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Comparative Performance of the Herbicides Ronstar 25EC, Setoff 20WG and Golteer 5G at Different Rates for Weed Control in Aman Rice (BR-11)

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Abstract: The performance of Ronstar 25EC, Setoff 20WG and Golteer 5G at different rates as herbicide in comparison to each other in BR-11 variety of aman rice was investigated. Twelve weeds species belonging to seven families were found to grow and infest the experimental crops of which Angta, Panikachu, Matichaisa and Joina were dominant in respect of population density. Ronstar 25EC @ 1.0 l ha⁻¹ was most effective in controlling weeds (64.21%). However, the efficacy of Ronstar 25EC at the rate of 2.0 l ha⁻¹ was more or less identical (62.44%) with that of Ronstar 25EC @ 1.0 l ha⁻¹.

Key words: Ronstar 25EC, Setoff 20WG, Golteer 5G, Weed control, Aman rice

Introduction

Weeds are the most destructive agricultural pests. Most of the weeds derive their nourishment from rapid development and manifested through quick root and shoot development than crop. For the competitive abilities weeds form a serious negative effect in crop production and responsible for marked losses in crop yield (Mamun *et al.*, 1993). Karim *et al.* (1998) reported that the probable yield loss due to unrestricted weed competition was 28.28% in broad cast aman rice.

Weed infestation is a major problem in wet-seeded rice culture due to alternate wetting and drying as is practiced during the initial seedling growth. The similarities in age of the weed and rice seedling and morphological features of young grassy rice seedlings make hand weeding more difficult in wet-seeded rice. Mechanical weeding would not be possible unless sowing is done in rows. Obviously the use of herbicides is one of the effective means of controlling of weeds in aman rice under wet-seeded culture.

The farmers of Bangladesh are not familiar with the effectiveness of herbicides in controlling weed. On the other hand, very little work has been done. In view of the current availability of herbicide in the market and their effectiveness against grasses, sedges and broad leaved weeds, Ronstar 25EC, Setoff 20WG and Golteer 5G were selected to evaluate the effectiveness in controlling the weeds of aman rice grown under wet-seeded culture.

Materials and Methods

The study was conducted at the Agronomy Field Laboratory, Department of Agronomy, Bangladesh Agricultural University, Mymensingh during July to December 1998. The popular transplanted aman rice variety BR11 (Mukta) was selected for wet-seeded

culture experimentation. It is non-lodging taking 140-145 days to complete its life cycle and can be successfully grown in aman season. The yield ranges between 5.5 to 6.5 tons ha⁻¹ (Anonymous, 1991).

The single factor experiment was laid out in a randomized complete block design (RCBD). Thus, the treatment combinations was thirty and unit plot size was 4.0 × 2.5m². The spacing between plot to plot was 1.0 and block to block were 1.5 m. The treatments were randomly assigned in the unit plots of each block.

The common names of Ronstar 25EC, Set off 20WG and Golteer 5G are- Oxadiazon, Cinosulfuron and Butachlor.

There were ten treatments in this study namely.

T₀ = Control, T₁ = Ronstar 25 EC @ 1.0 l ha⁻¹,
T₂ = Ronstar 25 EC @ 2.0 l ha⁻¹, T₃ = Ronstar 25 EC @ 3.0 l ha⁻¹,
T₄ = Set off 20 WG @ 50 g ha⁻¹, T₅ = Set off 20 WG @ 100 g ha⁻¹,
T₆ = Set off 20 WG @ 200 g ha⁻¹, T₇ = Golter 5G @ 12.35 kg ha⁻¹,
T₈ = Golter 5G @ 24.7 kg ha⁻¹, T₉ = Golter 5G @ 49.4 kg ha⁻¹.

In control, no weeding as well as no weedicide were used. All the three weedicide were used as pre-emergence application. Certified seeds of BR11 was treated with vitavex-200 @ 2.5 g kg⁻¹ of seeds (Anonymous, 1979). Seeds were sown @ 80 kg ha⁻¹.

For land preparation the land was irrigated and puddled thoroughly by ploughing three times with the country plough and the weeds and stubbles were thoroughly cleaned from the prepared field.

Fertilizers were applied to the plots @ 60, 8, 30 and 4 kg ha⁻¹ as N, P, K and S on the basis of Fertilizer Recommendation Guide (Anonymous, 1997) through urea, TSP, MP and gypsum, respectively. Seeds were evenly broadcasted on unit plot when about 80% of the seeds were sprouted, using conventional method. Irrigation was done as and when necessary.

