



## ORGANIC NUTRIENT MANAGEMENT IN TOMATO –DOLICHOS BEAN – BABY CORN CROPPING SEQUENCE

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### Abstract

Field experiment was conducted at farmers field Sendarappatti village in Salem district. during the year 2009-2010 to 2010-2011 to evaluated the performance of different organic farming packages for high value cropping system, viz., Tomato –Dolichos bean- Baby corn. The experiment was laid out in randomized block design with three replications. The result revealed that the in organics resulted higher net returns and B:C ratio due to the less cost involved in nutrient application compared with different organic farming packages, among the different organic farming packages, 75 % N as Vermicompost (10.03 t ha<sup>-1</sup>) + 25 % N as Neem cake (0.73 t ha<sup>-1</sup>) register higher net returns with B:C ratio (3.98 ).

**Key words :** Tomato-Dolichos bean- Baby corn cropping sequence, organic manures, equivalent yield and Benefit Cost Ratio.

### Introduction

Organic farming is a sustainable system that avoids the use of synthetic fertilizers, pesticides and raises the crop with the use of organic cultivation practices. It is one among the broad spectrum of production methods that are supportive of the environment. Use of high analysis chemical fertilizers in an imbalanced and discriminated manner has developed many problems like decline of soil organic matter, increase in salinity and sodicity, deterioration in the quality of crop produce, increase in hazardous pests and diseases and increase in soil pollutants (Singh, 2004). Continuous use of inorganic fertilizers not only brought about loss of vital soil fauna and flora but also resulted in loss of secondary and micronutrients. In view of these facts, supply of all the plant nutrients has been advocated through organic sources only (Treadwell, 2009). There is very little research work on total use of organic sources particularly for high value crops and experiences in the past have shown that it is impossible to attain sustainable agriculture production through the use of inorganic fertilizers production. Hence, the present study was conducted to evaluate the different organic farming packages for high value cropping sequences to obtain higher productivity.

### Materials and Methods

Field experiment was conducted at farmers field Sendarappatti village, Salem district and the experiment was laid out in randomized block with three replications. Tomato, Dolichos bean and Baby corn were raised in *kharif*, rabi and summer season during the year 2009-2010 in sequence. The soil of the experimental field site is sandy loam in texture, the soil pH is alkaline and has low to medium soluble salt content and low in available nitrogen, low to medium in available phosphorus and medium to high in available potassium. The mean annual rain fall is 657 mm distributed over 47 rainy days. The mean maximum and minimum temperatures are 31.5 and 21.4 respectively. The treatment combinations were

- T<sub>1</sub> - Control
- T<sub>2</sub> - Inorganic fertilizers (150:100:50 NPK kg ha<sup>-1</sup>)
- T<sub>3</sub> - 25% N as Farm Yard Manure (3.50 t ha<sup>-1</sup>) + 75% N as Neem cake (2.18 t ha<sup>-1</sup>)
- T<sub>4</sub> - 75% N as Farm Yard Manure FYM (10.50 t ha<sup>-1</sup>) + 25% N as Neem cake (0.73 t ha<sup>-1</sup>)
- T<sub>5</sub> - 25% N as Farm Yard Manure (3.50 t ha<sup>-1</sup>) + 75% N as Castor cake (2.00 t ha<sup>-1</sup>)
- T<sub>6</sub> - 75% N as Farm Yard Manure (10.5 t ha<sup>-1</sup>) + 25% N as Castor cake (0.65 t ha<sup>-1</sup>)

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- T<sub>7</sub> - 25% N as Vermicompost (3.34 t ha<sup>-1</sup>) +75% N as Neem cake (2.18 t ha<sup>-1</sup>)
- T<sub>8</sub> - 75% N as Vermicompost (10.03 t ha<sup>-1</sup>) +25% N as Neem cake (0.73 t ha<sup>-1</sup>)
- T<sub>9</sub> - 25% N as Vermicompost (3.34 t ha<sup>-1</sup>) +75% N as Castor cake (2.00 t ha<sup>-1</sup>)
- T<sub>10</sub> - 75%N as Vermicompost (10.03 t ha<sup>-1</sup>) +25% N as Castor cake (0.65 t ha<sup>-1</sup>)
- T<sub>11</sub> - 25% N as Poultry manure (0.72 t ha<sup>-1</sup>) +75% N as Neem cake (2.18 t ha<sup>-1</sup>)
- T<sub>12</sub> - 75% N as Poultry manure (2.16 t ha<sup>-1</sup>) +25% N as Neem cake (0.73 t ha<sup>-1</sup>)
- T<sub>13</sub> - 25% N as Poultry manure (0.72 t ha<sup>-1</sup>) +75% N as Castor cake (2.00 t ha<sup>-1</sup>)
- T<sub>14</sub> - 75%N as Poultry manure (2.16 t ha<sup>-1</sup>) + 25%N as Castor cake (0.65 t ha<sup>-1</sup>)

