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Original Research Article

Influence of Organic and Inorganic Sources of Nutrients on Growth and Yield of Coriander (*Coriandrum sativum* L.)

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A B S T R A C T

A field experiment on "Influence of organic and inorganic sources of nutrients on growth and yield of coriander (*Coriandrum sativum* L.)" was conducted at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *rabi* 2019-20 on loamy sand soil. Twelve treatment combinations comprising of three levels of inorganic fertilizer (100, 75 and 50% RDF), two sources of organic manure (FYM @ 5 t/ha and Castor cake @ 0.5 t/ha) and two levels of biofertilizer with biofertilizer *Azotobacter* @ 5 ml/kg seed and without biofertilizer were laid out in randomized block design (factorial) with three replications. The results revealed that the growth attributes *viz.*, plant height (at 30, 60 DAS & harvest) as well as branches per plant; yield attributes (*viz.*, number of umbellate per umbel, number of seeds per umbel, test weight, seed (954 kg/ha) and stover yields (1378 kg/ha) of coriander showed significant improvement due to application of 100% RDF it was at par with application of 75% RDF except number of umbels per plant. But volatile oil (%) did not differ significantly. Both the sources of organic manure gave significantly higher plant height at harvest and branches per plant. Rest of the yield and growth attributes along with yield remained unaffected. All the growth and yield attributes were significantly improved due to *Azotobacter* @ 5 ml/kg seed except plant height (30 & 60 DAS) and test weight. It also significantly increased seed yield (914 kg/ha), stover yield (1373 kg/ha).

Keywords

Coriander, Recommended dose of fertilizer, Farm yard manure, Castor cake, Azotobacter

Introduction

Coriander (*Coriandrum sativum* L.) is an annual herb and an important seed spices crop, commonly known as *Dhania*. India has been known as the "Home of spices". It is mainly cultivated for its fruits as well as fodder leaves. It is mainly grown in *rabi* season having diploid chromosome 2n=22 and belongs to the family *Apiaceae*. It is native to regions spanning from southern Europe and North Africa to south western

Asia. The tender leaves, stem and fruits of coriander have a pleasant aromatic flavor and thus is indispensable food addiction in Indian cookery. The seed are also used as condiment. Good quality oleoresin is extracted from coriander seeds. The oleoresin is used for flavouring beverages, pickles and sweets.

The green herb is also employed for the preparation of either steam-distilled essential oil or the solvent extracted oleoresin. Fresh juice of coriander is extremely advantageous in curing many deficiencies related to vitamins and iron. One to two teaspoons of its juice, added to refreshing buttermilk, is incredibly beneficial in curing many diseases. Fresh leaves can be eaten as such because of various health benefits however, if it is not harvested freshly, seeds mature and ripen in late summer developing delicate aroma which are then used as dried spice.

Coriander may sometimes be affected by certain diseases and pests like wilt (*Fusarium oxysporum*) and stem gall. The powdery mildew is effectively controlled by spraying sultaf (0.25%). There are no direct control measures for wilt. It is very difficult to control stem-gall. To check its quality, automatic quality assessment techniques have been developed in Indian spice industries.

In India, it is cultivated in about area 74,998 hectares with a total production of 116812 MT and productivity of 4870 MT/ha (Anonomous 2017-18). India is largest producer of coriander. It is prominently cultivated in Rajasthan, Andhra Pradesh, Gujarat and Madhya Pradesh with scattered pockets in Tamil Nadu, Odisha, Karnataka, Haryana, Uttar Pradesh and Bihar. Rajasthan occupies the premiere position in production and acreage and contributes about 40% to the total production of coriander in India. The medicinal properties of coriander are many used in Indian Ayurvedic and Unani medicinal preparation. Coriander seed contains 18.21% fatty oil which is used in the cosmetic industries.

Materials and Methods

A field experiment was conducted at the Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *rabi*season of the year 2019-20.

