

Research Article

## Inductive cum targeted yield model based Integrated fertilizer prescriptions for tomato (*Solanum lycopersicum* L.) under drip fertigation on an alfisol

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### Abstract

Soil test crop response (STCR) correlation studies under Integrated Plant Nutrition System were conducted in the western agro-climatic zone of Tamil Nadu during 2020-2021 to devise the fertilizer prescription equations for tomato (*Solanum lycopersicum* L.) under drip fertigation on an alfisol. The equations were derived by following Ramamoorthy's Inductive cum targeted yield model. The nutrient requirement of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O for producing one quintal of tomato fruit was found to be 0.22, 0.11, 0.27 kg respectively. The per cent contribution of nutrients were 37.93, 46.73 and 29.53 of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O from soil (Cs) and 47.84, 31.12 and 74.13 of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O from fertilizers (Cf) respectively. Two organic sources were applied viz., FYM (Farm Yard Manure) and Biocompost and the per cent contribution of nutrients from FYM were 38.36, 13.22 and 52.17 of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and from biocompost were 43.34, 10.90 and 57.00 of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O respectively. Fertilizer adjustment equations were formulated for STCR-NPK alone, STCR-IPNS (FYM) and STCR-IPNS (Biocompost) by applying the basic parameters such as NR, Cs, Cf, Cfym, Cbiocompost. A ready reckoner of fertilizer doses for a set of soil test values at yield targets 80 and 90 t ha<sup>-1</sup> was computed. The findings also showed that the adoption of STCR-IPNS could save more fertilizers.

**Keywords:** Drip fertigation, Fertilizer prescription equations, Palaviduthi soil series, STCR-IPNS, Tomato

### INTRODUCTION

Indiscriminate use of fertilizers poses a severe threat to the environment and soil health. Our concern in the field of agriculture is not only to hike production but also to conserve soil from the disproportionate fertilizer usage. Hence a balanced fertilization approach should be adhered to, which should ensure improved crop production and a healthy environment and soil. STCR-IPNS approach is a conformable technique as it helps to improve crop production, protect the environment

from excess fertilizers, and conserve energy by applying only the required amount of fertilizers by crop. This technique takes into consideration the nutrient requirement of a crop, contribution from soil, fertilizers and organics and the fertilizer prescription equations are developed. These fertilizer prescriptions play a major role in the prudent use of fertilizers by using the resources available to the farmers (Dey and Santhi, 2014).

Tomato is the second most commonly consumed vegetable in the world next to potato. The major tomato-

producing countries are China, India, USA, Turkey, Egypt, Italy. India is the second-largest producer of tomato in the world with 20 million tonnes of production. The water requirement of field-grown tomato is 400 to 600 mm after transplantation. Water being the scarcest resource, it is obligatory to sustain and manage the use of water. By adopting contemporary irrigation approaches like drip irrigation the water use efficiency can be increased thereby increasing the area under cultivation. Fertilizer application by drip irrigation has been witnessed as the most efficacious nutrient supply method that defends water use and enhances the yield of vegetables by increasing the nutrient use efficiency (Sundaresh *et al.*, 2019). In addition to high crop yield, drip fertigation ensures a healthy soil and environment by optimizing the use of water and fertilizers (Ankush *et al.*, 2018). Soil test based fertilizer prescriptions were developed formerly for surface irrigation and conventional method of fertilizer application on Palaviduthi soil series (Coumaravel *et al.*, 2012). But fertilizer prescriptions for tomato under drip fertigation is yet to be given which is need of the hour since most of the tomato cultivation is under drip fertigation. Hence the current study was performed on Palaviduthi soil series at Coimbatore district of Tamil Nadu to provide fertilizer prescriptions for tomato (*Solanum lycopersicum* L.) under drip fertigation.

