

Chemical Weed Control in Direct Seeded Wet Land Rice

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ABSTRACT

In field experiments conducted on direct seeded wet land rice during Kharif 1986 and 1987, pre-emergence application of butachlor and pretilachlor/fenclorim approved excellent control of grasses, good control of sedges and slight control of broad leaved weeds. On the other hand a mixture of thiobencarb and 2,4-D showed good control of grasses and excellent control of broad leaves but was least effective against sedges. A mixture of thiobencarb with naproanilide obtained only a slight control of all the three classes. Bensulfuron-methyl, quinchlorac alone and a mixture of piperophos with 2,4-D satisfactorily performed against grasses but remained moderate against sedges. Pendimethalin and oxyfluorfen could not satisfactorily control all the three classes of weeds. None of herbicides under evaluation except quinchlorac caused any visual phytotoxicity to rice plants. Highest grain yield was recorded from hand weeded plots in 1986 and from butachlor followed by hand weeding treatment in 1987. All the treatments involving butachlor gave grain yields which were not significantly different from hand weeding treatment.

INTRODUCTION

One of the major requirements for raising a successful direct seeded rice crop is the availability of satisfactory weed control techniques. A direct

seeded crop is apt to more weed infestation as compared to transplanted rice. However, because of the danger of trampling and uprooting, manual and mechanical weeding is not possible during early stages, particularly when the crop is broadcast seeded. Moreover distinction between grass weeds and rice seedlings is difficult for a common farmer at the early stage, when they must be removed. Under such conditions chemical weed control is an obvious alternative which is more imperative when the labour is scarce and expensive.

In Philippines, herbicides such as pretilachlor, and thiobencarb have been found to be suitable for direct seeded wetland rice and yields obtained were reported to be as good as from weed free treatment. Tank mixture or commercial mixture of different herbicides such as butachlor + 2,4-D (0.25 + 0.75) and molinate/simetryn/MCPA (1.8/1.0/0.1) Kg ai/ha were also tried under similar conditions and the results obtained were satisfactory (Moorthy and Manna (1984), Singh and Singh (1985).

In an other study Simth and Khodayari (1985) and Singh and Dash (1984) observed that post-emergence application of propanil (3.4 and 4.5 Kg ai/ha) in tank mixture with butachlor, oxadiazon, thiobencarb, or pendimethalin at various rates controlled *Echinochloa crusgalli*, *Leptochloa fascicularis* and several aquatic weeds more effectively than did the standard treatments of 4.5 Kg propanil/ha or 3.6

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or 5.6 Kg molinate granules/ha.

Similar evaluations were also carried out in Brazil where Abud (1985) reported that the best general weed control was given by mixture of pendimethalin and propanil. Dicamba alone or with bentazone or propanil gave good control of *Alternanthera philoxeroides* whereas propanil alone or with pendimethalin effectively controlled *Echinochloa crusgalli*.

The present study was planned to

(6 DAS) after mixing with sand.

Pregerminated seed of cultivars IRRI 6 in 1986 and KS-282 in 1987 at the rate of 40 Kg/ha was broadcast on the puddled soil. Alternate flooding and draining technique was adopted upto 6 days to obtain a proper crop stand. Efforts were made to maintain the water level but due to poor water management caused by electric failures, planned water depth of 5-7cm could not be maintained at several occasions.

Table 1. Detail of treatments of the experiments conducted on direct seeded wet land rice during 1986 and 1987

Treatments	Percent purity	Rates (Kg ai/ha)	
		1986	1987
Bensulfuron-methyl	10	0.05	0.40
Butachlor	5	1.00	1.00
Quinchlorac	1	0.30	0.20
Naproanilide/Thiobencarb	10/7	1.0/0.7	1.00
Oxyfluorfen	0.35	0.10	
Pretilachlor/Fenclorim	30		0.45
Pendimethalin	5	0.75	0.75
Piperophos/2,4-D	2.5/1.7	0.3/0.2	0.30
Thiobencarb/2,4-D	4/2	1.0/0.5	1.00
Butachlor + 2,4-D	5 + 3.2	0.75 + 0.5	
Butachlor fb hand weeding	5		0.5
Hand Weeding			
Weedy check			

fb = Followed by

evaluate a set of different herbicides in rice area of Pakistan where a trend to shift from transplanting to direct seeding culture is developing.

