https://doi.org/10.29321/MAJ.10.A01868

Madras agric. J.78 (9-12) Sep-Dec-1991

EFFECT OF MAIN FIELD NITROGEN MANAGEMENT AND NURSERY MANURING ON NPK UPTAKE BY RICE

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ABSTRACT

Field experiments conducted at Rice Research Station, Ambasamudram during *kar* and *Pishanam* seasons of 1984-1985 on rice varieties TKM 9 and IR 20 revealed that placement of USG at 10 cm. depth seven DAT to supply N at 90 kg.ha^{-1} resulted in highest uptake of NPK.

KEYWORDS: Rice, Uptake, Nursery, Field management

Poor soil ferility coupled with improper water and nutrient management are the major factors which contribute to the low yield in rice in Tamil Nadu. Nursery manuring of rice has not received adequate attention. Slow release N fertilizers have been proved to be efficient in N use efficiency and their use in rice is gaining importance in the recent past. Hence, to evaluate various nursery manuring practices and N application to the main field through urea super granule (USG) on the uptake of major nutrients by rice, field experiments were conducted at the Rice Research Station, Ambasamudram during *Kar* (June - September) and *Pishanam* (October - March) seasons of 1984-1985.

MATERIALS AND METHODS

The experiments were conducted in split plot design with seven N levels(main plot) and five nursery manuring treatments (sub plot) each replicated thrice. The main plot treatments were: control (M_1), application of N at 30 (M_2), 60 (M_3) and 90 (M_4) kg.ha^{-1} through urea and at 30 (M_5), 60 (M_6) and 90 (M_7) kg.ha^{-1} through USG, hand placed at 10 cm depth. The five nursery manuring treatments were: application of DAP at 2 kg. cent^{-1} (S_1), N at 360 g. cent^{-1} through urea (S_2), P_2O_5 at 920 g.cent^{-1} through single super phosphate (S_3), sprouted seed treatment with three per cent DAP solution (S_4) and farmers method (No manuring S_5). Rice TKM 9 during *Kar* season, and IR 20 during *Pishanam* season were raised. Calculated quantity of fertilizers per treatment schedule were applied to nursery plots before last levelling. For sprouted seed treatment, sprouted seeds after incubation were dipped in the supernatent three per cent DAP solution for 20 minutes and shade dried for 10 minutes. Each plot in the main field received a constant dose of P_2O_5 and K_2O at 50 kg.ha^{-1}. Urea as per the treatment schedule was applied in three splits, half as basal and the remaining half in two spilits, first at tillering and the second at panicle initiation. The USG was placed in alternate rows at a depth of 10 cm on seventh DAT. Routine cultural practices were followed in raising the crop. Plant samples were collected at tillering and flowering stages and also the grain and straw were analysed for their total NPK contents following conventional procedures and the uptake of these nutrients were computed.

RESULTS AND DISCUSSION

An increase in N uptake under N application at 90 kg.ha^{-1} as USG with DAP application to the nursery was observed during tillering and flowering stages in both the seasons (Table 1 and 2). In the case of grain and straw addition of highest dose of N through USG resulted in highest N uptake. With regard to the effect of nursery manuring treatments, the trend was inconsistent. Highest N uptake under the highest dose of N

through USG was due to the fact that the available N content of soil was highest under this treatment at all stages of crop growth. Besides, the dry matter yield was also the highest under this treatment and consequently the N uptake was also maximum. Several workers have already reported enhanced fertilizer use efficiency and plant recovery through deep placement of N as USG (Calabio *et al.* 1980; De Datta *et al.* 1983; Cao et al. 1984).

Yet another reason for increased plant recovery of applied N through USG placed at deeper layers could be due to the fact that the process of absorption of added fertilizer coincided with the plant growth stage during which N requirement was comparatively high (Obcemea *et al.* 1984).

In general, the P uptake was higher under the highest dose of applied N through USG possibly due to higher dry matter yield.

The K uptake also exhibited a similar trend as that of P. As N has complimentary effect on the nutrition of other nutrients especially P and K, enhancement in the uptake of N would naturally result in the enhancement of P and K uptake, and so was the case in the present study also. Moreover, the dry matter yield was higher under the highest dose of N added through USG and eventually the NPK uptake. Gopalasamy and Raj (1972), Rajasekaran (1976) and Mani (1979) also noticed a positive relationship between total uptake of NPK and levels of applied N.

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Table 1. NPK uptake as influenced by treatments (kg.ha^{-1}) - Kar - TKM 9

Treatments	Tillering			Flowering			Straw			Grain		
	N	P	K	N	P	K	N	P	K	N	P	K
M1	25	6.4	50	40	12.5	130	19	3.4	121	44	10.5	8
M2	33	6.5	55	48	15.1	162	28	4.5	138	50	13.4	10
M3	35	7.9	59	65	19.6	153	36	5.4	133	59	14.9	13
M4	47	7.8	58	71	23.6	178	49	7.9	230	64	17.4	15
M5	46	6.5	52	53	12.3	140	31	5.7	167	54	13.8	13
M6	55	7.8	68	60	17.3	162	37	5.9	188	60	15.4	15
M_7	67	8.8	79	66	23.2	209	53	9.1	205	76	16.3	16
CD (5%)	2.8	0.52	3.5	2.5	1.32	8.3	1.3	0.70	4.2	1.3	0.94	0.4
S_1	49	6.8	58	63	18.6	155	34	6.1	169	60	14.9	12
S_2	47	8.3	72	58	18.0	170	35	5.1	162	61	14.7	13
S_3	43	7.4	57	61	16.6	177	37	6.0	166	60	14.1	13
S_4	42	7.7	64	56	18.8	167	39	6.9	179	59	15.0	14
S_5	41	6.6	50	51	16.4	141	37	5.9	168	51	13.9	13
CD (5%)	1.7	0.57	2.3	2.4	1.7	11.1	1.4	0.75	4.1	1.7	14.9	0.7

Table 2. NPK uptake as influenced by treatments (kg.ha^{-1}) - PISHANAM - IR 20

Treatments	Tillering			Flowering			Straw			Grain		
	N	P	K	N	P	K	N	P	K	N	P	K
M_1	42	4.5	42	80	24.3	103	46	12.0	11	37	14.2	129
M_2	69	6.2	60	119	28.0	128	53	13.5	13	44	16.9	134
M_3	92	8.2	80	109	22.6	149	50	132.0	11	55	19.1	156
M_4	72	10.1	101	111	22.0	128	54	14.8	12	64	20.4	170
M_5	39	5.7	67	111	27.7	159	51	14.2	13	52	18.1	140
M_6	60	8.0	74	120	26.3	186	53	15.2	13	61	24.1	181
M_7	83	10.2	93	128	27.2	191	61	15.7	13	63	23.5	228
CD (5%)												
S_1	64	7.7	1.2	2.5	1.6	7.2	1.4	1.3	0.6	0.9	1.30	1.2
S_2	64	7.8	73	115	25.8	150	54	14.0	13	52	19.4	160
S_3	67	7.5	73	100	26.3	145	53	14.2	12	53	20.6	158
S_4	71	8.3	82	113	25.7	159	53	14.0	13	57	20.0	165
S_5	60	6.5	65	108	24.6	139	50	14.0	13	53	18.7	156
CD (5%)	4.3	0.59	1.1	1.9	NS	4.5	0.9	NS	0.9	1.7	1.69	1.1

N.S. : Not Significant