A quadrat of 1 × 1 m² was randomly placed on each plot and all the weeds (species -wise) in the quadrat was counted on 21st October, 1998. Then the average number of weeds (species-wise) per plot was computed from the results obtained in sampling. Thus, the computed weed number were used to determine the following parameters.

The following attributes were computed from the computed data

- i) Population density (PD) of weed=
Total number of weeds of all species m⁻²
- ii) Dry weight of weed- the weeds in each quadrat were uprooted, washed and dried in the sun and then in an electrical oven for 24 hours at a constant temperature of 70°C. After drying, weight each species was taken and converted it for 10 m².

iii) Intensity of weed infestation= $\frac{\text{PD of weed species}}{\text{PD of crop plants}} \times 100$

Weed control efficiency on the basis of dry weight was calculated using the following formula

$$\text{WCE (\%)} = \frac{\text{DWC}-\text{DWT}}{\text{DWC}} \times 100$$

Where,

- WCE = weed control efficiency
- DWC = Dry weight of weeds in weedy check
- DWT = Dry weight of weeds in mechanical and chemical treatments

The extent of weed control by different weed control treatments and susceptibility of different weed species were graded on the basis of weed control efficiency by the following scales as suggested by Mian and Gaffer (1968)

Degrees of weed susceptibility	Weed control efficiency	Grade of weed control
Completely susceptible (CS)	100	Completely control (CC)
Very high susceptible (VHS)	90-99	Excellent control (EC)
Highly susceptible (HS)	70-89	Good control (GC)
Moderately susceptible (MS)	40-69	Fair control (FC)
Poorly susceptible (PS)	20-39	Poor control (PC)
Slightly susceptible (SS)	1-19	Slight control (SC)
Completely resistant (CR)	0	No control (NC)

Percent of weed control: The percent of aquatic weed control by each of the weed control method were calculated by the following formula:

$$\text{Percent weed control} = \frac{\text{No. of weeds killed/ unit area in treated plots}}{\text{No. Of weed present/ unit area in control plots}} \times 100$$

The data recorded were compiled and tabulated in proper form and subjected to statistical analysis. The mean differences among the treatments were adjusted by Duncan's new multiple range test (Gomez and Gomez, 1984).

Results and Discussion

The results showed that three doses of Setoff 20WG and Golter 5G performed more or less similar weed control efficiency. However, there was no significant difference in weed control efficiency between Setoff 20WG and Golter 5G (Table 1).

The best efficiency in controlling *Fimbristylis miliaceae* (81.248%) was observed with Golter 5G and Setoff 20WG at 49.4 kg ha⁻¹ and 200 g ha⁻¹, respectively (Table 1). This findings were also reported by Burhan *et al.* (1989). Lee *et al.* (1989) to evaluate the use of Tridiphane and bensulfuron-methyl at 30 g ha⁻¹ against *Monochoria*, arrowhead and small flower umbrella plant, moderate activity against bulrush and poor activity against barnyard grass. Bensulfuron-methyl (Setoff 20WG group) has shown a high level of activity against broad-leaved weeds and sedges in sedges in paddy in Spain and Portugal. Bensulfuron-methyl was well tolerated by the local rice cultivars (Muntan, 1989).

Singh and Pillai (1993) to evaluate the efficacy of selected herbicides for direct sown rice under puddled conditions with Butachlor at 1.5 kg ha⁻¹, Benthocarb at 1.5 kg and Anilofos at 4 kg ha⁻¹, at 3, 6, 9 and 12 DAS that in comparison with the hand weed and non weeded treatment. They found that weed control in the Butachlor, Thiobencarb, Anilofos and the hand weeded control treatments was 69.3, 67.6, 71.2 and 91.6%, respectively. Vijayaraghavan *et al.* (1998) reported that Butachlor +one HW provided the best weed control (78%). Mabbayad and Moody (1985) found the dry weight of weeds, especially *Monochoria vaginalis*, *Echinochloa glabrescens* and *Echinochloa colonum* 45 days after sowing was lowest with Butachlor applied at the rate of 0.6 kg ha⁻¹ 3 days before sowing.