Geographically, Sardarkrushinagar is situated at 24°-19' N latitude and 72°-19' E longitude with an altitude of 154.52 meter above the mean sea level. It is located in the North Gujarat Agro-climatic Zone. The soil of the experimental plot was loamy sand in texture and slightly alkaline in reaction. The soil was low in organic carbon (0.23%), available nitrogen (158.0 kg/ha) and medium in available phosphorus (37.9 kg/ha) and high in available potassium (286.0 kg/ha) with soil pH of 7.42. Twelve treatment combinations comprising of three levels of inorganic fertilizer (100, 75 and 50% RDF), two sources of organic manure (FYM @ 5 t/ha and Castor cake @ 0.5 t/ha) and two levels of biofertilizer with biofertilizer *Azotobacter* @ 5 ml/kg seed and without biofertilizer were laid out in randomized block design (factorial) with three replications. The crop coriander and variety 'Gujarat coriander3' were sown on 16th November, 2019 with recommended seed rate of 15 kg/ha by maintaining 30 cm distance between rows. The seeds were sown manually at the depth of 5 cm in previously opened furrows and covered properly with soil. The experimental plots were fertilized as per treatments. Inorganic fertilizer levels, Sources of organic manure and levels of biofertilizer were applied as per the treatments. The total quantity of urea and DAP as per treatments

were applied in previously opened furrow at the time of sowing (From urea containing 46% N and DAP containing 46% P_2O_5, 18% N). The required quantity of FYM and castor cake worked out and appliedat the time of sowing as per treatments. The seeds were treated uniformly with *Azotobacter* was worked out and applied as seed treatment and allowed to dry in the shade. After drying, the seeds were sown immediately.

Results and Discussion

Effect of inorganic fertilizer

The results revealed that growth attributing characters of coriander like plant height and number of branches per plant were significantly influenced by different levels of inorganic fertilizer. Significantly higher plant height (76.82 cm) and number of branches per plant(5.27 cm) were recorded with the application of 100 % RDF. However, all these parameters have remained at par with 75% RDF (Table 1).

The application of recommended dose of nitrogen and phosphorus through inorganic fertilizers enhanced the availability of nutrients, which resulted in increased photosynthetic activity and translocation of photosynthates from source to sink and this might be the cause of higher plant height. Significantly the higher number of branches per plant might be due to balance supply of NPK which is responsible for better vegetative growth and more vegetative growth increased the supply of photosynthates for the formation of branches and also due to increase in photosynthetic rates. The higher number of branches per plant might be due to balance supply of NPK which is responsible for better vegetative growth and more vegetative growth increased the supply of photosynthates for the formation of branches and also due to increase in photosynthetic rates. This results are in close conformity with the results of Singh *et al.,* (2011), Nayak *et al.,* (2013), Dadiga (2015) and Javiya *et al.,* (2017).

The yield attributes *viz.,* number of umbellates per umbel, number of seeds per umbel, test weight (Table 1) were significant improvement due to application of 100% RDF it was at par with application of 75% RDF except number of umbels per plant. Significantly the number of number of umbels per plant (21.86 cm), number of umbellates per umbel (7.33 cm), number of seeds per umbel (6.20 cm), test weight (14.01 g). Increased number of umbels per plant might be due to the fact that application of higher level of nitrogen improved availability of nutrients in adequate quantity coinciding with physiological needs of crop, which might have accelerated crop growth and enhanced photosynthetic activity. The increased availability of photosynthates might have increased number of flowers and their fertilization resulted in higher number of umbels per plant. Adequate supply of nitrogen and phosphorus play vital role in various metabolic processes which resulted in increased flowering and fruiting thereby improving umbellate per umbel due to favourable effect of these nutrients on growth parameters. Application of recommended dose of N and P through inorganic fertilizers enhanced the availability of nutrients, which resulted in increased photosynthetic activity and translocation of photosynthates from source to sink and this might be the cause of higher number of seeds per umbel. More 1000-seed weight was due to more leaf area for photosynthesis and effective utilization of these photosynthates from source to sink which might have resulted in better filling of seeds. Further increase in thousand seed weight in treatments receiving NPK compared to control might be due to better availability of nutrients that might have

helped in producing bolder and heavier seeds. The results confirms the findings of Patel *et al.,* (2013[a]), Yousuf *et al.,* (2014), Singh *et al.,* (2015), Abdollahi *et al.,* (2016), Sanwal *et al.,* (2017).