MATERIALS AND METHODS

Experiments were conducted during Kharif 1986 and 1987, in a randomized complete block design with four replications and 3 x 5m plots size. The details of the treatments are given in table 1. All the herbicides were broadcast applied 6 days after seeding

Fertilizer at the rate of 46 Kg nitrogen and 23 Kg of P₂O₅ was uniformly applied to all the plots. Normal crop protection measures were adopted.

Weed samples were taken from 3 quadrats (0.25m² each) per plot, 45 DAS. For grain yield an area of 5-sqm was harvested by hand from the centre of each plot. Grain yield determination was based on the weight of threshed

grain and was adjusted at 14% moisture level and computed to tonns/hectare.

Data recorded on weed density, weed biomass, grain yield and yield components were analyzed statistically by appropriate statistical methods.

RESULTS AND DISCUSSION

In both the years of experimentation particularly in the year 1987, sedges formed the major component of the weed flora composition. On the other hand broad leaved weeds were almost missing in 1986, whereas in 1987 these were present at a density of 12 plants per meter square in weedy check (Table 2, 3).

All the herbicides except oxyfluorfen and pendimethalin showed moderately to satisfactory control of weeds. In both the years butachlor performed the best both in terms of weed density and weed biomass. It gave excellent control of grasses, good control of sedges and slight control of broad leaves. Same was true about pretilachlor/fenclozim, a mixture included in 1987 evaluation only. However a mixture of butachlor with 2,4-D used only in 1986 could have better taken care of broad leaved too, but because board leaves were not present in a high density, effect of this mixture could not be evaluated properly. (Table-2,3).

A mixture of thiobencarb and 2,4-D showed good control of grasses and excellent control of broad leaves but was least effective against sedges particularly during 1986. Another mixture of thiobencarb with naproanilide showed only a slight control of all the 3 classes and it was more true during 1986. During 1987, the performance of this herbicide remained moderately

good but not on broad leaves. Although thiobencarb is the most widely used hebicide and is reported to control grasses and sedges in rice (Thomson, 1984) but its performance in these experiments was not upto the mark. This could be due to its incompatibility with naproanilide and 2,4 - D which reduced its phytotoxicity against these weeds (Table - 2,3).

A mixture of piperophos and 2,4-D also showed nice performance against grasses but moderate against sedges and poor against broad-leaves. In this mixture performance of piperphos was as expected but that of 2,4 D was reduced. In this case too, compatibility of 2,4-D with piperophos is doubtful because broad-leaves which are usually very susceptible to phenoxy compounds were least affected. This is interesting that broad-leaves were satisfactorily controlled by 2,4-D when it is mixed with other herbicides such as butachlor, thiobencarb but not with piperophos. However antagonistic effects if any, needs further investigation (Table 2,3).

Bensulfuron-methyl and quinchlorac satisfactorily controlled grasses but showed very little phytotoxicity to sedges. The former showed only slight control of broad leaves, whereas the later controlled this class of weeds satisfactorily. These two herbicides need to be evaluated in mixture with other herbicides to improve their spectrum of phytotoxicity to control all kinds of weeds present in rice (Table 2,3).

Pendimethalin and oxyfluorfen were the two herbicides which showed lowest performance against all the three classes of weeds. Intrestingly non of the herbicides tested except

Table 2. Weed density, weed biomass and paddy yield in direct seeded rice as affected by different herbicides, Daska, 1986