The herbicidal treatments (T₁ to T₉) showed that their effectiveness in controlling weeds varied from poor to good and also showed the susceptibility grades from poor to high. The best performance (82.8% destruction) was observed in T₁ and the second highest weed killing efficacy (82.35%) was also demonstrated by T₁. Patanker

Table 1: Infesting species of weed in wet-seeded rice and their degree of susceptibility to control by different treatments

Weed species	No. of weed Vegetation in control plot (T ₀)	% weed killed by, degree of susceptibility to and degree of weed controlled by								
		Ronster 25EC			Setoff 20WG			Golter 5G		
		1 l ha ⁻¹ (T ₁)	2 l ha ⁻¹ (T ₂)	3 l ha ⁻¹ (T ₃)	50 g ha ⁻¹ (T ₄)	100 g ha ⁻¹ (T ₅)	200 g ha ⁻¹ (T ₆)	12.35 kg ha ⁻¹ (T ₇)	24.7 kg ha ⁻¹ (T ₈)	49.4 kg ha ⁻¹ (T ₉)
<i>Cyperus rotundus</i> L.	4.33	53.87 FC/MS	69.23 GC/HC	61.55 FC/MC	69.23 GC/MS	53.87 FC/MS	76.92 GC/HS	69.23 GC/HS	61.550 FC/MS	46.15 FC/MS
<i>Monochoria vaginalis</i>	6.00	66.66 FC/MS	72.23 GC/HS	83.33 GC/HS	66.66 FC/MS	61.11 FC/MS	50.00 FC/MS	55.56 FC/MS	50.00 FC/MS	61.11 FC/MS
<i>Panicum repens</i> L.	7.76	82.83 GC/HS	61.37 FC/HS	44.20 FC/MS	48.49 FC/MS	39.92 FC/MS	61.37 FC/MS	48.49 FC/MS	31.328 PC/PS	61.37 FC/MS
<i>Fimbristylis miliaceae</i> L.	5.33	75.04 GC/HS	68.74 FC/MS	62.49 FC/MS	75.04 GC/HS	81.24 GC/HS	62.49 FC/MS	31.25 PC/PS	62.497 FC/MS	61.24 GC/HS
<i>Leersia hexandra</i> SW	3.33	60.00 FC/MS	30.00 PC/PS	39.99 FC/MS	66.66 FC/MS	66.66 FC/MS	30.00 PC/PS	50.01 FC/MS	69.906 GC/HS	30.00 PC/PS
<i>Fimbristylis diphylla</i> L.	5.66	82.35 GC/HS	70.59 GC/HS	58.82 FC/MS	70.59 FC/MS	64.70 FC/MS	58.82 FC/MS	70.59 GC/HS	58.824 FC/MS	64.70 FC/MS
<i>Murdannia nudiflora</i> L.	4.33	69.23 FC/MS	61.55 FC/MS	61.55 FC/MS	61.55 FC/MS	53.84 FC/MS	46.15 FC/MS	53.84 FC/MS	61.551 FC/MS	69.23 GC/HS
<i>Ludwigia prostrata</i> roxb.	3.33	20.01 PC/PS	30.00 PC/PS	60.00 FC/MS	60.00 FC/MS	69.99 GC/HS	50.01 FC/MS	39.99 FC/MS	39.993 FC/MS	60.00 FC/MS
<i>Echinochloa colonum</i> L.	4.33	69.23 GC/HS	76.92 GC/HS	61.15 FC/MS	46.15 FC/MS	38.47 PC/PS	69.23 FC/MS	53.84 FC/MS	61.551 FC/MS	53.84 FC/MS
<i>Alternanthera sessilis</i> L.	4.00	58.38 FC/MS	66.67 FC/MS	50.38 FC/MS	58.38 FC/MS	66.67 FC/MS	66.67 FC/MS	58.38 FC/MS	66.675 FC/MS	50.00 FC/MS
<i>Aminania baccifera</i> L.	3.66	63.63 FC/MS	72.72 GC/HS	54.55 FC/MS	54.55 FC/MS	45.44 FC/MS	54.55 FC/MS	54.55 FC/MS	54.555 FC/MS	63.63 FC/MS
<i>Cynodon dactylon</i> L.	4.33	69.23 GC/HS	69.23 GC/HS	76.92 GC/HS	46.15 GC/HS	69.23 GC/HS	69.23 GC/HS	69.23 GC/HS	46.157 FC/MS	69.23 GC/HS
Total/Av.	56.43 FC/MS	64.21 FC/MS	62.44 FC/MS	59.58 FC/MS	60.29 FC/MS	59.27 FC/MS	57.95 FC/MS	54.58 FC/MS	55.38 FC/MS	59.21 FC/MS

GC= Good Control (70-89% Killed) HS= Highly susceptible (70-89% Killed)
 FC= Fair Control (40-69% Killed) MS=Moderately susceptible (40-69% Killed)
 PC= Poor Control (20-39% Killed) PS= Poorly susceptible (20-39% Killed)

Table 2: Effect of Ronstar 25EC, Setoff 20WG and Golter 5G on weeds in wet seeded rice cv.BR11

