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## Effect of integrated nutrient management on growth and yield of Radish (*Raphanus sativus* L.)

**Devendra Kumar Sahu, Khiromani Nag and LP Bhardwaj**

### Abstract

Experiment was conducted during rabi season of 2015-16 at research farm of AKS University, Sherganj Satna. To entitled Effect of integrated nutrient management on growth and yield of radish (*Raphanus sativus* L.). The experiment consisting of ten treatment combination with NPK, Vermi-compost, FYM, as well as poultry manure was laid out in randomize block design with three replications. Growth parameter differed significantly at all the stages of crop growth. Maximum plant height (13.76, 25.45, 30 and 45 DAScm), number of leaves per plant (4.36, 6.15, 30 and 45 DAS), were recorded in the treatment (T<sub>7</sub>) NPK 50% + poultry manure 1.5t/ha. Maximum length of root (28.03), fresh weight of leaves (150.81g), fresh weight of root (150.81g), root yield per hectare (22.82 q), were recorded in the same treatment. Combined Application of NPK 50% + poultry manure also increased the growth and yield parameter of radish.

**Keywords:** Effect of INM, growth and yield of Radish (*Raphanus sativus* L.)

### Introduction

Radish (*Raphanus sativus* L.) is a popular root vegetable grown all over the world. It is native of Europe and Asia and belongs to family cruciferae (Gill 1993). In India it is grown in several areas of the country throughout the year. Its edible fusiform roots are eaten raw as salad or cooked vegetable. Its leaves are rich in minerals and vitamins A and C and are also cooked as leafy vegetable. Besides this its immature pods usually called 'mongree' are either eaten raw or cooked as vegetable alone or mixed with other vegetables. Due to its high medicinal value it is prescribed for patients suffering from piles, liver troubles and jaundice (Brar and Nandpuri, 1972) [1]. The important radish growing districts in Madhya Pradesh are Chhattarpur, Tikamgarh, Katni, Balaghat, Dewas, Panna, Hoshangabad, Khargon The maximum Area (in 000 ha.) under radish is occupied is Chhattarpur (0.4 hectares) followed by Tikamgarh (0.305 hectares), Katni (0.3 hectares), Balaghat (0.15 hectares), Dewas (0.152 hectares), Panna (0.167 hectares) Hoshangabad (0.106 hectares) and, Khargon (0.082 hectares) districts of the state. The problem of high cost of chemical fertilizers fully meet out nutrient requirement of crop by single source therefore integrated nutrient management such as organic matters like farmyard manure, vermin-compost and poultry manure uses has become necessary. Farmyard manure being a bulky organic material releases the soil compaction and improves the aeration in addition to the supply of essential plant nutrients and organic matter, thereby increasing the soil microbial establishment along with accumulation of excess humus content. The chemical analysis of vermin-compost reveals that the N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O content was 0.8, 1.1, 0.5, respectively. The poultry manure estimated, contains 60 percent of organic N due to rapid mineralization poultry manure was recognized as a valuable source of plant nutrient for all crops. (Giraddi *et al*, 1993) [3]. Under normal agro-climatic conditions, the variety which is most suitable and which organic manure is supplied are the two chief factors which influence yield and quality of radish.

### Materials and Methods

The present research works "Effect of integrated nutrient management on growth and yield of Radish (*Raphanus sativus* L.)" have been undertaken in the Department of Horticulture, AKS

University, Satna (M.P.) during 2015-2016. The treatments combinations are as under - T<sub>1</sub>. Recommended dose of fertilizer (RDF) NPK 50:60:80 kg/ha., T<sub>2</sub>. Vermicompost 5t/ha, T<sub>3</sub>. FYM 20t/ha, T<sub>4</sub>. Poultry Manure 3t/ha., T<sub>5</sub>. Vermicompost 2.5t/ha +NPK 50%, T<sub>6</sub>. NPK 50% + FYM 10t/ha., T<sub>7</sub>. NPK 50% + Poultry Manures 1.5t/ha., T<sub>8</sub>. Vermicompost 2.5t/ha +FYM 10t/ha., T<sub>9</sub>. Poultry 1.5t/ha + Vermicompost 2.5t/ha., T<sub>10</sub>. FYM 10t/ha + poultry manure 1.5t/ha etc.