## MATERIALS AND METHODS

### Emplacement description and soil attributes

A field trial was conducted to meliorate the fertilizer prescriptions for tomato (Hybrid Sivam) under drip fertigation on Palaviduthi soil series, Typic Rhodustalf during 2020-2021 at farmer's holding in Kuppanur village, Coimbatore district, which is located in the Western agro-climatic zone of Tamil Nadu at 10°95' North latitude and 76°87' East longitude at an altitude of 416 m above MSL. The soil of the experimental field was red, non-calcareous, sandy loam in texture, neutral in reaction (pH-7.41) and non-saline (EC-0.15 dSm<sup>-1</sup>). The initial soil available alkaline potassium permanganate nitrogen, olsen phosphorus, ammonium acetate potassium, organic carbon were 225 kg ha<sup>-1</sup> (Low), 39 kg ha<sup>-1</sup> (High), 285 kg ha<sup>-1</sup> (High), 2.64 g kg<sup>-1</sup> (Low), respectively.

### Treatments

The trial was set out in Randomized Block Design with fifteen treatments and three replications. The fifteen treatments comprised of T<sub>1</sub>: STCR-NPK alone - 70 t ha<sup>-1</sup>, T<sub>2</sub>: STCR-NPK alone - 80 t ha<sup>-1</sup>, T<sub>3</sub>: STCR-NPK alone - 90 t ha<sup>-1</sup>, T<sub>4</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 70 t ha<sup>-1</sup>, T<sub>5</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 80 t ha<sup>-1</sup>, T<sub>6</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup>, T<sub>7</sub>:

FYM alone - 6.25 t ha<sup>-1</sup>, T<sub>8</sub>: FYM alone - 12.5 t ha<sup>-1</sup>, T<sub>9</sub>: Biocompost alone - 2.5 t ha<sup>-1</sup>, T<sub>10</sub>: Biocompost alone - 5 t ha<sup>-1</sup>, T<sub>11</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 70 t ha<sup>-1</sup>, T<sub>12</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 80 t ha<sup>-1</sup>, T<sub>13</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup>, T<sub>14</sub>: Blanket + FYM @ 12.5 t ha<sup>-1</sup>, T<sub>15</sub>: Absolute control. The fertilizer doses for STCR treatments were calculated based on existing FPEs (Fertilizer Prescription Equations) for tomato under conventional method of irrigation and fertilizer application on Palaviduthi soil series (Coumaravel *et al.*, 2012). The nutrients were given as Urea (46% N), Single Super Phosphate (SSP, 16% P<sub>2</sub>O<sub>5</sub>) and Muriate of Potash (MOP, 60% K<sub>2</sub>O). The entire amount of SSP was given basally whereas Urea and MOP were given through drip fertigation at weekly intervals (Rajan *et al.*, 2014). For STCR - IPNS treatments from T<sub>4</sub> to T<sub>6</sub>, FYM @ 12.5 t ha<sup>-1</sup> was applied as basal in addition to the calculated doses of fertilizers and treatments from T<sub>11</sub> to T<sub>13</sub>, Biocompost @ 5 t ha<sup>-1</sup> was applied in addition to the calculated doses of fertilizers.

### Soil and plant analysis

The soil samples were collected antecedent to fertilizer and manure application and analyzed for alkaline KMnO<sub>4</sub>-N (Subbiah and Asija, 1956), Olsen-P (Olsen *et al.*, 1954) and NH<sub>4</sub>OAc-K (Stanford *et al.*, 1949). The tomato crop (Hybrid sivam) duration was from December 2020 to April 2021. As per the Crop production guide 2020 of TNAU, all the package of practices were followed. The fruit and haulm yield were noted for different treatments and samples were collected and analyzed for total N (Humphries, 1956), total P and K (Jackson, 1973). The total N, P and K uptake for different treatments were calculated by taking into account the dry matter yield and N, P and K content in the fruit and haulm of tomato plant. SPSS statistical software was used to expound the effect of varied treatments imposition on fruit yield and N, P and K uptake (Nie *et al.*, 1975).