Treatment	Weed population no./m ²	Weed dry weight g	Intensity of weed infestation
Control (T ₀)	56.33a	11.75a	0.28a
Ronstar 25EC @ 1 l ha ⁻¹ (T ₁)	20.67c (19.64)	7.87b (33.02)	0.07c (75.0)
Ronstar 25EC @ 2 l ha ⁻¹ (T ₂)	20.67c (19.64)	4.89cd (58.38)	0.09bc (67.86)
Ronstar 25EC @ 3 l ha ⁻¹ (T ₃)	23.00bc (15.50)	3.67d (69.36)	0.12b (57.14)
Setoff 20 WG @ 50 g ha ⁻¹ (T ₄)	23.67bc (14.31)	4.96cd (58.13)	0.09bc (67.86)
Setoff 20 WG @ 100 g ha ⁻¹ (T ₅)	24.0bc (13.72)	4.82cd (58.98)	0.09bc (67.86)
Setoff 20 WG @ 200 g/ha (T ₆)	24.00bc (13.72)	4.45cd (62.13)	0.08c (71.43)
Golter 5G @ 12.35 kg/ha (T ₇)	25.67b (10.76)	4.92cd (58.13)	0.10bc (64.28)
Golter 5G @ 24.7 kg/ha (T ₈)	25.67b (10.76)	4.79cd (59.23)	0.1bc (64.28)
Golter 5G @ 49.4 kg/ha (T ₉)	23.33bc (14.91)	6.42bc (45.36)	0.1bc (64.28)
Sx	1.387	0.62	0.00
Level of significance	0.01	0.01	0.01

In a colour the values having common letter(s) do not differ significantly. Figures in the parantheses indicate per cent decrease of the concerned parameters compared to the values in the control treatment.

(1992) in the trial in up land rice during kharif season found that Ronstar 25EC at 1.0 kg a.i./ha followed by 2,4-D at 1.5 kg/ha +5% jaggery (course brown sugar) applied 30 days after sowing effectively controlled annual broad-leaved weeds and grasses.

The efficiency of different treatments to destroy different species of weeds varied among themselves and also with the weed species. From the results, it is clear that the performance of three herbicidal treatments in controlling weeds varied from good to poor (Table 1). Out of three herbicides, three levels of Ronstar 25EC resulted better performance than the doses of Setoff 20WG and Golter 5G. Further, out of the three levels of Ronstar 25EC of 1.01l/ha yielded the highest efficiency. The results demonstrated that three major species (*Monochoria vaginalis* *Panicum ripens* and *Fimbristylis diphylla*) were fair to good control and moderate to highly susceptible to Ronstar 25EC and Setoff 20WG; while rest of the weeds species were moderate to highly susceptible and controlled by different treatments of Ronstar 25EC, Setoff 20WG and Golter 5G.

Weed population/m² varied significantly at 1% level of significance. The highest number of weed population

(56.33) was observed in control (T_0); while the lowest (20.67) was found in T_1 and T_2 treatment which decreased 19.64% of weed population in compared to control (T_0). However, there was no significant difference between T_1 and T_2 in respect of weed destruction. On the other hand, Golter 5G @ 12.35 and 24.7 kg ha⁻¹ (T_7 and T_8) suppressed the higher percentage of weed population (10.76%) than control (T_0). The second highest weed controlling efficacy was found in T_5 and T_6 which resulted in 13.72% destruction in comparison with T_0 (Table 2).

Weed dry weight was significantly affected due to application of different treatments at 1% level of significance. In control (T_0) the maximum dry weight of weed was maximum (11.75 g m⁻²) and was minimum (3.67 g m⁻²) were observed in T_0 and T_3 treatments, respectively. Weed dry weight was also found to be significant (T_1 to T_8). The highest weed dry weight reduction (69.36%) was observed in T_3 in comparison with control (T_0). On the other hand, the lowest weed dry weight decrease (33.02%) was found in T_1 (Table 2).

Intensity of weed infestation did not exert any significant variation. The highest (0.28%) intensity of weed infestation was observed in control (T_0); while the lowest (0.07%) intensity of weed infestation was found in T_1 which was almost similar to T_6 . Out of three herbicides in Setoff 20 WG treatments showed average minimum weed infestation than in Ronstar 25EC and Golter 5G. Ronstar 25EC @ 1.0 l/ha decreased the highest level of weed intensity (75%) than any other treatments involved in the experiment (Table 2).

Different treatments of weed control influenced population density, intensity of weed infestation and weed dry weight in various ways. Ronstar 25EC at 1.0 l ha⁻¹ showed the best weed control performance (64.21%) which was identical with that of Ronstar 25EC at 2.0 l ha⁻¹.

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