



## RESEARCH PAPER

# Effect of organic manures and inorganic fertilizers on growth parameters in *Tinda* (*Praecitrullus fistulosus*)

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**Abstract :** A field experiment was conducted to study the effect of organic manures and inorganic fertilizers on growth parameters in *Tinda*. There were 13 treatments comprised of organic manures viz., FYM (25 t ha<sup>-1</sup>), vermicompost (2.5 t ha<sup>-1</sup>), neemcake (1000 kg ha<sup>-1</sup>), *Azospirillum* and Phosphobacteria (2 kg ha<sup>-1</sup>) along with recommended dose of inorganic fertilizers @ 50:20:20kg NPK ha<sup>-1</sup>. The experiment was laid out in a Randomized Block Design with three replications. The study revealed that 75 per cent of NPK along with vermicompost @ 2.5 t ha<sup>-1</sup> combined with *Azospirillum* and Phosphobacteria @ 2 kg ha<sup>-1</sup> recorded the highest vine length (207.22cm), number of laterals (18.96) and leaf area (110.86 cm<sup>2</sup>).

**Key Words :** *Tinda*, Vermicompost, *Azospirillum*, Phosphobacteria, NPK, Growth

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## INTRODUCTION

*Tinda* (*Praecitrullus fistulosus*) or Indian round gourd or apple gourd or Indian Baby Pumpkin, is a squash like cucurbit grown for its immature fruit. It is cultivated as a vegetable in India, Pakistan and Afghanistan. The origin is probably north-western India. In India, *Tinda* is also used as fodder and medicine. The plant is a prolific vine and is grown as an annual, climbing or trailing herb. Green coloured, apple sized *Tinda* fruits are flattish round in shape and 50-60 g in weight which is approximately spherical and 10-12 cm in diameter. The fruits are rich in water content, protein, fat, carbohydrate, fibre and minerals like calcium, iron, magnesium and phosphorus. The seeds may also be roasted and eaten.

Organic manures either singly or in combination with inorganic fertilizers have assumed greater

importance as sources of plant nutrients enhancing the yield in vegetable crops. The farmers use farm yard manures and compost on wider scale for the cultivation of vegetables. With this background, the present investigation was carried out to study the effect of organic manures and inorganic fertilizers on growth attributes in *Tinda*.

## MATERIAL AND METHODS

The experiment was conducted in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu during 2015 to study the effect of organic manures and inorganic fertilizers on growth parameters in *Tinda*. The treatments were selected for sole and combined application of vermicompost, farmyard manure, neemcake, *Azospirillum* and Phosphobacteria

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along with 100 per cent, 75 per cent and 50 per cent of recommended dose of inorganic fertilizers and thus, 13 treatment combinations were laid out in Randomized Block Design (RBD) with three replications. The treatments were T<sub>1</sub>-100 per cent recommended dose of inorganic fertilizers alone (50:20:20 kg NPK ha<sup>-1</sup>); T<sub>2</sub> - 75 per cent recommended dose of inorganic fertilizers alone; T<sub>3</sub>-50 per cent recommended dose of inorganic fertilizers alone; T<sub>4</sub>-Vermicompost @ 2.5 t ha<sup>-1</sup>; T<sub>5</sub>-FYM @ 25 t ha<sup>-1</sup>; T<sub>6</sub>-Neem cake @ 1000 kg ha<sup>-1</sup>; T<sub>7</sub>-75 per cent NPK + vermicompost @ 2.5 t ha<sup>-1</sup> + *Azospirillum* and Phosphobacteria @ 2kg ha<sup>-1</sup>; T<sub>8</sub>-75 per cent NPK +FYM@ 25 t ha<sup>-1</sup> + *Azospirillum* and Phosphobacteria @ 2kg ha<sup>-1</sup>; T<sub>9</sub>-75 per cent NPK + neemcake @ 1000 kg ha<sup>-1</sup> + *Azospirillum* and Phosphobacteria @2kg ha<sup>-1</sup>; T<sub>10</sub> -50 per cent NPK + vermicompost @ 2.5 t ha<sup>-1</sup> + *Azospirillum* and Phosphobacteria @ 2kg ha<sup>-1</sup>; T<sub>11</sub>-50 per cent NPK + FYM @ 25 t/ha + *Azospirillum* and Phosphobacteria @ 2kg ha<sup>-1</sup>; T<sub>12</sub>-50 per cent NPK + neem cake @ 1000 kg ha<sup>-1</sup> + *Azospirillum* and Phosphobacteria @ 2kg ha<sup>-1</sup>; T<sub>13</sub> - Absolute control. The field was laid out into beds of 3x 1 m size. The seeds of variety Punjab *Tinda* were sown in the centre of the beds by digging small pits. Each plot was applied with the respective dose of organic manures as basal application as per the treatment schedule. The fertilizers N, P and K were supplied by urea, single superphosphate (SSP) and muriate of potash (MOP), respectively.

All observations were recorded on six tagged plants in each replication in each treatment. The length of the vine was measured from the ground level to the apical

meristematic tip at the final harvest and expressed in centimetre. The number of laterals arising from the main stem was counted at final harvest and recorded. The area of fully expressed fifth leaf from the tip was measured at 60 DAS by using the leaf area meter and leaf area was expressed in square centimetre.