### Ciphering of basic parameters

Using the data on fruit yield, nutrient uptake, initial soil available nutrients and fertilizer doses applied, the basic parameters such as Nutrient requirement (NR) in kg q<sup>-1</sup>, Per cent contribution of nutrients from soil to total nutrient uptake (Cs), Per cent contribution of nutrients from fertilizer to total nutrient uptake (Cf) and Per cent contribution of nutrients from organics (FYM and Biocompost) to total uptake (Co) (Ramamoorthy *et al.*, 1967) were estimated. These basic parameters were utilized to formulate the fertilizer prescription equations for STCR alone, STCR-IPNS (FYM) and STCR-IPNS (Biocompost) to suit tomato under drip fertigation.

**RESULTS AND DISCUSSION**

**Fruit yield and nutrient uptake in assorted treatments**

The fruit yield ranged from 39.6 to 99.0 t ha<sup>-1</sup> due to different treatments imposition (Fig.1). The SEd and CD (P=0.05) values for fruit yield were found to be 730.6 and 1499.2, respectively. Among the various treatments, the highest fruit yield of 99.0 t ha<sup>-1</sup> was recorded in T<sub>6</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> followed by T<sub>13</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> with the yield of 94.5 t ha<sup>-1</sup>. There was a significant difference (P=0.05) in the fruit yield recorded in T<sub>6</sub> and T<sub>13</sub>. Higher fruit yield in STCR-IPNS higher yield target was in accordance with the results given by Basavaraja *et al.*, (2019) at Bengaluru, Karnataka for eggplant. The fruit yield in T<sub>3</sub>: STCR-NPK alone - 90 t ha<sup>-1</sup> was found to be 89.2 t ha<sup>-1</sup>, which was 9.8 and 5.3 t ha<sup>-1</sup> lesser than treatments T<sub>6</sub> and T<sub>13</sub>. This indicated the superiority of fruit yield in STCR-IPNS over STCR-NPK alone. This was due to the fact that the sole application of inorganic fertilizers lacked some other necessary nutrients that would be available in organic manures. Moreover, there was synchrony in nutrient release and plant recovery resulted in better yield and improved soil properties in STCR-IPNS (Meena *et al.*, 2019). The FYM alone treatments recorded more fruit yield of 43.5 and 45.7 t ha<sup>-1</sup> at 6.25 and 12.5 t ha<sup>-1</sup> FYM which was greater than Biocompost alone treatments with fruit yield of 41.1 and 42.2 t ha<sup>-1</sup> at 2.5 and 5 t ha<sup>-1</sup> biocompost. Fruit yield was found to be minimum in Absolute control with a yield of 39.6 t ha<sup>-1</sup>. The higher fruit yield under drip fertigation might be due to the maximum availability of nutrients and water in the root vicinity at the right time of crop demand (Kale *et al.*, 2018; Rongate *et al.*, 2017).

The N, P and K uptake ranged from 83.84 to 236.79 kg ha<sup>-1</sup>, 18.46 to 54.61 kg ha<sup>-1</sup> and 83.27 to 260.18 kg ha<sup>-1</sup>,

respectively (Fig.2). The SEd and CD (P=0.05) values were found to be 2.12 and 4.35 for N uptake, 0.31 and 0.63 for P uptake and 2.08 and 4.28 for K uptake, respectively. The N, P and K uptake were also reported to be higher in T<sub>6</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> with 236.79, 54.61 and 260.18 kg ha<sup>-1</sup> followed by T<sub>13</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> with 231.93, 51.46 and 251.91 kg ha<sup>-1</sup> respectively. The N, P and K uptake in T<sub>6</sub> and T<sub>13</sub> showed a significant difference (P=0.05). The N, P and K uptake was recorded the highest in STCR-IPNS treatments which is analogous to the uptake given by Vijayakumar *et al.* (2017) on Lithic Haplustept at Krishnagiri, Tamil Nadu for SRI rice. Owing to the increased application rate and availability of nitrogen in the soil, the nitrogen uptake is on the higher side (Kohire and Das, 2015 for chilli). The upsurged phosphorus and potassium uptake were due to the higher cation exchange capacity of plant roots influenced by nitrogen. Since the fertilizers were frequently given via drip fertigation at lower concentrations, the nutrients were efficiently absorbed by the plant roots with inconsequential loss by leaching, which also increased the nutrient uptake (Ankush *et al.*, 2018).

