

Weed management in rainfed lowland rice (*Oryza sativa*) under transplanted conditions

GAJENDRA SINGH, R. NAYAK, R. K. SINGH¹, V. P. SINGH² AND S. S. SENGAR³

Crop Research Station, N.D. University of Agriculture and Technology, Ghaghra-ghat, Bahraich, Uttar Pradesh 271 901

Received: January 1998

ABSTRACT

A field experiment was conducted at Ghaghra-ghat, Bahraich (U.P.) on rice (*Oryza sativa* L.) during wet season of 1994 and 1995. Pre-emergence application of mixture of anilofos + 2,4-DEE (0.4 + 0.5 kg/ha) recorded lower weed dry weight and higher grain yield than rest of the herbicidal mixtures and their single applications. Weed free up to 60 DAT gave higher weed control efficiency and grain yield followed by 2 hand weedings and anilofos + 2,4-DEE (0.4 + 0.5 kg/ha). Weeds caused a reduction in grain yield to the tune of 47.85% when compared with weed free up to 60 DAT. The depletion through weeds was the lowest in weed free up to 60 DAT whereas this treatment being on par with 2 hand weedings recorded higher N uptake by crop than other treatments.

Key words: Weed management, Rainfed lowland rice

In rice, the conventional method of weed control (hand weeding) is very laborious, expensive and inefficient. Chemical weed control can be considered as a better alternative (Singh and Singh, 1993). There is a possibility of development of resistant bio-types of weed by continuous use of single herbicide. In recent years, combination of herbicides has been found to be effective in controlling wide range of weed species in rice (Rao and Singh, 1994). An attempt was therefore made to find out the most effective weed control measure for transplanted rainfed lowland rice.

MATERIALS AND METHODS

A field experiment was conducted at Ghaghra-ghat during the wet season of 1994 and 1995. The soil of experimental site was sandy loam in texture, having a pH 7.8, 0.40% organic carbon, 248 kg N, 24.6 kg P₂O₅ and 297 kg K₂O/ha. The treatments comprising 13 weed control treatments (Table 1) was laid out in randomized block design with 3 replications. The crop was fertilized with 80 kg N + 40 kg P₂O₅ + 30 kg K₂O/ha. Thirty days old seedlings of rice cv. Jal-priya were transplanted on 19 and 28

Present address: ¹IRRI-Representative, C-18 New Friends Colony (East), New Delhi 110 065; ²Agronomist, Agro-ecology Division, IRRI, Los Banos, Philippines; ³ZARS, IGAU Kumharawand Farm, Jagdalpur, M.P.

Table 1. Effect of weed control treatments on weed population, weed dry weight, and nutrient uptake at harvest

Treatment	Dose (kg a.i./ha)	Weed- population/ m ² (No.)	Dry weight of weeds (q/ha)				Weed con- trol effi- ciency (%)	Weed index (W.I.)	N-uptake (kg/ha)	
			Grasses	Sedges	Dicot	Total			Rice	Weeds
2,4-D Na (80 WP)	0.4	432	6.6	1.4	6.4	14.4	44.4	40.1	34.5	12.2
2,4-D Na (80 WP)	0.8	408	6.1	1.3	5.1	12.5	51.7	36.4	36.1	11.3
Anilofos (2% G)	0.4	382	2.6	1.0	8.1	11.7	54.8	29.2	40.1	10.5
Anilofos (2% G)	0.8	365	2.4	0.9	7.4	10.7	58.6	32.7	38.8	9.6
Anilofos (30 EC)	0.3	309	2.2	0.6	8.7	11.5	55.6	24.6	42.2	9.4
Anilofos (30 EC)	0.4	292	2.0	0.5	7.0	9.5	63.3	21.0	44.0	8.3
Anilofos + 2, 4 DEE (30 EC + 24 EC)	0.3 + 0.4	255	4.0	1.0	3.6	8.6	66.8	14.3	48.7	7.5
Anilofos + 2, 4-DEE (30 EC + 24 EC)	0.4 + 0.5	242	3.6	0.8	2.9	7.3	72.6	9.6	51.3	6.3
Butachlor (50 EC)	1.5	278	4.2	1.2	5.0	10.4	59.8	24.6	44.2	9.2
Butachlor + 2, 4-D Na (50 EC + 80 WP)	1.0 + 0.5	259	4.1	1.1	4.7	9.9	61.2	17.5	47.7	8.9
Weedfree up to 60 DAT	—	48	0.6	0.8	0.7	2.1	91.9	—	55.5	1.7
2 hand weeding	20 & 40 DAT	90	1.0	4.0	2.9	7.9	69.5	7.7	53.9	6.9
Weedy check	—	594	6.9	2.6	16.4	25.9	—	47.9	31.6	25.1
CD (P = 0.05)	—	25	1.0	0.6	1.3	—	—	—	3.2	1.2

Table 2. Yield and yield attributing characters of rice as influenced by weed control treatments (mean of 2 seasons)

