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Fertilizer prescriptions for Brinjal (*Solanum Melangena*) in coastal Karaikal region

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Introduction

Brinjal fruits are excellent source of starch, proteins, minerals, vitamins, dietary fiber and low fat content. Among various methods of fertilizer recommendations, the soil test crop response approach is one of the most scientific approaches of nutrient application for crops by soil test values and targeted yield equations. The current fertilization practices do not put back in equal measure the nutrients to the soil as have been removed by crops, resulting in continuous depletion of soil fertility. This can be offset only by adopting soil testing and applying integrated plant nutrient supply (IPNS) as has been enunciated as "The Law of Optimum", which has been demonstrated and validated in numerous farmer's fields for obtaining targeted yield of crops under the All India Co-ordinated Research Project on Soil Test Crop Response (AICRP-STCR) project annual reports (Ramamoorthy and Velayutham, 2011, Tandan 2014 and Velayutham *et al.*, 2016).

Figure 1: Field view of test crop brinjal (Poyyur)

Methodology

The experiments were conducted at farmer's field in Varichikudy village, Nedungadu commune of Karaikal district, U.T. of Puducherry during 2023. The study area comes under Thirunallar soil series which occupies 26.14 per cent of soils of the Karaikal district. This soil is classified as fine, smectitic isohyperthermic, *Typic Haplusterts*. The soils of experimental field was slightly alkaline (pH - 8.5), non-saline in reaction and clay in texture. The P and K fixing capacities of the soil were 150 and 100 kg ha^{-1}, respectively. The fertility status of the soil is low in $KMnO_4$-N (276.8 kg ha^{-1}) and medium in organic carbon (0.69 per cent) and high in Olsen-P (76.4 kg ha^{-1}) and NH_4OAc-K (360 kg ha^{-1}). The experiment was carried out after the application of gypsum.

Following the inductive methodology of Ramamoorthy et al. (1967), the experiment was conducted in two phases. In the first phase, fertility gradient experiment was conducted by raising Rice (BPT 5204) as an exhaust crop during 2022.

For this, the field was divided into three equal which were fertilized with $N_0P_0K_0$ (strip-I), $N_1P_1K_1$ (strip-II) and $N_2P_2K_2$ (strip-III) levels to create fertility gradient. Subsequently, in the second phase, after the harvest of the exhaust crop, Brinjal (var. Poyyur) was raised as test crop. Each of the fertility strips was subdivided into 24 sub-plots resulting in 72 plots. There were 24 treatments consists of four levels of N (0, 40, 80 and 120 kg ha^{-1}), P_2O_5 (0, 25 , 50 and 75 kg ha^{-1}), K_2O (0, 15, 30 and 45 kg ha^{-1}) and FYM (0, 12.5 and 25 t ha^{-1}). The moisture and N, P_2O_5 and K_2O contents of FYM were 26, 0.56, 0.32 and 0.51%, respectively. Using the data on crop yield, nutrient uptake, pre-sowing soil available nutrient status and fertilizer doses applied, the basic parameters used in developing STCR based fertilizer prescription equation viz. nutrient (NR), contribution of nutrients from soil (CS), fertilizer (CF) and FYM (CFYM) were calculated as per procedure described by Ramamoorthy *et al.*(1967) and Santhi *et al.*(2002).

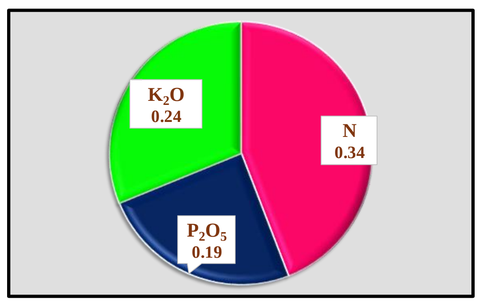

Figure 2: Nutrient requirement of brinjal

Table 1: Soil test-based fertilizer N and reduction in N fertilizer requirement for different yield targets of brinjal under IPNS.

