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Response of taramira (*Eruca sativa*) to varying levels of FYM and vermicompost under rainfed conditions

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Abstract

Effect of FYM and vermicompost on growth and yield of taramira (*Eruca sativa* Mill.) was carried out at SKN College of Agriculture, Jobner (Rajasthan) consecutively during *rabi* 2004-05 to 2006-07 under rainfed conditions. Sixteen treatment combinations comprising four levels of each FYM and vermicompost were evaluated. Progressive increase in level of FYM from control to 6.0 t ha^{-1} resulted significant improvement in growth and yield attributes *viz,* plant height, crop dry matter, primary and secondary branches per plant, number of siliquae per plant, seeds per siliqua and test weight, seed yield and net returns over preceding levels during individual years as well as in pooled analysis. It represented a mean seed yield of 12.33 q ha^{-1} that was 8.1 and 24.7 per cent higher than 3.0 t ha^{-1} and control, respectively. Remaining at par with 9 t ha^{-1}, it also fetched 6.0 and 21.9 per cent higher net returns than above levels of FYM. Growth and yield attributes, seed yield as well as net returns in taramira also increased considerably with every increase in level of vermicompost. The highest value of most of these attributes was recorded under 3.0 t ha^{-1}. However, significant improvement was noted upto 2.0 t ha^{-1}, only. Providing the mean seed yield of 12.33 q ha^{-1}, this level enhanced it to the extent of 6.9 and 24.2 per cent over 1.0 t ha^{-1} and control, respectively. Remaining at par with 2.0 t ha^{-1}, application of vermicompost at 1.0 t ha^{-1} fetched the maximum mean net returns of Rs 12249 ha^{-1} that were 7.9 per cent higher than control.

Key words: *Taramira, Eruca sativa, farm yard manure, vermicompost, growth and yield*

Introduction

Taramira (*Eruca sativa* Mill.) also known as "Rocket salad" is an important non-edible oilseed crop among rapeseed and mustard group and has tremendous potential even under the situation of resource constraint. Being a highly drought tolerant crop because of its efficient root system to extract moisture from deeper layers of soil, it is especially suitable for arid and semi-arid regions of Rajasthan (Singh and Sharma, 1976). During the periods of severe drought coupled with late *rabi* rains, taramira is the only alternative left with the farmers on the soils having limited moisture supply. It is generally cultivated on marginal and sub marginal lands of poor fertility without application of organic manures and fertilizers which is one of the most spectacular reasons of its poor productivity. In addition of nitrogen and phosphorus, global reports of sulphur deficiency and consequent crop responses are also quite ostensible (Tandon, 1991). Optimum dose of nutrients and their source play an important role in enhancing the productivity of crops. The increasing use of NPK fertilizers has no doubt remarkably increased the food production but prolonged cultivation of crops using chemical fertilizers alone and simultaneous loss of organic matter due to accelerated oxidation at high temperature in the rainfed ecosystem has resulted great reduction in productivity of soil. Thus time has come to supplement these with organic sources to sustain the productivity and fertility of the soil (Behera *et al.,* 2007). Systematic research work on fertility requirement of taramira involving use of organic sources like FYM and vermicompost is meager and needs immediate attention to raise its production. A proper and economically justifiable recycling of crop residues in the form of FYM, compost, vermicompost, green manuring etc. (Tandon, 1992)

and use of bio fertilizers may provide a substantial supply of nutrients to the system. India is endowed with the enormous potential of plant nutrients locked in biological wastes with an estimated annual amount of 875 mt, equivalent to 18.45 mt nutrients. Recycling of these would not only supply macro nutrients but also take care of micro nutrients which are otherwise limiting the growth and yield in many intensively cultivated areas (Singh 1999, Masood Ali and Mishra 2000). Organic sources also have residual effect on succeeding crop. In view of the escalating prices and high demand and supply gap of chemical fertilizers, nutrient management involving judicious use of organic manures holds a great promise in meeting the growing demand of intensive agriculture, sustaining soil health and maintaining the crop productivity at a fairly high level. Hence, the present investigation was undertaken to study the effect of FYM and vermicompost on growth and yield of taramira.

