meeting of All India Co-ordinated Research Project on Palms. ECT X MDY was released as VHC 2 (Veppankulam Hybrid Coconut 2) by the State Variety Release Committee of Tamil Nadu in 1988 The morphological and productive characters are enclosed (Table 7).

REFERENCES

LIYANAGE, D.V. 1956. Intra-specific hybrids in coconut. *Coconut Res. Inst Ceylon Bull.* No. 7

MEUNIER, J., SANGARE, A., LESAINT, J.P. and BONNOT, F. 1984. Genetic analysis of yield characters in some hybrids of coconut (*Cocos nucifera L.*) *Oleagineux.* 39 (12) : 581 - 86.

PATEL, J.S. 1937, *Coconut Breeding. Proc. Assoc. Econ. Biol.* 5 : 1 - 16.

RAMANATHAN, T. LOUIS, H.I. and NAVAKODI, K. 1982. High Yielding VHC - 1 coconut hybrid Proc. PLACROSYM V p. 125. - 130.

SATYABALAN, K. 1984. Life history of the coconut palm on the west coast of India - A study. *Indian coconut J.*, 15 : 3 - 11.

https://doi.org/10.29321/MAJ.10.A01946

Madras Agric. J. 77 (5 & 6): 216–220 May–June 1990

N USE EFFICIENCY OF RICE AS INFLUENCED BY MODIFIED FORMS OF UREA AND $ZNSO_4$ APPLICATION IN VERTISOL

P. SAVITHRI AND K.M. RAMANATHAN

Dept of Soil Science and Agricultural Chemistry

Tamil Nadu Agricultural University Coimbatore 641 003

ABSTRACT

Field experiments were conducted during Kuruvai 1986 in soils of Adanur, Kalathur and Sikar series with modified forms of urea and soil application of $ZnSo_4$. Among different modified forms of ures, viz., USG, NCU, CTU and mudball urea, the performance of point placed USG was more pronounced in the fine textured soils of Adanur and Kalathur series rather than in the medium textured soils of Sikar series as shown by the trend of values obtained for rice yield, apparent N use efficiency, uptake of N and available N content of the soils.

KEY WORDS : Rice, Urea forms, N Use efficiency, N uptake.

The utilisation of applied N by rice under submerged conditions is estimated to be low since the applied N particularly in inorganic form is very much vulnerable for leaching, volatilisation, denitrification and surface run off losses. Any attempt to increase the N use efficiency is advantageous both to the farmers as well as to the nation, particularly in saving the energy resources of the country. Having already identified the low N status of the Cauvery delta as one of the constrains in rice production, an attempt was made in the present investigation in the performance of different modified forms of urea in major rice growing soil series viz., Adanur,

Kalathur (Entic chromustert) and Sikar series (Typic chromustert) during Kuruvai 1986. To assess the influence of limiting micro nutrient of this zone viz. Zinc on N use efficiency, treatment with $ZnSo_4$ application was also included.

MATERIALS AND METHODS

The soils of the experimental fields varied in texture from clay loam to sandy loam. The available nutrient status, E.C. and pH of the soil of the experimental fields are furnished below.

	Adanur: TRRI farm,	Kalathur: TRRI farm,	Sikar: State Seed Farm.
Location	Aduthurai	Aduthurai	Moongilkudi
EC(m.mhos/cm)	0.8	0.3	0.5
Available N (kg/ha)	308	326	169
Available P (kg/ha)	70	34	12.4
Available K (kg/ha)	235	230	147 K (kg/ha)
DTPA-Zn (ppm)	1.2	1.4	0.67
CEC meq/100g	20.0	30.6	19.8
Clay (%)	25.0	35.0	29.5
Organic carbon %	0.5	0.5	0.4

Field experiments were conducted during Kuruvai (June-September) in 1986. The treatments adopted are presented in Table 1. The rice varieties tried were ADT 36 and TKM 9. An uniform dose of N, P_2O_5 and K_2O at 75:37.5:37.5 kg/ha was added to all the treatments except control. Nitrogen was added in split dose viz. 50% at basal, 25% at tillering and 25% at panicle initiation stage. Both neam cake coated urea and coal tar coated urea were broadcasted, while USG and mudball urea were placed at 10 cm depth at planting at the rate of one per four hills. Entire quantity of N was applied as basal for USG and mudball treatments, while prilled urea was used for top dressing for the rest of the treatments. For T6, prilled urea was applied along with 25 kg $ZnSo_4$/ ha as basal application. Full quantity of P and K were also applied as basal. The experiment was laid out in RBD replicated thrice. Besides recording the grain and straw yield, apparent N use efficiency (kg grain/kg N added) was worked out. Soil samples collected at tillering and harvest stages were analysed for alkaline permanganate N (Subbiah and Asija, 1956) and available Zn using 0.005 M DTPA (Lindsay and Norvell, 1978). Grain and straw samples were analysed for N content by taking diacid extract and uptake of N by the crop was computed (Jackson, 1973).

