

EFFECT OF FERTILITY LEVELS, SPACINGS AND WEED CONTROL MEASURES ON UPLAND DIRECT SEEDED RICE GROWTH, YIELD ATTRIBUTES AND YIELD

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ABSTRACT

Studies carried out at the Banaras Hindu University, Varanasi in *kharif* season of 1988 and 1989 to determine the most effective method of weed control in direct seeded upland rice revealed that higher fertility levels (N100 P50 K 50) and narrower spacing (20cm, uniform row) produced more dry matter and increased grain and straw yield of rice crop. Among weed control treatments, hand weeding twice was most effective in augmenting growth and yield of rice crop. Among weed control treatments, hand weeding twice was most effective in augmenting growth and yield of rice crop followed by butachlor at the rate of 2.5 Kg. a.i./ha. + one hand weeding (21 DAS)

A major barrier to increase productivity of upland direct seeded rice is severe weed competition. The losses from weeds range from 10 to 70 per cent (Mani *et al.*, 1968; Shetty, 1973). Experimental evidences show that use of herbicide singly does not give satisfactory weed control in direct seeded rice unless supplemental manual weeding or sequential use of herbicides is done (IRRI, 1989). In view of this, the present experiment was planned to study the effect of fertility levels, spacings and certain weed control measures on crop yield in direct seeded upland rice.

MATERIALS AND METHOD

Field experiment was conducted at the Research Farm, Banaras Hindu University,

Varanasi in *kharif*, 1988-89 on sandy clay loam soil having initial fertility of 204.8, 13.8 and 171.7 Kg. NPK /ha respectively with soil pH 7.5. The experiment was laid out in split plot design with three replications. Fertility levels and spacing were together assigned to main plots with six combinations i.e. N80, P40, K40 at 25 cm, uniform row, N80, P40, K40 at 10/40 cm, paired row, N80, P40, K40 at 20 cm, uniform row, N100, P50, K50 at 25 cm, uniform row, N100, P50, K50 at 10/40 cm, paired row, N100, P50, K50 at 20 cm, uniform row. Weed management practices were allotted to subplots having weedy check, one hand weeding (21 DAS), two hand weeding (21 DAS + 42 DAS), pre-emergence butachlor at the rate of 2.5 Kg. a.i./ha and pre-emergence butachlor at 2.5 Kg.

Table 1. Dry matter, grain yield and straw yield of rice

Treatments	Dry matter of rice (g/m ²)		Grain yield (q/ha)		Straw yield (q/ha)	
	1988	1989	1988	1989	1988	1989
Fertility levels and spacing						
N ₈₀ P ₄₀ K ₄₀ at 25 cm (uniform row)	277.31	280.55	17.23	17.95	23.59	25.72
N ₈₀ P ₄₀ K ₄₀ at 10/40cm (paired row)	277.85	281.81	17.25	18.10	23.65	25.81
N ₈₀ P ₄₀ K ₄₀ at 20 cm (uniform row)	279.83	283.91	18.30	19.25	24.71	26.65
N ₁₀₀ P ₅₀ K ₅₀ at 25 cm (uniform row)	302.79	305.77	18.33	20.56	26.65	28.39
N ₁₀₀ P ₅₀ K ₅₀ at 10/40 cm (paired row)	302.83	305.82	19.22	20.69	26.84	28.47
N ₁₀₀ P ₅₀ K ₅₀ at 20 cm (uniform row)	306.11	310.08	20.29	22.22	28.00	30.12
SEm ±	1.05	1.31	0.01	0.05	0.07	0.04
C D at 5%	3.30	4.13	0.04	0.16	0.20	0.11
Weed control treatments						
Weedy check	125.58	128.55	8.25	9.32	11.68	13.77
One hand weeding	323.00	326.27	10.72	19.71	26.34	28.14
Two hand weedings	340.65	344.56	23.16	24.61	31.84	33.61
Butachlor @ 2.5 kg a.i./ha. (pre-em)	327.24	331.71	20.28	21.65	28.03	30.07
Butachlor @ 2.5 kg a.i./ha + one hand weeding	339.63	342.14	22.02	23.31	29.78	31.72
SEm ±	0.66	0.89	0.01	0.03	0.05	0.03
C D at 5%	1.89	2.55	0.03	0.09	0.14	0.08