**Response to N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and percent achievement**

The response of fertilizers to fruit yield was estimated by finding the difference in fruit yield in absolute control and fruit yield in different treatments which varied from 59.4 to 1.5 t ha<sup>-1</sup> (Table 1). The response was higher in T<sub>6</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> with 59.4 t ha<sup>-1</sup> succeeded by T<sub>13</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup> with 54.9 t ha<sup>-1</sup>. The results were similar to the response trend given by Mohanapriya *et al.*, (2020) on Typic Rhodustalf at Coimbatore, Tamil Nadu, for hybrid maize. The least response was observed in T<sub>9</sub>: Biocompost alone - 2.5 t ha<sup>-1</sup>.

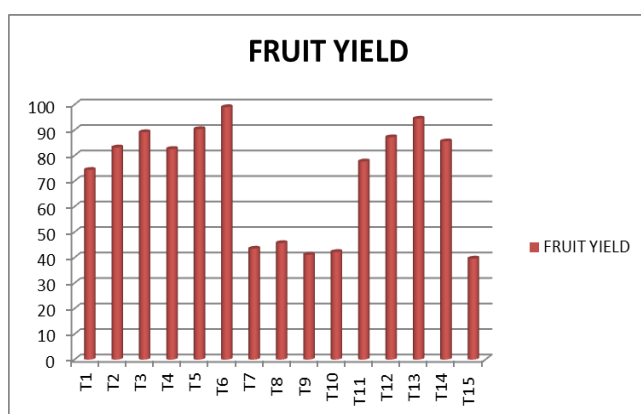
**Table 1.** Response of fertilizers to fruit yield and per cent achievement

Trt.	Yield (t ha <sup>-1</sup> )	Response (t ha <sup>-1</sup> )	Percent Achievement (%)	Trt.	Yield (t ha <sup>-1</sup> )	Response (t ha <sup>-1</sup> )	Percent Achievement (%)
T <sub>1</sub>	74.4	34.8	106	T <sub>8</sub>	45.7	6.1	
T <sub>2</sub>	83.2	43.6	104	T <sub>9</sub>	41.1	1.5	
T <sub>3</sub>	89.2	49.6	99	T <sub>10</sub>	42.2	2.6	
T <sub>4</sub>	82.6	43.0	118	T <sub>11</sub>	77.7	38.1	111
T <sub>5</sub>	90.4	50.8	113	T <sub>12</sub>	87.2	47.6	109
T <sub>6</sub>	99.0	59.4	110	T <sub>13</sub>	94.5	54.9	105
T <sub>7</sub>	43.5	3.9		T <sub>15</sub>	39.6		

(T<sub>1</sub>: STCR-NPK alone - 70 t ha<sup>-1</sup>, T<sub>2</sub>: STCR-NPK alone - 80 t ha<sup>-1</sup>, T<sub>3</sub>: STCR-NPK alone - 90 t ha<sup>-1</sup>, T<sub>4</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 70 t ha<sup>-1</sup>, T<sub>5</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 80 t ha<sup>-1</sup>, T<sub>6</sub>: STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup>, T<sub>7</sub>: FYM alone - 6.25 t ha<sup>-1</sup>, T<sub>8</sub>: FYM alone - 12.5 t ha<sup>-1</sup>, T<sub>9</sub>: Biocompost alone - 2.5 t ha<sup>-1</sup>, T<sub>10</sub>: Biocompost alone - 5 t ha<sup>-1</sup>, T<sub>11</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 70 t ha<sup>-1</sup>, T<sub>12</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 80 t ha<sup>-1</sup>, T<sub>13</sub>: STCR-NPK + Biocompost @ 5 t ha<sup>-1</sup> - 90 t ha<sup>-1</sup>, T<sub>15</sub>: Absolute control)

