



RESEARCH ARTICLE

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## Utilization of vermiwash spray on growth and yield of radish cv. LOCAL VARIETY

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**ABSTRACT :** The present investigation was undertaken with the main objective of utilization of vermiwash spray on growth and yield of radish cv. LOCAL VARIETY. The experiment was laid out in Randomized Completely Block Design with five treatments and four replications. The experiment consists of five treatments involving application of water and vermiwash in the proportion of 1:1, 1:2, 1:3 and 1:4 and control were imposed and the foliar application was made by using knapsack sprayer in the evening hours twice at 15 and 30 days after sowing seeds. The data clearly revealed that the yield obtained with treatment T<sub>4</sub> (100 % RDF as fertigation and vermiwash foliar twice times spray 1:4 at 15 and 30 days after sowing seeds) was significantly higher than all other treatments in growth and yield attributes such as root diameter (5.53 cm), length (25.90 cm), weight (90.90 g), yield/plot (18.18 kg), yield/ha (60.59 t/ha) and marketable yield (45.45 t/ha) of radish cv. LOCAL VARIETY. Thus, it can be concluded that foliar spray of vermiwash (1:4) effective than control.

**KEY WORDS :** Radish, Local, Vermiwash, Water, Organic

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### INTRODUCTION

The degradation in soil health in many intensively cultivated areas is manifested in terms of loss of soil organic matter, depletion of native soil fertility, particularly with respect to secondary micronutrients and stagnation

or even decline in crop productivity. The depletion in soil fertility is due to imbalanced and unscientific use of fertilizer and is one of the major constraints in improving crop productivity (Dwivedi and Dwivedi, 2007). It has been widely accepted that organic farming alone could serve as a holistic approach towards achieving sustainable agriculture as it is nature based, environment friendly and ensures the conservation of resources for the future (Sangeetha and Thevanathan, 2010). Radish (*Raphanus sativus*) a member of the family cruciferae is a popular vegetable in both tropical and temperate regions of the world. It is one of the most ancient vegetables. Certain remarks of Herodotus reveal that it was cultivated about 2700 B.C. (Becker, 1962). Radish is a widely used root vegetable, tender leaves and shoots are also used as

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greens. It is cool season vegetable and monthly mean temperature of 10-15°C favours its growth and development. For an early and good crop stand, sandy to sandy loam soils are considered suitable for it. Its roots can be eaten raw as salad or cooked as a vegetable. It has cooling effect, prevents constipation, increases appetite and its roots and leaves are very tasty, when cooked together. It is recommended to the patients suffering from piles, liver trouble, enlarged spleen and jaundice. In the year 2013, area and production of radish in India was 170.30 thousand hectare and 2410.78 thousand metric tonnes, respectively (Anonymous, 2013). Zambare *et al.* (2008) reported that vermiwash contains enzyme of proteases, amylases, ureases and phosphatase besides nitrogen fixing bacteria like *Azotobacter* sp., *Agrobacterium* sp. and *Rhizobium* sp. and some phosphate solubilizing bacteria which influences significantly the growth of plant.

## EXPERIMENTAL METHODS

The field experiment was conducted at Nare village, Palghar district in Maharashtra during November, 2013-14 in a back side of ASPEE, ARDF, experimental plot by Local variety of radish with the spacing of 15 × 10 cm. The experiment was laid out in Randomized Completely Block Design with five treatments and four replications. The experiment consists of five treatments involving application of water and vermiwash in the proportion of 1:1, 1:2, 1:3 and 1:4 and control were imposed. The foliar application was made with knapsack sprayer in the evening hours twice at 15 and 30 days after sowing seeds.

An untreated check was also maintained, plot size was 3 × 1 m and each treatment as replicated four times. The recommended doses of 25 tones FYM, half dose 25 kg N, 50 kg P<sub>2</sub>O<sub>5</sub> and 50 kg K<sub>2</sub>O per hectare at the time of soil preparation and half 25 kg N top dressed in two equal splits at 12 and 23 days after sowing were imposed. Vermiwash was applied as per treatment at 15 and 30 days after seed sowing and thinning operation were carried out at 15 and 25 days after seed sowing and maintained proper plant population.