RESULTS AND DISCUSSIONS

A perusal of the data on the grain yield (Table 1) clearly depicted the superiority of USG over other modified and ordinary forms of urea in increasing the grain yield. Though the rest of the modified forms of urea recorded more yield than prilled urea, the differences were not wide enough to attain the level of statistical significance and were on par with ordinary urea in all the experiments. The

results reported by Roy (1983) and Savant *et al.* (1983) give ample evidence for the trend of results obtained in the present investigation. The textural variations observed among different series would have led to indifferential behaviour of USG in these series, since the percent increase for USG application in Sikar series was 8.3% as against 15.7 and 31.3% which were associated with Adanur and Kalathur series respectively. The results obtained were encouraging for the application of USG, particularly for Kalathur and Adanur series soils having fine textured soils, while for coarse textured soils of Sikar series, the tune of increase was of lesser magnitude, probably the leaching loss in the percolation water would have been more. Velu and Ramanathan (1985) also observed similar findings for Adanur series.

In spite of the deficient available Zn status in all the soils of experimentation fields as per the critical limit fixed specifically for cauvery delta soils, the yield increase was substantial in Sikar series only, probably due to the very low Zn status of the soils (0.67 ppm). The grain yield increase for $ZnSo_4$ application ranged from 4 to 6 q/ha. These results clearly reveal that greater responses in terms of increased yield could be expected with the magnitude of deficiency in the Zn status in conformity with the level of limiting nutrients.

Apparent N use efficiency also confirmed the positive influence of USG on grain yield by supplying N to the crop in a phased manner. This was also confirmed by the increased available N content of the soil. Sikar series also recorded the lowest available soil N. The increased values recorded by $ZnSo_4$ treatment again indicated the role of Zn which was deficient for the proper utilisation of added N particularly under submerged condition.

Availability of N did not vary significantly for different forms of urea at both stages except at harvest and tillering in Adanur and Sikar series respectively (Table 2). In these two instances, available N content was significantly high only in USG treatment as compared to prilled urea in spite of high quantity removed by the crop in this treatment as reflected by the high N uptake values. This indicates that the residual effect due to USG application could be greater as compared to other forms of urea.

Eventhough grain yield was significantly increased by USG application in all the soil series, N uptake in grain was only numerically higher in this treatment (Table 3). However when the total N uptake by the whole crop was considered, only in Kalathur series, USG application excelled other forms in an unique way than the other two series. In Sikar series, N up take was substantially increased by $ZnSo_4$ application indicating the necessity of correcting Zn deficiency to maximise the N use efficiency of added nitrogenous fertilizer besides increasing the yield of rice.

The study thus revealed the usefulness of modified forms of urea, USG and NCU in particular, for the major soil series of Cauvery delta zone to be more advantageous for the fine textured soil series. Also the necessity of the application of limiting micronutrient viz., Zn was also felt, particularly for the soils having DTPA Zn < 1.0 ppm.

Table 1. Effect of modified forms of urea and $ZnSo_4$ application on yield of rice in different soil series during Kuruvai (Kg/ha)

Treatments	Adanur ADT 36		Kalathur ADT 36		Sikar TKM 9	
	Grain	Straw	Grain	Straw	Grain	Straw
1. Coal tar coated urea	5915	6659	4128	4746	4242	4821
2.Neem coated urea	5892	7243	4369	4746	4439	4626
3. Prilled urea	5844	6541	4222	4531	4129	4449
4. Urea super granule	6767	7528	5543	5581	4470	5045
5. Mud ball urea	5703	6072	4718	5178	4288	4613
6. NPK + 25Kg $ZnSo_4$/ha	6247	6903	4836	5106	4607	4732
7. Control	3647	5110	2004	2647	2144	3050
CD	651	933	865	831	290	937

Table 2. Effect of modified forms of urea and $ZnSo_4$ application on available N content and apparent N use efficiency in major soil series.

