

Effect of sheep manure, vermicompost and biofertilizer on productivity of dill

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Abstract

A field experiment was conducted to study the effect of sheep manure, vermicompost and biofertilizers on productivity of dill (*Anethum graveolense* L.) at NRC Seed Spices, Ajmer (Rajasthan) during rabi 2005-06 and 2006-07. The experiment consisted sixteen treatments comprising of control, three levels of sheep manure (5.0, 7.5, and 10.0 t ha⁻¹), vermicompost (2.0, 3.0, and 4.0 t ha⁻¹) and recommended fertilizer with and without biofertilizer. The results revealed that application of sheep manure, vermicompost and recommended fertilizer with and without bio-fertilizer proved superior over control. Moreover application of biofertilizer alone and with sheep manure, vermicompost and recommended fertilizer resulted in higher growth parameters, yield attributes and yield of dill over control. The increasing levels of sheep manure and vermi compost exhibited higher yield over their respective lower doses. The highest seed yield (15.25 q ha⁻¹), stover yield (32.12 q ha⁻¹) and biological yield (47.37 q ha⁻¹) of dill was obtained with application of sheep manure @ 10 t ha⁻¹ with bio-fertilizer.

Key words: Dill, bio-fertilizer, sheep manure, vermi-compost, fertilizer

Introduction

Spices are integral part of Indian diet and that's why India is known as home of spices. India is the largest producer, consumer as well as exporter of the seed spices. Dill (*Anethum graveolense* L.) belongs to the family Apiaceae and is an important seed spice crop, grown for its seed and leaves which are used for culinary purposes. Fruits are marketed as common condiments for its essential oils (3.0-4.0%) which possesses a peculiar aroma. Oil or its emulsion in water commonly known as "dill water" is considered to be aromatic, carminative, digestive, diuretic and very useful in "colic pain". Seeds are used as whole as well as ground in soup, salad, sauces and pickles. It is mainly grown in Rajasthan, Gujarat, Maharashtra, Andhra Pradesh and Madhya Pradesh. Rajasthan contributes about 50% of total production of dill which is grown in an area of 2000 ha, with production of 1000 t having productivity of 500 kg ha⁻¹ (Tiware and Agarwal, 2004).

Traditionally the nutrient requirement of dill is being met out by the application of chemical fertilizers. The experience of many research scientists working in India as well as abroad have shown that excessive and imbalance use of chemical fertilizer and pesticides in the past have resulted in degradation and deterioration of soil's physical, chemical and biological properties. To overcome this problem, use of organic sources of nutrition are needed.

Such studies are lacking in dill. Moreover, the demand of seed spices all over the world is increasing which is an important source of earning foreign exchange because whole world is looking towards India for supply of quality seed spice free from contamination of toxic residue. In view of the above, the studies were conducted to identify suitable and feasible source of organic nutrition for increasing productivity of dill.

Materials and methods

The experiment was carried out at National Research Centre on Seed Spices, Ajmer (Rajasthan) during rabi 2005-06 and 2006-07. The experiment consisted sixteen treatments comprising of three levels of sheep manure (5.0, 7.5, and 10.0 t ha⁻¹), vermicompost (2.0, 3.0, and 4.0 t ha⁻¹), recommended fertilizer (50 kg N, 30 kg P₂O₅ and 20 kg K₂O) with and without biofertilizer (*Azotobacter*) and absolute control in randomized block design with three replications. The organic sources of nutrients were applied before sowing and seeds of dill were treated with bio-fertilizer (*Azotobacter*) immediately before sowing. The soil of the experimental site was sandy loam with a pH of 8.92 and 0.21 per cent organic carbon content having 76.0, 33.4 and 234.1 kg ha⁻¹ available N, P₂O₅ and K₂O, respectively. Observations were recorded on growth parameters, yield attributes and yield of dill.

Results and discussion

The data revealed that application of increasing levels of sheep manure i.e., 5.0, 7.5 and 10.0 t ha⁻¹ and

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Table 1. Effect of sheep manure, vermi-compost and bio-fertilizer on growth and yield of Dill (Pooled data of two years)

