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## Study on Growth and Control of Weeds as Affected by Weeding Methods in Upland Direct Seeded Aus Rice

M. Robiul Alam, M.S.H. Molla, <sup>1</sup>M. Shahjahan, M.O. Hoque, M. Akhtar Hossain and F. Islam  
On-Farm Research Division, Agricultural Research Station,  
Bangladesh Agricultural Research Institute(BARI), Pabna, Bangladesh  
<sup>1</sup>On-Farm Research Division, BARI, Rajshahi, Bangladesh

**Abstract:** The research work was conducted to observe weed vegetation and to ascertain the comparative control efficiency of weeding methods in upland direct seeded Aus rice. Weed density was affected significantly by weeding methods at 60 days after sowing. The highest weed density ( $149.14 \text{ m}^{-2}$ ) was observed in control plot. The lowest weed density ( $77.64 \text{ m}^{-2}$ ) was recorded in T<sub>6</sub> (ronstar @  $2.5 \text{ L ha}^{-1}$ ) treatment and the second lowest density of weed was attained from T<sub>5</sub> (ronstar @  $2.0 \text{ L ha}^{-1}$ ) and T<sub>2</sub> (Two hand weeding) treatment. Most of the weed species infested in experimental plots were graded as good control in T<sub>6</sub> (ronstar @  $2.5 \text{ L ha}^{-1}$ ), T<sub>5</sub> ( $2.0 \text{ L ha}^{-1}$ ) and T<sub>2</sub> treatment. But the application of ronstar @  $2.5 \text{ L ha}^{-1}$  resulted in phytotoxic effect and rice plants were short statured and flowering was delayed. Moreover conventional two hand weeding method was observed very much laborious, time consuming and less cost effective for controlling the weeds. It was evident that the application of ronstar @  $2.0 \text{ L ha}^{-1}$  was found the easiest and economically viable method for controlling different weed species grown in upland direct seeded Aus rice.

**Key words:** Weed density, weed dry weight, Aus rice, weeding methods, ronstar 25 EC, control efficiency

### Introduction

Weed grows so luxuriantly or plentifully that it chokes out all other plants that possess more valuable nutritive properties. The negative effect of crop-weed association results in remarkable losses of crop yield. Weeding and pest management cost could be reduced by 10-30% through proper control of weeds. Production of crops can be increased by 15-30% through successful control of weeds (Amin *et al.*, 1984). Crop loss due to weed infestation is a burning threat for the food deficit countries like Bangladesh. Poor weed control is one of the major factors for yield reduction of rice depending on the type of weed flora and their intensity (Amarjit *et al.*, 1994). Cost of production of rice increases due to severity of weed infestation in crop fields. Weeding costs sometimes much higher than the total cost of other cultural operations. It is generally observed that specific weeds have good association with specific crops. Islam (1974) observed that the most infesting weeds in Aus rice were *Echinochloa colonum*, *Echinochloa crus-galli*, *Cynodon dactylon*, *Eleusina indica* and *Cyperus rotundus*.

In Bangladesh, hand weeding is the most common age-old practice of weed control. This traditional method of weed control is very much tedious, time consuming, inadequate and less cost effective and does not ensure the effective control of weeds. Moreover, weed control at the critical period by traditional method may not be possible due to

the unfavorable weather conditions and at the periods of peak labour demand. In such situation, herbicides are promising alternatives in controlling weeds (De Datta, 1980). In present day agriculture, the chemical method of weed control is gaining popularity all over the world because of its miraculous results in the crop fields (Singh and Narayana Rao, 1975). Depending upon the crops, weeds and cultural conditions, various weedicides have been found to be an effective means of weed control. Among various weedicides Ronstar 25 EC (Common name- Oxadiazon) is considered as one of the effective means for controlling mono and dicotyledonous weeds in rice. Biswas *et al.* (1991) reported that Ronstar was found superior to hand weeding as a means of weed control in direct seeded upland rice. Ronstar was manufactured by RHONE-POULENC in France and it has been registered in Bangladesh recently and being supplied for farmers use. A little information is available on the effectiveness of Ronstar in controlling weeds in direct seeded Aus rice. The present study was therefore, carried out to observe weed vegetation and to ascertain the comparative control efficiency of weeding methods in upland direct seeded Aus rice.

