



Influences of organic and inorganic sources of nutrients on growth, yield attributed traits and yield economic of coriander (*Coriandrum sativum* L.) cv JD-1

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Received: 28-10-2014

Accepted: 13-10-2015

DOI: 10.18805/ijare.v49i6.6691

ABSTRACT

The present investigation was carried out during *Rabi* season of 2012-13 at Vegetable Research Farm, Department of Horticulture, JNKVV, Jabalpur (Madhya Pradesh). The experimental material for the present investigation was comprised of twelve treatments, these treatments were sown in RCBD design with three replications, to assess the influence of organic and inorganic sources of nutrients on growth, yield attributed traits and yield economic of coriander (*Coriandrum sativum* L.). All the treatments resulted in significantly higher values of growth attributes and seed yield of coriander. The maximum plant height recorded with vermicompost @ 5 t ha⁻¹ + 100 % RDF, while the minimum with poultry manure @ 2.5 t ha⁻¹ + 50 % RDF. Vermicompost @ 5 t ha⁻¹ + 100 % RDF recorded the maximum number of primary and secondary branches, while the minimum were observed with FYM @ 10 t ha⁻¹ + 50% RDF. Maximum number of umbels plant⁻¹ were found with poultry manure @ 5 t ha⁻¹ + 100 % RDF, while it was the minimum with the application of FYM @ 10 t ha⁻¹ + 50% RDF. The maximum number of seeds umbel⁻¹ were found with poultry manure 5 t ha⁻¹ + 100 % RDF, while the minimum in vermicompost @ 2.5 t ha⁻¹ + 50% RDF. Interaction effect on weight of seeds umbel⁻¹ was found to be non-significant, but the maximum weight of seeds umbel⁻¹ was found with poultry manure @ 5 t ha⁻¹ + 100 % RDF, while the minimum in vermicompost @ 2.5 t ha⁻¹ + 50% RDF. Significantly maximum number of seeds plant⁻¹ were found with poultry manure 5 t ha⁻¹ + 100 % RDF, while it was the minimum in FYM @ 10 t ha⁻¹ + 50% RDF. Variation in seeds yield plant⁻¹, seed yield plot⁻¹ and seed yield due to interactions were found to be significant. The maximum seed yield was recorded with poultry manure 5 t ha⁻¹ + 100 % RDF, while it was the minimum with FYM @ 10 t perha⁻¹ + 50% RDF. The highest net return of Rs 89069.4 per ha and cost benefit ratio 1:2.98 with treatment combination T₅ (Poultry manure 5 t ha⁻¹ + 100 % RDF) followed by T₁ (FYM @ 20 t ha⁻¹ + 100% RDF) with Rs 79419.4 perha⁻¹ and 1: 2.76 respectively estimated.

Key words: B.C. ratio, Coriander, Growth, Inorganic fertilizer, Organic manure, RDF, Yield.

INTRODUCTION

Coriander (*Coriandrum sativum* L.) is an important seed spice crop mainly grown in *rabi* season and belongs to family Apiaceae. India is the largest producer of coriander; it is prominently cultivated in Rajasthan, Andhra Pradesh, Gujrat and Madhya Pradesh. The tender leaves stem and fruits of coriander have a pleasant aromatic flavour and thus is indispensable food adjunction in Indian cookery. The seeds are also used as condiment; good quality oleoresin is extracted from coriander seeds. The oleoresin is used for flavouring beverage, pickles and sweets.

Coriander crop responds well to the application of both organic manures and inorganic fertilizers Munnu Singh (2011). Organic manures supply the major nutrients, micronutrients, besides improving soil health Palaniappan and Anndurai (1999). Inadequate and imbalanced application

of nutrients is one of major factors for low yield and poor quality. Exclusive application of inorganic fertilizers creates deleterious effect on soil fertility due to limitation of one or more nutrients including micro nutrients and poor soil health leading to decline in productivity, not any single source of nutrient is capable of supplying plant nutrients in adequate amount and balanced proportion. The conjunctive application of organics with inorganic sources of nutrients reduces the dependence on chemical inputs and it not only acts as a source of nutrients but also provides micro nutrients as well as modifies the soil physical behaviour and increases the efficiency of applied nutrients Pandey *et al.*, (2007) and Parihar *et al.*, (2010). Therefore the present study was undertaken to evaluate the influence of organic and inorganic sources of nutrients on growth parameters and yield of coriander.

