

Efficacy of organic manures on growth and yield of radish (*Raphanus sativus* L.) cv. JAPANESE WHITE

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SUMMARY

A field experiment was conducted at Horticulture Research Farm, Babasaheb Bhimrao Ambedkar University, Lucknow to study the influence of organic source of nutrients on growth and yield of radish cv. Japanese White. The experiment consisted of 11 treatments laid out in randomized block design with three replications. The growth parameters were recorded at 15 days interval. It was seen that the plant height was significantly increased by the application of organic manures and it was maximum under treatment T₉ i.e. Vermicompost + poultry manure (50% each). Similarly, vermicompost+poultry manure 50% each (T₉) recorded highest number of leaves. Root length and root diameter were significantly influenced by organics at harvest. Highest root length (18.91 cm) was recorded with vermicompost (50%) + poultry manure (50%). The treatment was also proved to be better for fresh and dry weight of plant as well as roots and recorded highest in vermicompost (50%) + poultry manure (50%) treatment. The study suggested that application of poultry manure (50%) + vermicompost (50%) was found more beneficial and significantly improved growth and yield of radish var. Japanese White grown under Lucknow condition.

Key Words : Radish, Organic manures, Nutrition, Growth, Yield

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Radish (*Raphanussativus*L.) belongs to the family Brassicaceae. It is a popular root vegetable in both tropical and temperate regions. It can be cultivated under cover for early production but large scale production in field is more common in India. Radish is grown for its young tender tuberous root which is consumed either cooked or raw. It is a good source of vitamin-c and minerals like calcium, potassium and phosphorus. It has refreshing and diuretic properties. It is also used for neurological headache, sleeplessness and chronic diarrhoea. The roots are also useful

in urinary complaints and piles. The leaves of radish are good source for extraction of protein on a commercial scale and radish seeds are potential source of nondrying fatty oil suitable for soap making illuminating and edible purposes. Being a short duration and quick growing crop, the root growth should be rapid and uninterrupted. Hence, for the production of good quality radish, optimum nutrition through organic, inorganic and biofertilizers are essential for sustainable production. Organic agriculture practices rely upon recycling of crop residues, animal manure, farm organic residues and wastes etc. (Choudhary *et al.*, 2002; Stockdale *et al.*, 2001 and Bhuma, 2001). In view of higher cost of synthetic fertilizers and its contribution to poor health of soil and water it becomes imperative to go for alternative and cheaper source like organic manures. With this background, the present investigation was carried out to study the effect of organic manures on growth and yield of radish under Lucknow condition.

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MATERIAL AND METHODS

The field experiment was conducted at Horticultural Research Farm, Department of Applied Plant Science, School for Biosciences and Biotechnology, Babasaheb Bhimrao Ambedkar University, Lucknow, U.P. The soil of the experimental field was sandy loam with high pH (more than 8.0). The organic manures applied, were arranged in 11 treatments and replicated thrice following Randomized Block Design. The seeds of radish cv. JAPANESE WHITE were collected from Indian Agricultural Research Institute (IARI), New Delhi. Seeds were dibbled half way down the ridges at a distance of 15 cm in the soil. Thinning was done at 8 days after sowing by rotation one seedling per hill. Seeds were sown in rows at 30x15 cm spacing. The organic manures under study were FYM, vermicompost, poultry manure and their combinations. These manures were applied during field preparation 15 days

before sowing. The observations were taken on their vegetative growth and yield parameters. The recorded observations were statistically analyzed using analysis of variance following the method of Panse and Sukhatme (1967) and the mean values were compared at 5% level of significance.