Vermiwash was used in four different dilutions *viz.*, 1:1, 1:2, 1:3 and 1:4 by mixing with water, as foliar spray to evaluate its effect on growth and yield of radish cv. LOCAL. Recommended dose of fertilizer along with water sprays was maintained as standard check. Two rounds

of vermiwash sprays were taken up at 15 days interval commencing after sowing. Vermiwash was obtained by culturing earthworms on organic substrates (65 % pre-composted crop wastes and 35 % animal manure) in equipment specially fabricated as described by ASPEE, ARDF, Tansa Farm. Composting material such as, cow dung, waste leaf material were collected from their by buffalos shed was exposed to sun light for 5 to 10 day to remove the various harmful organism and noxious gases. The moisture level was maintained by sprinkling water and the earthworms to get acclimatized to the vermiwash unit conditions. Vermiwash extracted from vermiwash collecting device. The apparatus made by effective cementing tank method in which worm bed is prepared. Concentrated sample of vermiwash collected after a period of 30 days. Vermiwash is a liquid that is collected after the passage of water through a column of worm and is very useful as a foliar spray. If us a collection of excretory products and mucus secretion of earthworm along with micronutrient from the soil organic molecular. These are transported to the leaf, shoot and other parts of the plants in the natural ecosystem vermiwash.

### Statistical analysis :

The recorded data were statistically analyzed (ANOVA analysis) using the software WASP, (developed at Indian Council of Agricultural Research, Research Complex for Goa, India). Sources of variation were vermiwash treatments. Mean comparisons were performed using LSD test to determine whether the difference between the variables were significant at P < 0.05.

## EXPERIMENTAL RESULTS AND ANALYSIS

The present study was undertaken to study the utilization of vermiwash spray on growth and yield of radish cv. LOCAL.

Different levels of vermiwash recorded significant variation leaf length of radish (Table 1 and Fig. 1a and b). The highest leaf length (42.22 cm) was found with T<sub>4</sub> (1:4 vermiwash) and the lowest leaf length (30.80 cm) was observed in control treatment.

Single radish leaf weight (Fig. 2) and total no of leaves per plant was observed maximum in treatment T<sub>4</sub> *i.e.*, 16.30 g, 11.80 and was lowest in treatment T<sub>5</sub> *i.e.*, 9.50 g, 7.40, respectively. The positive effect of

vermiwash spray on crop growth was observed by Buckerfield *et al.* (1999), Thangavel *et al.* (2003) and Samuthiravelu *et al.* (2012).

Different levels of vermiwash showed significant variation in root diameter, length and weight (Table 1 and Fig. 2). Maximum root diameter (5.53 cm), length (25.90 cm) and weight (90.90 g) was recorded from treatment T<sub>4</sub> (1:4 vermiwash) whereas, minimum root diameter (4.40 cm), length (20.90 cm) and weight (80.06 g) was recorded in T<sub>5</sub> control. Root length was maximum in plants involving vermiwash treatments. Root length increase indicates efficient absorption of water followed by transport and conduction.

The positive effect of vermiwash spray on root growth is in confirmation with Buckerfield *et al.* (1999); Thangavel *et al.* (2003) and Samuthiravelu *et al.* (2012).

#### Effect of vermiwash spray on radish cv. LOCAL VARIETY yield parameters :

The results of the experiment revealed that the radish

cv. LOCAL VARIETY yield characters such as yield/plot, yield/ha and marketable yield (Fig. 1a and b) were significantly influenced by foliar spray of vermiwash compared to control with no spray or water spray. Among the vermiwash sprays, (1:4 *i.e.* dilution of water: vermiwash) recorded significantly higher values for yield (18.18 kg/plot), yield/ha (60.59 t/ha) and marketable yield (45.45 t/ha) of radish cv. LOCAL VARIETY. Whereas, lower values yield /plot (16.01 kg), yield/ha (53.37 t/ha) and marketable yield (40.03 t/ha) of radish cv. LOCAL VARIETY was recorded in control (T<sub>5</sub>) (Table 2). Several reports revealed that application of vermiwash increased radish yield of 7.30 per cent by Buckerfield *et al.* (1999) and dry chilly yield by George *et al.* (2007).

Venkataramana *et al.* (2009) studied the influence of foliar sprays of vermiwash yield increased due to might be the reason for increasing chlorophyll and nitrogen contents in the leaf. Similar results related to the present investigation were also obtained by Khairnar and Gunjal (2012) on greengram and Dhok (2013).

**Table 1 : Effect of vermiwash spray on radish cv. LOCAL VARIETY growth parameters**

Treatments	Leaf length (cm)	Single radish leaf weight (g)	Total no. leaves per plant	Root diameter (cm)	Single root length (cm)
T <sub>1</sub>	36.00	10.20	8.00	4.27	21.12
T <sub>2</sub>	37.38	14.02	9.80	4.84	23.66
T <sub>3</sub>	41.26	15.15	10.20	5.28	24.86
T <sub>4</sub>	42.22	16.30	11.80	5.53	25.90
T <sub>5</sub>	30.80	9.50	7.40	4.04	20.90
S.E. ±	0.62	0.71	0.76	0.17	0.67
C.D. (P=0.05)	1.87	2.12	2.27	0.52	2.02
C.V. (%)	3.71	12.13	17.93	8.13	6.47

