

RESPONSE OF MAIZE TO VARIED RATES AND SPLITS OF NITROGEN

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The efficiency of Urea-N applied in uneven-splits and in briquette form to maize crop was studied in Kharif 1978 and 1979 and in rabi 1979-80. Application of 70 to 120 Kg N/ha encouraged the days to silking by 5 to 7 days. Urea briquettes were not found so effective in the case of maize. Application of 10 Kg N/ha initially or after 45 days was not sufficient. In 110 Kg N/ha in 30-50-30 splits, and in rabi, 120 Kg N/ha in 40-40-40 splits proved the best giving 37.0 and 58.9 q/ha grain yield, and Rs. 4775/ha and Rs. 7711/ha as gross income respectively.

Many workers found that splitting the application of nitrogen at appropriate physiological growth stages of kharif crops increased its production efficiency compared to application of all the quantity of fertilizer N at sowing (Spratt and Chowdhury 1978, De Rajat, 1979). The usual recommendation of nitrogen dose for maize crop is 120kg/ha applicable in three equal splits at sowing, at 25 and 45 days after sowing, being the active vegetative and reproductive growth phases respectively. Whether this rate of nitrogen application can be economised either by varied levels of splitting or by using slow-release urea nitrogen (Prasad, 1978) needs investigation. An experiment was, therefore, planned to ascertain the response of maize to different levels of nitrogen (upto 120 kg/ha) under uneven splitting but at the similar growth stages

MATERIAL AND METHODS

The trial was conducted during *Kharif* seasons of 1978 and 1979 and in *rabi* season of 1979-80 on medium loam soil, rich in nitrogen and available P_2O_5 . The treatments comprised of different levels of urea-N (0-120 kg/ha) applied to three splits at planting at 25 and 45 days after planting. Urea - briquettes @ 40 and 60 kg N/ha were applied only as basal application of 60 kg P_2O_5 and 40 kg K_2O /ha along with the nitrogen of initial stage was done by drilling in furrows below the seed line. Urea-briquettes were applied the same way. The remaining nitrogen of the later stages were applied as side-dressing. The treatments were arranged in a randomised block design with four replications. The maize varieties were Deccan-101 in kharif seasons, and Chandan-3 in rabi season, which were the prevalent varieties of that area in

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respective seasons. The planting was done in the first week of July in Kharif and in the last week of October in rabi keeping a planting distance of 75 x 25 cm. The crop in kharif season was raised under rainfed condition and in rabi season irrigations were applied.

RESULTS AND DISCUSSION

Effect on yield-attributes:- The data presented in Table 1 revealed that urea-N from 70 to 120 kg/ha enhanced the number of cobs/ha significantly and advanced the days to silk by 5 to 7 days over no nitrogen. The urea-briquettes acted better than no nitrogen but, it was not proved superior to split applications.

The other yield attributes were not found significant during the rabi season of 1979-80.

Effect on grain yield :

1. Kharif 1978 and 1979

The application of 70 to 120 Kg N/ha at various splits enhanced the grain yield of Deccan-101 significantly (by 17.9 to 26.4 q/ha) over no nitrogen. Application of 10 Kg N initially or after 45 days of growth was not found sufficient in terms of grain yield (Table 2). The best response was obtained when nitrogen was either applied in 30-50-20 or in 30-50-30 splits. The resultant grain yields were 36.3 and 37.0 q/ha and the gross income were Rs. 4700/ha and Rs. 4775/ha respectively. Both the levels of Urea-briquettes enhanced the yield by 7.2 to 9.8 q/ha over control treatment (10.6 q/ha.)

2. Rabi 1979-80

In rabi season, Chanda-3 variety gave the maximum out turn of 58.9q/ha

(Rs. 7711/ha gross income) under 40-40-40 split application of nitrogen. This was followed by 55.0 q/ha yield under Urea-briquettes applied @ 60 Kg N/ha. The lower dose of urea-briquettes (40 Kg N/ha) was not found effective.