## Results and Discussion

Pooled analysis of the showed that application of Inorganic fertilizers (150:100:50 NPK kg ha<sup>-1</sup>) recorded higher yield in the Tomato (37910 kg ha<sup>-1</sup>), Dolichos bean (6460 kg ha<sup>-1</sup>) and Babycorn (14980 kg ha<sup>-1</sup>) compared with the only organic management practices. Among the various organic practices application of 75% N as Vermicompost (10.03 t ha<sup>-1</sup>) +25 % N as Neem cake (0.73 t ha<sup>-1</sup>) recorded significantly higher fruit, pod and cob yield (30270 kg ha<sup>-1</sup>, 5500 kg ha<sup>-1</sup> and 13710 kg ha<sup>-1</sup>) which was followed by the application 75 % N as Poultry manure (2.16 t ha<sup>-1</sup>) +25 % N as Neem cake (0.73 t ha<sup>-1</sup>). Though the identified yield characters like number of fruits, pods and cobs per plant, weight of the fruits, pods and cobs per plant, number of seeds per fruit and pods and biomass production are controlled genetically, they are greatly influenced by the availability of nutrients to the crop. In the present study, the yield attributes and dry fruit yield were maximum in the inorganic fertilizer treatment. This is in accordance with Chanda *et al.*, (2011) in tomato. Regarding the yield parameters and dry fruit yield, appreciable variation was recorded. Among the organic manures and oil cakes tried, vermicompost @ 10.50 t ha<sup>-1</sup> and neem cake@ 0.73 t ha<sup>-1</sup> registered the maximum yield and yield attributing characters. This might be due to the higher nutrient uptake from vermicompost when compared to other treatments. The superiority of vermicompost over poultry manure might be due to higher P fertilization by symbiotic mycorrhizal association as reported by Kale *et al.* (1987), presence of N fixers (Loquet *et al.*, 1997), growth substances (Gavrilov, 1962) and other essential nutrients (Bano *et al.*, 1987). Similarly, Bagyaraj and Powell (1985) revealed

that N uptake in plants grown with vermicompost was significantly more than that with poultry manure due to higher availability of N in the vermicompost which was attributed to the higher activity of nitrogen fixers. Similarly uptake of P was also more with vermi compost treated plants due to the symbiotic mycorrhizal association with vermicompost. According to Kale *et al.*, (1987), vermicompost acts as a good medium for growth and development of microbes in the soil and made the nutrients available for the uptake by plants. The higher nutrient uptake of the plants treated with vermicompost might be the reason for the better exhibit of yield attributing characters and yield. While N promoted the vegetative growth, P probably influenced root growth in a positive manner which could have helped better absorption and transformation of nutrients from source to sink capacity of plants. Better root growth would have helped to divert photo assimilates to more economic yield. Higher uptake of nutrients would have helped to produce more vegetative growth and more number of flowers per plant. By this way, the effective conversion of carbohydrate (reserved material) to productive (economic) part might have increased the yield attributing characters and yield as reported by Singh and Maurya (1992). As reported by Vadiraj *et al.*, (1998) improved nitrogen metabolism particularly an increase in nitrate reductase activity has been proposed as a predictive test for crop yield. Here there is a relationship between nitrate reductase activity and protein synthesis. Earth worm casts are known to increase protein synthesis in plants which have definite influence in plant growth and yield. Furthermore, vermicompost is not only supplying the nutrients, but also supplies the enzymes, vitamins and growth hormones like IAA which are highly responsible for the prevention of flowers and fruit drop along with higher fruit set percentage as reported by Atiyeh *et al.*, (2002). Better availability of photosynthates and increased levels of various endogenous hormones in plant tissue due to the application of vermicompost could have been responsible for enhanced pollen germination and tube growth resulting in increased fruit set as opined by Nanthakumar and Veeraragavathatham (1999). According to Singh and Chanda *et al.*, (2011) vermicompost is capable of supplying growth hormones, enzymes and minerals which are very much helpful for the fruit and seed development. Higher and ready availability of nutrients at the right time might be the reason for higher nutrient uptake and simultaneously increased the yield and yield attributing characters in the plots where neem cake was incorporated along with vermicompost. This is in accordance with Supradipsaha *et al.*, (2007) in baby corn. Regarding the yield and yield attributes, the next best result was achieved

**Table 1:** Effect of organic amendments on yield and economic benefits of Tomato-Dolichos Bean-Baby Corn Cropping Sequence.

Treatments	Yield (kg/ha)			TEY*(kg/ha)	Net return	B:CRatio
	Tomato	Dolichos Bean	Baby Corn			
T <sub>1</sub>	9330	2720	2250	16550	159625	1.44
T <sub>2</sub>	37910	6460	14980	74330	311004	4.78
T <sub>3</sub>	12360	3630	4300	24590	248383	1.98
T <sub>4</sub>	10070	3640	5000	20710	206069	2.01
T <sub>5</sub>	11510	3010	2700	19920	245925	1.62
T <sub>6</sub>	10530	3210	3700	13740	161647	1.70
T <sub>7</sub>	25660	5260	11010	52940	286162	3.70
T <sub>8</sub>	30270	5500	13710	68512	310007	3.98
T <sub>9</sub>	18590	4430	8310	39640	276236	2.87
T <sub>10</sub>	20360	5080	9500	44440	112561	2.81
T <sub>11</sub>	23750	5100	10010	48870	273016	3.58
T <sub>12</sub>	28930	5350	12130	58540	302532	3.87
T <sub>13</sub>	14500	4320	6090	31000	160206	2.48
T <sub>14</sub>	16320	4130	7230	34910	274881	2.54
S. ED	0.512	0.02	0.33	0.44		
CD (P=0.05)	1.040	0.05	0.66	0.88		

\*Tomato Equivalent Yield.

TEY= Tomato per kg price/Other crop per kg price \* Other crop yield.

by the combination of poultry manure @ 2.16 t ha<sup>-1</sup> and neem cake @ 0.73 t ha<sup>-1</sup>. The residual effects of manures viz poultry droppings, farm yard manure, neem cake, vermicompost and castor cake was favorable and resulted in better growth of succeeding crops. This has ensured sustainable crop production in same field.

### Conclusion

Organic farming can be taken up for high value crops like tomato, Dolichos bean and baby corn on-farming generation of organic sources and possibility of getting high premium price for organically grown crops will commensurate the net returns in addition to maintain the soil ecological equilibrium.

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