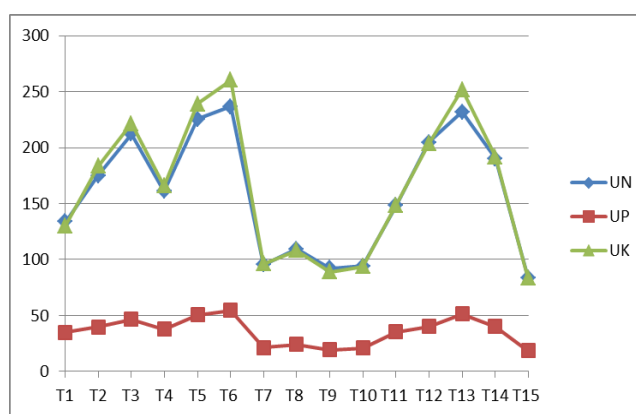
**Table 2.** Ready reckoner of fertilizer doses for STCR-NPK alone, STCR-IPNS (FYM) and STCR-IPNS (Biocompost) for desired yield target of 80 t ha<sup>-1</sup> of tomato under drip fertigation

Soil Test Values (kg ha <sup>-1</sup> )	NPK alone (kg ha <sup>-1</sup> )	NPK+FYM @ 12.5 t ha <sup>-1</sup> (kg ha <sup>-1</sup> )	Reduction over NPK alone (%)	NPK+Biocompost @ 5 t ha <sup>-1</sup> (kg ha <sup>-1</sup> )	Reduction over NPK alone (%)
<b>KMnO<sub>4</sub>-N</b>					
180	226	184	19	197	13
200	210	168	20	182	13
220	194	152	22	166	14
240	178	136	24	150	16
260	163	121	26	134	18
280	147	105	29	118	20
<b>Olsen-P</b>					
18	218	192	12	203	7
20	211	185	12	196	7
22	204	178	13	190	7
24	197	172	13	183	7
26	191	165	14	176	8
28	184	158	14	169	8
<b>NH<sub>4</sub>OAc-K</b>					
250	168	132	21	153	9
270	158	123	22	143	9
290	149	113	24	133	11
310	139	104	25	124	11
330	130	94	28	114	12
350	120	84	30	105	13



**Fig.1.** Fruit yield in respective treatments expressed in t ha<sup>-1</sup>

The per cent achievement was calculated by dividing the yield obtained in the respective STCR treatments and their corresponding target yield. The per cent achievement was maximum up to 118 % recorded in T<sub>4</sub> : STCR-NPK + FYM @ 12.5 t ha<sup>-1</sup> - 70 t ha<sup>-1</sup> and the minimum was ascertained to be 99 % in T<sub>3</sub> : STCR-NPK alone - 90 t ha<sup>-1</sup> (Table 2). Resemblant results of higher per cent achievement in STCR-IPNS (FYM) lower yield target and lower per cent achievement in STCR alone higher yield target were given by Praveena



**Fig. 2.** Nutrient uptake in various treatments expressed in kg ha<sup>-1</sup>

Katharine *et al.* (2014) on Vertic Ustropept at Coimbatore, Tamil Nadu for transgenic cotton.

**Basic parameters for FYM and biocompost**

Employing the data on fruit yield, NPK uptake, initial soil test values and fertilizer doses applied in the treatments T<sub>1</sub> to T<sub>13</sub> and T<sub>15</sub>, the basic parameters such as nutrient requirement (NR), the contribution of nutrients from soil (Cs), fertilizers (Cf), FYM (Cfym) and biocompost (Cbiocompost) were worked out. They were utilized for

**Table 3.** Ready reckoner of fertilizer doses for STCR-NPK alone, STCR-IPNS (FYM) and STCR-IPNS (Biocompost) for desired yield target of 90 t ha<sup>-1</sup> of tomato under drip fertigation