RESULTS AND DISCUSSION

The experiment showed that application of organic manures improved plant height in comparison to control, in general (Table 1). Among the various organic manures, combined application of vermicompost and poultry manure (50% each) followed by FYM+vermicompost (50%+50%) and vermicompost (100%) proved to be better for improvement of plant growth at 45 and 60 days after sowing (DAS). However, FYM+vermicompost (50%+50%) showed the maximum plant height at 30 DAS. The Table 1 also

Table 1 : Effect of organic manures on plant height, leaves number and length of leaves of radish

Treatments	Plant height (cm)			Number of leaves			Length of leaves (cm)		
	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS	30 DAS	45 DAS	60 DAS
T ₁ -FYM	12.54	21.92	35.15	4.98	12.98	15.44	7.20	15.08	15.33
T ₂ - Vermicompost	10.07	24.45	34.34	4.80	13.62	15.36	7.12	15.92	15.92
T ₃ -Poultry manure	12.88	21.85	34.11	4.73	13.69	15.69	7.22	17.11	17.10
T ₄ -FYM+vermicompost (75%+25%)	14.99	21.93	33.63	4.82	13.22	14.98	6.92	16.55	16.56
T ₅ -FYM+vermicompost (50%+50%)	15.54	24.65	35.88	4.96	13.80	16.07	7.50	17.62	17.71
T ₆ -FYM+poultry manure (75%+25%)	15.04	24.31	35.17	4.80	14.13	15.64	7.34	16.90	16.90
T ₇ -FYM+poultry manure (50%+50%)	13.91	24.27	35.03	4.71	13.04	14.60	7.28	16.78	16.77
T ₈ -Vermicompost+poultry manure (75%+25%)	12.31	22.94	33.66	4.44	11.29	12.84	7.16	16.57	16.57
T ₉ -Vermicompost+poultry manure (50%+50%)	14.01	25.51	37.91	4.98	13.87	16.09	7.50	18.26	18.31
T ₁₀ Vermicompost+poultrymanure (25%+75%)	12.91	24.38	33.44	4.67	13.13	14.69	6.86	16.93	16.93
T ₀ (control)	7.11	15.93	31.58	3.40	8.91	9.82	5.42	13.81	13.82
S E. (±)	0.608	2.351	2.799	0.512	1.540	1.738	0.486	1.227	1.241
CD (P=0.05)	1.269	4.904	5.838	1.069	3.213	3.625	1.015	2.560	2.590

Table 2 : Effect of organic manures on weight of plant, roots, leaves and root length and diameter of radish

Treatments	Total plant weight (g)	Root weight (g)	Root length (cm)	Root diameter (cm)			Leaf weight (g)	
				Upper side	middle side	Lower side	Fresh weight	Dry weight
T ₁ -FYM	177.00	105.51	16.93	2.48	2.98	1.04	95.13	5.11
T ₂ - Vermicompost	253.24	159.96	17.27	2.86	3.48	1.11	95.69	4.78
T ₃ -Poultry manure	268.31	168.16	17.73	2.78	3.34	1.09	97.20	3.51
T ₄ -FYM+vermicompost (75%+25%)	241.93	161.47	16.81	2.83	3.28	1.02	76.31	3.22
T ₅ -FYM+vermicompost (50%+50%)	283.84	169.49	18.77	2.92	3.57	1.19	98.96	6.40
T ₆ -FYM+poultry manure (75%+25%)	258.18	184.14	18.32	2.85	3.52	1.13	79.22	5.24
T ₇ -FYM+poultry manure (50%+50%)	247.29	153.69	16.89	2.75	3.34	1.12	86.36	3.91
T ₈ -Vermicompost+poultry manure (75%+25%)	240.51	144.24	17.16	2.84	3.39	1.06	86.16	3.67
T ₉ -Vermicompost+poultry manure (50%+50%)	302.44	197.22	18.91	2.95	3.62	1.21	139.96	6.51
T ₁₀ -Vermicompost +poultry manure (25%+75%)	228.69	152.16	17.04	2.70	3.51	0.95	81.13	4.44
T ₀ (control)	177.33	95.98	14.81	2.53	2.79	0.91	69.49	3.09
S E m (±)	70.975	46.263	1.789	0.258	0.356	0.169	33.684	1.417
CD (P=0.05)	148.052	96.503	1.789	0.540	0.744	0.354	70.265	2.956

revealed that the effect due to FYM+vermicompost and vermicompost + poultry manure and sole application of vermicompost were not significant. In case of number of leaves per plant at 60 DAS, treatment with vermicompost + poultry manure (50% each) also showed the maximum number of leaves per plant followed by FYM + vermicompost (50% each) however their effects were statistically at par.