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MATERIALS AND METHODS

A field investigation was carried out to study influence of organic and inorganic sources of nutrients on growth parameters and yield of coriander during winter season of 2012-13 at Horticulture Research Farm, Department of Horticulture, JNKVV, Jabalpur (Madhya Pradesh). The texture of soil of experimental was medium black having organic carbon (6.8 g ha^{-1}), available nitrogen (253 kg ha^{-1}), available phosphorus (10.5 kg ha^{-1}), available potassium (336 kg ha^{-1}) with 6.93 pH and electrical conductivity (0.13 dsm^{-1}). The investigation comprises of twelve treatments (T_1 - FYM @ $20 \text{ t/ha} + 100\%$ RDF, T_2 - FYM @ $20 \text{ t/ha} + 50\%$ RDF, T_3 - FYM @ $10 \text{ t/ha} + 100\%$ RDF, T_4 - FYM @ $10 \text{ t/ha} + 50\%$ RDF, T_5 - poultry manure @ $5 \text{ t/ha} + 100\%$ RDF, T_6 - poultry manure @ $5 \text{ t/ha} + 50\%$ RDF, T_7 - poultry manure @ $2.5 \text{ t/ha} + 100\%$ RDF, T_8 - poultry manure @ $2.5 \text{ t/ha} + 50\%$ RDF, T_9 - vermicompost @ $5 \text{ t/ha} + 100\%$ RDF, T_{10} - vermicompost @ $5 \text{ t/ha} + 50\%$ RDF, T_{11} - vermicompost @ $2.5 \text{ t/ha} + 100\%$ RDF, T_{12} - vermicompost @ $2.5 \text{ t/ha} + 50\%$ RDF) was laid out during the asymmetrical factorial RCBD with three replications. Manually applications of organic sources viz., farm yard manure, poultry manure, vermicompost were applied in required plots prior sowing of seeds, and chemical fertilizers were applied at the time of sowing in furrows, nitrogen was supplied through Urea, Phosphorus through SSP and Potash through Muriate of potash @ $50:30:60 \text{ kg/ha}$ in plots of RDF @ 100% and $25:15:30$ in plots of RDF @ 50% were also applied. Half amount of N with full amount of P and K were given per plot as basal dose and remaining amount of N was given as top dressing after 40 days of sowing. The coriander variety JD-1 was shown on 30th Oct. 2012 in farrows opened at $30 \times 10 \text{ cm}$ plant spacing using $20\text{-}25(\text{kg}) \text{ seeds ha}^{-1}$. Standard agronomic and plant protection practices were adopted for raising healthy crop, data on growth and yield attributes were taken from ten tagged plants. Biological and economic yields were taken from net plot. To ascertain the economic feasibility of different treatments, economics of the treatments were worked out by calculating parameters like cost of cultivation, gross returns, net returns and benefits cost ratio using the prevailing price of inputs and outputs in local market. Statistical analysis was performed as per methods suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Effects on vegetative growth: The higher values of growth and yield attribute viz., plant height(cm), number of primary and secondary branches, days to first flowering, days to 50% flowering of coriander were recorded with the application of chemical fertilizers @ $50:30:60 \text{ kg/ha}$ in plots of RDF @