Materials and methods

A field experiment was conducted consecutively during *Rabi* 2004-05 to 2006-07 at S.K.N. College of Agriculture, Jobner in Jaipur district of Rajasthan to study the effect of FYM and vermicompost on growth and yield of taramira. Soil of the experimental field was loamy sand in texture, alkaline in reaction (pH 8.3) with EC-1.13 dSm^{-1}, organic carbon- 0.22 per cent, available N-134 kg/ ha, P_2O_5-16.6 kg/ha and S - 8.3 ppm. Sixteen treatment combinations comprising four levels of each FYM (control, 3.0, 6.0 and 9.0 t ha^{-1}) and vermicompost (control, 1.0, 2.0 and 3.0 t ha^{-1}) were evaluated in randomized block design and replicated thrice. A recommended dose of 30 kg N and 20 kg P_2O_5 ha^{-1} was applied at the time of sowing through urea and DAP, respectively. FYM and vermicompost were applied before sowing as per treatments and incorporated well into the soil. The taramira variety 'RTM-314' was sown in rows spaced 30 cm apart in the second fortnight of October during all the years. Except pre sowing, no irrigation was applied in standing crop. Rainfall was also not received during the crop season. Adequate management practices and plant protection measures were followed to raise a good crop. Observations were recorded for growth and yield attributing characters and seed yield and statistically analyzed. The crop was harvested in the first fortnight of March. Comprehensive economics was also worked out taking into account the prevailing prices of inputs and returns through seed.

Results and discussion

Effect of FYM

Three year pooled results presented in table 1 indicated that taramira crop responded very well to FYM application in terms of improvement in various growth and yield attributing characters *viz.* plant height, crop dry matter, primary and secondary branches/ plant, number of siliquae/ plant,

Table 1: Effect of FYM and vermicompost on growth and yield attributing characters of taramira (pooled mean of three years)

Treatments	Plant height (cm)	Crop dry matter (kg ha^{-1})	Branches /plant		Siliquae /plant	Seeds /siliqua	Test weight (g)
			Primary	Secondary			
A. FYM levels							
Control	85.2	2954	5.51	8.43	154.4	20.20	3.48
3.0 t ha^{-1}	94.1	3315	6.58	11.30	186.5	21.36	3.74
6.0 t ha^{-1}	101.1	3488	7.45	12.66	212.5	21.84	3.86
9.0 t ha^{-1}	105.3	3528	7.31	13.22	222.3	22.28	3.78
CD at 5%	6.84	163	0.44	0.72	12.48	1.15	0.16
B. Vermicompost levels							
Control	87.1	2983	5.46	9.05	162.4	20.80	3.45
1.0 t ha^{-1}	95.2	3290	6.59	11.22	192.3	21.38	3.71
2.0 t ha^{-1}	100.2	3468	7.29	12.60	206.2	21.88	3.84
3.0 t ha^{-1}	103.2	3544	7.51	12.74	212.8	21.62	3.86
CD at 5%	6.84	163	0.44	0.72	12.48	1.15	0.16

seeds/ siliqua and test weight. Every increase in level of FYM significantly enhanced most of these attributes upto 6.0 t ha^{-1} over lower levels. It represented the plant height, crop dry matter, primary and secondary branches/ plant, number of siliquae/ plant, seeds/ siliqua and test weight of 101.1 cm, 3488 kg ha^{-1}, 7.45, 12.66, 212.5, 21.84 and 3.86 g, respectively that were 18.7, 18.1, 35.2, 50.2, 37.6, 8.1 and 10.9 per cent higher than noted under control. However, it remained at par with 9.0 t ha^{-1} wherein the maximum values of most of the characters were recorded. The corresponding increase rendered by this level in above characters was 23.6, 19.4, 32.7, 56.8, 44.0, 10.3 and 8.6 per cent. In seeds/ siliqua and test weight, significant improvement was observed upto 3.0 t ha^{-1}, only which matched with the findings were reported by Mahla *et al.* (2006).

