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## Effect of organic manures on growth and yield of Toria (*Brassica campestris*)

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**Abstract**

The field experiment was conducted during *Rabi* 2019-20 at SMOF (SHIATS Organic Modal Farm), Department of Agronomy, SHUATS, Prayagraj (UP). The soil of the experimental field is sandy loam in texture, nearly neutral in soil reaction (pH 7.6), the available N, P, K fertilizer is applied through organic fertilizers i.e. Cow manure, Vermicompost and Poultry manure. The treatment consisted of two varieties T-9 and Uttara and application of Vermicompost, Poultry manure and FYM *viz*: whose effect is observed on Toria. The experiment was laid out in Randomized Block Design with 12 treatments replicated thrice. The treatment with T9 + 4t/ha of Vermicompost showing significantly higher in plant height (92.36 cm), number of branches (7.71), number of siliqua per plant (102.34), grain yield (12.30 q/ha).

**Keywords:** Vermicompost, poultry manure, farm yard manure, organic, manures, varieties

**Introduction**

India is a major grower and producer of oilseeds as well as a major importer of vegetable oils, ranks fourth among the countries in oilseed economy. Despite cultivation over a large area covering 26.54 million hectares under various oilseeds of different agro-climatic zones of this country, the present average per capita consumption of oils and fats has been very low against the nutritional standard for a balanced diet. Although most cultivating states are Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat, Haryana, West Bengal (DRMR 2017). Nearly 30.7% area under rapeseed mustard is under rainfed farming. Rapeseed-Mustard is predominantly cultivated in the states of Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh, and Gujarat which contribute 81.5% area and 87.5% production (2001-02 to 2005-06). India occupies third position in Rapeseed-mustard production in world after china and Canada. Vermicompost has been recognized as a low cost and environmentally sound process for treatment of many organic wastes. Bevacqua and Mellano (2013)<sup>[1]</sup> reported that vermicompost treated soils had lower pH and increased levels of organic matter, primary nutrients, and soluble salts. Poultry manure is a good source of nutrients for crops. It is also called as chicken manure, is an excellent soil amendment that provides nutrients for growing crops and also improves soil quality when applied wisely. Good quality farmyard manure (FYM) is perhaps the most valuable organic manure. It must be stressed that the value of FYM in soil improvement is due to its micronutrient content, besides helping in the improvement of soil structure and water holding capacity of soil. FYM or well decomposed compost at the 5 to 10 t/ha every year is helpful in maintaining soil health, increases the availability of nutrient and reduces toxic effects of chemicals and fertilizers.

**Materials and methods**

A field experiment was conducted during *rabi* 2019-20 at the SMOF (SHUATS Model Organic Farm), Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), Uttar Pradesh. The SMOF is situated at 25°24'41.27" N latitude, 81°50'56" E longitude (Google, 2018) and 98 m altitude above the mean sea level in North Eastern Plain Zone. The soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (pH 7.6). The total rainfall received during crop season 2019-20 was 2.62 mm. Toria was sown @ 4 kg/ha on 15 October 2019 with plant geometry of 30 × 15 cm apart and evaluated in Randomized block

design with twelve treatments and three replications. The treatment combinations with 2 varieties (T-9 & Uttara) and 3 organic manures with each 2 levels *viz.* Vermicompost 2 & 4 t/ha, Poultry manure 2 & 4 t/ha and Farm yard manure 10 & 15 t/ha. Optimum plant population maintained by thinning and gap filling. The thinning operation was done after 10 days of sowing. Spray of cow urine 2% was applied to protect the crop from aphids. The observations were recorded on the different growth parameters *viz.* plant height, number of branches per plant. Yield parameters *viz.* seed yield, Stover yield and harvest index. The experimental crop was harvested in the month of January 14, 2020. The produce from net plots were harvested in one lot and tied in bundles and allowed to completely dry. Material was passed through threshing operation. After threshing and winnowing the clean seeds from each plot were weighed and the weight was recorded as seed yield in kg/plot and then converted in q/ha.

## Results and discussion

### Growth parameters

#### Plant height (cm)

Plant height maximum at harvest (92.36 cm), was observed in treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). However, at par plant height values were observed in treatment T<sub>7</sub> (Uttara + 2 t/ha of Vermicompost), T<sub>1</sub> (T9 + 2 t/ha of Vermicompost), T<sub>10</sub>

(Uttara + 4 t/ha of Poultry manure), T<sub>6</sub> (T9 + 15 t/ha of Farm yard manure) and T<sub>5</sub> (T9 + 10 t/ha of Farm yard manure). Vermicompost can provide all nutrients in readily available form and also enhance uptake of nutrients by plants (Zahedifard *et al.*, 2014) [9]. Application of vermicompost helps in higher availability of essential nutrients particularly nitrogen increased the plant height. Application of vermicompost made higher nutrients available to plants resulted into more height (Murali *et al.*, 2108) [3].

