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EFFECT OF RIFIT, RONSTAR AND MACHETE ON THE GROWTH, YIELD AND YIELD ATTRIBUTES OF BR28 PADDY GROWN IN BORO SEASON

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ABSTRACT

In the present investigation BR28 paddy was grown in the Boro season. Three herbicides: Rifit 500 EC, Ronstar 25 EC and Machete 5G were applied in different doses and studied their effects on the control of weeds and ultimate growth, yield and yield components of Boro paddy. Eleven different treatments viz.: T_1 (control, no herbicide was used), T_2 (only hand weeding was done), T_3 (Rifit normal dose), T_4 (double of Rifit normal dose), T_5 (half of Rifit normal dose), T_6 (Ronstar normal dose), T_7 (double of Ronster normal dose), T_8 (half of Ronster normal dose), T_9 (normal dose of Machete), T_{10} (double of Machete normal dose) and T_{11} (half of Machete normal dose) were used in the experiment. The number of tillers, length per tiller, length per panicle, area of flag leaves, number of filled grains, percentage of filled grains, straw and grain yield per hectare were found maximum at T_3 where normal dose of Rifit 500 EC was applied.

Key words: Herbicide, weed, BR28, yield Components, Boro season.

INTRODUCTION

Weeds are abundantly found to grow in rice fields. They grow with the cultivated rice plant and cause injury to them. Weeds compete with rice plant for nutrient, water, light and air. They prevent the crops from attaining complete development and giving a maximum yield. Weeds accumulate more N, P, K, Ca and Mg than the crops and thereby reduce yield, particularly when the availability of these elements in the soil is low (Vengris 1955, 1956). In rice field, the crops and weeds remain associated with each other from the very beginning of their life cycle (Sarker 1979). Loss due to weed infestation is quite high (Isley 1960) and can reduce yield up to 34% in case of transplanted aman rice (Datta 1981). In Bangladesh, weeds are traditionally controlled by hand weeding. This method of

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weed control is very much laborious, time consuming, inefficient and costly. On the other hand, herbicides are used successfully for weed control in rice fields for rapid effect, easier to apply and low cost involvement in comparison to the traditional methods of hand weeding (Mian and Mamun 1969).

Considering the above facts, in the present experiment three herbicides: Rifit 500EC, Ronstar 25EC and Machete 5G were applied in different doses in BR28 paddy field in Boro season and their effects on the control of weeds and yield and yield components of the paddy were studied.

MATERIALS AND METHODS

The seeds of BR28 paddy were sown in the prepared seed bed of 3m × 1m × 15cm in the Botanical Garden, University of Chittagong. Two hundred grams of seeds were evenly sown in prepared seed bed on 03 January 2005. Watering, weeding and other cultural practices were done in the seed bed as and when required. The main field was prepared by ploughing, cross ploughing and leveling properly. After preparation, the field was divided into 33 plots each measuring 4m × 4m. There were eleven treatments each with three replications (block) where Complete Randomized Design (CRD) was maintained. Twenty four days old seedlings of BR28 were uprooted from seed bed and were transplanted in the prepared field. Two healthy seedlings were transplanted per hill in all the experimental plots. Row to row and hill to hill distances were maintained at 20 cm each and there were 400 hills per plot. The fertilizers were used per plot following BRRI (1991):

Dose of fertilizers / plot	**Time of application**
110 g Urea 160 g TSP 168 g MP	As basal dose during last ploughing
110 g Urea	After 35 days of transplantation (DAT) as top dressing.
110 g Urea	At booting stage as top dressing.

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Three herbicides: Rifit 500EC, Ronstar 25EC and Machete 5G were used in the present experiment 3 days after transplantation as per following schedule**:**

Treatments	Herbicides/weeding	Dose
T1 (Control)	No herbicide was used and no weeding	Not Applicable
T2	Only hand weeding was done.	Not Applicable
T3	Rifit 500EC	1.60ml/ 800ml water @ 1L/ ha
T4	Rifit 500EC	3.20 ml/ 800ml water @ 1 L/ ha
T5	Rifit 500EC	0.80 ml/800ml water @ 1L/ha
T6	Ronstar 25EC	3.20ml / 800ml water @ 2 L / ha
T7	Ronstar 25EC	6.40 ml/800ml water @ 2L/ ha
T8	Ronstar 25EC	1.60 ml/800ml water @ 2L/ ha
T9	Machete 5G	40g / plot @ 25kg / ha
T10	Machete 5G	80g/plot @25kg /ha
T11	Machete 5G	20g/plot @25kg/ha

All the herbicides were applied in the BR28 paddy field three days after transplantation as per the product monograph. The weeding was done at 45 (W1) and 75 (W2) days after transplantation and during harvest (W3) in all the treatments. In control plots the weeds were allowed to grow up to maturity and were collected during harvest.