100% and $25:15:30$ in plots of RDF @ 50% along with FYM @ 20 t/ha^{-1} , 10 t/ha , poultry manure @ 5 t/ha^{-1} , 2.5 t/ha^{-1} and vermicompost @ 5 t/ha^{-1} , 2.5 t/ha were also applied (Table 1). The plant height at 90 DAS was significantly influenced, it was noticed that vermicompost @ $5 \text{ t ha}^{-1} + 100\%$ RDF recorded the maximum height (95.69) followed by poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF with a height (94.70) found to be significant over other interactions. However, minimum plant height (85.41) was estimated with FYM @ $10 \text{ t ha}^{-1} + 50\%$ RDF present finding is in conformity to Singh (2011). Number of primary branches plant⁻¹ and number of secondary branches plant⁻¹ was estimated that vermicompost @ $5 \text{ t ha}^{-1} + 100\%$ RDF recorded the maximum values (9.67), (27.60) respectively followed by poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF. Days taken to first flowering were significantly influenced by treatment interactions, FYM @ $10 \text{ t ha}^{-1} + 50\%$ RDF showed early flowering (47.67) followed by FYM @ $20 \text{ t ha}^{-1} + 50\%$ RDF (50.33) and late flowering was observed in the treatment of plants with Poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF (56.67). As such results has been reported with days taken for 50% flowering were significantly influenced by treatment interactions. FYM @ $10 \text{ t ha}^{-1} + 50\%$ RDF (55.67) followed by FYM @ $20 \text{ t ha}^{-1} + 50\%$ RDF (57.67). Late 50 % flowering was observed with Poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF (65.33) finding is in conformity to following workers Singh (2011), Singh *et al.* (2006). It was observed that among the treatment combination T_9 - Vermicompost @ $5 \text{ t/ha} + 100\%$ RDF recorded the maximum growth followed by poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF, the result might be due to the high water-holding capacity of vermicompost and proper supply of inorganic nutrients. Similarly results reported that vermicompost has a positive effect on biomass production which subsequently enhanced the vegetative growth and developments these results is in conformity to Asgharipour (2012) in cumin.

Effects on yield and yield attributed traits: Results of investigation had shown (Table1) that application of integrated nutrients sources had direct positive effects on coriander seeds yield traits viz, number of umbels plant⁻¹, number of umbellates umbel⁻¹, number of seeds umbel⁻¹, weight of seeds umbel⁻¹(g), number of seeds umbel⁻¹, number of seeds plant⁻¹, seeds yield plant⁻¹(g), seeds yield plot⁻¹(kg) and seeds yield(q/ha⁻¹). In case of interactions number of umbels plant⁻¹ were significantly influenced by Poultry manure @ $5 \text{ t ha}^{-1} + 100\%$ RDF (36.27) followed by Vermicompost @ $5 \text{ t ha}^{-1} + 100\%$ RDF (34.13). The least number of umbels per plant (29.03) were recorded in FYM @ $10 \text{ t ha}^{-1} + 50\%$ RDF, findings corroborated the results of Choudary *et al* (2011) for number of pods per plant⁻¹ in fenugreek. Number of umbellates umbel⁻¹ was not

TABLE 1: Interaction effect of different source of nutrients on growth and yield attributes of coriander in variety JD-1