Treatments	Available N Kg/ha						Apparent N use efficiency		
	Adanur		Kalathur		Sikar		Kg grain / Kg N addition		
	Tillering	Harvest	Tillering	Harvest	Tillering	Harvest	Adanur	Kalathur	Sikar
1. Coal tar coated urea	262	321	237	204	285	321	30.3	28.3	27.4
2. Neem coated urea	240	301	253	248	310	301	29.9	31.5	30.6
3. Prilled urea	284	257	252	207	289	257	29.3	29.6	26.4
4. Urea super granule	244	323	248	215	347	323	41.6	47.2	31.0
5. Mud ball urea	299	321	224	204	319	321	27.5	36.2	28.6
6. NPK + 25Kg $ZnSo_4$/ha	288	303	205	228	323	303	34.7	37.8	32.8
7. Control	267	305	224	221	350	305	-	-	-
CD	N.S	40	N.S	N.S	49	N.S	-	-	-

Table 3. Effect of modified forms of urea and $ZnSo_4$ application on N uptake by rice in different soil series. (Kg/ha)

	Adanur ADT 36			Kalathur ADT 36			Sikar TKM 9		
	Grain	Straw	Total	Grain	Straw	Total	Grain	Straw	Total
1. Coal tar coated urea	53.3	30.1	83.4	46.9	27.6	74.5	44.0	29.3	73.3
2. Neem coated urea	57.7	30.3	88.0	47.6	23.5	71.1	45.9	25.9	71.8
3. Prilled urea	55.6	28.5	84.1	45.3	22.6	67.8	45.9	22.4	68.3
4. Urea super granule	58.5	29.2	87.7	55.4	27.8	83.2	43.3	23.5	66.8
5. Mud ball urea	46.9	31.2	78.1	51.9	22.5	74.4	40.4	25.3	65.7

NPK + 25Kg $ZnSo_4$/ha	54.1	29.9	94.0	47.9	26.1	74.0	46.5	31.0	77.5
Control	34.7	26.0	60.7	19.5	17.9	37.4	23.0	19.5	42.5
CD	7.8	N.S	14.8	12.3	N.S	8.3	5.4	N.S	17.1

REFERENCES

JACKSON, M.L. 1973. *Soil Chemical Analysis.* Prentice Hall India (P) Ltd., New Delhi.

LINDSAY, W.L. and NORVELL, W.A. 1978. Development of DTPA soil test for Zn, Fe and Cu. *Soil Sci. Soc. Amer. Proc.* 42 : 421-428.

POY, B. 1983. Nitroge use efficiency in transplanted rice with point placement method. *Oryza*, 22 : 53-56.

SAVANT, N.K., CRASWELL, E.T. and DIAMOND, R.E. 1983. Use of urea super granules for wetland rice - a review. *Fert. News.*, 28(8); 27 - 35.

SUBBIAH, B.V. and ASIJA, G.L. 1956. A rapid procedure for the estimation of available N in soils. *Curr. Sci.*, 25 : 259 - 260.

VELU, V. and RAMATHAN, K.M. 1985. N sources for lowland rice, IRRN, 10(2); 22.

Madras Agric. J. 77 (5 & 6): 220–224 May–June 1990

EFFECT OF LOW LIGHT INTENSITY ON GROWTH AND PRODUCTIVITY OF IRRIGATED RICE (*Oryza sativa L.*) GROWN IN CAUVERY DELTA REGION

M. THANGARAJ [1] AND V. SIVASUBRAMANIAN [2]

Tamil Nadu Rice Research Institute, Aduthurai 612 101

ABSTRACT

Irrespective of varieties, low light intensity significantly increased the plant height, leaf area index (LAI) and total leaf chlorophyll content while significant reduction was evident in respect of total dry matter, panicle number, spikelet number, filled grains and grain yield. It was considered that low light intensity during samba/thaladi season, appearing particularly from panicle initiation to harvest was an important constraint for higher productivity since yields as low as 3.19 to 4.28 t/ha were recorded with varieties which yielded 5.00 to 5.84 t/ha under normal light intensity conditions. Among several varieties, Ponni appeared to be more tolerant with least reduction in grain yield (15.9%) under low light intensities thus more suitable for samba/thaladi season followed by White Ponni, Co 43 and IR 20.

KEY WORDS : Rice, Low light, Productivity.

In Cauvery deltaic region, rice is mostly grown during North East monsoon season (Samba/Thaladi) starting from August-September to December-January. During these seasons, low light intensity coincides with the reproductive and ripening phases resulting in poor yield. The present study was therefore aimed at elucidating information on the effect of low light intensity on growth and productivity in certain genotypes of rice.

MATERIALS AND METHODS

The experiment was conducted at Tamil Nadu Rice Research Institute, Aduthurai during 1986. Four rice varieties commonly grown during samba/thaladi seasons *Viz.*, IR 20, Co 43, Ponni and White Ponni were studied in a strip plot design with six replications. Thrity day old seedlings were transplanted in 5 X 4 m plots with a spacing of 20 X 10 cm. The plots were artificially shaded by using two

1. Professor of Crop Physiology.

2. Professor of Agricultural Botany, Annamalai University.