The paddy was harvested after 117 days of sowing and the following data were recorded from randomly selected five hills of each treatment.
a. Number of tillers per hill. b. Length per tillers. c. Area of flag leaves. d. Length per panicle. e. Fresh weight of straw. f. Fresh weight of grain. g. Straw and grain

yield. i. Number filled and unfilled grains per panicle (three panicles in each replication) and j. 1000-grains weight.

For chemical analysis 100 g of straw and grains were taken from each plot separately and then dried and grinded for making powder. Dried powdered plant samples (straw and grains) were digested following modified Microkjeldahal method. Then nitrogen (N), phosphorus (P) and potassium (K) were determined as described by Jackson (1973). Analysis of variance (ANOVA) was done to show the significant differences among the treatments. The correlation studies were also done to obtain the relationship between two parameters following the techniques of Little and Hills (1977).

RESULTS AND DISCUSSION

Different doses of Rifit500 EC, Ronstar 25 EC and Machete 5G were used in BR28 paddy field and studied their effects on growth, yield and yield components of BR28 paddy. The results showed that the number of tillers per hill increased highly and significantly ($p=0.01$) in all the treatments from T_1. The highest number of tillers per hill was found in T_3 followed by T_5, T_{10}, T_8, T_2, T_9, T_7, T_4; T_{11} and T_6 (Table1).The length per tiller increased highly and significantly ($p=0.01$) in all the treatments from T_1 except T_6. The highest length per tiller was found in T_3 followed by T_8, T_7, T_{10}, T_5, T_9, T_2, and T_{11} (Table 1). The increase in length of tiller in the present investigation due to the application of Rifit 500EC was found consistent with the findings of Awan *et al.* (2001).The length per panicle increased highly and significantly in all the treatments from T_1 and the highest length per panicle was found in T_3 followed by T_{10}, T_8, T_7, T_9, T_2, T_6, T_8, T_{11} and T_4 (Table 1).The area of flag leaves increased highly and significantly in all the treatments from T_1. The highest value was in T_3 followed by T_{10}, T_8, T_7, T_9, T_6, T_5, T_2, T_{11} and T_4 (Table 1).The number of filled grains per panicle was found to be increased highly and significantly in all the treatments from T_1.The highest number of filled grains was obtained in T_3 followed by T_{10}, T_8, T_5, T_7, T_9, T_2, T_{11}, T_6 and T_4. (Table 1).The number of unfilled grains per panicle was found significantly lower in all the treatments from T_1 except T_4. The lowest number of unfilled grains was found in T_3 followed by T_{10}, T_8, T_7, T_9, T_6, T_5, T_2 and T_{11}. (Table 1).The total number of grains per panicle was increased highly significantly in all the treatments from T_1. The highest value was obtained in T_3 followed by T_{10}, T_8, T_5, T_7, T_2, T_9, T_{11}, T_6 and T_4 (Table 1).The ratio of filled and unfilled grains increased highly significantly in all the treatments from T_1. The highest ratio of filled and unfilled grains was found in T_3 followed by T_{10}, T_8, T_7,

T_9, T_5, T_6, T_2, T_{11} and T_4 (Table 1).The percentage of filled grains increased highly significantly in all treatments from T_1.The highest value was in T_3 followed by T_{10}, T_8, T_7, T_9, T_5, T_6, T_2, T_{11} and T_4 (Table 1).

TABLE 1: EFFECTS OF RIFIT 500EC, RONSTAR 25EC AND MACHETE 5G ON NUMBER OF TILLERS/HILL, LENGTH/TILLER, LENGTH/PANICLE, AREA OF FLAG LEAVES, NUMBER OF GRAINS/PANICLE, RATIO OF FILLED AND UNFILLED GRAINS AND % OF FILLED GRAINS OF BR28 PADDY GROWN IN BORO SEASON.