Treatments combination	1	2	3	4	5	6	7	8	9	10	11	12	13
	Plant height (90 DAS)	No. of primary branches	No. of secondary branches	Days to first flowering	Days to 50% flowering	No. of umbels plant ⁻¹	Number of umbellate umbel ⁻¹	No. of seeds umbel ⁻¹	Weight of seeds umbel ⁻¹ (g)	No. of seeds plant ⁻¹	Seed yield plant ⁻¹ (g)	Seed yield plot ⁻¹ (kg)	Seed yield (q ha ⁻¹)
T ₁ - FYM @ 20 t/ ha + 100% RDF	93.87	8.93	20.30	52.33	59.67	32.67	6.99	33.07	0.47	591.37	5.78	1.90	17.81
T ₂ - FYM @ 20 t/ ha +50% RDF	88.17	8.27	18.67	50.33	57.67	30.73	6.29	29.07	0.34	475.65	4.50	1.59	14.89
T ₃ - FYM @ 10 t/ ha + 100% RDF	89.21	8.33	19.53	51.67	59.33	32.10	6.78	31.43	0.42	536.49	4.89	1.72	16.14
T ₄ - FYM @ 10 t/ ha +50% RDF	85.41	7.87	16.13	47.67	55.67	29.03	5.97	28.33	0.33	440.59	3.62	1.27	11.90
T ₅ - Poultry manure @ 5 t/ ha+ 100% RDF	94.70	9.13	21.80	56.67	65.33	36.27	7.71	36.74	0.49	701.97	7.14	2.04	19.16
T ₆ - Poultry manure@ 5 t/ha+50% RDF	89.16	8.13	18.53	53.33	62.67	31.07	6.40	30.63	0.39	505.53	5.04	1.65	15.43
T ₇ - Poultry manure@ 2.5 t/ha+ 100% RDF	91.32	8.53	19.57	56.33	64.33	33.33	6.87	32.37	0.45	571.76	6.27	1.82	17.08
T ₈ - Poultry manure@ 2.5 t/ha+50% RDF	86.48	7.97	17.47	52.67	61.33	30.73	6.13	29.33	0.36	480.02	4.13	1.52	14.20
T ₉ - Vermicompost@ 5t/ ha+100% RDF	95.69	9.67	23.60	54.33	63.67	34.13	7.11	34.13	0.48	598.34	6.72	1.98	18.53
T ₁₀ - Vermicompost @ 5 t/ ha+50% RDF	90.64	8.47	20.13	51.33	59.33	30.53	6.54	30.90	0.38	502.54	4.34	1.67	15.61
T ₁₁ - Vermicompost @ 2.5 t/ ha+ 100% RDF	92.05	8.73	21.40	53.33	61.33	32.07	6.81	31.97	0.42	542.92	5.23	1.75	16.43
T ₁₂ - Vermicompost @ 2.5 t/ ha+ 50% RDF	87.68	8.20	17.43	50.67	58.33	29.77	6.20	27.73	0.32	440.51	3.88	1.47	13.77
SEm±	0.293	0.110	0.382	0.300	0.340	0.367	0.397	0.502	0.058	7.213	0.291	0.028	0.300
CD @ 5%	0.860	0.323	1.120	0.880	0.996	1.075	-	1.473	-	21.157	0.855	0.081	0.735

found to be significant but the maximum number of umbellate (7.71) were found with poultry manure @ 5 t/ ha + 100 % RDF followed by vermicompost @ 5 t ha⁻¹ + 100 % RDF (7.11), the present findings are in propinquity with Kumar *et al.* (2007). Number of seeds umbel⁻¹ (36.74) were recorded in poultry manure @ 5 t ha⁻¹ + 100 % RDF followed by vermicompost @ 5 t ha⁻¹ + 100 % RDF (34.13). The least number of seed umbel⁻¹ (27.73) were recorded in vermicompost @ 2.5 t ha⁻¹ + 50% RDF, quite similar findings was reported by Choudary *et al.* (2011). Weight of seeds umbel⁻¹ was not found to be significant, but the maximum seed weight of seeds umbel⁻¹ (0.49 g) was recorded in poultry manure @ 5 t ha⁻¹ + 100 % RDF followed by vermicompost @ 5 t ha⁻¹ + 100% RDF (0.48), whereas least seed weight per umbel (0.32) was observed in vermicompost @ 2.5 t ha⁻¹ + 50% RDF. Number of seeds plant⁻¹ was found to be significant with poultry manure @ 5t ha⁻¹ + 100 % RDF (701.97). While it was observed to be minimum in FYM @ 10 t ha⁻¹ + 50% RDF (440.51), present findings are in propinquity with Channabasavanna *et al.* (2002). Seed yield plant⁻¹ was found to be significant and the maximum (7.14) in poultry manure @ 5 t ha⁻¹ + 100 % RDF followed by poultry manure @ 2.5 t ha⁻¹ + 50 % RDF, similar results also reported by El- Mekawey *et al.*, (2010). The maximum seed yield plot⁻¹ (2.04) was found with poultry manure @ 5 t ha⁻¹ + 100 % RDF followed by vermicompost @ 5 t ha⁻¹ + 100 % RDF (1.98). The least seed yield per plot (1.27) was recorded in FYM @ 10 t ha⁻¹ + 50% RDF. However, difference in between poultry manure @ 5 t ha⁻¹ and vermicompost @ 5 t ha⁻¹ was non significant. Similar results are reported by Oliveira *et al.*, (2006) Kumar *et al.*, (2008) and Nagar *et al.*, (2009). Maximum seed yield (19.16) were found with poultry manure @ 5 t ha⁻¹ + 100 % RDF followed by vermicompost @ 5 t ha⁻¹ + 100 % RDF (18.53). Similar results are reported by Channabasavanna (2002) Oliveira *et al.*, (2006) and Nagar *et al.*, (2009).