**Observation assessments; (I) Plant height;** The plant height was measured with the help of a meter scale from the ground level of the root up to the tip of leaf at 30, 45 and 60 DAS.

**(II) Number of leaves per plant;** Number of leaves was counted 15 days interval and was started from 30 days after sowing and continued to harvest, *i.e.* 30, 45 and 60 DAS.

**(III) Dry weight of leaves per plant;** Fresh leaves of 100g as per treatment sample were weight and cut into small pieces. After sun drying for 3 days the samples were oven dried at 72 hours.

**(IV) Fresh weight of root per plant;** Five selected radish roots were used to determine the fresh weight of root. Modified roots were detached by knife from the foliage part and fresh weight was taken by using balance and recorded in gram (g).

**(V) Yield per hectare (quintal);** The weight of roots was recorded treatment-wise from each net plot and from each replication.

## Results And Discussion; Growth parameters;

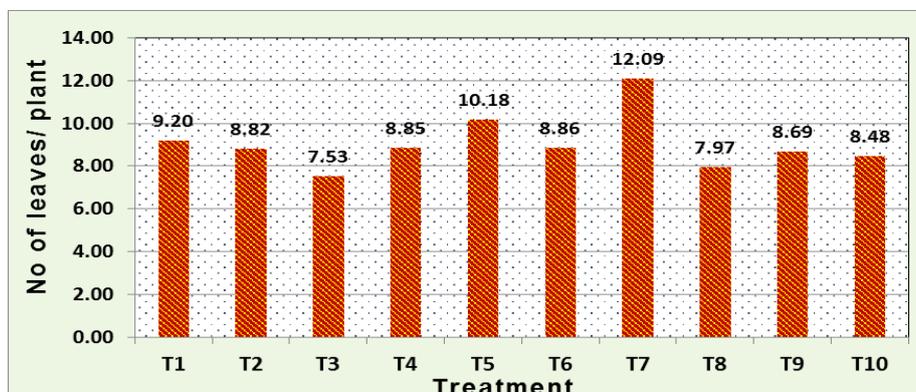
**Plant height at 30DAS;** The plant height was recorded at 30

days after sowing. The plant height varied significantly due to using of different (INM) integrated nutrient management treatment at 30 DAS. The highest plant height (13.76 cm) was found on NPK 50% +poultry manure 1.5t/h and the lowest plant height (8.71 cm) was found when FYM 20t/ha (Farm yard manure) was applied.

**Plant height at 45DAS;** Plant height (cm) showed significant variations due to the (INM) integrated nutrient management treatment at 45 DAS. The maximum plant height (25.45cm) received when integrated nutrient management treatment NPK 50% + poultry manure 1.5t/ha, was applied and minimum plant height (16.12cm) was noted when FYM 20t/ha. was incorporated.

**Number of leaves per plant 30 days after sowing;** Number of leaves per plant was significantly influenced by the different integrated nutrient management combination at 30 DAS. The maximum number of leaves per plant (4.36) was found in NPK 50%+poultry manure1.5t/ha and minimum number of leaves (2.80) was noted from the Farm yard manure 20t/ha.

**Number of leaves per plant 45DAS;** The number of leaves were significantly increased due to use of different (INM) integrated nutrient management treatment. The maximum number of leaves (6.15) at 45 days after sowing (DAS) in application of NPK 50% + poultry manure 1.5t/ha and minimum number of leaves (3.88) was recorded with application of farm yard manure 20t/ha.



**Fig 1:** Number of leaves per plant of radish as influenced by integrated nutrient management during at harvest

**Length of Root (cm);** Data assembled in connection with length of root (cm) at harvest as affected by integrated nutrient management have been presented in different integrated nutrient management (INM) show significant effect

on root length of radish. The longest root length (28.03 cm) was observed in NPK 50% + poultry manure 1.5t/ha and shortest root length (18.00 cm) was found in (FYM) Farm yard manure 20t/ha.

