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**RESEARCH ARTICLE**

# DEMONSTRATION OF STCR-IPNS BASED FERTILISER PRESCRIPTION FOR RICE IN SODIC SOIL

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**ABSTRACT**

Balanced fertilization using the right kind and amount of fertilisers is made possible using Soil Test Crop Response (STCR) studies. The application of fertiliser by farmers in the field without understanding the soil fertility and nutrient requirement of crops results in negative impact on the soil and crops either through nutrient shortage or toxicity due to excessive or inadequate fertiliser use. Therefore site-specific nutrient management strategies have to be adopted to sustain soil health and to maintain soil fertility in sodic soil. A demonstration trial on STCR-IPNS was conducted during samba season during 2021-2022 in Alathur soil series in Anbil Dharmalingam Agrl. College and Research Institute farm in field No A5a of Trichy with rice variety TRY 3. The result revealed that STCR-IPNS based fertilizer prescription recorded the highest grain yield (5150 kg $ha^{-1}$) and maintenance of soil fertility. The yield increase in STCR-IPNS (5150 kg $ha^{-1}$) over blanket fertilizer recommendation and farmer's fertilization practice was 16.0 and 24.7% respectively. The data on post-harvest soil fertility revealed that the higher available N (235kg $ha^{-1}$), P (24.5kg $ha^{-1}$) and K (273kg $ha^{-1}$) status was observed in STCR-IPNS followed by blanket recommendation and farmers fertilization practice. To get higher yield and soil fertility maintenance and to avoid excess and under usage of fertilizer, the STCR –IPNS fertilizer prescription is highly essential.



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# INTRODUCTION

Tamil Nadu occupies 4.7 lakh ha of salt affected soils, in which 3.0 lakh ha area under inland and 1.7 lakh ha under coastal. Among the inland salt affected soils, 2.0 lakh ha occupy alkalinity and 1.0 lakh ha under salinity. In Trichirappalli 18,155 ha comes under alkalinity problem. The rice in Tamil Nadu under sodic soil is much lower than the other prominent rice producing states. This might be due to unbalanced nutrient management which is one of the important reasons for low productivity in sodic soil. Balanced NPK fertilization has received considerable attention in India (Ghosh *et al*., 2004, Singh *et al*., 2008). Sodic soil reclamation, which essentially aims to replace the sodium by calcium on exchange sites and the subsequent removal of exchanged sodium by the application of good quality water, is often context-specific and depends on the availability of amendments and the crops to be grown. Declining soil fertility and mismanagement of plant nutrients have made this task more difficult. Soil testing helps the farmers to use fertilizers according to needs of crop. Fertilizer use for targeted yield (Ramamoorthy *et al.,* 1967) is an approach which takes into account the crop needs and nutrients present in the soil. In the intensive agriculture system, integrated fertilizer recommendation is an urgent need since it balances soil and applied nutrients from inorganic as well as organic sources to balance nutrition of crops and maintenance of soil health (Subba Rao and Reddy 2009).

# MATERIALS AND METHODS

To demonstrate the benefits of STCR-IPNS technology, field demonstrations were conducted during samba season during 2021-2022, demonstrationtrial has been conducted Alathur soil series in ADAC&RI farm in field No A5a during samba season of Trichy with rice variety TRY 3 for demonstrating the benefits of STCR-IPNS technology. The following fertiliser prescription equations pertaining to Alathur soil series were used for calculating fertilizer doses for STCR-IPNS treatment.

**Fertiliser Prescription Equations ( Alathur soil series)**

**$FN = 6.08T - 0.72\ SN - 0.80\ ON$**
**$FP_2O_5 = 1.64T - 1.55\ SP - 0.69\ OP$**
**$FK_2O = 2.96T - 0.39SK - 0.73\ OK$**

where, FN, $FP_2O_5$ and $FK_2O$ are fertilizer N, $P_2O_5$ and $K_2O$ in kg $ha^{-1}$ respectively; T is the yield target in q $ha^{-1}$; SN, SP and SK respectively are alkaline $KMnO_4$-N,Olsen-P and $NH_4OAc$-K in kg $ha^{-1}$and ON,OP and OK are the quantities of N, P and K in kg $ha^{-1}$supplied through FYM.

**Table 1. Grain yield and post -harvest soil fertility status- Samba rice (2021)**

| S.No | Treatments | Nutrients added (kg ha$^{-1}$) | | | Grain yield (t ha$^{-1}$) | Post-harvest soil fertility (kg ha$^{-1}$) | | |
|---|---|---|---|---|---|---|---|---|
| | | FN | $FP_2O_5$ | $FK_2O$ | | SN | SP | SK |
| 1 | Blanket recommendation (100 % NPK+ FYM 12.5t ha$^{-1}$) | 150 | 50 | 50 | 4.44 | 204 | 20.3 | 235 |
| 2 | STCR-IPNS- 5.5 t ha$^{-1}$ (NPK + FYM 12.5t ha$^{-1}$) | 160 | 49 | 48 | 5.15 | 212 | 22.4 | 240 |
| 3 | Farmer's Fertilization Practice (NPK + FYM 3.0t ha$^{-1}$) | 110 | 60 | 40 | 4.13 | 178 | 17.6 | 202 |