Treatments	Number of tillers/hill	Length/tiller (cm)	Length/panicle (cm)	Area of flag leaves (cm^2)	Number of grains /panicle			Ratio of filled & unfilled grains*	% of filled grains*
					Filled (F)	Unfilled (UF)	Total * (F+UF)		
T_1	8.00	73.52	16.30	17.16	78.64	14.99	93.63	5.25	83.99
T_2	10.50	78.29	18.93	27.88	90.67	12.59	103.26	7.20	87.81
T_3	12.27	80.95	21.48	30.16	106.15	8.30	114.45	12.79	92.75
T_4	9.33	67.72	17.45	17.59	85.82	14.33	100.15	5.99	85.69
T_5	11.25	78.81	18.78	28.00	92.65	12.43	105.08	7.45	88.17
T_6	8.84	74.32	18.85	28.30	89.00	12.29	101.29	7.24	87.87
T_7	9.33	79.33	19.80	29.39	92.00	11.33	103.33	8.12	89.04
T_8	10.70	79.92	20.38	29.97	101.67	9.80	111.47	10.37	91.21
T_9	10.34	78.49	19.39	29.09	91.72	11.50	103.22	7.98	88.86
T_{10}	11.17	79.07	20.67	30.07	102.60	9.00	111.60	11.40	91.94
T_{11}	9.25	75.80	18.24	27.82	89.42	13.42	102.84	6.66	86.95
$LSD_{0.05}$	0.55	0.68	0.5	0.06	0.44	0.52	0.75	0.02	0.02
$LSD_{0.01}$	0.79	0.96	0.71	0.08	0.63	0.73	1.07	0.03	0.03

* Calculated value.

The fresh weight of straw per plot increased significantly in all the treatments from T_1 except T_2 and T_4. The highest value was in T_3 followed by T_{10}, T_8, T_7, T_6, T_9, T_5, and T_{11} (Table 2).The fresh weight of grains per plot was found

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to be increased significantly in all the treatments from T_1 except T_4.The highest value was in T_3 followed by T_{10}, T_8, T_7, T_9, T_6, T_5, T_2, and T_{11} (Table 2).The total fresh weight of straw and grains per plot increased significantly in all treatments from T_1. The highest value was found in T_{10} followed by T_3, T_8, T_7, T_9, T_6, T_5, T_{11}, T_{12}, and T_4 (Table 2).The straw and grains ratio decreased highly significantly in all the treatments from T_1 except at T_4 where the ratio was found to be highest (Table 2).The straw yield per hectare increased highly significantly in all the treatments from T_1 except T_2 and T_4. The highest yield was obtained in T_3 followed by T_{10}, T_8, T_7, T_6, T_9, T_5, and T_{11} (Table 2).The grain yield per hectare increased highly significantly in all the treatments from T_1 except T_4 and the highest yield was found in T_3 followed by T_{10}, T_8, T_7, T_9, T_6, T_5, T_2, and T_{11} (Table 2).The 1000-grain weight increased highly significantly in all the treatments from T_1 except T_4. The highest 1000-grain weight was found in T_8 followed by T_{10}, T_3, T_7, T_2, T_9, T_6, T_{11}, and T_6 (Table 2). Present findings corroborates with the findings of Chandler (1969) who also reported significant increases in the yield of rice by the application of herbicide. Matsunaka (1970) also reported the significant increase in rice yield due to use of herbicides over hand weeding. Budhar *et al*. (2002) observed significantly higher grain and straw yield by the use of three herbicides over hand weeding. The N concentration of straw increased significantly in all the treatments from T_1. The highest value was obtained in T_9 followed by T_{10}, T_2, T_6, T_{11}; T_8, T_3, T_4, T_5 and T_7 (Table 3). The P concentration of straw increased significantly in all the treatments from T_1 except T_4. The highest value was in T_{10} followed by T_{11}, T_8, T_9; T_2, T_6, T_7; T_3 and T_5 (Table 3).The K concentration of straw increased significantly in all the treatments from T_1 except

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TABLE 2 : EFFECTS OF RIFIT 500 EC, RONSTAR 25 EC AND MACHETE 5G ON FRESH WEIGHT OF STRAW, FRESH WEIGHT OF GRAIN, TOTAL FRESH WEIGHT OF STRAW & GRAIN, STRAW AND GRAIN RATIO, STRAW AND GRAIN YIELD AND 1000- GRAIN WEIGHT OF BR28 PADDY GROWN IN BORO SEASON.