Treatments	Plant Height (cm)		Umbels Plant ⁻¹	Umbel lets Umbel ⁻¹	Seed yield q ha ⁻¹	Stover yield q ha ⁻¹	Biological yield q ha ⁻¹
	80 DAS	Maturity					
Absolute control	48.25	98.35	11.40	15.90	9.40	20.24	29.64
Recommended Fertilizer dose	53.25	112.25	15.00	19.20	13.80	29.40	43.20
Bio fertilizer (<i>Azotobacter</i>)	50.40	107.25	14.00	18.68	10.50	23.45	33.95
RF+Biofertilizer	57.28	115.40	18.90	20.24	14.50	30.15	44.65
Sheep manure @ 5 t ha ⁻¹	51.50	109.25	16.10	19.10	12.40	26.80	39.20
Sheep manure @ 7.5 t ha ⁻¹	53.00	113.40	17.00	19.80	13.85	29.75	46.60
Sheep manure @ 10 t ha ⁻¹	55.20	118.20	19.60	21.30	14.50	31.40	45.90
Sheep manure @ 5 t ha ⁻¹ + Biofertilizer	55.25	116.25	18.00	20.24	13.50	28.15	41.65
Sheep manure @ 7.5 t ha ⁻¹ + Biofertilizer	59.45	122.40	19.70	22.10	14.40	29.40	43.80
Sheep manure @ 10 t ha ⁻¹ + Biofertilizer	63.40	125.80	20.00	23.00	15.25	32.12	47.37
Vermicompost @ 2 t ha ⁻¹	51.00	106.40	16.00	18.70	12.15	26.10	38.25
Vermicompost @ 3 t ha ⁻¹	52.50	110.25	16.30	19.00	13.25	27.45	40.70
Vermicompost @ 4 t ha ⁻¹	54.80	115.40	16.60	19.50	14.00	29.70	43.70
Vermicompost @ 2 t ha ⁻¹ + Biofertilizer	54.20	114.50	17.30	20.00	14.15	29.50	43.65
Vermicompost @ 3 t ha ⁻¹ + Biofertilizer	58.25	119.40	19.00	20.90	14.20	30.10	44.30
Vermicompost @ 4 t ha ⁻¹ + Biofertilizer	62.50	121.00	19.70	22.00	14.60	31.85	46.45
C D at 5%	0.95	1.35	0.63	0.60	1.68	0.72	0.73

vermicompost, 2.0, 3.0 and 4.0 t ha⁻¹ exhibited significantly higher plant height, yield attributing character and yield over their respective lower levels (Table 1). Moreover, the application of sheep manure at all three levels showed better performance on yield attributing characters as compared to three levels of vermicompost with and without bio fertilizer. The application of biofertilizer responded positively with all the sources of organic nutrition as well as with recommended fertilizer in respect of growth, yields attributing characters and yield of dill. However, the application of sheep manure @ 10.0 t ha⁻¹ with biofertilizer exhibited highest plant height (125.80 cm), umbels/plant (20.20), umbel lets/umbel (23.00), seed (15.25 q ha⁻¹) stover (32.12 q ha⁻¹) and biological yield (47.37 q ha⁻¹) which was followed by the application of vermi-compost @ 4.0 t ha⁻¹ with biofertilizer. This shows the additive effect of organic sources of nutrition and biofertilizer on yield and yield attributing characters of dill.

Application of sheep manure and vermicompost and biofertilizer may be responsible for the improvement of physical, chemical and biological properties of the soil which in turn enhance availability and uptake of macro and micro-nutrients and affect various physical and biochemical processes in plants resulting in better yield attributing characters and yield of the crop. Hence, the overall effect of organic source of nutrient in improving yield attributes leads to better seed, stover and biological yield of dill at higher vermi-compost and sheep manure level with biofertilizer. Prabhu et al. (2000) reported significantly higher yield of coriander with 25% recommended dose of fertilizer + FYM @ 10 t ha + *Azospirillum* + VAM over other combination of nutrient

sources. Similar results were obtained by Mehta et al. (2007) in case of ajowan. The results are in close conformity with the findings of Kumar et al. (2004) and Kothari et al. (1998) in case of coriander.

References

- Kothari, M.L., Singh, B. and Chaudhary, G.R. 1998. Technology of vermicompost preparation and its effect on seed yield of coriander. In: *National Seminar on Entomology in 21st Centaury Biodiversity Sustainability, Environmental safety and human health*, held at Udaipur.
- Kumar, S., Chaudhary, G.R., Sumeriya, H.K. and Vikash. 2004. Productivity of coriander as influenced by nitrogen and bio-fertilizer. In: *National Seminar on New Perspective in Commercial Cultivation, Processing and Marketing of Seed Spices and Medicinal Plants*, held at Jobner, p. 53
- Mehta, R.S., Malhotra, S.K., Vashishtha, B.B. and Meena, S.S. 2007. Effect of Vermi-compost, sheep manure and bio-fertilizer on yield attributes and yield of ajowan (*Trachyspermum ammi* Sprague) cv. NRCSS-AA-1. In: Malhotra, S.K. and Vashishtha, B.B. (Eds.), *Production, Development, Quality and Export of Seed Spices*, pp. 270-273.
- Prabhu, T., Narwadakar, P.R., Sajindranth and Rathore, N.G. 2000. Effect of integrated nutrient management on growth and yield of coriander (*Coriandrum sativum* L.). *South Indian Horticulture*. 50 (4-6): 680-684.
- Tiwari, R.S. and Agrawal, A. 2004. *Production technology of spices*. International Book Distribution Co. Lucknow.