by Singh *et al* (1993). Trends of harvest index, and weed index were similar as in case of grain and straw yield (Table 3). Phytoxicity symptoms on rice crop were studied and it was observed that none of the herbicidal treatments showed any type of phytotoxicity symptoms on rice crops at 1 to 10 days after application of herbicide.

Hence, time consuming, laborious and low benefit hand weeding can be replaced by pre-emergence application of Bensulfuron-methyl + Butachlor @ 0.05 + 0.938 kg a.i./ha for successful cultivation of paddy during *boro* season in the gangetic plains of West Bengal.

Table 2 Effect of weed control treatments on weed density, weed dry weight and weed control efficiency (2002-03 and 2003-04).

Treatments	Weed density /m^2									Weed dry weight (g/m^2)									Weed control efficiency (%)								
	30 DAT			60 DAT			90 DAT			30 DAT			60 DAT			90 DAT			30 DAT			60 DAT			90 DAT		
	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled
T_1	11.33	12.67	12.00	25.66	27.0	26.33	30.0	29.32	29.66	6.51	7.33	6.92	9.50	12.50	11.0	13.5	17.7	15.60	51.49	36.81	44.68	45.52	32.65	38.88	43.75	32.54	37.89
T_2	18.66	17.34	18.00	35.0	33.66	34.33	38.66	41.34	40.00	10.92	9.58	10.25	15.15	14.75	14.95	20.15	17.65	18.90	18.62	17.41	18.06	13.13	20.52	16.94	16.04	32.73	24.76
T_3	17.00	15.00	16.00	32.0	31.32	31.66	36.0	38.0	37.00	9.11	9.53	9.32	14.71	16.49	15.60	19.32	21.07	20.15	32.11	17.84	25.49	15.65	11.15	13.33	19.87	19.70	19.78
T_4	9.66	11.0	10.33	24.33	25.67	25.00	29.33	26.67	28.00	6.51	5.69	6.10	9.92	8.68	9.30	15.0	11.22	13.11	51.49	50.94	51.23	43.11	52.26	48.33	37.50	57.24	47.81
T_5	9.0	8.32	8.66	23.0	25.0	24.00	26.0	27.32	26.66	5.0	5.92	5.46	9.75	10.27	10.01	14.51	11.49	13.00	62.74	48.96	56.35	44.09	44.66	44.38	39.54	65.21	48.24
T_6	8.33	8.99	8.66	17.66	20.34	19.00	24.33	23.67	24.00	4.63	3.39	4.01	8.67	7.95	8.31	9.75	11.57	10.66	65.49	70.77	67.94	50.28	57.16	53.83	59.37	55.90	57.56
T_7	6.66	8.0	7.33	18.0	18.66	18.33	22.66	24.66	23.66	3.31	2.89	3.10	8.0	8.28	8.14	9.31	11.31	10.31	75.33	75.08	75.21	54.12	55.38	54.77	61.20	56.89	58.95
T_8	16.66	14.0	15.33	28.0	27.32	27.66	35.33	34.67	35.00	7.09	7.93	7.51	11.37	13.85	12.61	22.0	21.10	21.55	47.16	31.63	39.96	34.80	25.37	29.94	8.33	19.58	14.21
T_9	14.0	13.32	13.66	27.33	26.67	27.00	31.0	34.32	32.66	8.01	8.69	8.35	15.62	12.22	13.92	22.67	25.33	24.00	40.31	25.08	33.25	10.43	34.15	22.66	5.54	3.46	4.45
T_{10}	5.0	5.66	5.33	16.0	14.0	15.00	210	21.62	21.31	2.75	2.25	2.50	7.11	4.89	6.00	8.75	9.89	9.32	79.50	80.60	80.01	59.23	73.65	66.66	63.54	62.30	62.89
T_{11}	5.66	6.34	6.00	17.66	17.0	17.33	23.0	21.0	22.00	2.61	3.09	2.85	7.04	8.08	7.56	9.71	10.49	10.10	80.55	73.36	77.21	59.63	56.46	58.00	59.54	60.02	59.79
T_{12}	18.0	23.32	20.66	34.0	36.0	35.00	44.66	46.0	45.33	13.42	11.6	12.51	17.44	18.56	18.00	24.0	26.24	25.12	0	0	0	0	0	0	-	-	0
S.Em ±	0.41	0.47	0.44	0.62	0.70	0.66	0.95	0.93	0.94	0.36	0.42	0.41	0.41	0.47	0.46	0.39	0.42	0.44	-	-	-	-	-	-	-	-	-
CD (P=0.05)	1.20	1.38	1.30	1.82	2.06	1.95	2.80	2.74	2.75	1.06	1.23	1.21	1.20	1.38	1.35	1.15	1.23	1.30	-	-	-	-	-	-	-	-	-

Table 3 Effect of weed control treatments on yield components, yield (both grain and straw), harvest index and weed index (2002-03 and 2003-04).