Herbicides	Rate Kg ai/ha	Grasses	Weed density (No/m ²)			Weed biomass (gms/m ²)	Paddy yield (t/ha)
			Sedges	Broad leaved	Total		
Bensulfuron-methyl	0.05	9	30	-	39 bc	193.62 b	5.06 cd
Butachlor	1.00	6	23	1	30 c	70.12 cd	6.03 b
Quinchlorac	0.30	17	49	1	67 ab	233.50 ab	4.72 de
Naproanilide/Thiobencarb	1.0/0.7	26	31	1	58 ab	203.37 a	5.41 cd
Oxyfluorfen	0.10	29	34	1	64 ab	223.85 ab	5.97 b
Pendimethalin	0.75	30	39	-	69 ab	254.80 a	5.06 cd
Piperophos/2,4-D	0.3/0.2	9	22	-	31 c	123.00 c	5.69 bc
Thiobencarb/2,4-D	1.0/0.5	11	32	-	43 bc	194.75 b	4.97 cd
Butachlor/2,4-D	0.75 + 0.5	5	27	1	33 bc	62.24 cd	6.13 ab
Hand Weeding	-	-	-	-	-	-	7.16 a
Weedy check	-	32	37	2	71 a	266.62 a	3.59 f

Means followed by common letters are not significantly different fb - followed by

Table 3. Weed density, weed biomass and paddy yield in direct seeded rice as affected by different herbicides, Daska, 1987

Herbicides	Rate Kg ai/ha	Grasses	Weed density (No/m ²)			Weed biomass (gms/m ²)	Paddy yield (t/ha)
			Sedges	Broadleaved	Total		
Bensulfuron-methyl	0.04	11	50	9	70 ab	101.47 b	3.89 c
Butachlor	1.00	9	17	7	33 bc	86.09 c	4.67 a
Quinchlorac	0.20	6	67	4	77 ab	84.47 c	3.81 c
Nanproanilide/Thiobencarb	1.0/0.7	12	18	7	37 bc	107.15 b	4.52 ab
Pretilachlor/Fenchlorim	0.45	9	24	10	43 bc	110.77 b	4.28 b
Pendimethalin	0.75	18	49	7	74 ab	136.97 a	3.97 c
Piperophos/2,4-D	0.3/0.2	10	34	9	53 bc	119.60 ab	3.75 c
Thiobencarb/2,4-D	1.0/0.5	14	31	3	48 bc	89.70 c	4.27 bc
Butachlor fb Hand weeding	0.5	4	6	2	12 c	26.50 d	4.75 a
Hand Weeding	-	-	-	-	-	-	3.03 a
Weedy check	-	38	60	12	110 a	130.25 a	3.03 d

quinchlorac produced any visible symptoms of phytotoxicity to rice plants. However, quinchlorac adversely affected the crop stand and growth of rice (Table - 2,3).

In the year 1986, highest grain yield was obtained from hand weeded treatments where the plots were kept weed free throughout the cropping period. In the year 1987, highest grain yield was obtained from butachlor (0.5 Kg ai/ha) followed by one hand weeding treatment. However in both the years yields obtained from treatments involving butachlor were not significantly different from the hand weeding treatment except in 1986 where the yield obtained from butachlor applied alone was less but still the highest as compared to the other herbicides treatments (Table 2,3).

After the treatments, in which butachlor was a component, oxyfluorfen produced the highest grain yield. Other treatments too, recorded significantly higher grain yield than weedy check but the differences in grain yield among the remaining treatments were not significant (Table - 2,3).

REFERENCES

- Abud J.K. (1985) Comparison of herbicide for irrigated rice. Pelotas Brazil. Embrapa - Cpath. pp: 344-350.
- Moorthy B.T.S. and Manna, G.P. (1984) Herbicides for weed control in puddle seeded rice. Indian J. of Weed Sci. 16 (3): 148 - 155.
- Singh, B. and Dash, B. (1984) Effect of method of weed control on growth of weeds and uptake of nitrogen by weeds in direct seeded upland rice Agri. Sci. Digest, India 4(4): 231-233
- Singh, R.P and Singh, O.N. (1985) Integrated methods of weed control in direct sown upland rice. Abst. of paper, Annual Con. of Indian Society of Weed Science PP:65-66.
- Smith, R.J and Khodayari, K. (1985) Herbicide treatments for control of weeds in dry-seeded rice. Weed Sci. 33(5) 686-692
- Thomson, W.T (1983-84) Agricultural chemicals Book II. Thomson publications. P.O. Box 9335 Fresno, Ca. 93791. PP91-92.

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