Results further showed that application of FYM at 6.0 t ha^{-1} represented significantly higher seed yield during all the years as well as in pooled analysis (Table 2). It provided a mean seed yield of 12.33 q ha^{-1} that was 8.6 and 24.7 per cent higher than obtained with 3.0 t ha^{-1} and control, respectively. It also fetched the highest net returns of Rs 13763 ha^{-1}. Further increase in level of FYM to 9.0 t ha^{-1}, though maximized the seed yield (12.84 q ha^{-1}) and net returns (Rs 13916 ha^{-1}) but the increase was not upto the level of significance. The increase in seed yield due to application of FYM might be due to the fact that application of organic manure favourably improved the nutritional environment thereby resulting in better growth and development leading to higher yield attributes and yield. These results are in close agreement with those reported by Sahoo and Panda (1990) and Thuan and Rana (2010).

Table 2: Effect of FYM and vermicompost on yield and economics of taramira

Treatments	Seed Yield (q ha^{-1})				Gross returns (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Mean net returns (Rs ha^{-1})
	2004-05	2005-06	2006-07	Pooled			
A. FYM levels							
Control	10.25	9.92	9.49	9.89	14341	3053	11288
3.0 t ha^{-1}	11.67	11.43	11.13	11.41	16545	3866	12979
6.0 t ha^{-1}	12.59	12.39	12.02	12.33	17879	4116	13763
9.0 t ha^{-1}	13.23	13.07	12.23	12.84	18618	4702	13916
CD at 5%	0.68	0.74	0.77	-			-
B. Vermicompost levels							
Control	10.05	10.12	9.61	9.93	14399	3047	11352
1.0 t ha^{-1}	11.94	11.60	11.05	11.53	16719	4470	12249
2.0 t ha^{-1}	12.66	12.37	11.98	12.33	17879	5914	11965
3.0 t ha^{-1}	13.10	12.72	12.21	12.68	18386	7083	11303
CD at 5%	0.68	0.74	0.77	0.56			-

Effect of vermicompost

Growth and yield determining characters also showed profound improvement due to application of vermicompost (Table 2). Crop dry matter, primary and secondary branches/ plant and number of siliquae/ plant were improved significantly with successive addition of vermicompost upto 2.0 t ha^{-1}, whereas, significant improvement in plant height, seeds/ siliqua and test weight was observed upto 1.0 t ha^{-1}, only. However, the maximum values of all the characters were obtained at 3.0 t ha^{-1}.This level of vermicompost increased the plant height, crop dry matter, primary and secondary branches/ plant, number of siliquae/ plant, seeds/ siliqua and test weight to the extent of 15.0, 16.3, 33.5, 39.2, 27.0, 5.2 and 11.3 per cent respectively. However, it was found statistically similar with 2.0 t ha^{-1} in respect of all these characters

It is also evident from the data presented in table 2 that increasing level of vermicompost brought about significantly higher seed yield of taramira upto 2.0 t ha^{-1} over preceding levels during individual years as

well as in pooled analysis. It provided a mean seed yield of 12.33 q ha^{-1} that was 6.9 and 24.2 per cent more than recorded under 1.0 t ha^{-1} and control, respectively. However, it was found at par with 3.0 t ha^{-1} wherein the maximum seed yield of 12.68 q ha^{-1} was obtained. Thus, it enhanced it to the tune of 10.0 and 27.7 per cent over 1.0 t ha^{-1} and control, respectively. Due to high cost of vermicompost, the maximum mean net returns were obtained with the application of 1.0 t ha^{-1}, only. These results are in accordance with the findings of Chand *et al.* (2002) and Premi *et al.* (2004).

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