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Effect of Weed Control Methods on the Growth and Yield of Rainfed Aus Rice

M. Robiul Alam, M. O. Hoque, [1]M. A. Rahman, F. Islam, M. Akhtar Hossain, M. S. H. Molla
On- Farm Research Division, Agricultural Research Station,
Bangladesh Agricultural Research Institute (BARI), Pabna, Bangladesh
[1]Regional Agricultural Research Station, BARI, Ishurdi, Pabna, Bangladesh

Abstract: An experiment was conducted at Agricultural Research Station of Bangladesh Agricultural Research Institute (BARI), Pabna during April to August 2001 to see the effect of weed control methods on the growth and yield of rainfed aus rice (CV. BR16). Plant height, effective tillers plant^{-1}, length of panicle, filled grains panicle^{-1}, unfilled grains panicle^{-1}, 1000-grain weight and grain yield were significantly influenced due to different treatments. The maximum number of effective tillers plant^{-1} (3.60), filled grains panicle^{-1} (50.54) and grain yield (3.02 t ha^{-1}) were obtained from T_5 treatment (Ronstar @ 2.0 L ha^{-1}), which was closely followed by T_2 treatment (two hand weeding). The minimum number of effective tillers plant^{-1} (2.30), filled grains panicle^{-1} (41.32) and grain yield (2.27 t ha^{-1}) were observed in control treatment.

Key words: Rainfed aus rice, ronstar 25 EC, hand weeding

Introduction

Rice (*Oryza sativa*) is one of the most important cereal crops of the world and half of the world population live on its grains (Aiyer, 1966). It is the staple food in Bangladesh and has got a tremendous influence on the economy of this country.

Weed is a nutrient absorbing competitive plant which grows out of place spontaneously and possesses the characteristics of plentiful growth and reproduction, even under adverse conditions. For the competitive ability weeds form a serious negative effect in crop production and are responsible for marked losses in crop yield (Mamun *et al.*, 1993). About 10% loss of agricultural crops occurs due to weed competition (Zimdhal, 1980). Food loss through weed competition has been estimated to be 25% in the developing countries where herbicides are used rarely and 5% in the developed countries where herbicides are widely used (Parker and Fryer, 1975). Weed caused yield loss by 15.75% in mixed aus-aman rice, 10.50% in broadcast aman rice, 8.65% in transplant aman rice and 8.69% in modern boro rice (Mamun, 1990). This loss is therefore, a burning threat for the food deficit countries like Bangladesh. Hence, proper weed management is essential for rice production in Bangladesh.

In Bangladesh, weeds are traditionally controlled by hand weeding. This method of weed control is very much laborious, time consuming, inadequate and costly. On the other hand, herbicides are used successfully for weed control in rice fields due to rapid effect, easier for application and cheaper cost involvement in comparison with the traditional methods of hand weeding (Mian and Mamun, 1969).

"Ronstar" 25 EC (Oxadiazon) is a herbicide having both pre and post emergence activity against grasses and broad leaved weeds. It has good selectivity in a number of crops like rice, cotton, sugarcane etc. Ronstar is used for weed control of rice in different countries of the world. This herbicide has been registered in Bangladesh very recently and being supplied for farmers use particularly for weed control of rice. Therefore, the study was undertaken:

a To find the effect of weed control methods on the growth and yield of rainfed aus rice and
b To determine the suitable method of weeding for successfully production of rainfed aus rice.

Materials and Methods

The experiment was conducted at Agricultural Research station of Bangladesh Agricultural Research Institute (BARI), Pabna during April to August 2001. Seeds of Aus rice var-BR16 were used in the study. Seeds were sown on 20, April in line following 25 cm row spacing with continuous seeding. Six weed control methods viz. T_1 = control, T_2 = Two hand weeding, T_3 = Ronstar @ 1.0 L ha^{-1}. T_4 = Ronstar @ 1.5 L. ha^{-1}, T_5 = Ronstar @ 2.0 L ha^{-1} and T_6 = Ronstar @ 2.5 L ha^{-1} were included in the study. The experiment was laid out in the RCBD design. The unit plot size was 4 X 2.5 m^2. Fertilizer were applied at the rate of 126 kg urea, 75 kg TSP 40 kg MP, 60 kg gypsum and 10 kg $ZnSO_4$ hectare^{-1}. The entire amount of all fertilizer were applied during final land preparation. Treatment wise doses of Ronstar 25 EC (@1.0, 1.5, 2.0 and 2.5 L ha^{-1}) were applied five days after sowing. In control plots, weeds were allowed to grow up to harvesting. Two hand weeding were done at 15 and 35 days after sowing. Plant protection measures were taken as and when required. The rice was harvested on 23 August, 2001.

The data on different growth and yield parameters of aus rice were recorded and statistically analyzed and the means were compared by DMRT method (Gomez and Gomez, 1984).