**Table 2 : Effect of vermiwash spray on radish cv. LOCAL VARIETY yield parameters**

Treatments	Single radish weight (g)	Yield/ plot (kg)	Yield per ha (t/ha)	Marketable yield (t/ha)
T <sub>1</sub>	84.40	16.88	56.26	42.20
T <sub>2</sub>	86.06	17.21	57.37	43.03
T <sub>3</sub>	88.68	17.74	59.11	44.34
T <sub>4</sub>	90.90	18.18	60.59	45.45
T <sub>5</sub>	80.06	16.01	53.37	40.03
S.E. ±	2.17	0.43	1.45	1.08
C.D. (P=0.05)	6.50	1.30	4.33	3.25
C.V. (%)	5.64	5.64	5.64	5.64

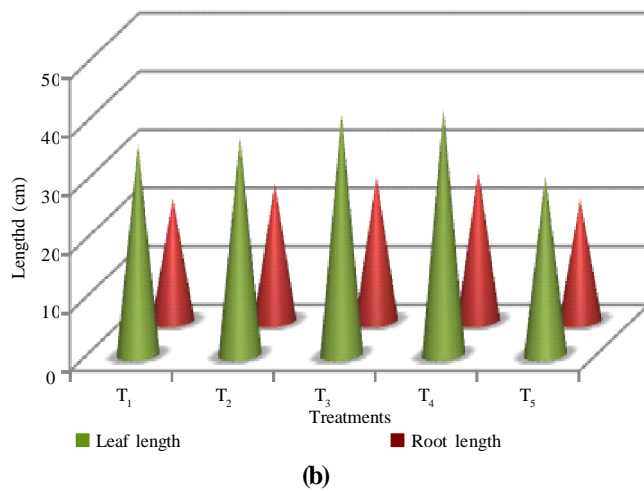
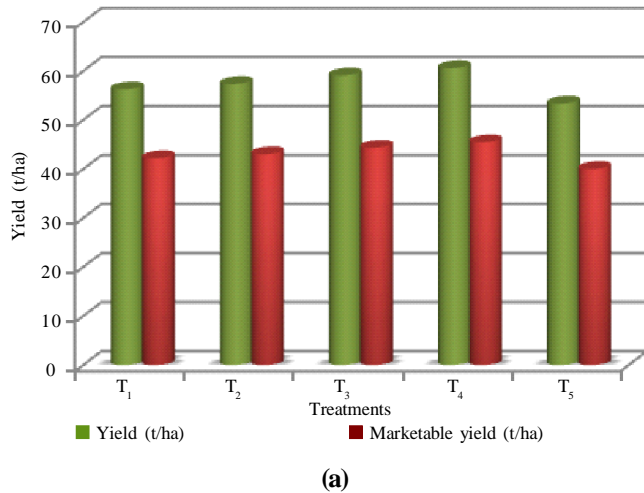


Fig. 1a and b : Effect of vermiwash spray on radish cv. LOCAL VARIETY

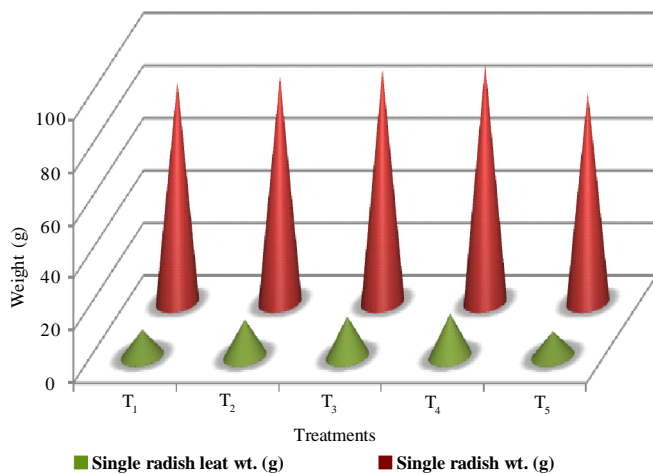


Fig. 2 : Effect of vermiwash spray on radish cv. LOCAL VARIETY

### Conclusion :

Present study on utilization of vermiwash spray on growth and yield of radish cv. LOCAL VARIETY clearly explains that the yield obtained with treatment T<sub>4</sub> (100 % RDF as fertigation and vermiwash foliar twice times spray 1:4 at 15 and 30 days after sowing seeds) was significantly higher than all other treatments in growth and yield attributes such as root diameter (5.53 cm), length (25.90 cm), weight (90.90 g), yield/plot (18.18 kg), yield/ha (60.59 t/ha) and marketable yield (45.45 t/ha) of radish cv. LOCAL VARIETY. Thus, it can be concluded that foliar spray of vermiwash (1:4) effective than control for enhancing growth and yield attributes of radish cv. LOCAL VARIETY.

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