Soil Test Values	NPK alone	NPK+FYM @ 12.5 t ha <sup>-1</sup>	Reduction over NPK alone	NPK+Biocompost @ 5 t ha <sup>-1</sup>	Reduction over NPK alone
(kg ha <sup>-1</sup> )	(kg ha <sup>-1</sup> )	(kg ha <sup>-1</sup> )	(%)	(kg ha <sup>-1</sup> )	(%)
<b>KMnO<sub>4</sub>-N</b>					
180	272	230	15	243	11
200	256	214	16	228	11
220	240	198	18	212	12
240	224	182	19	196	13
26---0	209	167	20	180	14
280	193	151	22	164	15
<b>Olsen-P</b>					
18	253	227	10	238	6
20	246	220	11	231	6
22	239	213	11	225	6
24	232	207	11	218	6
26	226	200	12	211	7
28	219	193	12	204	7
<b>NH<sub>4</sub>OAc-K</b>					
250	204	168	18	189	7
270	194	159	18	179	8
290	185	149	19	169	9
310	175	140	20	160	9
330	166	130	22	150	10
350	156	120	23	141	10

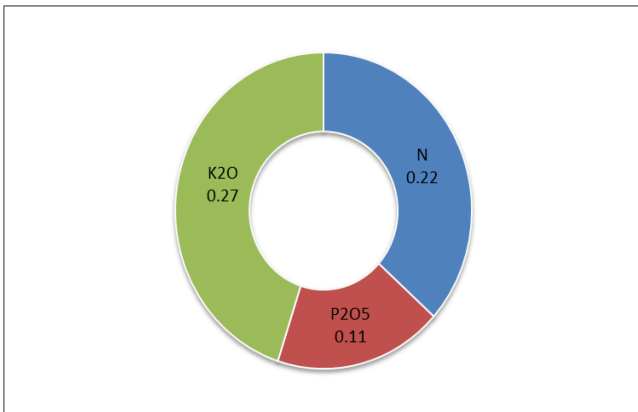
the formulation of fertilizer prescriptions under STCR-NPK alone, STCR-IPNS (FYM) and STCR-IPNS (Biocompost). Examining the basic data, it can be concluded that the amount of nutrient required to produce a quintal of tomato fruit was 0.22 kg N, 0.11 kg P<sub>2</sub>O<sub>5</sub>, 0.27 kg K<sub>2</sub>O (Fig.3). The K<sub>2</sub>O requirement was higher subsequently followed by N and P<sub>2</sub>O<sub>5</sub>. The nutrient requirement was in accordance with the results of Jadhav *et al.* (2013) on Typic Ustorthent at Rahuri, Ahmednagar for tomato. The per cent contribution of nutrients from soil to total nutrient uptake was estimated from absolute control and the values were 37.93 for N, 46.73 for P<sub>2</sub>O<sub>5</sub> and 29.53 for K<sub>2</sub>O (Fig.4). The per cent contribution of P<sub>2</sub>O<sub>5</sub> from soil was higher compared to N and K<sub>2</sub>O which is similar to the findings of Bagavathi ammal *et al.* (2020) on Typic Ustrophept at Karikalampakkam village, U.T. of Puducherry for bhendi; Muralidharudu *et al.* (2011) for tomato. The per cent contribution of nutrients from fertilizer to total nutrient uptake was estimated from NPK alone, NPK-FYM treated plots and NPK-Biocompost treated plots. The values were found to be 47.84 for N, 31.12 for P<sub>2</sub>O<sub>5</sub> and 74.13 for K<sub>2</sub>O (Fig.4). The per cent contribution of K<sub>2</sub>O from fertilizer was higher followed by N and P<sub>2</sub>O<sub>5</sub>. The

higher contribution of K<sub>2</sub>O from the fertilizers was due to the priming effect of K in addition to the interaction effect of the higher amount of N and P fertilizers which resulted in more K uptake (Deshpande *et al.*, 2016 on Vertic Haplustepts at Rahuri, Maharashtra; Ray *et al.*, 2000 on Typic Ustochrept at Barrackpore, West Bengal) The per cent contribution of nutrients from FYM to total nutrient uptake was computed from FYM treated plots and the values were 38.36, 13.22 and 52.17 for N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O respectively (Fig.4). The per cent contribution of nutrients from biocompost to total nutrient uptake was found to be 43.34, 10.90 and 57.00 for N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively, calculated from biocompost treated plots (Fig. 4). The organic manures followed the same trend as Beena *et al.* (2018) reported for vegetable cowpea on a ultisol at Thrissur, Kerala, where the nutrient contribution was in order as K<sub>2</sub>O > N > P<sub>2</sub>O<sub>5</sub>.

