An Asian Journal of Soil Science, Vol. 3 No. 2 : 326-328 (December-2008)

Soil test crop response (STCR) - fertilizer nitrogen recommendations for an yield target of 70 qha^{-1} of rice

S. SRINIVASAN AND A. ANGAYARKANNI

Accepted : *November, 2008*

See end of the article for authors' affiliations

Correspondence to :

S. SRINIVASAN
Department of Soil Science and Agricultural Chemistry, Faculty of Agriculture, Annamalai University, ANNAMALAINAGAR (T.N.) INDIA

ABSTRACT

A field experiment was carried out at an Experimental Farm, Annamalai University, Annamalainagar. The needed variation in soil fertility was deliberately created by dividing the field into 4 equal strips *viz*., I, II, III and IV. An exhaust crop of rice cv. ADT- 43 was grown to enable through interaction between the nutrients in soil and added fertilizers. After the harvest, each gradient strip was divided into 24 plots. Treatments consisted of 5 levels of N(0, 50, 100, 150 & 200 kg ha^{-1}), 4 levels of P_2O_5 (0, 30, 60 and 90 kg ha^{-1}), 3 levels of K_2O (0, 40 and 80 kg ha^{-1}), 2 levels of FYM 0, 12.5 t/ha^{-1} and 2 levels of *Azospirillum*, 0, 2 kg ha^{-1} (Fractional Factorial Randomized Block Design). Rice(ADT- 36) was grown as the test crop. At harvest, by using grain yield, N uptake, initial soil available N status and fertilizer doses applied the basic data *viz*., nutrient requirement kg ha^{-1}, soil and fertilizer nutrient efficiencies (%) were estimated for making fertilizer N recommendation. There was considerable reduction in the quantities of fertilizer N due to IPNS.

Key words : STCR, Rice, IPNS, Fertilizer adjustment equations, FN prescriptions

Fertilizer use is a major contributing factor for higher rice production in India. The fertilizer requirement of a crop depends to a larger extent on the native soil fertility and hence, the prescription of doses should always be made by examining the relationships of soil test values with applied fertilizer doses and crop yield (Velayutham and Raniperumal, 1976). Among the nutrients, nitrogen is the primary one in the fertilizer management programme for rice as it is key to realise the yield potential of rice. It is estimated that to achieve average rice yield of 8.0 t/ha^{-1} in Asia by 2025, about 300% increase in N addition will be required with the present levels of fertilizer N efficiency. In this context, efficient use of N fertilizers plays a major role for reducing the amount of N fertilizer application to rice crop (Stalin *et al*., 2002).

MATERIALS AND METHODS

A field experiment was carried out at an Experimental Farm, Annamalai University, Annamalainagar, which was based on STCR- fertility gradient approach developed by Ramamoorthy *et al*. (1967). The initial soil belongs to Kondal series, pH 7.7, EC 0.48dSm^{-1}, CEC 29.70 cmol (p$^+$) kg^{-1}. The available N, P and K status were 196, 9.14 and 270 kg ha^{-1}, respectively. Fertilizer levels $N_0P_0K_0$, $N_{1/2}P_{1/2}K_{1/2,}$ $N_1P_1K_1$ and $N_2P_2K_2$ were given to strip I, II, III and IV, respectively. N was applied through urea as per blanket recommendation. P and K were applied based on their fixing capacity through SSP and MOP, respectively. The needed variation in soil fertility for nitrogen was deliberately created. Strips *viz*., I, II, III and IV, were fertilized with 0, 60,120 &240 kgha^{-1} nitrogen through urea. An exhaust crop of rice cv. ADT- 43 was grown to enable through interaction between the nutrients in soil and added fertilizer. After the harvest, each gradient strip was divided into 24 plots. Treatments consisted of 5 levels of N(0, 50, 100, 150 and 200 kg ha^{-1}), 4 levels of P_2O_5(0, 30, 60 and 90 kg ha^{-1}), 3 levels of K_2O kg ha^{-1}(0,40 and 80 kg ha^{-1}), 2 levels of FYM 0, 12.5 t/ha^{-1} and 2 levels of *Azospirillum*, 0, 2 kg ha^{-1}(Frational Factorial Randomized Block Design). Initial soil samples were collected from each sub-plot at 0-15 cm depth were analysed for available N by alkaline permanganate method(Subbiah and Asija, 1956). Rice cv. ADT- 36 was grown as the test crop by proper recommended cultural practices. At harvest,by using grain yield, N uptake , initial soil available N status and fertilizer doses applied the basic data *viz*., nutrient requirement kg ha^{-1}, soil and fertilizer nutrient efficiencies (%) were estimated for making fertilizer nitrogen recommendation as described by Reddy *et al*. (1994).

RESULTS AND DISCUSSION

The mean values of soil available N, uptake of N and grain yield of rice cv. ADT- 43 in gradient crop experiment are presented in Table 1. The soil available nitrogen mean value recorded in strip I,II,III and IV were 217, 258,290 and 325 Kg ha^{-1}, respectively. The mean value for N uptake increased from strip I(36.31 kg ha^{-1}) to strip IV (92.26 kg ha^{-1}). The mean grain yield values were 2368, 3351, 4774 and 5692 kgha^{-1} in strip I, II, III and IV, respectively. It was observed that significant relationship was created by yield and soil fertility for N