## RESULTS AND DISCUSSION

Vine length is considered to be an important factor to arbitrate the vigour in *Tinda*. The data presented in Table 1 revealed that the treatment of 75 per cent recommended dose of NPK, vermicompost along with dual inoculation of *Azospirillum* and Phosphobacteria, yielded the highest vine length (207.22 cm). The increase in vine length could probably be due to improvement in the physio – chemical properties of soil, increase in microbial population and activity and easy availability of macro and micronutrients by application of vermicompost (Azarmi *et al.*, 2008 and Ekinci and Dursun, 2009). The finding is close conformity with those of Hamid *et al.* (2011) in brinjal and Singh *et al.* (2011) in french beans. *Azospirillum* and Phosphobacteria were reported to improve available N and P in soil thereby sustaining the soil health. This helps to improve the growth parameters (Bhunja *et al.*, 2006 and Kumar *et al.*, 2002). In the present study also, application of biofertilizers along with 75 per cent recommended dose of NPK and vermicompost resulted in enhancing the growth parameters. A similar significant improvement in growth characters due to inoculation of biofertilizers has been reported by Chattoo *et al.* (2007) in garlic, Chettri and

**Table 1: Effect of organic manures and inorganic fertilizers on vine length (cm), number of laterals per plant and leaf area (cm<sup>2</sup>) in *Tinda***

Treatments	Vine length (cm)	Number of laterals per plant	Leaf area (cm <sup>2</sup> )
T <sub>1</sub> - 100% NPK	201.00	17.83	108.69
T <sub>2</sub> - 75% NPK	179.24	13.87	101.11
T <sub>3</sub> - 50% NPK	160.59	10.46	94.56
T <sub>4</sub> - Vermicompost @ 2.5 t ha <sup>-1</sup>	154.37	9.31	92.39
T <sub>5</sub> - FYM @ 25 t ha <sup>-1</sup>	148.15	8.18	90.20
T <sub>6</sub> - Neem cake @ 1000 kg ha <sup>-1</sup>	145.05	7.67	89.17
T <sub>7</sub> - 75% NPK + Vermicompost @ 2.5 t ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria@ 2 kg ha <sup>-1</sup>	207.22	18.96	110.86
T <sub>8</sub> - 75% NPK + FYM @ 25 t ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria @ 2 kg ha <sup>-1</sup>	191.68	16.15	104.33
T <sub>9</sub> - 75% NPK + Neemcake 1000 kg ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria@ 2 kg ha <sup>-1</sup>	194.78	16.68	106.50
T <sub>10</sub> - 50% NPK + Vermicompost 2.5 t ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria@ 2 kg ha <sup>-1</sup>	185.46	15.2	103.28
T <sub>11</sub> - 50% NPK + FYM @ 25 t ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria@ 2 kg ha <sup>-1</sup>	166.81	11.59	96.75
T <sub>12</sub> - 50% NPK + Neemcake @ 1000 kg ha <sup>-1</sup> + <i>Azospirillum</i> and Phosphobacteria@ 2 kg ha <sup>-1</sup>	173.03	12.74	98.92
T <sub>13</sub> - Absolute control	138.83	6.52	87.00
S.E.±	3.10	0.55	1.07
C.D.(P=0.05)	6.21	1.11	2.15

Thapa (2006) in potato and Zayed (2012) in moringa.

Application of various organic manures along with inorganic fertilizers significantly increased the number of laterals. The treatment which received the application of vermicompost @ 2.5 t ha<sup>-1</sup> along with *Azospirillum* and Phosphobacteria @ 2 kg ha<sup>-1</sup> combined with 75 per cent of recommended dose of inorganic fertilizers (T<sub>7</sub>) recorded the highest number of laterals (18.96). Similar findings were reported by Uma and Malathi (2009) in amaranthus and Khan *et al.* (2011) in chilli.

Regarding the leaf area, data presented in Table 1 revealed that the application of 75 per cent of recommended dose of inorganic fertilizers combined with vermicompost @ 2.5 t ha<sup>-1</sup> along with *Azospirillum* and Phosphobacteria @ 2 kg ha<sup>-1</sup> (T<sub>7</sub>) recorded the highest value (110.86 cm<sup>2</sup>). This might be due to beneficial effects of vermicompost. The results emphasize the integration of organic sources of nutrition which will provide maximum area for CO<sub>2</sub> fixation and in turn helped the plants to boost their growth. Singh *et al.* (2010) in tomato and Jadhav *et al.* (2014) in radish have reported similar findings correspondingly.

The application of nutrients like vermicompost, *Azospirillum* and Phosphobacteria, inorganic fertilizers has significant and vital effect on growth parameters of *Tinda*. The supply of various plant nutrients at an optimum level sustains the desired crop productivity by optimizing the benefits from all sources in an integrated manner. In light of the results, this study can infer that organics are effective alternatives as a source of macro and micronutrients and have a potential to improve the growth parameters. The biofertilizers, such as *Azospirillum* and Phosphobacteria also produce growth promoting substances, increase soil fertility in terms of nitrogen, phosphorus and potassium. Thus, it can be concluded from the present study, the application of 75 per cent NPK, vermicompost @ 2t ha<sup>-1</sup> along with *Azospirillum* and Phosphobacteria @ 2 kg ha<sup>-1</sup> found to have beneficial effect on the growth parameters of *Tinda*.

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