Results and Discussion

All the parameter studied were significantly influenced by different weed control methods (Table 1). It was observed that statistically similar plant height was obtained from all weed control methods excepts control treatment. The highest plant height (88.89cm) was attained in T_5 treatment (Ronstar @ 2.0 L ha^{-1}), while the shortest plant (75.14cm) was produced by control treatment. This might be due to different weed intensity varied in competition with crop plants for growth requirement. Similar results were reported by Chowdhury *et al.* (1995). The same trend was observed in respect of panicle length and 1000-grain weight. The highest number of effective tillers plant^{-1} (3.60) was produced by T_5 (Ronstar @ 2.0 L ha^{-1}) treatment which was statistically similar with two hand weeding. The lowest number of effective tillers plant^{-1} (2.30) was produced in the control treatment. This might be due to severe infestation of weed. It was also found that the rest of all doses of Ronstar was statistically identical. This result is in agreement with that of Gaffer and Rikabder (1975).

It was found that panicle length produced by all doses of Ronstar was statistically identical with two hand weeding. The highest (20.85cm) and the shortest (18.56cm) panicle length was recorded from T_5 and control treatment respectively. The number of filled grains panicle^{-1} was affected significantly by different treatments. The treatment T_5 (Ronstar @ 2.0 L ha^{-1}) produced the highest number of filled grains panicle^{-1} (50.54) and the lowest from control plot. Filled grains panicle^{-1} was increased gradually up to application of Ronstar @ 2.0 L. ha^{-1} and then decreased with higher dose. This might be due to the phytotoxic effect of Ronstar 25 EC at higher concentration to the rice plant. The results are in supported by the findings of Prusty *et al.* (1989) who stated that the number of fertile grains were increased with application of Ronstar. An inverse effect was observed in case of unfilled grains panicle^{-1} where the maximum unfilled grains panicle^{-1} (25.34) was

Table 1: Yield and yield parameters of rainfed aus rice as affected by different weed control methods

Treatments	Plant height (cm)**	Effective tillers panicle^{-1} (no)**	Length of panicle (cm)*	Filled grains panicle^{-1} (no)**	Unfilled rains plant $^{-1}$ (no)**	1000 grain weight (g)**	Grain yield (ton ha^{-1})**
T_1 = control	75.14b	2.30c	18.56b	41.32c	25.34a	21.04b	2.27c
T_2 = Two hand weeding	87.47a	3.57a	20.54a	47.33b	19.81c	22.54a	2.90ab
T_3 = Ronstar 1.0 L ha^{-1}	8492a	3.17b	20.27a	44.53b	22.53b	22.20a	2.77b
T_4 = Ronstar 1.5 L. ha^{-1}	85.81a	3.25b	20.08a	45.32b	20.52bc	22.38a	2.81b
T_5 = Ronstar 2.0 L ha^{-1}	88.89a	3.60a	20.85a	50.54a	19.53c	22.88a	3.02a
T_6 = Ronstar 2.5 L ha^{-1}.	86.15a	3.30b	20.01a	45.83b	19.33c	22.30a	2.42c
CV%	4.5	3.7	4.2	3.9	7.2	2.5	4.7

** and* = Significant at 1 and 5% level of probability, respectively

observed in control treatment and the minimum unfilled grains (19.33) was recorded in T_6 treatment, which was statistically similar with T_2 (two hand weeding) and T_5 (Ronstar 2.0 L ha^{-1}). 1000-grain weight differed significantly by the different treatments where all does of Ronstar was statistically identical with two hand weeding treatment. The lowest 1000-grain weight (21.04 g) was recorded in control plot.

The weed control treatments had significant effect on the grain yield of rainfed aus rice. Among the treatments, the highest grain yield (3.02 t ha^{-1}) was obtained from the T_5 treatment (Ronstar 2.0 L ha^{-1}) followed by T_2 treatment (2.90 t ha^{-1}). The lowest yield (2.27 t ha^{-1}) was recorded in control treatment. The rest three doses of Ronstar were produced statistically similar yield which was significantly inferior to all other treatments. The lowest yield hectare^{-1} in control treatment might be due to the resultant effects of the lowest number of effective tillers plant^{-1}, filled grains panicle^{-1} as well as the lowest 1000- grain weight. The grain yield obtained from T_2 treatment revealed that two hand weeding was equally good for obtaining desirable yield of aus rice comparison to Ronstar 25 EC application.

In the light of the results obtained, it may be concluded that to control of different weed species application of Ronstar @ 2.0 L ha^{-1} was found superior for production of rainfed aus rice. Secondly two hand weeding was found equally good for obtaining desirable yield of aus rice. However, further trial needs to be carried out in different locations of the country including more doses of Ronstar and more number of hand weeding.

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