

NITROGEN UPTAKE BY WEEDS AND RICE CROP UNDER DIFFERENT WEED CONTROL METHODS

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ABSTRACT

The field experiment conducted during *kharif* season of 1988 and 1989 at Varanasi (U.P.) revealed that nitrogen removal by both crop and weeds increased with increase in fertility of soil. However, narrow spacing helped to reduce nitrogen uptake by weeds and it was less with two hand weeding followed by butachlor + one hand weeding. In crop, two hand weeding resulted in maximum uptake of nitrogen followed by butachlor + one hand weeding.

KEY WORDS : Weed Drymatter, Rice Yield, Nitrogen Uptake, Weed Control Methods.

Weeds compete with crop for nutrients, soil moisture, light and space and thus, reduce yield and impair the quality of agricultural produce. The upland direct seeded rice which, accounts for about 20 per cent of total rice area of India, faces severe weed competition and yield reduction to the extent of 50-60 per cent and sometimes complete failure of the crop due to infestation of weeds (Mukhopadhyay *et al.*, 1972, Poonia, 1983). Nitrogen application not only augments the crop growth but also affects the weed growth. Kim and Moody (1980) reported that losses due to weeds in rice were high at low and high fertility levels as compared to intermediate level. Hence, a field experiment was conducted to find the weed control efficiency of cultural and herbicidal treatments in relation to nitrogen uptake by weeds and rice crops.

MATERIALS AND METHODS

An experiment was conducted at the Research Farm, Banaras Hindu University, Varanasi during *kharif* season of 1988 and 1989 in alluvial soil having sandy clay loam texture (coarse sand 3.0, fine sand 54.6, silt 19.4 and clay 22.9 percentage) with soil pH 7.5. It was low in nitrogen (204.8kg N/ha) and medium in available phosphorus (13.8 kg P/ha), potassium (171.7 kg K/ha) and 0.34 per cent organic carbon. The experiment was laid out in split plot design with fertility levels and spacing together assigned to main plots as six treatment combinations *i.e.*, N₈₀P₄₀K₄₀ at 25 cm uniform row, N₈₀P₄₀K₄₀ at 10/40 cm paired row, N₈₀P₄₀K₄₀ at 20 cm uniform row, N₁₀₀P₅₀K₅₀ at

25 cm uniform row, N₁₀₀P₅₀K₅₀ at 10/40 cm paired row, N₁₀₀P₅₀K₅₀ at 20cm uniform row. Weed management practices were allotted to subplots having weedy check, one hand weeding (21 DAS), two hand weeding (at 21 DAS, 42 DAS), butachlor pre-emergence (pre.em.)@ 2.5 kg a.i./ha and butachlor pre-em. @ 2.5 kg a.i./ha + one hand weeding (21 DAS). N.P.K, were applied as per treatment in the form of urea, single super phosphate and muriate of potash. Herbicide was applied at pre-emergence next day after sowing with the help of Knapsack sprayer fitted with flat fan nozzle using spray volume of 800 l/ha. The N content was determined in weeds and straw as well as grain by modified Kjeldahl method (Jackson, 1973). N content of weeds, grain, and straw was multiplied by the respective dry matter yield to get total N uptake.

RESULTS AND DISCUSSIONS

Major weed species recorded in the rice crop were *Cynodon dactylon* Pers., *Echinochloa colonum* Link, *Echinochloa crusgalli* Beauv., *Cyperus rotundus* L., *Fimbristylis miliaceae* Vahl., *Corchorus acutangulus* Lamk., *Euphorbia hirta* Linn., *Phyllanthus niruri* Linn and *Amaranthus viridis* Linn.

Fertilizer application proved instrumental in increasing nitrogen depletion by weeds at wider spacing. The maximum N removal by weeds was recorded in higher than rest of the treatments. The minimum N uptake was recorded at lowest fertility level with narrower spacing during both the years.

Table 1. Nitrogen uptake (kg/ha) by weeds and rice (grain and straw) as influenced by fertility levels, spacings and weed control treatments

Treatments	Weeds		Grain		Straw	
	1988	1989	1988	1989	1988	1989
N ₈₀ P ₄₀ K ₄₀ at 25 cm (uniform row)	13.51	5.67	27.47	26.75	11.33	12.17
N ₈₀ P ₄₀ K ₄₀ at 10/40 cm (paired row)	12.06	5.00	28.11	27.77	11.57	12.63
N ₈₀ P ₄₀ K ₄₀ at 20 cm (uniform row)	10.49	4.83	30.01	29.84	12.37	13.28
N ₁₀₀ P ₅₀ K ₅₀ at 25 cm (uniform row)	15.44	7.87	31.17	32.06	13.73	14.70
N ₁₀₀ P ₅₀ K ₅₀ at 10/40 cm (paired row)	14.04	6.49	31.92	32.43	15.00	15.07
N ₁₀₀ P ₅₀ K ₅₀ at 20 cm (uniform row)	13.73	5.63	34.29	35.09	15.95	16.27
SEm ±	0.003	0.014	0.03	0.16	0.03	0.01
CD at 5%	0.01	0.04	0.09	0.49	0.09	0.03
Weed control treatments						
Weedy check	28.56	13.95	13.62	14.51	6.14	7.04
One hand weeding	17.03	8.67	29.14	28.89	15.07	15.65
Two hand weeding	6.16	3.19	38.19	38.25	16.61	17.13
Butachlor (Pre.em.) at the rate of 2.5 kg a.i./ha	9.60	7.14	33.45	33.70	14.56	15.38
Butachlor (Pre.em.) at the rate of 2.5 kg a.i./ha + one hand weeding	9.22	3.53	33.94	33.67	16.81	17.35
SEm ±	0.002	0.002	0.03	0.07	0.02	0.01
CD at 5%	0.01	0.01	0.09	0.21	0.04	0.03