**Table 1:** Table showing the length of roots (cm) of radish as influenced by integrated nutrient management

Treatments	Length of roots (cm)
T <sub>1</sub> (RDF) NPK 50:60:80 kg/ha.	21.20
T <sub>2</sub> (Vermicompost 5t/ha)	21.07
T <sub>3</sub> (FYM 20t/ha )	18.00
T <sub>4</sub> (poultry Manures 3t/ha)	21.14
T <sub>5</sub> (Vermicompost 2.5t/ha +NPK 50%)	24.32
T <sub>6</sub> (NPK 50% + FYM 10t/ha)	21.18
T <sub>7</sub> (NPK 50% + Poultry Manures 1.5t/ha)	28.03
T <sub>8</sub> (Vermicompost 2.5t/ha +FYM 10t/ha)	19.06
T <sub>9</sub> (Poultry 1.5t/ha + Vermicompost 2.5/ha)	20.77
T <sub>10</sub> (FYM 10t/ha + poultry manure 1.5t/ha)	20.15
SEm ±	0.79
CD (P=0.05)	2.35

**Dry weight of leaves per plant (g);** The highest dry weight of leaves (6.43 g) was obtained from NPK 50% + poultry manure 1.5t/ha and lowest dry weight of leaves (3.72g) was found with application of farm yard manures 20t/ha.

**Fresh weight of root (g);** Data collected on fresh weight root per plant (g) as influenced by different INM integrated nutrient management have been presented in fresh weight of root was significantly influenced by the use of different integrated nutrient management (INM). The high weight of root (150.81g) was recorded with NPK 50% + poultry manure 1.5t/ha and low fresh weight of root (96.18g) was recorded in farm yard manures 20t/ha was applied.

**Root yield per hectare (q/ha);** Data pertaining to root yield per hectare at harvest of radish as influenced by various integrated nutrient management treatment and results are presented in different integrated nutrient management treatment, NPK 50%+poultry manure 1.5t/ha was significantly influenced root yield per hectare and recorded highest yield (22.82 q/ha) and the lowest yield (14.48 q/ha) was in farm yard manures 20t/ha.

### Discussion

**Growth parameters;** Application of different nutrient management significantly influenced plant height at 30 and 45 DAS. At 30 DAS, the tallest plant height (13.76cm) was found in use of (T<sub>7</sub>) NPK 50% + poultry manure 1.5t/ha and shortest plant height 8.71cm was found in (T<sub>3</sub>) FYM 20t/ha. At 45 DAS tallest plant were obtained due to use of NPK 50%+poultry manure 1.5t/ha and also at harvest. Similar result was also reported by Jadhav *et al.* (1999) [4] and revealed that the NPK+poultry manure1.5t/ha significantly increased plant height. The data clearly indicated that the number of leaves per plant of radish responded significantly to various treatment of nutrient management at all the growth stages (*i.e.*, 30 and 45 DAS). The maximum numbers of leaves per plant were recorded in the treatments (T<sub>7</sub>) NPK 50% + poultry manure 1.5t/ha. However, the minimum leaves per plant was noted in (T<sub>3</sub>) FYM 20t/ha. Similar result was also reported by Mahabir *et al.*, (1990) [5].

**Yield Attributes;** Chavan *et al.*, (1997) [2] also reported similar findings. The fresh weight of leaves increased significantly by the use of different nutrient management. The significantly maximum fresh weights of leaves were recorded in the treatments (T<sub>7</sub>) NPK 50%+poultry manure 1.5t/ha. However, the minimum leaves per plant (86.65 g) was noted in (T<sub>3</sub>) FYM 20t/ha. Different nutrient management were significantly affected dry weight of leaves. The Maximum dry weight of leaves (6.43 g) was found in use of NPK 50%+poultry manure 1.5t/ha and lowest dry weight of leaves (3.72g) was found in farm yard manure (FYM 20t/ha). Fresh weight of root per plant was also different significantly by using different nutrient management. The maximum fresh weight of root (150.81) per plant was obtained in treatment (T<sub>7</sub>) NPK 50% poultry manure, while the minimum fresh weight of root (96-18g) was noted in (T<sub>3</sub>) FYM 20t/ha. The dry weight of root was significantly influenced by the use of different nutrient management. The maximum dry weight of root (12.78) was obtained in (T<sub>7</sub>) NPK 50%+poultry manure 1.5t/ha. Root yield per hectare was significantly increased due to use of different nutrient management in radish crop. The highest root yield of radish per hectare (22.82q/h) was obtained in (T<sub>7</sub>) (NPK 50%+poultry manure, while lowest

root yield (14.48q) in this respect was obtained by using FYM 20t/ha.

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