Treatments	Fresh weight of straw & grains/plot.			Straw and grain ratio* (S/G)	Straw yield* (t/ha)	Grain yield* (t/ha)	1000-grain weight (g)
	Straw (S) (Kg)	Grain (G) (Kg)	Total (S+G) kg				
T_1	8.78	4.52	13.30	1.94	5.49	2.83	20.05
T_2	9.19	6.80	15.99	1.35	5.74	4.25	21.80
T_3	13.13	8.50	21.63	1.54	8.20	5.31	22.08
T_4	8.97	4.60	13.57	1.95	5.61	2.88	20.68
T_5	11.30	6.86	18.16	1.65	7.06	4.29	20.82
T_6	12.62	6.92	19.54	1.82	7.89	4.33	21.30
T_7	12.90	7.48	20.38	1.72	8.06	4.68	21.98
T_8	13.00	8.20	21.20	1.59	8.13	5.13	24.48
T_9	12.35	7.20	19.55	1.72	7.72	4.50	21.51
T_{10}	13.05	8.28	22.33	1.58	8.16	5.18	23.43
T_{11}	10.90	6.63	17.53	1.64	6.81	4.14	21.28
$LSD_{0.05}$	0.63	0.13	0.02	0.02	0.40	0.08	0.54
$LSD_{0.01}$	0.89	0.18	0.03	0.03	0.56	0.11	0.76

* Calculated value.

T_2, T_6 and T_{10}. The highest value was in T_7 followed by T_5, T_{11}, T_3, T_8 and T_9 (Table 3).The total NPK concentrations of straw increased significantly in all the treatments from T_1. The highest value was in T_9 followed by T_{10}, T_{11}, T_7, T_4, T_2, T_6, T_8, T_5 and T_3 (Table 3).In N: P:K of straw, N concentration was found to be maximum in T_9. The P concentration of N:P:K was maximum at T_{10}. The K concentration of N:P:K was found maximum in T_4 (Table 3).The N concentration of grains increased highly significantly in all the treatments from T_1 except T_8.The highest value was in T_3 and T_2 followed by T_4, T_6, T_{11}, T_9, T_5, T_7 and T_{10} (Table 3).The P concentration of grains was found to be increased significantly in all the treatments from T_1.except T_4 and T_9. The highest value was in T_6 followed

by T_3, T_{10}. T_2, T_5, T_7, T_9 T_4, T_8. The P concentration of grains was found to be decreased highly significantly in T_{11} from T_1 (Table 3).The K concentration of grains was found to be increased highly significantly at the treatments of T_2, T_3, T_9 and T_{10} from T_1. The highest concentration was found in T_3 followed by T_2, T_9 and T_{10}. On the contrary, the K concentration of grains was found to decrease significantly in the treatments of T_7 and T_{11} from T_1 (Table 3).The total NPK concentration of grains significantly increased in all the treatments from T_1 except T_8 and T_{11}.The highest value was in T_3 followed by T_2, T_6, T_4, T_{10}, T_9, T_5 and T_7 (Table 3).In N:P:K of straw, N concentration was found to be maximum in T_4. The P concentration of N:P:K was maximum in T_7. The K concentration was found maximum in T_1 (Table 3).

TABLE 3: EFFECTS OF RIFIT 500 EC, RONSTAR 25 EC AND MACHETE 5G ON N, P AND K CONCENTRATIONS (G% OF DRY WEIGHT BASIS) OF STRAW AND GRAINS OF BR28 PADDY GROWN IN BORO SEASON.

Treatment	Straw					Grain				
	N	P	K	Total NPK*	N: P: K*	N	P	K	Total NPK*	N: P: K*
T_1	0.40	0.32	1.14	1.86	21.50: 17.20: 61.29	0.28	0.69	0.56	1.53	18.30: 45.09: 36.60
T_2	0.70	0.44	1.16	2.30	3043: 19.13: 50.43	0.77	0.82	0.68	2.27	33.92: 36.12: 29.95
T_3	0.49	0.43	1.22	2.14	22.89: 20.09: 57.01	0.77	0.84	0.72	2.33	33.05: 36.05: 30.90
T_4	0.49	0.37	1.46	2.32	21.12: 15.95: 62.93	0.70	0.71	0.54	1.95	35.89: 36.41: 27.69
T_5	0.49	0.38	1.35	2.22	22.07: 17.12: 60.81	0.40	0.81	0.54	1.75	22.86: 46.28: 30.86
T_6	0.63	0.44	1.18	2.25	28: 19.55: 52.44	0.56	0.88	0.58	2.02	27.72: 43.56: 28.71
T_7	0.49	0.44	1.46	2.39	20.50: 18.41: 61.09	0.36	0.79	0.45	1.6	22.5: 49.37: 28.12
T_8	0.56	0.47	1.20	2.23	25.11: 21.08: 53.81	0.28	0.70	0.52	1.5	18.66: 46.67: 34.67
T_9	0.85	0.47	1.20	2.52	33.73: 18.65: 47.62	0.42	0.72	0.62	1.76	23.86: 40.90: 35.23
T_{10}	0.70	0.57	1.19	2.46	28.45: 23.17: 48.37	0.35	0.84	0.62	1.81	19.34:46.41: 34.25
T_{11}	0.63	0.56	1.26	2.45	25.71:22.86: 51.43	0.49	0.58	0.34	1.41	34.75: 41.13: 24.11
$LSD_{0.05}$	0.02	0.03	0.06	0.02		0.01	0.03	0.03	0.02	
$LSD_{0.01}$	0.00	0.05	0.08	0.03		0.02	0.04	0.05	0.03	