The findings allude that instead of 120 Kg. N/ha (in 40-40-40 splits), 100 Kg N/ha (in 30-50-20 splits) can be followed with more outturn and profit in case of Deccan-101 variety maturing in 100 to 105 days. But in case of Chanda-3 variety (maturing in 115-120 days in rabi) the reverse was true.

In 22 percent of the 77 trials conducted under the INFER programme (Anonymous, 1978) Urea-briquettes gave a significantly higher yield of rice than the best split application. However, in the present study, the maize crop showed a very good response to the split application of nitrogen rather than the urea-briquettes application. In relation to nitrogen utilization, the slow-release phenomenon may not be the substitute of split applications in case of maize crop because of the differential physico-chemical soil conditions than in rice fields.

REFERENCES

- ANONYMOUS 1979. Summary report on the 1st and 2nd international trials on nitrogen fertilizer efficiency in rice, IRRI (Philippines), 36.
- DE RAJAT 1979. Time and method of fertilizer application, *Ferti. News*, 24:21-4.
- PRASAD, R. 1978. Increasing fertilizer nitrogen efficiency with slow-release fertilizers and nitrification inhibitors, *Ferti. News*, 24 25-32
- SPRATT, E. D. and S. L. CHOWDHURY 1978. *Field Crops Research*, 1:103-26.

Table 1
Yield-Attributes as Affected by Various Treatments

Urea-N (Kg/ha)	Split application (kg N/ha)		Plant height (cm)		No. of cobs (000/ha)		Days to silking		
	at sowing	after 45 days	1978	1979	1978	1979	1978	1979	
0	0	0	93	119	106	20	47	73	74
70	10	50	168	166	167	34	54	68	70
80	10	50	171	177	174	37	58	65	70
90	10	50	171	176	174	38	54	66	69
80	20	50	182	177	180	36	50	65	70
90	20	50	162	158	161	42	49	67	71
100	20	50	180	176	178	38	53	66	70
90	30	50	171	182	177	35	55	64	70
100	30	50	171	176	174	36	58	66	69
110	30	50	183	180	182	35	51	65	68
100	40	50	187	186	187	37	58	65	69
110	40	50	175	189	182	37	53	65	69
120	40	50	190	193	192	36	56	65	68
120	40	40	195	187	186	33	52	65	69
40	40	0	152	127	140	24	48	70	73
60	60	0	157	120	139	27	56	67	72
C. D. (5%)			19.0	17.1		8.2	NS	2.5	1.33

Note :- The yield-attributes were not significant in 1979-80, (rabi season)

Table 2
Yield of maize as affected by various treatments.

Urea-N (Kg/ha)	Split application (Kg/ha)		Maize yield (q/ha)		Mean	Maize yield (q/ha) Rabi 1978-80	Gross - Income (Rs./ha) 1978 & 1979 (Mean)
	at sowing	after 45 days	1978	1879			
0	0	0	4.4	16.8	10.6	40.6	1431
70	10	50	20.3	37.0	28.6	48.7	3721
80	10	50	23.4	40.6	32.0	46.0	4160
90	10	50	25.3	41.3	33.3	52.5	4315
80	20	50	21.4	35.6	28.5	48.9	3677
90	20	50	24.6	39.0	31.8	52.9	4113
100	20	50	24.8	40.4	32.6	49.7	4201
90	30	50	21.5	39.3	30.4	51.9	3924
100	30	50	26.2	46.5	36.3	51.9	4700
110	30	50	27.5	46.5	37.0	49.8	4775
100	40	50	24.8	44.5	34.6	51.0	4471
110	40	50	23.5	40.6	32.0	51.6	4100
120	40	50	25.5	43.8	34.6	51.6	4431
120	40	40	29.9	40.0	35.0	58.9	4485
40	40	0	8.4	27.2	17.8	41.3	2228
60	60	0	14.9	27.9	20.4	55.0	2498
C. D. (5%)			5.9	6.55			7.69

Note : The last two treatments include urea-briquettes only.