### Materials and Methods

The research work was conducted at Agricultural Research Station of Bangladesh Agricultural Research

Institute (BARI), Pabna during April to August, 2001. The experiment consisted of six treatments viz. T<sub>1</sub> = Control, T<sub>2</sub> = Two hand weeding, T<sub>3</sub> = Ronstar @ 1.0 L ha<sup>-1</sup>, T<sub>4</sub> = Ronstar @ 1.5 L ha<sup>-1</sup>, T<sub>5</sub> = Ronstar @ 2.0 L ha<sup>-1</sup> and T<sub>6</sub> = Ronstar @ 2.5 L ha<sup>-1</sup>. The experiment was laidout in a randomized complete block design with four replications. All the treatments were randomly allocated in the experimental plots. The size of unit plot was 4X2.5 m<sup>-2</sup>. Seeds of Aus rice (cv. BR16) were sown on April 20, in line following 25 cm row spacing with continuous seeding. Fertilizer nutrients were applied at the rate of 58-15-21-11-4 kg N-P-K-S-Zn ha<sup>-1</sup>. The entire amounts of all fertilizers were applied during final land preparation. Treatment wise doses of Ronstar 25 EC (@1.0, 1.5, 2.0 and 2.5 L ha<sup>-1</sup>) were applied five days after sowing. Control plots received no herbicides. Weeds were allowed to grow in control plots up to harvesting. Hand weeding was done twice at 15 and 35 days after sowing. Proper protective measures were taken to the plant as and when necessary. The data on weed infestation were taken from the unit plot as per treatment at 60 days after sowing. The weeds growing in each plot were identified species wise and their density per square meter was counted. Treatment wise identified weeds were uprooted, cleaned and separated species wise. The collected weeds were dried in the sun and in an electric oven for 48 h maintaining a constant temperature of 80°C. After drying, weight of each weed species was recorded. Weed control efficiency was calculated by the following formula developed by Sawant and Jadhav (1985).

$$WCE = \frac{DWC - DWT}{DWC} \times 100$$

WCE = Weed control efficiency.  
 DWC = Dry weight of weeds in weedy check(control).  
 DWT = Dry weight of weeds in mechanical and chemical treatment.

Control of different weed species as affected by weeding methods were graded on the basis of scales suggested by Mian and Gaffer (1968). Finally the collected data on weed density and weed dry weight were analyzed statistically and the means were judged by DMRT method (Gomez and Gomez, 1984).

**Results and Discussion**

Weed density and weed dry weight was influenced significantly by different weeding methods at 60 DAS (Table 1). The highest weed density (149.14 m<sup>-2</sup>) was observed in control plots. The lowest weed density (77.64

Table1: Weed density and dry weight as affected by weeding methods in direct seeded Aus rice

Treatments	Weed density (no.) (No. m <sup>-2</sup> )	Weed dry weight (g) (g m <sup>-2</sup> )**
T <sub>1</sub> = control	149.14a	118.21a
T <sub>2</sub> = Two hand weeding	86.66cd	67.74cd
T <sub>3</sub> = Ronstar 1.0 L ha <sup>-1</sup>	107.93b	77.51b
T <sub>4</sub> = Ronstar 1.5 L ha <sup>-1</sup>	94.07c	71.75c
T <sub>5</sub> = Ronstar 2.0 L ha <sup>-1</sup>	85.65cd	63.71d
T <sub>6</sub> = Ronstar 2.5 L ha <sup>-1</sup>	77.64d	31.19e
CV%	7.5	6.2
Level of significance	*	**

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

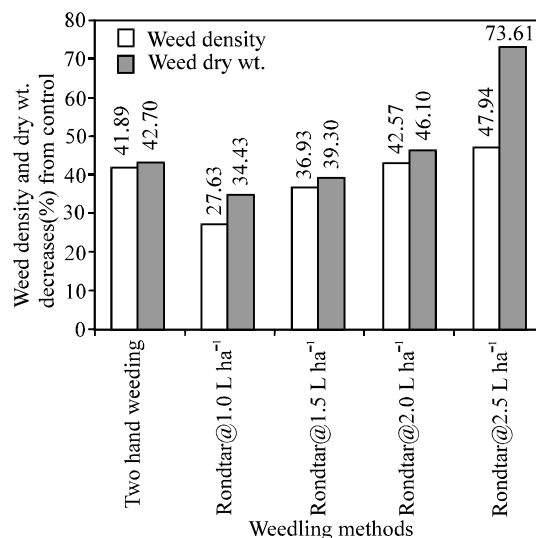


Fig. 1: Weed density and dry weight decrease due to weeding methods compared with control in upland direct seeded Aus rice

m<sup>-2</sup>) was recorded in T<sub>6</sub>(ronstar 2.5 L ha<sup>-1</sup>) treatment and the second lowest density of weed was attained from T<sub>5</sub> (ronstar 2.0 L ha<sup>-1</sup>) and T<sub>2</sub> (two hand weeding) treatment. The density of weed observed in T<sub>5</sub> and T<sub>2</sub> treatment was statistically identical. There was a decreasing trend of weed density with increasing doses of ronstar. Similar response was also observed in weed dry weight. The highest dry weight of weeds (118.21 g m<sup>-2</sup>) was recorded in control treatment and the lowest weed dry weight (31.19 g m<sup>-2</sup>) was observed in T<sub>6</sub> treatment (ronstar @ 2.5 L ha<sup>-1</sup>) which is in agreement with the findings of Biswas *et al.* (1991). The second lowest weed dry weight was recorded in T<sub>5</sub> (ronstar 2.0 L ha<sup>-1</sup>) and T<sub>2</sub> (two hand weeding) treatment.