A study of data concerning seed and stover yield (Table 1) showed that different levels of inorganic fertilizer. Application of 100% RDF (F_1) recorded significantly higher seed and stover yield of 954 and 1378 kg/ha it was at par with 75% RDF (F_2). Significantly lower seed and stover yield were obtained with the application of 50% RDF (F_3).

Nitrogen is considered to be a vitally important plant nutrient. In addition to its role in the formation of proteins, nitrogen is an integral part of chlorophyll which is the primary absorber of light energy needed for photosynthesis.

Besides these, it is also a constituent of certain organic compounds of physiological importance. The growth coupled with batter expression of yield attributes might have attributed for enhancing the seed yield under higher nitrogen level. These results are in accordance with the findings of Godara *et al.,* (2014), Kamrozzaman *et al.,* (2014), Kumar *et al.,* (2015), Javiya *et al.,* (2017).

However, volatile oil (%) did not differ significantly due to the application of different levels of inorganic fertilizer.

Data presented in table 2 further indicated that different treatments of nitrogen levels gave a better net return and benefit-cost ratio. Application of 100% RDF (F_1) realized higher gross (□ 44308/ha) and net return (□ 14287/ha) as well as benefit : cost ratio (BCR) (1.48). These findings are in agreement with those reported by Godara *et al.,* (2014), Dadiga *et al.,* (2015), Javiya *et al.,* (2017).

Effect of organic manure

The results revealed that growth attributing characters like plant height and number of branches per plant was significantly influenced by different levels of sources of organic manure. Significantly higher plant height (73.90 cm) and number of branches per plant (5.11 cm) were recorded with the application of Castor cake @ 0.5 t/ha. The increased plant height might be due to proper mixing of FYM in soil which had supplied all essential nutrients to plants and created a favorable soil environment, which ultimately increased the nutrient status and water holding capacity for longer time. The highest number of branches per plant might be attributed to the more balance C:N ratio, abundant supply of available nutrients from soil with comparatively lesser retention in roots and more translocation to aerial parts for protoplasmic proteins and synthesis of other compounds. The results are in conformity with the results of Mehta *et al.,* (2011[a]), Agarwal *et al.,* (2013), Kumar *et al.,* (2015) in coriander and Patel *et al.,* (2019) in fennel.

A perusal of data in Table 1 and 2 indicated that different sources of organic manure failed to exert significant differences yield attributes and volatile oil of coriander.

However, the application of 75% RDF registered numerically higher values of all the characters of coriander but failed to reach a significant level of over 50% RDF.

Data presented in Table 2 revealed that application of castor cake @ 0.5 t/ha (O2) recorded maximum gross realization (□ 42671/ha) and net realization (□ 15079/ha) respectively with the benefit : cost ratio (BCR) 1.55. These findings corroborate with the reports of Mehta *et al.,* (2011a), Lal *et al.,* (2012) and Singh *et al.,* (2015).

Table.1 Effect of inorganic fertilizer levels, Sources of organic manure and biofertilizer levels on growth and yield attributes and yield of coriander

