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COMPARATIVE EFFICIENCY OF DIFFERENT SOURCES OF NITROGEN ON RICE IN CLAYLOAM SOILS OF CAUVERY DELTA

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ABSTRACT

Field experiments were conducted in clayloam soils of Cauvery delta to evaluate the efficiency of different N sources on rice during kuruvai and thaladi seasons of 1984 and 1985. Application of lac coated urea was beneficial in recording higher grain yield, N use efficiency as well as N uptake by the crop over ordinary urea during kuruvai season. Application of green manure during thaladi season needed higher dose of fertilizer N at planting to get higher yield of rice. Application of Urea super granule recorded the highest N use efficiency during thaladi season. The uptake of N by the crop was higher with the use of urea super granule, lac coated urea as well as green manure + urea.

KEY WORDS: Nitrogen sources, N use efficiency, N uptake, Rice.

It has always been a problem to raise the N use efficiency in rice soils and to increase the efficiency of absorbed N for grain production. Suitable and effective use of N is required to increase the rice yield from the view point of both economy as well as world's energy resources. The efficiency of added N under submerged condition being notoriously low due to losses through leaching, volatilization and denitrification etc., any attempt to increase the N use efficiency for rice is sure to bring rich dividend to the farmers. With this objective, the efficiency of different sources of N viz; Lac coated Urea (LCU), Neem cake coated Urea (NCU), Coaltar coated Urea (CTU), Urea super granule (USG) and green manure + urea were compared with ordinary prilled urea at the Tamil Nadu Rice Research Institute, Aduthurai during kuruvai (June-Sept) and thaladi (Oct-Jan) seasons of 1984 and 1985 and the results are presented.

MATERIALS AND METHODS

The soil of the experimental field was clayloam (Entic chromustert) with a pH 7.4, EC 0.3 m.mhos/cm, available N (alkaline $KMnO_4$ -N) 110 ppm, available P(Olsen) 9.7 ppm,

available K (NN NH_4 OAC extractable) 80 ppm and organic carbon 0.75%. An uniform dose of N (90 kg N/ha) was adopted for all the N sources tried and 25% reduced dose (67.5 kg N/ha) was also adopted for the modified urea forms. The treatment CTU was included from thaladi '84 onwards and USG during thaladi'85 season only. Rice varieties ADT 36 and IR 20 were used as test crops during kuruvai and thaladi seasons respectively. Green manure + urea combination was tried in 1:1 proportion on equal N basis, each to supply 45 kg N/ha. Glyricidia was used as green manure and was applied one week before transplanting and the balance of nitrogen was applied both as all basal and in splits. Nitrogen was applied in split doses **viz.**, 50% basal, 25% at tillering and 25% at panicle initiation stages. All the coated forms of urea were broadcasted while that of USG was point placed at 10 cm depth at planting. A common dose of 45 kg each of P_2O_5 and K_2O/ha was imposed for all the treatments. The experiment was laid out in RBD replicated twice. The yield of grain at harvest was recorded. The grain and straw samples collected at harvest were analysed for N content and the total uptake of N by the crop was computed.

RESULTS AND DISCUSSION

The grain yield of rice under different sources of N is presented in the Table. The results indicated that the application of LCU was found to record significantly higher grain yield than ordinary urea during kuruvai season. Slow dissolution of LCU could have prolonged the nitrogen availability for a longer period enabling higher yield of rice. The superiority of LCU over ordinary urea has been reported earlier by Sahu and Pal (1983), Rana **et al.** (1984) among others. The performance of NCU and CTU was on par with ordinary urea in all the four experiments conducted as was also reported by Biswas and Bassi (1983), Rabindra **et al.** (1983) and Velu and Ramanathan (1985). Application of green manure + urea recorded significantly higher grain yield than ordinary urea during kuruvai'85 season and was on par during the other seasons indicating that green manure could be used as an efficient substitute for chemical N fertilizer as observed by Khind **et al.** (1983), Singh (1984) and Soundarapandian **et al.** (1986). The performance of USG, tried during thaladi'85 crop season was encouraging as was reported by Savant **et al.** (1983) and Velu and Ramanath (1985).

The total uptake of N by the crop is presented in Table. Significantly higher uptake of N was observed in LCU all basal (124.1 kg/ha) and LCU split (98.7 kg/ha) as well as green manure + split application of urea (99.2 kg/ha) over ordinary urea during kuruvai seasons of 1984 and '85 respectively. During thaladi seasons, the variation in the uptake of N for the different coated forms of urea was not significant. But in the case of USG application during thaladi'85, the highest uptake of 97.5 kg N/ha was recorded and was superior to ordinary urea. So also in the case of reduced dose (67.5 kg N/ha) of USG and LCU, the uptake of N by the crop was on par with that of 90 kg N/ha of ordinary urea indicating higher utilization of fertilizer N applied as USG or LCU ultimately reflecting on the higher grain yield of rice over ordinary urea.

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