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Calcium Ammonium Nitrate - A Fertilizer to Paddy

by

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Introduction: Calcium ammonium nitrate is one of the new fertilizers manufactured on large scale in India. Chemically it is a homogenous mixture of ammonium nitrate with lime chiefly as calcium carbonate. It contains 20·5% nitrogen (half the quantity is in the nitrate form and the balance in the ammonical form) and 36% calcium carbonate. To assess the comparative efficacy of the new fertilizer with ammonium sulphate and urea, an experiment was conducted in different research stations of the State and the results obtained at Coimbatore are recorded in this paper.

Review of Literature: The application of calcium ammonium nitrate neither adds acidity nor alkalinity to the soil but supplements the loss of calcium that is being removed in large quantities from the soil every year by different crops (Nijhawan, 1960). Prasad (1958) has reported that trials conducted by the Kisan Khad Scheme of India on various crops go to show that calcium ammonium nitrate compares favourably with ammonium sulphate. Late application of nitrochalk as a top dressing may raise the paddy yield more than its application as a base manure (Cku, 1967). Sources of Nitrogen such as calcium ammonium nitrate, urea, ammonium sulphate did not differ in their influence on yield of rice (Wells, 1964).

Material and Methods: The experiment was conducted at the Paddy Breeding Station, Coimbatore during 1962—'65 with seven treatments viz.,

1. 5,000 lb. green leaves + 150 lb. superphosphate per acre (Contracts).
2. Tr. 1 + 20 lb. N. as Calcium ammonium nitrate.
3. Tr. 1 + 30 lb. N. as " " "
4. Tr. 1 + 20 lb. N. as Ammonium sulphate.
5. Tr. 1 + 30 lb. N. as " " "
6. Tr. 1 + 20 lb. N. as Urea.
7. Tr. 1 + 30 lb. N. as "

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The layout was randomised block replicated four times and the varieties used were Co. 25 in *Samba* season (July–August to February–March) and TKM. 6 in *Navarai* season (January – to April–May). Green leaf and Superphosphate were applied as basal dressing and the nitrogenous fertilizers were applied as top dressing, 20 days after planting in the case of *Navarai* crop and 50 days after planting in the case of *Samba* crop.

Results: The yield data of grain and straw were analysed statistically and it was found that in the case of grain yield the treatment differences were not significant in all the three *Samba* seasons and 1962—'63 and 1964—'65 *Navarai* seasons. In 1963—'64 *Navarai* season, Tr. 5 (30 lb N. as ammonium sulphate) recorded the highest grain yield and it was on par with Tr. 4 (20 lb N. as ammonium sulphate), Tr. 7 (30 lb N. as urea)., Tr. 3 (30 lb N. as calcium ammonium nitrate) and Tr. 6 (20 lb N. as urea). Since the treatment differences were not significant in all the *Samba* seasons, pooled analyis was done only for the data of *Navarai* seasons. Homogenity of errors was first tested and it was found that the errors were heterogenous in nature and hence the weighted analysis was carried out. Since the interaction between season and treatments was found to be insignificant the treatment means were compared. The summary of results are presented in Table I, It is seen that the difference in yield among the three kinds of fertilizers is negligible at equal level of N, the difference being 2·6% at 30 lb N. and 4·4% at 40 lb N.

As regards straw yield, the treatment differences were significant only in 1962—'63 *Samba* and *Navarai* seasons and the results showed that 30 lb N. in the form of all the fertilizers and 20 lb N. in the form of ammonium sulphate and urea yielded on par with one another (Table II).

The data on tiller counts taken for 20 plants per plot showed that there was no difference among treatments, the number of tillers per plant (8) being the same in all the treatments.

Discussion and Conclusion: The results of the trial conducted for six seasons at the Paddy Breeding Station, Coimbatore have shown that the treatment differences were not significant in five seasons in respect of grain and four seasons in respect of straw yield. There was no significant difference in yield among the fertilizers at 30 lb N. level even during the season in which the results satisfied the 'F' test. The results obtained from the Rice Research Stations, Tirurkuppam and Ambasamudram have also indicated that at 30 lb N. level the difference in yield among the various fertilizers is not significant.

TABLE I

Summary of Results—Grain Yield

(a) Samba Season (July, August to February, March)

Year	Particulars	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5	Tr. 6	Tr. 7	GM	SE	'F' Test	C D (P : 0·05)
1962–'63	Per cent on Control	100·0	111·2	106·7	111 6	113 7	110·8	118·1	110·4	4·3	Not satisfied	
1963–'64	,, ,,	100·0	108·5	110 4	110·1	110·6	110·4	111·3	108 8	4·1	,, ,,	
1964–'65	,, ,,	100·0	114·3	110·0	107·3	112·7	102·7	115·8	109 0	5·3	,, ,,	

(b) Navarai Season (January–April, May)

1962–'63	,, ,,	100·0	106·3	108·9	111·3	112·7	117·9	113·6	109 8	5·9	Not satisfied	
1963–'64	,, ,,	100·0	106·2	108·7	111·8	113 0	107·3	109·0	108·0	2·3	Satisfied	6·7
1964–'65	,, ,,	100·0	102·1	108·8	107·5	106·5	106·0	108·7	106·5	2·3	Not satis fied	

Conclusion : 1963–'64 Navarai Season Tr. 5, 4, 7, 3, 6, 2, 1

Treatment means of Navarai seasons

Particulars	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5	Tr. 6	Tr. 7
Yield in kg/Hectare	3592	3821	3898	3977	3990	3980	3983
Per cent on Control	100·0	106·4	108 5	110·7	111·1	110 8	110 9

TABLE II

Summary of Results—Straw yield

1962–'63 Samba Season

Particulars	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5	Tr. 6	Tr. 7	GM	SE	'F' Test	C D P : 0·05
Yield in kg. per hectare	5191	5439	6546	6642	6817	6563	6686	6270	352·5	Satisfied	1047
Per cent on Control	100·0	104·7	126·0	127·8	131·2	126·3	128·7	120·7	8 5	...	25 3

Conclusion : Tr. 5, 7, 4, 6, 3 2, 1

1962–'63 Navarai Season

Yield in kg. per hectare	3972	4103	4347	5293	5513	4199	4836	4609	380·7	Satisfied	1135
Per cent on Control	100·0	103·5	109·4	138·3	133·3	105 7	120·5	125·9	10·4	...	31·0

Conclusion : Tr. 5, 4, 7, 3, 6, 2, 1

Summary: The experiment was conducted to assess the comparative efficacy of calcium ammonium nitrate with ammonium sulphate and urea at 20 lb N. and 30 lb N. level over no nitrogen. It was found that there was no significant difference in yield among the different fertilizers especially at 30 lb N. On a comparison of the cost these three kinds of fertilizers to supply 30 lb N. per aere, it is seen that there is not much difference in the same, the cost being Rs. 24, Rs. 25/- and Rs. 20/- per acre for ammonium sulphate, calcium ammonium nitrate and urea respectively. Hence calcium ammonium nitrate can be used as a straight nitrogenous fertilizer as top dressing for paddy in the State with equal effect of ammonium sulphate.

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