#### Fertilizer prescriptions for tomato under drip fertigation

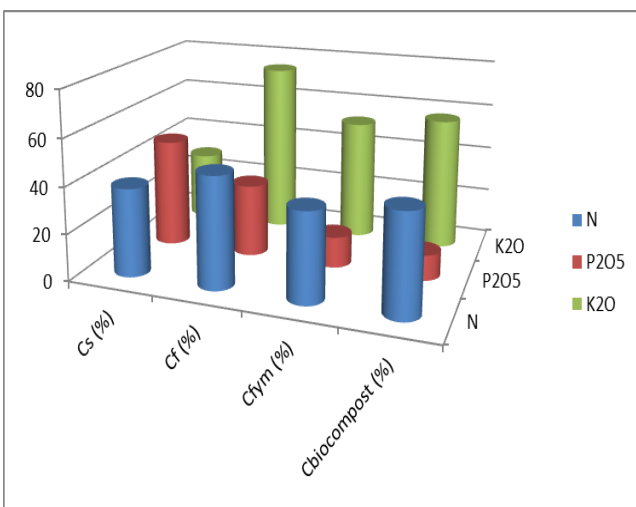
To compute the fertilizer doses for desired yield target of tomato under drip fertigation based on soil test values, the basic parameters were used to establish FPEs, which are provided below:





**Fig. 3.** Nutrient Requirement (NR) expressed in kg q<sup>-1</sup>

The FPEs were utilized to develop ready reckoners for a range of soil test values at desired yield target of 80 and 90 t ha<sup>-1</sup> for tomato under drip fertigation on an alfisol (Table 2,3). It is observed that at soil test values of 180:18:250 kg ha<sup>-1</sup> of KMnO<sub>4</sub>-N, Olsen-P, NH<sub>4</sub>OAc-K for yield targets 800 and 900 q ha<sup>-1</sup> the calculated fertilizer doses of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O for NPK alone was 226, 218 and 168 kg ha<sup>-1</sup> and 272, 253 and 204 kg ha<sup>-1</sup> respectively. Under STCR-IPNS, when FYM was applied at 12.5 t ha<sup>-1</sup> (Moisture content 24%, 0.55% N, 0.28% P and 0.44% K) the fertilizer savings was 42, 26 and 36 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O. When Biocompost was applied at 5 t ha<sup>-1</sup> (Moisture content 36%, 0.95% N, 0.56% P and 0.50% K) the fertilizer savings were 28, 15 and 15 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O. As the soil available N, P and K increased, the percent reduction of NPK fertilizers under NPK+FYM and NPK+Biocompost increased, whereas it decreased with increasing yield targets which is in corroboration with Sivaranjani et al. (2018) on Vertic Ustropept at Coimbatore, Tamil Nadu for hybrid maize; and with Udayakumar and Santhi (2017) on Typic Ustropept at Coimbatore, Tamil Nadu for pearl millet.



**Fig. 4.** Contribution of nutrients from soil (Cs), fertilizer (Cf), FYM (Cfym) and biocompost (Cbiocompost) (%)

## Conclusion

In this inquiry, the FPEs for tomato under drip fertigation on Typic Rhodustalf (red, non-calcareous, Palaviduthi soil series) has been evolved. The study concluded that by integrating STCR treatments with IPNS by application of organic manures the soil fertility, soil physical properties and microbial activities were enhanced which increased the enzyme activity in the soil which directly influenced the betterment of crop yield. Since the employment of biocompost as an organic source of fertilizer in crop cultivation has increased, the FPEs for STCR-IPNS (Biocompost) were also provided in addition to the FPEs for STCR-IPNS (FYM). Hence this study provides a dual benefit to farmers where they can opt for either of the FPEs based on their resource availability.

## Conflict of interest

The authors declare that they have no conflict of interest.

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