Treatments	No. of effective tillers/m^2			No. of filled grains/ panicle			1000 grain weight (g)			Grain yield (t/ha)			Straw yield (t/ha)			H.I. (%)			Weed index (%)		
	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled	1st	2nd	Pooled
T_1	235.3	246.9	240.7	68.0	7.2	70.00	19.45	22.25	20.85	3.90	4.5	4.20	5.12	7.08	6.10	43.23	38.86	40.77	22.0	13.46	17.64
T_2	200.7	189.4	195.0	65.0	60.32	62.66	19.75	20.45	20.10	3.50	3.3	3.40	4.65	5.75	5.20	42.94	36.46	39.53	30.0	36.53	33.33
T_3	205.0	215.7	210.3	61.33	67.99	64.66	20.51	20.09	20.30	3.75	3.47	3.61	5.70	4.92	5.31	39.68	41.35	40.47	25.0	33.26	29.21
T_4	275.7	264.3	270.0	78.0	72.66	75.33	21.05	20.95	21.00	4.10	4.52	4.31	6.51	5.73	6.12	38.64	44.09	41.32	18.0	13.07	15.49
T_5	281.3	278.7	280.0	74.66	79.34	77.00	19.95	22.05	21.00	4.45	4.55	4.50	6.00	7.02	6.51	42.58	39.32	40.87	11.0	12.5	11.76
T_6	290.3	283.0	286.7	81.33	77.99	79.66	21.12	21.28	21.20	4.21	5.01	4.61	6.15	7.45	6.80	40.63	40.20	40.40	15.8	3.65	9.60
T_7	287.0	293.0	290.0	78.66	84.66	81.66	21.81	21.69	21.75	4.95	4.69	4.82	5.95	7.95	6.95	45.41	37.10	40.95	1.0	9.80	5.49
T_8	224.3	226.0	225.7	67.66	66.34	67.00	20.65	20.37	20.51	4.71	3.41	4.06	5.91	5.71	5.81	44.35	37.39	41.13	5.80	34.42	20.39
T_9	240.5	221.5	231.0	65.33	73.99	69.66	20.75	20.55	20.65	3.8	4.42	4.11	5.45	6.45	5.95	41.08	40.66	38.55	24.0	15.0	19.41
T_{10}	315.3	305.3	310.3	84.33	85.67	85.00	22.61	21.79	22.20	5.0	5.2	5.10	7.0	7.62	7.31	41.66	40.56	41.09	0	0	0
T_{11}	297.0	293.0	295.0	85.0	83.66	84.33	22.15	21.85	22.00	4.8	5.10	4.95	7.31	7.09	7.20	39.63	41.83	40.74	4.0	1.92	2.94
T_{12}	184.3	175.7	180.0	61.33	58.67	60.00	19.45	20.55	20.00	3.18	3.04	3.11	5.0	5.14	5.07	38.87	20.91	38.01	36.40	41.53	39.01
S.Em ±	2.11	2.61	2.56	1.91	2.05	1.96	0.23	0.24	0.22	0.09	0.12	0.11	0.21	0.24	0.23	-	-	-	-	-	-
CD (P=0.05)	6.22	7.69	7.50	5.63	6.04	5.75	0.67	0.70	0.65	0.26	0.35	0.35	0.61	0.70	0.70	-	-	-	-	-	-

REFERENCES

Pillai, K. G., and M. V. Rao, 1974. Current status of herbicides research on rice in India. *Principles of Weed Science* by V. S. Rao, IBH Pub. pp. 189.

Rao, A. S. and Singh, R. P. 1997. Effect of herbicide mixtures and sequential application on weed control in transplanted. *Indian Journal of Agronomy*, 42(1): 77–79.

Singh, G., and Singh, O. P. 1993. Chemical weed control in low land transplanted rice under puddle condition. *Annals of Agric, Res.* 14: 229–231.