Treatment	Dose (kg a.i./ha)	Panicles/m ²	Panicle length (cm)	Panicle weight (g)	Grains/ panicle	Grain weight/ panicle (g)	1000- grain weight (g)	Grian yield (q/ha)		
								1994	1995	Mean
2, 4-D Na (80 WP)	0.4	154	24.5	2.60	100	2.2	23.6	22.2	19.6	20.9
2, 4-D Na (80 WP)	0.8	158	24.6	2.62	105	2.3	23.8	23.6	20.8	22.2
Anilofos (2% G)	0.4	166	24.7	2.74	109	2.5	24.1	25.6	23.7	24.7
Anilofos (2% G)	0.8	160	25.0	2.70	106	2.5	24.0	24.7	22.3	23.5
Anilofos (30 EC)	0.3	174	25.2	2.90	112	2.7	24.5	27.7	24.9	26.3
Anilofos (30 EC)	0.4	179	25.2	2.97	120	2.7	25.0	28.9	26.6	27.6
Anilofos + 2, 4-DEE (30 EC + 24 EC)	0.3 + 0.4	185	26.0	3.09	126	2.7	25.5	31.6	28.1	29.9
Anilofos + 2, 4-DEE (30 EC + 24 EC)	0.4 + 0.5	194	26.4	3.16	128	2.8	25.7	32.3	30.8	31.6
Butachlor (50 EC)	1.5	173	25.1	2.94	116	2.7	24.6	27.9	24.7	26.3
Butachlor + 2, 4 D Na (50 EC + 80 WP)	1.0 + 0.4	180	25.4	3.03	120	2.7	25.3	30.4	27.2	28.8
Weed free up to 60 DAT	—	201	26.6	3.43	134	2.9	26.4	35.6	34.3	34.9
2 hand weedings	20 & 40 DAT	196	26.4	3.24	129	2.9	25.8	32.9	31.5	32.2
Weedy check	—	147	23.0	2.37	85	2.1	5.4	17.9	18.2	18.2
CD (P = 0.05)	—	9	1.2	0.17	11	0.3	1.1	3.4	3.1	3.2

July in respective years. All herbicides were applied on third day after transplanting in spray volume of 750 litres water/ha. Granular herbicides were mixed with sand before application.

RESULTS AND DISCUSSION

Effect on weeds

The major weed flora of the experimental site consisted of grasses [*Echinochloa crus-galli* (L.) P. Beauv, *E. colonum* (L.) Link, *E. glabrescense* Aurou & Hook, *Leptochloa chinensis* (L.) Nees, and *Cynodon dactylon* (L.)], sedges [*Cyperus rotundus* (L.), *Cyperus iria* L., *Cyperus difformis* L., *Fimbristylis milliacea* (L.) Vahl.] and broad leaved weeds [*Caesulia axillaris*, *Cynotis axillaris*].

Broad-leaved (dicot) weeds were dominant (56.31%) than grasses (32.94%) and sedges (10.75%) in terms of weed dry weight. Weed control treatments significantly reduced the weed dry weight than unweeded check (Table 1). Pre-emergence application of anilofos + 2,4-DEE (0.4 + 0.5 kg/ha) reduced the weed dry weight by 72.58% compared with unweeded check and was comparable with 2 hand weedings. In general weed dry weight was lower at higher doses of each herbicide. Among herbicidal treatments, application of anilofos + 2, 4-DEE @ 0.4 + 0.5 kg/ha was the most effective against grasses and sedges (Table 2) and recorded the highest weed control efficiency. Weed index was lowest in 2 hand weedings (7.7%) followed by anilofos + 2, 4-DEE @ 0.4 + 0.5 kg/ha (9.6%), and anilofos + 2, 4-DEE @ 0.3 + 0.4 kg/ha (14.3%). This could be attributed to efficient control of weeds resulting in higher rice yield.

Effect on yield and yield attributes

All weed control treatments resulted in

significant increase in grain yield over weedy check. Highest mean grain yield (34.9 q/ha) was recorded in weed free up to 60 DAT followed by 2 hand weedings (32.2 q/ha). Among the herbicidal treatments, anilofos + 2, 4 - DEE @ 0.4 + 0.5 kg/ha gave significantly higher grain yield than rest of the treatments except anilofos + 2, 4-DEE @ 0.3 + 0.4 kg/ha. and butachlor + 2, 4-D Na (1.0 + 0.4 kg/ha). Improvement in grain yield with these treatments could be associated to significant reduction in population and dry weight of weeds resulting in higher uptake of nutrients by the crop favouring improvement in yield attributes. Rao and Singh (1994) have reported similar results. Continuous infestation of weeds caused 47.85% reduction in grain yield as compared to weed free up to 60 DAT.

Nutrient uptake

Crop kept weed free up to 60 DAT removed the maximum N (55.5 kg/ha) followed by 2 hand weedings, and anilofos + 2, 4-DEE @ 0.4 + 0.5 kg/ha. On the contrary, weed free and anilofos + 2, 4-DEE (0.4 + 0.5 kg/ha) treatments resulted in lower uptake of N by weeds. This might be ascribed to efficient control of weeds as evident by lower dry weight of weeds in these treatments.

REFERENCES

- Rao, A.S. and Singh, R.P. 1994 Effect of herbicide mixture and their sequential application on nutrient uptake by rice (*Oryza sativa*) and associate weeds. *Oryza* 31 : 115-118.
- Singh, G. and Singh, O.P. 1993. Chemical weed control in lowland transplanted rice under puddled condition. *Annals of Agricultural Research* 14 : 229 - 231.