

Effect of combined application of pesticides and urea on nitrogen uptake and grain yield of lowland rice.

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Application of Carbofuran and gamma BHC along with Urea increase the uptake of nitrogen by rice. The uptake at lower levels of N applied along with Carbofuran or gamma BHC was more or less same to that at higher levels of N without the Pesticides. Grain yield was increased by combined application of N and pesticides. When pesticides were not applied, N had a negative effect on grain yield.

Combined application of pesticides and urea is being advocated to lowland rice for better availability of nutrient and control of early pests. Khomen (1969) had shown that pre-sowing application of fertilizers, in combination with pesticides, increased the uptake of nutrients. Mani *et al* (1976) reported that the nutrient uptake by rice was higher when Machete was applied along with urea. Here a study was conducted to find out the efficiency of combined application of pesticides with urea on nitrogen uptake by lowland rice.

MATERIALS AND METHODS

Field experiments were conducted to study the effect of soil applied pesticides and fertilizer N on nitrogen uptake in lowland rice varieties, IET 1444 and IR 20 raised during SW and NE monsoon seasons of 1979 at Tamil Nadu Agricultural University, Coimbatore. The soil was deep clay loam, low in available N (208 kg N/ha), medium in available P₂O₅ (14.5 kg/ha)

and high in available K₂O (300 kg/ha). The experiment was laid out in split plot design with three replications. The treatment details are given below.

Main plot treatments (Seven) :

- T1 : Hand weeding twice without any insecticide or herbicide application.
- T2: Hand weeding twice with need-based plant protection.
- T3 : Pre-emergence application of butachlor followed by one hand weeding and with need-based plant protection.
- T4 : Hand weeding twice and soil application of gamma BHC along with N fertilizer.
- T5 : pre-emergence application of butachlor followed by one hand weeding and soil application of gamma BHC along with N fertilizer.
- T6 : Hand weeding twice and soil application of Carbofuran along with N fertilizer.

T7 : Pre-emergence application of butachlor followed by one hand weeding and soil application of Carbofuran along with N fertilizer.

Sub plot treatments (Four):

No : Control (No N).

N1 : 50 Per cent of recommended dose i. e., 50 kg for IET 1444 and 60 kg N/ha for IR 20.

N2 : 75 per cent of recommended dose i. e., 75 kg for IET 1444 and 90 kg for IR 20.

N3 : 100 per cent of the recommended dose i. e.,

100 kg for IET 1444 and 120 kg N/ha for IR 20. Machete was applied as pre-emergence herbicide 5 days after planting at 1.5 kg a. i./ha. The insecticides viz., gamma BHC (gammexane), and Carbofuran (Furadan 3 G) were applied at the rate of 1.5 and 0.75 kg a.i./ha respectively along with urea on 12 days after planting. Nitrogen uptake was studied at four stages viz., tillering, panicle initiation, flowering and harvesting stages.

RESULTS AND DISCUSSION

Nitrogen uptake at different growth stages.

(1) *At tillering:* The treatments involving gamma BHC and Carbofuran application (T4, T5, T6, and T7) recorded higher N uptake than the other pesticide treatments (T1, T2 and T3). The

N uptake was higher in plots applied with N compared to control in the SW monsoon season but the difference due to N application were not significant during NE monsoon season. The interaction effect between soil application pesticides and N was significant in monsoon season. The treatments T5 and T7 recorded higher uptake of N at all levels of N and in all treatments. N applied plots registered high N uptake.

(2) *At panicle initiation:* Application of Carbofuran along with pre-emergence butachlor (T7) recorded the highest N uptake in SW monsoon season. No significant variation was observed among the pesticide treatments in the NE monsoon season. Though the uptake did not increase beyond N1 level during SW monsoon season, the uptake at different levels of N was significantly different during NE monsoon season, the highest uptake being at N3 level.

The interaction effect was significant in both the seasons. When no plant protection measures were resorted to (T1), there was very little response to applied N in terms of uptake. Due to application of Carbofuran (T6 and T7), the response to N2 and N3 levels was markedly superior to that with No and N1 levels. At lower levels of N (No and N1) need based plant protection (T2) was as good as or better than Carbofuran application.

(3) *At flowering:* At this stage also, Carbofuran application (T6 and T7)

resulted in increased uptake of N followed by gamma BHC alone (T4) during SW monsoon season. The treatment T7 registered about 38 per cent increase in uptake over the unprotected crop (T1) and 20 per cent increase over the need-based protection. These treatment differences were not observed during NE monsoon season.