Application of FYM + vermicompost (50% each) and vermicompost + poultry manure (50% each) showed that the length of leaves at 30 DAS was the highest (7.50 cm) at those treatments (T_5 and T_9). On the process of growth, application of vermicompost in combination with poultry manure at 50% each increased the length of leaves at 45 DAS and 60 DAS among the treatments studied.

The growth parameter study showed that the variety Japanese White recorded significantly highest number of leaves though recorded higher values, the differences were not statistically significant. The results are in conformity with the finding of Lingaiah *et al.* (1992) in respect of number of leaves and leaf area. The result obtained in this study clearly indicate that radish respond well to poultry vermicompost. In general, the treatment with vermicompost 50% + poultry manure 50% had significantly greater number of leaves, followed by control, the increase in number of leaves may be due to the vermicompost (Giraddi, 1993). Thanunathan *et al.* (1997) also reported that application of vermicompost appears to be very effective amendment in onion.

The interaction effect of variety and organic manure recorded significantly higher value of number of leaf and leaf area though recorded higher values, the differences were not significant. The treatment with vermicompost 50% + poultry manure 50% the recorded higher values of growth parameter followed by RDF application in this crop.

The effect of organic manures on yield and its attributes is presented in Table 2. The treatment effect showed that total plant height was maximum under T_9 (Vermicompost + poultry manure at 50% each) followed by T_5 (FYM 50% + vermicompost 50%) and the minimum was noted under FYM 100% (T_1) and control which were statistically similar. Root weight of radish was increased due to the application of organic manures than control. It was maximum (139.96 g) under the treatment with vermicompost + poultry manure (50% each) followed by T_5 . Similarly, T_9 (vermicompost + poultry manure at 50% each) also produced the radish with maximum length of roots (18.91 cm). Similar trend was also seen in case of root diameter *i.e.* diameter at upper side, middle side and lower side. In all cases, application of vermicompost + poultry manure (50% each) showed the maximum diameter of roots.

The study regarding the fresh and dry weight of leaves revealed that there was very much improvement in fresh and dry weight due to the application of organic manures. Among the treatments application of vermicompost + poultry manure at 50% each (T_9) showed the highest increase in fresh weight

and dry matter content followed by T_5 (FYM+ vermicompost at 50% each). The treatment with poultry manure (50%) + vermicompost (50%) recorded significantly greater values for higher fresh weight of leaves, dry weight of leaves, total dry weight and root length. The results are in conformity with the findings of Babalad (2005) in respect of dry weight and total dry matter recorded highest by applying poultry manure and other green manures in chili.

Japanese white recorded significantly higher fresh weight of leaves, dry weight of leaves, total dry weight of whole plant and higher root length. These results are in consonance with the findings of many workers (Pujari *et al.*, 1977; Rajgopal *et al.*, 1979; Lingaiah *et al.*, 1992 and Parthasarathy, 1998). Yadav and Vijayakumari (2003) also reported the similar result in respect of fresh weight and dry weight of plants was higher in vermicompost and NPK in chili. The increase in fresh weight of leaves, roots and whole plant may be due to higher level of nitrogen. The nitrogen is also synthesized in to amino acids which are built into complex proteins and help in promoting the luxurious growth of crop (Muthuswamy and Muthukrishnan, 1971). Sendur *et al.* (1998) also indicated that the application of organic and inorganic fertilizers recorded higher growth yield and quality of tomato. Thanunathan *et al.* (1997) also related the good root length of onion with vermicompost application. This might be due to favorable physical conditions of soil and availability of plant nutrients in sufficient quantities.

Conclusion:

It is concluded that application of vermicompost (50%) + poultry manure (50%) was found more beneficial and significantly improved growth parameters, yield and yield components in radish cv. Japanese White grown under Lucknow condition.

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