Nutrient depletion by weeds increased linearly with increase in rate of fertilizer application. This showed a positive relationship between nutrient application and its removal by weeds. Increased depletion of nutrient is expected due to more availability of fertilizers to weeds resulting into more dry matter production. Similar observations were made by Vengris *et al* (1953). Two hand weeding was most effective weed control measure in reducing N depletion by weeds and significantly superior to rest of treatments. The maximum N depletion was recorded under weedy check which was significantly more than rest of treatments during both the years at the maturity of crop. In addition to two hand weeding, butachlor + one hand weeding, and butachlor alone showed effective check on nutrients drain by weeds. This is in accordance with the finding of Pillai and Sreedevi (1980).

Varying fertility levels and spacing brought about significant variation on N uptake during both the years of experimentation. The maximum uptake of N by crop plants was recorded with higher fertility under narrower spacing which was significantly superior over the other treatments. The minimum uptake of N in grain and straw was observed with lower fertility and wider spacing during both the years. An increased supply of

fertilizer in the soil in general leads to an increased uptake of nutrients by crops and this was true with present investigation also.

All the weed control treatments significantly induced the N uptake as compared to weedy check. The results were consistent in both the years. N uptake was significantly enhanced due to two hand weeding, butachlor and the combination of butachlor + one hand weeding. The favourable effect of these treatments 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. In the present investigation, two hand weeding treatment recorded the maximum N uptake during both the years. It might have been possible due to comparatively weed free environment the crop plant received. Under the situation, the plants were able to express their maximum genetic potential because of least weed crop competition. Application of butachlor and butachlor + one hand weeding brought about significant increase in N uptake by crop by arresting weed growth. These findings are similar to that of Shetty and Gill (1974).

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EFFECT OF FERTILIZER TREATMENTS ON GROWTH, PRODUCTIVITY, INSECT- PEST AND DISEASE INCIDENCES ON RICE

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ABSTRACT

The effect of fertilizer treatments (O, N, NP and NPK doses in kg/ha) on growth, productivity, insect-pest and disease incidence on rice in Gangetic alluvial soil (Entisol) of West Bengal under rainfed condition was evaluated in 1987 and 1988. The balanced fertilisation made highest increment on plant height, number of tillers, but phosphate fertilisation along with nitrogen exerted marked effect on dry matter production at panicle initiation stage. Increased number of matured panicles/m² due to NPK fertilisation resulted in higher grain and straw yield. Phosphorus along with nitrogen showed significant effect on number of filled grains/panicle and test weight. Nitrogen either alone or coupled with phosphorus exhibited higher degree of incidence of gall midge and yellow stem borer but NPK lowered the incidence of rice bug, leaf folder, gall midge and yellow stem borer. NPK increased the bacterial leaf-streak infestation significantly than either of N or NP treatments.

KEY WORDS : Balanced Fertilisation, Dry Matter Accumulation, Insect-pest and Disease

The modern high yield dwarf rice varieties are highly responsive to applied nutrients. Increased growth due to fertilisation particularly when it is unbalanced, causes plants more vulnerable to different pests and diseases, particularly during the rainy season (June to September) in West Bengal. The present paper deals with the studies on the effect of different fertiliser combination on growth, yield and yield components, insect-pest and disease incidences in rainfed rice.

MATERIALS AND METHODS

The investigation was carried out at the experimental farm of Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal. The soil is entisol, neutral in reaction, low in nitrogen, medium in available phosphorus and potassium contents.

The experiment was conducted during the wet seasons of 1987 and 1988 in a randomised block design with three replications, using rice cultivar CR 222 MW10.

There were four fertiliser treatments viz., Control, N₈₀, N₈₀ P₄₀, N₈₀P₄₀K₄₀ (kg/ha of the nutrients). The nitrogen was applied as urea and out of 80 kg N/ha, half was applied as basal and the remaining half in two equal splits. Phosphate and potassic fertilisers were applied as basal as single super phosphate and muriate of potash respectively. The crop was transplanted during the third week of July at 20 x 10 cm spacing. The natural occurrence of insect-pests and disease as influenced by fertilizer treatments, was quantified by direct counting of pests or injury symptoms in a m² cropped area following standard methods.