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RESPONSE OF PRILLED AND NEEM EXTRACT COATED UREA APPLICATION TIMINGS TO RICE (*ORYZA SATIVA*)

S.K. Upadhyay and R.S. Tripathi
Department of Agronomy,
College of Agriculture, IGAU, Raipur-492 012, India.

ABSTRACT

The application of neem extract coated urea (NCU) 50% basal + 25% at tillering + 25% at panicle initiation (PI) stage recorded the maximum grain and straw yield. N concentration and uptake, nitrogen use efficiency and nitrogen recovery. The application of 30% NEU as basal + prilled urea (PU) 40% at tillering and 30% at PI stage or NCU 75% basal and 25% at PI stage performed as good as application of NCU 50% basal + 25 at tillering + 25% at PI stage for grain yield, N concentration and N uptake of rice.

. The efficiency of urea is a serious problem especially in rainfed direct seeded rice. The 50 to 70 per cent of the nitrogen applied as prilled urea is lost through various mechanism such as volatilization, denitrification and leaching. However, split application of urea is reduced these losses upto certain extent and favoured the grain yield and N use efficiency in rice prilled urea treated with neem extract coated urea improve the grain yield and N use efficiency due to minimising the release rate. This technique of urea application is appeared to be more effective for increasing N use efficiency in rice. Singh *et al.* (1993) reported that basal application of whole amount of neem extract coated urea was beneficial for growth and yield of rice. On the other hand, Porval *et al.* (1994) observed that neem extract coated urea applied in split produced significantly higher grain yield than its whole amount was given as basal. Therefore, experiment was undertaken to find out appropriate time of prilled and neem extract coated urea application in rainfed direct seeded rice.

Field experiment was conducted during the *kharif* season of 1997 at Indira Gandhi Agricultural University, Raipur, M.P. The soil was clay loam with pH 6.9, organic carbon 0.65% and available nitrogen, phosphorus and potassium were 255, 20 and 304 kg/ha respectively. The eight treatments comprising of no nitrogen (Control) : application of 100% N as basal (B) through neem extract coated urea; application of 75% N as B and 25% N at panicle initiation (PI) through neem extract coated urea ; application of 50% N as B and 25% N at tillering (T) and 25% N at PI stage through neem extract coated urea; application of 30% N as B through neem extract coated urea and 40% N at T and 30% at PI through prilled urea; application of 30% N as B 40% at T and 30% at PI through prilled urea; application of 75% N as B and 25% at T through prilled and application of 75% N at T and 25% at PI through prilled urea;. The experiment was laidout in randomised block design with three replications. A uniform dose of 60 kg P_2O_5 and 40 kg K_2O per Hectare was given to the crop at sowing. A medium duration high yielding rice variety "Mahamaya" was sown at 20 cm. apart on first week of July. The nitrogen content in grain and straw was analysed by micro kjeldhal method Jackson (1967). The nitrogen use efficiency (kg grains/kg N) was calculated by the subtracting grain yield of unfertilized plot from the fertilized plot and dividing this value by the amount of N applied. The N recovery percentage was obtained by substracting N uptake of unfertilized plot from fertilised plot and dividing the value by amount of N applied. This was then multiplied with 100.

The application of nitrogen in both the forms of urea i.e. prilled urea and neem extract coated urea significantly increased the grain and straw yield. N content and N uptake as compared to control (Table 1). The grain (39.60 q/ha) and straw (63.90 q/ha) yield was found to be maximum where, nitrogen was applied through neem extract coated urea 50% basal and remaining amount in two equal splits at tillering at PI stage. The application of neem extract coated urea 75% basal and 25% at PI stage or application of neem extract coated urea 30% basal and remaining N as prilled urea 40% at tillering and 30% at PI performed similar to that of N applied 50% basal + 25% at tillering + 25% at PI stage. The effective tillers, grains/panicle and test weight remained at par under these treatments. The sig-

Table 1. Yield components, grain yield and N uptake of rainfed direct seed rice as influenced by time of application of prilled and neem extract coated urea.

Treatments	Grain yield (q/ha)	Straw yield (q/ha)	Effective tillers /m²	Grains/ panicle	Test weight (g)	Grain N (%)	Straw N (%)	N uptake(kg/ha)		Total N uptake (kg/ ha)	NUE (kg grain/ kg/N)	N recovery (%)
								Grain	Straw			
Control	16.50	23.60	120	72	26.60	0.80	0.08	13.20	1.88	15.08	-	-
NCU 100% B	35.10	55.20	198	106	29.70	1.18	0.16	41.41	8.83	50.24	18.60	35.16
NCU 75% B + 25% at PI	37.50	60.10	217	114	28.50	1.24	0.17	46.50	10.21	56.71	21.00	41.63
NCU 50% B+ 25% at T +25% at PI	39.60	63.90	219	118	29.80	1.26	0.19	49.90	12.14	62.04	23.10	46.96
NCU 30% B + PU 40% at T + PU 30% at PI	38.00	62.00	214	115	29.57	1.21	0.16	45.98	8.58	55.90	21.50	40.82
PU 30% B + 40% at T + 30% at PI	36.20	56.80	201	109	28.10	1.18	0.14	42.72	7.95	50.67	19.70	35.59
PU 75%B+25% at T	33.75	50.65	187	103	27.20	1.14	0.15	38.47	7.59	46.06	17.25	30.98
PU 75% at T+ 25% at PI	32.60	49.50	182	101	28.30	1.16	0.12	37.81	5.94	43.75	16.10	28.67
CD at 5%	3.1	5.7	7.6	4.3	1.40	0.07	0.04	5.12	2.20	7.25	-	-

NCU - Neem extract coated urea; PU - Prilled urea; PI - Panicle Initiation;
T - Tillering; B - Basal.

nificant increase in productive tillers, grain per panicle and test weight, contributed to increase the grain and straw yield of rice. The application of neem extract coated urea 50% basal + 25% at tillering + 25% at PI stage produced 8.58 per cent and 58.33 per cent higher grain yield than application of prilled urea 30% basal + 40% tillering + 30% at PI stage and control, respectively. On the other hand grain and straw yield and its components were minimum in the treatment receiving prilled urea 75% at tillering and 25% at PI stage.

The application of neem extract coated urea 50% basal + 25% at tillering + 25% at PI stage gave the maximum N content and uptake in grain and straw. The similar affects on grain and straw N content and uptake was observed with the application of neem extract coated urea 30% as basal and prilled urea at tillering and prilled urea 30% at PI stage and neem extract coated urea 75% as basal + 25% at PI stage. The significant increase in grain and straw yield and N content attributed to the increase the N uptake in above treatments. The similar findings have been also reported by Panigrahi and Dixit (1991). The application of neem extract coated urea might have facilitated slow and steady release of N resulting in reduced losses and increased the N uptake. On the other hand prilled urea applied 75% as basal and 25% at tillering and prilled urea 75% applied as tillering and 25% at PI stage might have been subjected to steady losses from the soil affecting crop uptake and grain yield adversely.

The maximum N use efficiency (23.10 kg grain/kg N) and nitrogen recovery (46.96%) was obtained with the application of neem extract coated urea 50% basal, 25% at tillering and 25% at PI stage. However, lowest (16.10 kg grain/kg N) and nitrogen recovery (28.87%) was obtained with the application of prilled urea 75% at tillering and remaining 25% at PI stage.

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