Table 2. Yield components of rice crop and economics of different treatments

Treatments	Effective tillers per m ² (No.)		Panicle length (cm)		Filled grain per panicle		1000-grain weight per panicle (g)		Gross income (Rs.)		Net return (Rs)	
	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989
Fertility levels and spacing												
N ₈₀ P ₄₀ K ₄₀ at 25 cm (uniform row)	158.23	161.19	13.83	14.43	74.36	80.09	17.34	18.25	4393.6	4618.8	201.14	426.34
N ₈₀ P ₄₀ K ₄₀ at 10/40cm (paired row)	158.41	161.52	13.87	14.47	74.89	80.69	17.45	18.40	4396.0	4652.8	203.54	460.34
N ₈₀ P ₂₀ K ₄₀ at 20 cm (uniform row)	207.90	209.73	14.00	14.59	75.39	81.39	17.69	19.10	4648.8	4916.0	455.44	723.54
N ₁₀₀ P ₅₀ K ₅₀ at 25 cm (uniform row)	170.71	171.62	15.06	15.66	85.82	87.65	18.55	19.81	4732.0	5247.6	357.79	873.39
N ₁₀₀ P ₅₀ K ₅₀ at 10/40 cm (paired row)	170.96	171.92	15.05	15.67	86.21	88.44	18.77	19.90	4917.6	5276.8	543.39	902.59
N ₁₀₀ P ₅₀ K ₅₀ at 20 cm (uniform row)	222.61	223.97	15.42	16.02	87.35	90.05	19.15	20.87	5178.0	5648.8	803.79	1274.59
SEm ±	0.46	0.27	0.02	0.01	0.24	0.55	0.09	0.22				
C D at 5%	1.45	0.85	0.05	0.04	0.76	1.75	0.29	0.68				
Weed control treatments												
Weedy check	140.56	145.33	10.28	10.88	60.19	64.95	15.34	17.29	2171.2	2414.8	-1303.30	-1005.70
One hand weeding	185.46	186.89	14.07	14.65	80.30	84.46	17.76	19.73	4797.6	5067.6	876.6	1167.60
Two hand weeding	201.79	202.93	16.83	17.53	90.04	93.63	19.82	21.73	5905.6	6266.4	1585.1	1945.90
Butachlor @ 2.5 kg a.i./ha. (pre-em)	183.37	184.65	15.29	15.89	84.53	87.97	19.38	20.33	5177.2	5532.8	1246.7	1602.30
Butachlor @ 2.5 kg a.i./ha + one hand weeding	196.17	196.82	16.14	16.74	88.30	92.07	19.29	21.33	5595.2	5930.8	1184.7	1502.3
SEm ±	0.22	0.07	0.01	0.01	0.19	0.11	0.03	0.09				
C D at 5%	0.63	0.21	0.03	0.03	0.54	0.32	0.09	0.24				

Common cost of cultivation = Rs. 3420.50 + cost of fertilizer (N+P+K) + cost of weed control treatments

a.i./ha + one hand weeding (21 DAS). Biometric observations were recorded on both weeds as well as crop on weed population, dry matter production of weeds, number of effective tillers, length of panicle, number of filled grains / panicle, 1000 grain weight, grain yield and straw yield.

RESULTS AND DISCUSSION

The weed flora of the experimental area has been classified into grasses, sedges and broad leaved weeds. The important weeds of different groups were grassy weeds: *Cynodon dactylon* (L.) Pers., *Echinochloa colonum* (L.) Link., *E. crusgalli* (L.) Beauv.; Sedges: *Cyperus rotundus* (L.), *Fimbristylis miliacea* (L.) Vahl., and broad leaved weeds: *Commelina benghalensis* Linn., *Euphorbia hirta* Linn., *Corchorus acutangulus* Lamk., *Phyllanthus niruri* Linn., *Eclipta alba* Hassak and *Amaranthus viridis* Linn.