Treatments							
$KMnO_4$-N (kg/ha)	NPK alone (kg/ha)	NPK + FYM 12.5 t ha^{-1} (kg/ha)	% reduction over NPK	Fertilizer saving (kg/ha)	NPK + FYM 25 t ha^{-1} (kg/ha)	% reduction over NPK	Fertilizer saving (kg/ha)
260 q ha^{-1}							
200	115	65	43.5	50	50	56.5	65
220	108	58	46.3	50	50	53.7	58
240	101	51	49.5	50	50	50.5	51
260	95	50	47.4	45	50	47.4	45
280	88	50	43.2	38	50	43.2	38
280 q ha^{-1}							
200	129	79	38.7	50	50	61.2	79
220	122	72	40.1	50	50	59.0	72
240	116	65	43.1	50	50	56.9	65
260	109	58	46.8	51	50	54.1	59
280	102	51	50.0	51	50	51.0	52
300 q ha^{-1}							
200	143	93	35.0	50	50	65.0	93
220	136	86	36.8	50	50	63.2	86
240	130	79	39.2	51	50	61.5	80
260	123	72	41.5	51	50	59.3	73
280	116	66	43.1	50	50	56.9	66

Results and Discussion

The percent nutrient contribution of nutrients from soil (CS), fertilizer (CF) and FYM (CFYM) were found to be 16.39, 47.97 and 14.94 for N, 12.65, 57.82 and 5.41 for P_2O_5 and 10.20, 56.09 and 6.81 for K_2O, respectively. Based on fertilizer prescription equations and nomograms formulated for a range of soil test values and desired yield target for brinjal.

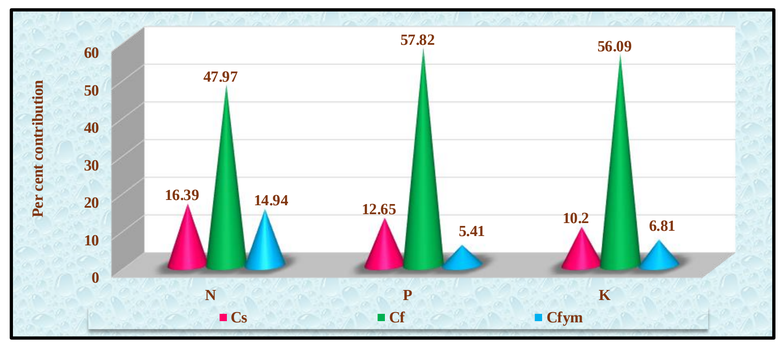

Figure 3: Per cent contribution of nutrients from soil (Cs), fertilizer (Cf) and FYM (Cfym)

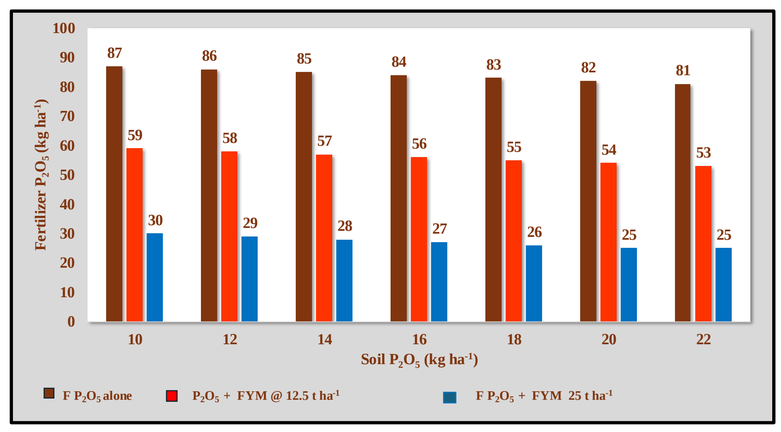

Figure 4: Soil test based fertilizer phosphorus doses for 280 q ha^{-1} yield target of brinjal

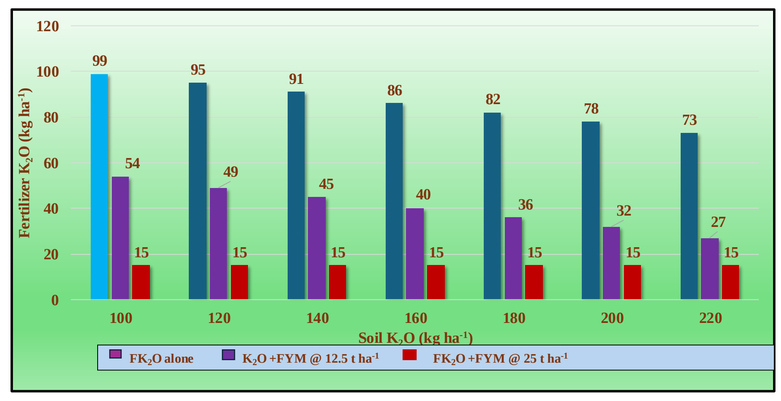

Figure 5: Soil test based fertilizer potassium doses for 280 q ha^{-1} yield target of brinjal

Conclusions

In the treatment NPK + FYM @ 12.5 t ha^{-1} there was a saving of 40, 35 and 50 kg of fertilizer N , P_2O_5 and K_2O, respectively.

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Acknowledgments

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