Treatments		Plant height at harvest (cm)	Number of branches per plant at harvest	Number of umbels per plant	Number of umbellates per umbel	Number of seeds per umbel	Test weight (g)	Seed yield (kg/ha)	Stover yield (kg/ha)
Levels of inorganic fertilizer (F)									
F_1	100 % RDF	76.82	5.27	21.86	7.33	6.20	14.01	954	1378
F_2	75 % RDF	73.23	4.96	19.82	6.77	5.76	12.95	890	1256
F_3	50 % RDF	62.00	4.01	16.83	6.56	5.30	12.26	794	1116
SEm ±		1.47	0.11	0.69	0.20	0.17	0.41	24	44
CD at 5%		4.32	0.33	2.03	0.59	0.49	1.19	70	129
Sources of organic manure (O)									
O_1	FYM @ 5 t/ha	67.47	4.38	18.77	6.67	5.57	12.64	854	1203
O_2	Castor cake @ 0.5 t/ha	73.90	5.11	20.24	7.10	5.93	13.51	905	1297
SEm ±		1.20	0.09	0.56	0.16	0.14	0.33	19	36
CD at 5%		3.53	0.27	NS	NS	NS	NS	NS	NS
Levels of biofertilizer (B)									
B_1	With biofertilizer	74.63	5.31	20.34	7.16	6.00	13.49	914	1373
B_2	Without biofertilizer	66.75	4.18	18.67	6.62	5.50	12.67	845	1128
SEm ±		1.20	0.16	0.56	0.16	0.14	0.33	19	36
CD at 5%		3.53	0.46	1.66	0.48	0.40	NS	57.03	105.68
Interactions		NS	NS	NS	NS	NS	NS	NS	NS
CV (%)		7.22	8.10	12.28	10.04	10.04	10.78	9.38	12.23

Table.2 Effect of inorganic fertilizer levels, Sources of organic manure and biofertilizer levels onon quality and economics of coriander

Treatments		Volatile oil (%)	Seed yield (kg/ha)	Stover yield (kg/ha)	Gross realization (□ /ha)	Cost of cultivation (□ /ha)	Net realization (□ /ha)	BCR
Levels of inorganic fertilizer (F)								
F_1	100 % RDF	0.40	954	1378	44308	30020	14287	1.48
F_2	75 % RDF	0.38	890	1256	41306	29838	11467	1.38
F_3	50 % RDF	0.38	794	1116	36846	29665	7180	1.24
SEm ±		0.01	---	---	---	---	---	---
CD at 5%		NS	---	---	---	---	---	---
Sources of organic manure (O)								
O_1	FYM @ 5 t/ha	0.39	854	1203	40235	32091	8143	1.25
O_2	Castor cake @ 0.5 t/ha	0.39	905	1297	42671	27591	15079	1.55
SEm ±		0.01	---	---	---	---	---	---
CD at 5%		NS	---	---	---	---	---	---
Levels of biofertilizer (B)								
B_1	With biofertilizer	0.39	914	1373	43189	29911	13278	1.44
B_2	Without biofertilizer	0.39	845	1128	39153	29772	9381	1.31
SEm ±		0.01	---	---	---	---	---	---
CD at 5%		NS	---	---	---	---	---	---
Interactions		NS						
CV (%)		8.57						

Effect of biofertilizer

The results revealed that growth attributing characters of coriander like plant height and number of branches per plant were significantly influenced by different levels of biofertilizer. Significantly higher plant height (74.63 cm) and number of branches per plant (5.31 cm) were recorded with biofertilizer *Azotobacter* @ 5 ml/kg seed. The improvement in growth related attributes could be because of certain growth promoting substance, secreted by bio-fertilizers, besides increasing the availability of atmospheric nitrogen and soil phosphorus, which might have led to better root and shoot development, better uptake of water, nutrients and their transportation. Significantly the higher number of branches per plant might be due to balance supply of NPK which is responsible for better vegetative growth and more vegetative growth increased the supply of photosynthates for the formation of branches and also due to increase in photosynthetic rates. This results are in close conformity with the results of Sahu *et al.*, (2013) and Singh (2014) in coriander Maheta *et al.*,(2012[a]) and Patel *et al.*, (2013[b]) in cumin.