* Calculated value.

The response of different doses of Rifit 500EC, Ronstar 25EC and Machete 5G on the growth, yield and yield components of BR28 Boro paddy was not similar. The highly significantly increased growth, yield and yield components were found in T_3 where normal dose of Rifit (1L/ ha) was applied. Ronster normal dose (2L/ ha) though decreased the weed population in Boro paddy but the yield and yield components were not found satisfactory. This may be due to the toxic effect of this herbicide in Boro paddy. On the other hand, Rifit normal dose gradually decreased the weed population in Boro paddy from W1 to W3 and ultimately produced the highest yield and yield components.

In Boro paddy, the total NPK concentration of straw was observed maximum in T_9 when Machete 5G was used in normal dose (25kg / ha). The normal dose of this herbicide may help in better uptake of NPK nutrients from the soil. The NPK concentrations of grains were also found different due to the treatment of the herbicides. The total NPK concentrations of grain were found maximum in T_3 when normal dose of Rifit was used.

From the above discussion it may be concluded that, action of three herbicides in BR28 paddy field was not found similar. The effect of herbicides differed with its nature and concentration in BR28 Boro paddy. Rifit at the rate of 1L/ha (normal dose) was found effective to control the weed population and to increase yield and yield components in the BR28 rice.

REFERENCES

AWAN, I.U., ABBASS, T. AND NADEEM, M. A. 2001. Production Efficacy of Six rice Cultivars against Various Herbicides Applied for Weed Control in Direct Wet- seeded Rice (*Oryza sativa* L.) Culture. *On Line Journal of Biological Sci.* **1**(9)**:** 828- 830.

BRRI,1991. *Adhunik Dhaner Chash*. Bangladesh Rice Research Institute (BRRI), Joydebpur, Gazipur, Bangladesh. pp. 26-27.

BUDHAR, M.N. AND TAMILSEIVAN, N. 2002. International Rice Research Institute.Notes: P.28.

CHANDLER, R.F. JR. 1969. *New horizons for an ancient crop*. XI Int. Bot. Congr. All-Congress. pp-17-23

DATTA, S. K. 1981. *Principle and practices of rice production*. Johan Wiley and Sons. New York. Chichester, Brisbane. Toronto. P. 618.

ISLEY, D. 1960. *Weed identification and control in North Central Slates*. Iowa State Univ. Press. Ames. Iowa. USA. pp. 28-29.

JACKSON, M.L. 1973. *Soil Chemical Analysis*. Prantice-Hall of India. Pvt. Ltd. New Delhi, India. pp-111, 134, 183

LITTLE, T.M. AND HILLS, F.J. 1977. *Agricultural experimentation*. John Wiley and Sons. Ltd. USA. pp-31, 171

MATSUNAKA, S. 1970. Weed control in rice. Technical papers of the FAO Int. Conf. on Weed Control, Davis, California, USA, pp. 7-23.

MIAN, A.L. AND MAMUN, A.A. 1969. Chemical control of weeds in transplant aman rice. *The Nucleus.* **6**:155-163.

SARKER, P.A. 1979. Study on varietal response to planting geometry in transplanted rice. *Allahabad Farm.* **50**(4): 357-358.

VENGRIS, J. 1955. Plant nutrient competition between weeds and crops. *Agron. J.* **47** :213-216.

VENGRIS, J. 1956. Weeds-robber of our firms. *Bett. Crops.* **40**(10):9-12, 46-47.

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