In both the seasons N uptake was higher at the highest level of N (N3). The interaction effect was significant during SW monsoon season, again indicating the superiority of Carbofuran application (T6 and T7) over other treatments in increasing N uptake.

(4) *At harvest* : (Table 1).

Whatever the influence of pesticide treatments on N uptake during the growth stages, this was not reflected at harvest in both the seasons. Increasing N levels increased its uptake at harvest in both the seasons, but the effect of higher level of N (N 3) was more marked in the SW monsoon season.

The interaction was significant during both the seasons. There was practically no response to N application in terms of uptake when the insect pests were not adequately controlled (T1). This indicates that a proper plant protection measure is a *sine qua non* in increasing the N uptake. This was prominently noticed in T4, T5 and T6 treatments where the uptake at N3 level was significantly higher than at all other levels of N during the SW monsoon season. This

was not observed during NE monsoon season.

Increased uptake of N due to Carbofuran application has been reported by Singaram (1975). Gamma BHC applied plots recorded the next highest uptake of N. Increased availability and uptake of N and improved efficiency of applied N due to gamma BHC application have been reported in sugarcane (Srivastava and Ghosh, 1968; Jaiswal *et al.*, 1973 and Singh *et al.*, 1973) and in wheat and maize (Thakre and Sexena 1972).

Grain Yield : (Table 2).

In SW monsoon season the protected plots recorded 39 per cent increase in grain yield over unprotected ones. In NE monsoon season Carbofuran application increased the grain yield by 719 kg/ha (26 per cent) over that of need-based plant protection. Grain yield was increased with increasing N levels. The favourable effect of N on grain yield of IET 1444 was further enhanced by application of either of the insecticides, gamma BHC and Carbofuran. When the insect pests were not controlled, application of N had a negative effect on grain yield.

It was concluded that nitrogen uptake was increased due to application of Carbofuran and gamma BHC, particularly at tillering, panicle initiation and flowering stages. The uptake at low levels of N applied with either gamma BHC, or Carbofuran was more or less same to that at high levels of N applied alone. Nitrogen application increased its uptake. Grain yield was

increased by combined application of N and pesticides. When pesticides were not applied, N had a negative effect on grain yield.

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Table 1. Nitrogen uptake at harvest (Kg/ha).

	SW Monsoon.					NE Monsoon				
	N ₀	N ₁	N ₂	N ₃	Mean	N ₀	N ₁	N ₂	N ₃	Mean
T 1.	64.1	82.9	83.9	78.8	74.4	109.6	101.2	109.5	111.3	107.9
T 2.	67.9	89.9	116.4	121.0	98.7	90.7	119.7	133.2	162.1	117.4
T 3.	67.3	119.2	118.5	113.0	104.5	75.8	113.7	113.4	127.4	107.6
T 4.	76.0	103.6	101.0	131.2	102.9	109.2	123.1	126.0	151.5	127.5
T 5.	70.1	81.9	82.0	113.3	86.8	102.2	119.6	112.9	127.4	115.5
T 6.	85.2	85.3	99.6	138.0	102.0	103.9	124.7	133.1	120.1	123.0
T 7.	78.7	117.1	105.1	119.0	104.9	96.1	109.6	107.6	120.8	108.5
Mean	72.8	97.1	101.0	116.2		98.2	116.0	119.4	127.8	
					CD					CD
Treatments					NS					NS
N levels					8.7					11.0
N at T					23.1					29.1
T at N					28.0					33.7

Table 2. Grain Yield (Kg/ha).

	SW Monsoon.					NE Monsoon				
	N ₀	N ₁	N ₂	N ₃	Mean	N ₁	N ₀	N ₂	N ₃	Mean
T 1	2121	2689	2820	2088	2430	2561	2788	3151	3394	2974
T 2	2534	3052	3899	3754	3310	2121	3515	3527	3606	3192
T 3	1988	2909	4569	4106	3393	2364	2191	2636	2582	2443
T 4	2323	3889	3897	4518	3707	2364	3546	3485	4000	3349
T 5	2744	2862	2641	4183	3108	2576	3091	2849	2909	2856
T 6	3473	2693	3447	4579	3548	2524	3667	3606	3771	3392
T 7	2639	3367	3106	3918	3258	3182	3788	3697	4061	3682
Mean	2546	3066	3483	3907		2527	3227	3279	3475	
					CD					CD
Treatments					NS					535
N levels					396					305
N at T					1048					NS
T at N					1196					NS