Initial Soil Test values: SN, SP &SK: 190:19& 220 kg ha$^{-1}$

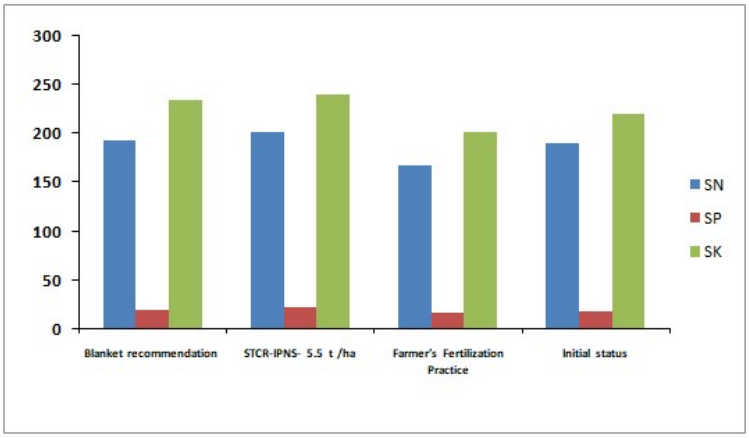


**Fig. 1. Post-harvest soil fertility status (Samba 2021)**

The rice variety TRY -3 consisting of three treatments viz., Blanket recommendation (150:50:50), The soil is low in available nitrogen (190 kg ha$^{-1}$), medium in available phosphorus (19.0 kg ha$^{-1}$) and available potassium (220kg ha$^{-1}$). Based on the initial soil test values, the fertiliser N, $P_2O_5$ and $K_2O$ doses were calculated using the refined fertiliser prescription equations developed. For STCR-IPNS, FYM @ 12.5 t ha$^{-1}$ (Moisture -30%, with total N:P:K content of 0.60:0.30: 0.50 per cent) was applied and the nutrients supplied by FYM was subtracted and N, $P_2O_5$ and $K_2O$ doses were adjusted accordingly. Twenty five percent of recommended N and K dose and 100 per cent of recommended dose of $P_2O_5$ were applied basally.

$T_1$- Blanket recommendation-150:50:50 NPK kg/ha
$T_2$ - STCR-IPNS for sodic soil of yield target of 5.5 t/ha along with FYM @12.5t/ha.
$T_3$- Farmer's Fertilization practice -110:60:40 NPK kg/ha
Grain yield was recorded and post-harvest soil samples were analysed for available N, P and K status.

# RESULTS AND DISCUSSION

During samba season, the grain yield ranged from 5.15 to 4.13t ha$^{-1}$ and the highest yield of 5.15 t/ha was recorded in STCR-IPNS –5.5 t ha$^{-1}$ (Table 1). The yield increase in STCR-IPNS treatment over blanket and Farmer's practice was 16.0 and 24.7 per cent respectively. The data on post-harvest soil fertility revealed that the higher available N (212kg ha$^{-1}$), P (22.4kg ha$^{-1}$) and K (240 kg ha$^{-1}$) status was observed in STCR-IPNS followed by blanket recommendation and farmers fertilization practice. As compared to initial nutrient status, there was depletion of available N, P and K in farmer's fertilization practice and it extend to the tune of 22, 3.4 and 18 kg ha$^{-1}$ respectively while slight built-up was observed in STCR-IPNS treatment. Ghosh *et al.* (2004) showed importance of balanced fertilization for maintaining soil health and sustainable agriculture in problematic soils. State recommendations (SR) and farmers' practice (FP) clearly found that the FP even though contained higher levels of N or P, gave lower yields thus advocating the superiority of economic performance of STCR-IPNS technology over farmers' practice and there is a build up of post -harvest soil fertility in STCR-IPNS (Fig 1). The over view of the field trial indicated that STCR-IPNS treatment excelled when compared to blanket and farmers practice in terms of yield and soil fertility maintenance.

# CONCLUSION

The reclamation of sodic soils using gypsum is well understood and once the nutrient requirement for a given yield target is known, the fertilizer requirement can be calculated taking into account the efficiency of Soil and fertilizer nutrients particularly in sodic soils. Hence Soil Test Crop Response-based fertilizer prescriptions under integrated Plant Nutrition System (STCR-IPNS for 6 tonnes/ha) *ie* application of fertilizer N, $P_2O_5$ and $K_2O$ based on initial soil test values with FYM @12.5 tonnes/ha recorded the highest yield and maintain the soil fertility.

# REFERENCES

Ghosh PK, Bandopadhyay KK, Misra AK and Rao AS 2004. Balanced fertilization for maintaining soil health and sustainable agriculture. *Fertiliser News*49(4): 13-24.

Ramamoorthy B, Narsimhan RL and Dinesh RS 1967. Fertilizer application for specific yield targets of Sonora 64. *Indian Farming*17(5): 43-44.

Singh VK, Tiwari R, Gill MS, Sharma SK, Tiwari KN, Dwivedi BS, Shukla AK and Mishra PP. 2008. Economic viability of site-specific nutrient management in rice-wheat cropping. *Better Crops- India*92(3): 28-30.

Subba Rao A and Reddy KS. 2009. Implications of soil fertility to meet future demand: Indian scenario. *In: Proceedings of the IPI-OUAT-IPNI- International Symposium on Potassium Role and Benefits in Improving Nutrient Management for Food Production, Quality and Reduced Environmental Damages*, 5-7 November 2009, Vol 1, Edited Papers, (MS Brar and SS Mukhopadhyay, eds), IPI, Horgen, Switzerland and IPNI, Norcross, USA**,** pp109-135.

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