ECONOMIC ANALYSIS

Perusal of analysis of data (Table 2) showed that application of T₅ - poultry manure @ 5 t/ha + 100 % RDF, fetched maximum seed yield of 19.16 q ha⁻¹ was recorded in coriander variety JD-1 in treatment combination T₅ (poultry manure @ 5 t ha⁻¹ + 100 % RDF) along with net return of Rs 89069.4 ha⁻¹ and cost benefit ratio 1:2.98 followed by T₁ (FYM @ 20 t ha⁻¹ + 100% RDF) with 17.81 q ha⁻¹, Rs 79419.4 ha⁻¹ and 1: 2.76 seed yield, net return and cost benefit ratio respectively. However, the minimum cost benefit ratio (1:1.92) was obtained in the treatment combination T₁₀ (vermicompost @ 5 t ha⁻¹ + 50% RDF) due to higher expenditure.

TABLE 2: Effect of different source of nutrients on economics of the crop production of coriander in variety JD-1

Treatments	Yield (q/ha.)	Cost of cultivation(Rs. /ha.)	Gross income (Rs. /ha.)	Net income (Rs. /ha.)	Cost : Benefit Ratio
T ₁ - FYM 20 t/ ha + 100 % RDF	17.81	124670	45250.6	79419.4	1:2.76
T ₂ - FYM 20 t/ ha + 50 % RDF	14.92	104440	44425.3	60014.7	1:2.35
T ₃ - FYM 10 t/ ha + 100 % RDF	16.14	112980	43950.6	69029.4	1:2.57
T ₄ - FYM 10 t/ ha + 50 % RDF	12.83	89810	43125.3	46684.7	1:2.08
T ₅ - Poultry manure 5 t/ ha + 100 % RDF	19.16	134120	45050.6	89069.4	1:2.98
T ₆ - Poultry manure 5 t/ ha + 50 % RDF	15.43	108010	44225.3	63784.7	1:2.44
T ₇ - Poultry manure 2.5 t/ ha +100 % RDF	17.08	119560	43850.6	75709.4	1:2.73
T ₈ - Poultry manure 2.5 t/ ha + 50 % RDF	14.2	99400	43025.3	56374.7	1:2.31
T ₉ - Vermicompost 5 t/ ha + 100 % RDF	18.53	129710	57650.6	72059.4	1:2.25
T ₁₀ - Vermicompost 5 t/ ha + 50 % RDF	15.61	109270	56825.3	52444.7	1:1.92
T ₁₁ - Vermicompost 2.5 t/ ha +100% RDF	16.43	115010	50150.6	64859.4	1:2.29
T ₁₂ - Vermicompost 2.5 t/ ha +50 % RDF	13.77	96390	49325.3	47064.7	1:1.95

CONCLUSION

Thèse two trématent comminations poultry manure@5 t/ha + 100 % RDF and FYM @ 20 t ha⁻¹+100% RDF through chemical fertilisers gave maximum yield, net return, and high cost benefit ratio. Hence it can be concluded that the present findings have practical utility in successful cultivation of seed spices particularly coriander for 'Kymore pleatue and Satpura hills' of Madhya Pradesh.

ACKNOWLEDGMENT

Authors sincerely appreciate the support of the Administrative team and all the supporting staffs involved in the vegetables research from Department of Horticulture, College of Agriculture, JNKVV Jabalpur (M.P.) for their valuable suggestions during field investigation and preparation of this manuscript.

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