It was evident that there was a decreasing trend of weed density and weed dry weight in different weeding methods against control (Fig. 1). The application of ronstar @ 2.5 L ha<sup>-1</sup> was highly effective for decreasing weed density and dry weight which was recorded by 47.94

Table 2: Weed control efficiency of different weeding methods in upland direct seeded Aus rice

Weed species		Treatments				
Scientific name	Family	Two hand weeding	Ronstar 1.0 L ha <sup>-1</sup>	Ronstar 1.5 L ha <sup>-1</sup>	Ronstar 2.0 L ha <sup>-1</sup>	Ronstar 2.5 L ha <sup>-1</sup>
<i>Panicum repens</i>	Gramineae	69.54fc	39.99pc	50.93fc	71.47gc	79.77gc
<i>Cyperus rotundus</i>	Cyperaceae	93.45ec	43.25fc	50.21fc	67.56fc	71.63gc
<i>Echinochloa colonum</i>	Gramineae	72.49gc	45.83fc	74.55gc	92.75ec	100.00cc
<i>Cynodon dactylon</i>	Gramineae	88.27gc	46.11fc	54.77fc	73.44gc	83.37gc
<i>Digitaria sanguinalis</i>	Gramineae	76.47gc	44.57fc	56.79fc	71.94gc	75.79gc
<i>Amaranthus viridis</i>	Amaranthaceae	75.63gc	41.31fc	60.74fc	72.35gc	84.63gc
<i>Fimbristylis miliaceae</i>	Cyperaceae	73.41gc	43.47fc	68.42fc	76.52gc	83.71gc
<i>Cyanotis axillaris</i>	Commelinaceae	83.27gc	51.17fc	63.34fc	71.65gc	79.57gc

CC= Complete control (100%) EC= Excellent control (90-99%) GC= Good control (70-89%) FC=Fair control (40-69%)

and 73.61%, respectively. Application of ronstar @ 1.0 L ha<sup>-1</sup> was found less effective for decreasing weed density (27.63%) and dry weight (34.43%). The application of ronstar @ 2.0 L ha<sup>-1</sup> was found 2nd effective treatment for decreasing weed density (42.57%) and dry weight (46.10%) next to higher dose of ronstar @ 2.5 L ha<sup>-1</sup> and two hand weeding was equally effective for decreasing the weed density and dry weight by 41.89% and 42.70%, respectively.

**Control efficiency of weeding methods:** From the results it was evident that all weed species infested in the experimental fields were influenced differently by different doses of ronstar and two hand weeding. It was also observed that all weed species were controlled effectively with the increasing rate of ronstar application. This result was supported by the findings of Haque(1993) who stated that the efficiency of ronstar increased with increasing doses. *Panicum repens* was poorly controlled by the application of ronstar @ 1.0 L ha<sup>-1</sup> and its grade of control was increased as good control due to the highest dose of ronstar @ 2.5 L ha<sup>-1</sup> and ronstar @ 2.0 L ha<sup>-1</sup> while this species was controlled fairly by two hand weeding. It indicated that the application of ronstar @ 2.5 L ha<sup>-1</sup> and ronstar @ 2.0 L ha<sup>-1</sup> was equally effective for controlling *Panicum repens* than that of two hand weeding. *Echinochloa colonum* was controlled excellently by the application of ronstar @ 2.0 L ha<sup>-1</sup> and it was graded as complete control due to ronstar @ 2.5 L ha<sup>-1</sup> but the same species was graded as good control in case of two hand weeding treatment. This result indicated that *Echinochloa colonum* was highly susceptible weed species to ronstar @ 2.5 L ha<sup>-1</sup> and ronstar @ 2.0 L ha<sup>-1</sup> treatment than that of two hand weeding. Two hand weeding as a manual method was also found an effective means for controlling different weed species. *Cyperus rotundus* was controlled excellently by two hand weeding than that of any doses of ronstar application. The five weed species namely *Cynodon dactylon*, *Digitaria sanguinalis*, *Amaranthus viridis*, *Fimbristylis miliaceae* and *Cyanotis axillaris* were graded as good control in ronstar @ 2.5 L ha<sup>-1</sup>, ronstar @ 2.0 L ha<sup>-1</sup> and two hand weeding. But it was observed that the application of

ronstar @ 25 L ha<sup>-1</sup> resulted in phytotoxic effect on rice plants. These results are in agreement with Khemphet and Rangsit (1986) who stated that higher rate of oxadiazon resulted in more phytotoxic effects and plants were short statured and flowering delayed. Moreover two hand weeding is very much laborious, time consuming and less cost effective for controlling weed. From the above findings of the study it may be suggested that the application of ronstar @ 2.0 L ha<sup>-1</sup> would be the easiest and economically viable method for controlling different weed species grown in direct seeded upland Aus rice and this technique could be adopted widely in Bangladesh.

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