#### Number of branches/plant

Number of branches per plant at harvest (7.71/plant), were observed in treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). However, the statistically at par values was observed in T<sub>6</sub> (T9 + 15 t/ha of Farm yard manure), T<sub>10</sub> (Uttara + 4 t/ha of Poultry manure) and T<sub>1</sub> (T9 + 2t/ha of Vermicompost). The reason for better growth and development is increased availability of nitrogen to the plants through vermicompost. It played important role in development of roots and increased microbial activity because of balanced mutational environment in both soil rhizosphere and plant system. Due to continuous availability of nitrogen throughout the plant growth leads to increase in number of branches (Sandhu 2010) [5].

**Table 1:** Effect of organic manures on growth attributes of Toria

Treatments	Plant height (cm)	Number of branches/plant
T9 + 2 t/ha of Vermicompost	89.06	7.2
T9 + 4t/ha of Vermicompost	92.36	7.71
T9 + 2 t/ha of Poultry manure	77.10	5.6
T9 + 4 t/ha of Poultry manure	84.26	5.6
T9 + 10 t/ha of Farm yard manure	81.66	5.6
T9 + 15 t/ha of Farm yard manure	87.90	7.59
Uttara + 2 t/ha of Vermicompost	89.63	6.2
Uttara + 4t/ha of Vermicompost	79.50	5.58
Uttara + 2 t/ha of Poultry manure	83.46	5.41
Uttara + 4 t/ha of Poultry manure	88.73	7.58
Uttara + 10 t/ha of Farm yard manure	84.46	5.8
Uttara + 15 t/ha of Farm yard manure	86.73	6.2
SEm (±)	2.12	0.40
CD	6.21	1.20

### Yield and Yield attributes

#### Number of Siliqua/plant

Maximum Number of siliqua per plant (102.34siliqua/plant) was observed in treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). However, treatment T<sub>10</sub> (Uttara + 4 t/ha of Poultry manure) was statistically at par with treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). Application of vermicompost significantly increased the yield attributes such as number of siliqua per plant, seeds per siliqua and test weight and ultimately increases in yield. Since, vermicompost contains almost all essential plant nutrients, its incorporation in soil promoted rapid vegetative growth and branching, thereby, increasing flowering 'sink size' fruit and seed setting. The improvement of overall growth was due to vermicompost application coupled with transport of photosynthesis towards reproductive structures might have increased the yield attributes (Kansotia *et al.*, 2013) [2]. These results are in close conformity with those of Rajkhowa *et al.*, (2000) [4] and Sing *et al.*, (2007) [7].

#### Grain yield (q/ha)

Maximum grain yield (12.30 q/ha) was observed in treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). However, treatment T<sub>7</sub> (Uttara + 2 t/ha of Vermicompost) was found to be statistically at par with treatment T<sub>2</sub> (T9 + 4t/ha of Vermicompost). It is an established fact that vermicompost improves the physical and biological properties of soil including supply of almost all the essential plant nutrients for the growth and development of plants. Thus, balanced nutrition under favourable environment might have helped in production of new tissues and development of new shoots. The beneficial effect of vermicompost on these parameters might also be due to its contribution in supplying additional plant nutrients and increasing the availability of native soil nutrients due to increased microbial activity, As a result almost all growth and yield of crop resulted into significant improvement due to application of vermicompost (Sharma *et al.*, 2017) [6]. These results are in agreement with those of Kansotia *et al.*, (2013) [2] and Singh *et al.*, (2014) [8].

**Table 2:** Effect of organic manures on yield and yield attributes of Toria

Treatments	Number of Siliqua/plant	Grain yield (q/ha)
T9 + 2 t/ha of Vermicompost	69.11	10.53
T9 + 4t/ha of Vermicompost	102.34	12.30
T9 + 2 t/ha of Poultry manure	50. 11	7.86
T9 + 4 t/ha of Poultry manure	66.56	7.80
T9 + 10 t/ha of Farm yard manure	60.11	7.73
T9 + 15 t/ha of Farm yard manure	71.78	9.16
Uttara + 2 t/ha of Vermicompost	78.00	9.90
Uttara + 4t/ha of Vermicompost	51.33	7.73
Uttara + 2 t/ha of Poultry manure	54.78	7.90
Uttara + 4 t/ha of Poultry manure	95.78	11.53
Uttara + 10 t/ha of Farm yard manure	79.67	8.10
Uttara + 15 t/ha of Farm yard manure	71.78	8.53
SEm ( $\pm$ )	7.47	0.58
CD	21.92	1.72

### Conclusion

On the basis of one season experimentation application of T9 + 4t/ha of Vermicompost was found more productive in plant height (92.36 cm), number of branches per plant (7.71/plant), number of siliqua per plant (102.34 siliqua/plant), grain yield (12.3 q/ha).

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