

## Fertilizer potassium doses based on STCR for an yield target of 70 qha<sup>-1</sup> or rice cv. ADT -36

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### ABSTRACT

Soil test crop response (STCR) correlation studies were conducted by gradient crop experiment-rice (ADT43) and then Test crop experiment- rice(ADT-36) at an Experimental Farm, Annamalai University, Annamalai Nagar. The field layout comprised four strips (I, II, III & IV), in which the needed variation in soil fertility for potassium was deliberately created (Dev *et al.*, 1978). After the harvest, each gradient strip was divided into 24 plots which were received 5 levels of nitrogen @ (0, 50, 100, 150 & 200 kg ha<sup>-1</sup>), four levels of phosphorus (0, 30, 60 and 90 kg ha<sup>-1</sup>), three levels of potassium (0, 40 and 80 kg ha<sup>-1</sup>), Two levels of FYM (0.1, 2.5 t/ha<sup>-1</sup>) and *Azospirillum* levels were (0, 2 kg ha<sup>-1</sup>) (Fractional Factorial Randomized Block Design). Rice(ADT-36) was grown as the test crop. At harvest, grain yield, K uptake, initial soil available K status and fertilizer K<sub>2</sub>O applied were noted plot-wise. The NR kg q<sup>-1</sup>, CS% and CF % values for potassium were 1.50, 10.67 and 54.05, respectively. The per cent contribution of K from FYM and FYM+*Azospirillum* were found to be 28.79 and 29.72, respectively. These data have been transformed in the form of simple equations. The results revealed that at an initial soil available potassium status was 350 kg ha<sup>-1</sup>, the FK<sub>2</sub>O requirement to get an yield target of 70 qha<sup>-1</sup> of rice was 111 kg ha<sup>-1</sup> with fertilizer alone, whereas the FK<sub>2</sub>O requirement reduced to 86 kg ha<sup>-1</sup> with fertilizer + FYM + *Azospirillum* application.

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Soil fertility is a prerequisite to its productivity. Quantity of fertilizer depends on uptake of nutrients by crops. It should be based on soil analysis. Dumping of fertilizers by the farmers in fields without information on soil fertility status and nutrient requirements by crops might cause adverse effects on soils and crops both regarding nutrient toxicity and deficiency either by over use or inadequate use. INM approach is flexible and minimises use of chemicals but maximise use efficiency and improve the soil health. The targeted yield concept was developed by Ramamoorthy *et al.* (1967) and later elaborated by Kanwar (1970). It provides the balanced nutrition to the crop according to the actual requirement of the crop and soil fertility conditions. The present investigation aimed at STCR based fertilizer potassium prescription for specific yield target of rice

### MATERIALS AND METHODS

A field experiment on rice(ADT 43) was conducted at an Experimental Farm, Annamalai University, Annamalai Nagar using the fertility gradient approach. The field was divided into four equal strips in which four fertility gradients were artificially created by applying graded doses of NPK fertilizers. Fertilizer levels N<sub>0</sub>P<sub>0</sub>K<sub>0</sub>, N<sub>1/2</sub>P<sub>1/2</sub>K<sub>1/2</sub>, N<sub>1</sub>P<sub>1</sub>K<sub>1</sub> and N<sub>2</sub>P<sub>2</sub>K<sub>2</sub> were given to strip I, II, III and IV, respectively. The initial soil consisted of pH 7.7, EC 0.48 dsm<sup>-1</sup>, CEC 29.70 cmol (p<sup>+</sup>) kg ha<sup>-1</sup>. N was applied

through urea as per blanket recommendation. P and K were applied based on their fixing capacity through SSP and MOP, respectively. Each fertility gradients was further subdivided into 24 equal plots. Initial soil samples were drawn from each plot and analysed for available potassium by neutral normal ammonium acetate method (Hanway and Heidal, 1952). Treatments consisted of 5 levels of N(0, 50, 100, 150 and 200 kg ha<sup>-1</sup>), 4 levels of P<sub>2</sub>O<sub>5</sub>(0, 30, 60 and 90 kg ha<sup>-1</sup>), 3 levels of K<sub>2</sub>O (0, 40 and 80 kg ha<sup>-1</sup>), 2 levels of FYM 0, 12.5 t ha<sup>-1</sup> and 2 levels of *Azospirillum*, 0, 2 kg ha<sup>-1</sup>. After harvest of the rice crop, the yield per plot was noted, plant samples collected from plot-wise analysed for K uptake (Jackson, 1973). From the rice grain yield, K uptake, initial soil available K status and fertilizer K<sub>2</sub>O applied, the basic parameters *viz.*, nutrient requirement (NR qha<sup>-1</sup>), per cent nutrients contribution from soil (%CS) and per cent nutrients contribution from fertilizer (%CF) were calculated and using these basic parameters the fertilizer prescription equations were developed to recommend FK<sub>2</sub>O dose for getting an yield target of 70 qha<sup>-1</sup> rice at varying soil available K status.

### RESULTS AND DISCUSSION

The mean values of soil available K, uptake of K and grain yield of rice cv. ADT-43 in gradient crop experiment are presented in Table 1. The soil available