Higher fertility levels (N100, P50, K50) and narrower spacing (20cm. uniform row) recorded significantly more dry matter over lower fertility levels and wider spacing and ultimately more grain yield. The increase in dry matter accumulation in rice plants with increasing fertility levels may be

attributed to higher production of green leaves with increased chlorophyll content, enabling plants to have increased photosynthetic efficiency. Weed control treatments also showed profound influence on dry matter production. It was recorded in two hand weeding followed by butachlor at the rate of 2.5 kg. a.i. / ha. + one hand weeding. Differential response of the treatment is understandable because of better weed control which allowed the crop plants to utilise the moisture, nutrients, light and space more efficiently resulting in better growth and development. Under higher weed infestation (weedy check) the crop plants were unable to express their genetic potential due to tough weed competition.

Varying fertility levels and spacing brought about significant variation on yield and yield attributing characters. Higher fertility and narrower spacing significantly enhanced the yield attributes i.e. effective tillers per m², panicle length (cm.) filled grain per panicle, 1000 grain weight as also grain and straw yield g/ha. It ultimately reflected in higher grain production over rest of the treatments. Similar results have also been reported by Bernard (1988) and Duhan *et al.*, (1989). All the weed

control treatments significantly increased the yield and yield attributes as compared to weedy check. Yield attributing characters as also grain and straw yield were significantly enhanced by two hand weeding, butachlor at the rate of 2.5 kg. a.i. /ha. and the combination of butachlor at the rate of 2.5 kg. a.i. /ha. + one hand weeding. Two hand weedings recorded maximum grain yield during the experimentation. It might have been due to resultant comparatively weed free environment the crop plant received. Under the situation, the plants were able to express genetic potential to the maximum. Application of butachlor at the rate of 2.5 kg a.i. /ha. and butachlor at the rate of 2.5 kg. a.i./ha. + one hand weeding also had comparatively lesser weed population which reflected in better growth, increased yield attributes and ultimately greater yield. These observations are in conformity with the findings of Kumar and Gill (1981). The interaction effect of fertility levels, spacings and weed control treatments was not significant with dry matter of rice, yield and yield component.

Increase in the fertility levels and narrow spacing increased the net return during both years. Application of weed control measures increased the gross as well as net return from rice cultivation. All

the weed control treatments fetched more return over weedy check. Hand weeding twice gave the maximum net return. Butachlor at the rate of 2.5 kg. a.i. /ha. + one hand weeding and butachlor alone were the other treatments in order of superiority. Higher net return under these treatments may be due to effective check on weed growth of the crop (Table 2) and ultimately higher grain and straw yield (Table 1).

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EFFECT OF SOWING DATES AND WHEAT CULTIVARS IN LATE SOWN CONDITION

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ABSTRACT

A field experiment was conducted on clay loam soil during *rabi* seasons of 1986-87 and 1987-88 at the New Dairy Farm of C.S.A. University of Agriculture and Technology, Kanpur (U.P.) to find out the effect of sowing dates and wheat cultivars in late sown condition. It was observed that December 5 sown crop gave highest yield than crops sown subsequently. However, December 5 sown crop being at par with December 20, sowing produced significantly more yield than January 6 sowing. Among cultivars, UP-115 being at par with K 816, HW 135, Sonalika and HP 1209 gave significantly higher yield than HUW 37, HD 1982 and K 7410. December 5 sown crop gave the highest returns with the highest net profit derived from UP.115 in late sown condition.

The sowing time of wheat in the North and Central Uttar Pradesh takes place from early November to late December. More than 50 per cent of the total area under wheat in these areas is generally sown late due to the harvesting of long duration paddy and other crops like sugarcane,

carrot and cauliflower. In low lying areas also, sowing of wheat is often delayed till late December or early January. Khan and Chatterjee (1981) have sown that average reduction in yield due to late sowing was about 5 Q/ha for every fortnight's delay in sowing after November 15. Further, there