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Effect of fertilizer and butachlor on weeds and yield of transplanted rice (*Oryza sativa*)

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ABSTRACT

A field experiment was conducted during rainy season of 1988 and 1989 at Jorhat, to study the effect of different doses of fertilizer and methods of butachlor application on weeds and transplanted rice (*Oryza sativa* L.) under standing water condition. Better crop growth owing to application of 40 kg N, 20 kg P_2O_5 and 20 kg K_2O/ha suppressed the growth of weeds considerably. This recorded 36.9 q grain yield/ha. Among the butachlor application methods, sand-mix controlled the weeds most effectively and accrued in significantly higher crop yield (40.28 q/ha) than to other methods. Rice cultivar 'Mahsuri' (40.75 q/ha) significantly outyielded the traditional one 'Badshabhog' (27.48 q/ha).

Reduction in rice yield due to weeds ranges from 9 to 51% (Mani *et al.*, 1968). The growth of both weed and rice (*Oryza sativa* L.), specially the crop depends greatly on the amount of applied nutrients. Better nutrient supply leads to better crop growth which in turn suppresses weeds. Several herbicides including butachlor proved most successful against weeds of transplanted rice (Mishra and Singh, 1989; Pandey and Sukla, 1990). However, its efficacy under standing-water condition is effected due to different methods of application. Therefore the present investigation was carried out to study the effect of various doses of fertilizer and methods of butachlor application on weeds and transplanted rice under standing-water condition.

MATERIALS AND METHODS

The field experiments were conducted during rainy season of 1988 and 1989 at Jorhat. The soil was clay-loam with pH 5.8, organic carbon 0.69%, total N 0.16%, available P_2O_5 16.9 kg/ha and available K_2O 45.0 kg/ha. The experiment comprised 3 fertilizer doses, 2 cultivars and 3 butachlor application methods (Table 1), tested in split-plot design with 3 replications. The cultivars and fertilizer doses in combination were assigned to main plots and butachlor application methods to subplots. Thirty-five-day-old seedlings were transplanted during the second week of July maintaining 25 cm x 20 cm spacing. Fertilizers were applied in 3 splits. Half of N and entire quantity of P_2O_5 and K_2O were applied at the time of final puddling. Remaining part of N was applied in 2 equal splits at tillering and panicle-initiation stages. Butachlor @ 1.5 kg/ha was applied 4 days after transplanting (DAT) on standing water. Observations on weeds were made at 70 DAT.

RESULTS AND DISCUSSION

Weed flora

Important weed species observed in the experimental field were: *Cyperus iria* L.,

Fimbristylis miliacea Vahl., *Ludwigia octovalvis* (Jacof) Raven subsp. *sessiliflora* (Mich) Raven, *Monochoria vaginalis* (Burm. f.) Presl., *Leersia hexandra* Sw., *Brachiaria mutica* (L.) Beauv., *Paspalum conjugatum* Berg., *Cyperus difformis* L., *C. kyllinga* L., *Monochoria hastaefolia* Presl. and *Commelina benghalensis* L.

Cultivar

Due to higher yielding-potentiality 'Mahsuri' (40.75 q/ha) significantly outyielded the traditional cultivar 'Badshabhog' (27.48 q/ha) (Table 1), despite there was no variation in reducing weed population and their dry-matter accumulation.

Fertilizer dose

The crop responded well up to 40, 20 and 20 kg N, P_2O_5 and K_2O/ha respectively and recorded significantly higher number of panicles, grains/panicle and grain yield (36.9 q/ha) than that under lower fertilizer doses. Adequate nutrient supply under 40 kg N, 20 kg P_2O_5 and 20 kg K_2O/ha led to better crop growth which in turn suppressed the weed growth considerably. Better vegetative growth of the crop accompanied by significantly lower weed–competition led to better reproductive growth and ultimately higher crop yield.

Butachlor application method

Butachlor EC sprayed and directly poured on to the standing water diffused through the water body to find the soil. Therefore these methods could not carry sufficient amout of the soil-active chemical into the soil for better weed control. However, butachlor EC as sand-mix resulted in significantly more reduction in total weed population in 1988

Table 1. Effect of different treatments on yield attributes and grain yield of rice

Treatment	Panicles/m²		Grains/panicle		Grain yield (q/ha)		
	A	B	A	B	A	B	Mean
N, P_2O_5, K_2O (kg/ha)							
0, 0, 0	138.3	110.7	80.0	78.3	35.85	26.47	31.16
20, 10, 10	164.0	115.5	85.7	88.0	38.25	30.30	34.28
40, 20, 20	197.7	117.4	92.0	91.7	41.64	32.16	36.90
CD (P = 0.05)	12.5	3.4	2.6	2.0	2.00	2.21	1.77
Cultivar							
'Mahsuri'	182.7	115.8	90.3	93.0	48.16	33.33	40.75
'Badshabhog'	150.6	113.3	81.3	79.0	29.00	25.96	27.48
CD (P = 0.05)	15.9	NS	4.5	5.7	2.76	1.66	3.12
Butachlor EC (@ 1.5 kg ai/ha)							
Direct-pouring	157.0	114.6	84.7	88.3	38.78	32.22	35.50
Sand-mix	193.0	123.4	91.0	92.0	46.41	34.15	40.28
Spray	149.5	105.7	82.0	77.7	38.54	23.01	30.78
CD (P = 0.05)	17.1	6.3	7.2	8.8	4.63	3.42	4.45

A, 1988; B, 1989

and their dry-matter production than the above 2 methods. Sand carried the soil-active herbicide into the soil most efficiently and thus accrued in better weed control (Gogoi and Kalita, 1993). Better weed control under sand-mix led to higher number of panicles, grains/panicle and grain yield (40.28 q/ha) compared with direct pouring and spray. Singh and Kumar (1986) also reported higher efficacy of butachlor EC as sand-mix in controlling weeds and increasing crop yield.

The interaction effects of the treatments were non-significant.

The rice cultivar 'Mahsuri' could be grown successfully. The crop should be fed with 40 kg N, 20 kg P_2O_5 and 20 kg K_2O/ha. For effective weed control and higher crop production, butachlor EC is to be applied as sand-mix under standing water condition.

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