The yield attributes *viz.*, number of umbels per plant, number of umbellates per umbel, number of seeds per umbel, test weight (Table 1) were significant improvement due to application of with biofertilizer *Azotobacter* @ 5 ml/kg seed. Significantly the number of number of umbels per plant (20.34 cm), number of umbellates per umbel (7.16 cm), number of seeds per umbel (6.00 cm). However, test weight were not varied significantly due to the application of different levels biofertilizer. The increase in yield attributes may be due to better root proliferation, uptake of nutrients and water, higher leaf area, more photosynthesis and enhanced food accumulation, increasing availability of atmospheric nitrogen and phosphorus by microbial inoculants might have played a vital role in coriander. *Azotobactor* were responsible for improvement of physical, chemical and biological properties of the soil which in turn enhance availability and uptake of macro and micro- nutrients which consequently increase the number of seeds per plant. The results confirms the findings of Mehta *et al.,* (2011[a]), Aishwath *et al.,* (2012), Singh (2014), Patidar *et al.,* (2016).

A study of data concerning seed and stover yield (Table 1) showed that different levels of biofertilizer. Application of *Azotobacter* @ 5 ml/kg seed recorded significantly maximum seed and stover yield of 914 and 1373 kg/ha. Availability of P improved by PSB, N transfer from atmosphere by *Azotobactor* and soil was already have sufficient amount of K leads to balance supply of major nutrients and ultimately contributed higher yield. Greater root extension under higher availability of phosphorus might have helped in greater uptake of other nutrients especially micronutrient and secondary nutrients enhanced photosynthesis, production of photosynthates and higher partitioning between vegetative and reproductive structures might have helped in improving the yield attributes. These results confirms the findings of Mehta *et al.,* (2011[a]), Aishwath *et al.,* (2012), Patidar *et al.,* (2016) in coriander and Mehta *et al.,* (2012[a]) in cumin.

However, volatile oil (%) did not differ significantly due to the application of different levels of biofertilizer.

Data presented in Table 2 showed that treatment B_1 (seed treatment with *Azotobacter* @ 5 ml/kg seed) recorded maximum gross realization (□ 43198/ha) and net realization (□ 13278/ha), respectively

with the benefit : cost ratio (BCR) 1.44. The results are in agreement with findings of Mehta *et al.,* (2011[a]), Singh (2014) in coriander and Patel *et al.,* (2013[b]) in cumin.

Interaction effect

The interaction effect of inorganic fertilizer levels, sources of organic manure and levels of biofertilizer was not found significant on growth attributes, yield, yield attributes, quality parameter.

It is concluded that coriander should be fertilized with 75% of RDF (15-7.5-00 kg N:P:K/ha), seed inoculation with *Azotobacter* @ 5 ml/kg seed and soil application of either FYM @ 5 t/ha or castor cake @ 0.5 t/ha for obtaining higher yield and economic return.

References

Abdollahi, A., Salehi, A., Shahabi, R. and Rahimi, A. (2016). Effect of different nitrogen sources on vegetative traits, grain yield and essential oil yield of Coriander(*Coriandrum sativum* L).*Cercetari Agronomice in Moldova*, 1 (165)/ 2016: 51:65.

Agarwal, Y.K. Ramchandra.and Kumar, H. (2016). Effect of organic fertilizers on growth and yield of Coriander (*Coriandrum sativum* L.) under subabul (*Leucaenaleucocephala*) alley cropping system. *International Journal of Farm Sciences*, 6(4): 104-108.

Aishwath, O.P. Lal, G. Kant, K. Sharma, Y.K. Ali, S. F. and Naimuddin (2012). Influence of biofertilizers on growth and yield of Coriander (*Coriandrum sativum* L.) under Typic Haplustepts. *International Journal Seed Spices*, 1(1) 9-14.

Anonomous (2017-18) Directorate of Horticulture, Gujarat state Gandhinagar.

Dadiga, A. Kadwey. S. and Prajapati, S. (2015). Influences of organic and inorganic sources of nutrients on growth, yield attributed traits and yield economic of Coriander (*Coriandrum sativum* L.) cv JD-1. *Indian Journal Agricultural Res*earch, 49(6): 577-580.

Godara, A.S. Gupta, U. S. Lal, G. and Singh, R. (2014). Influence of organic and inorganic source of fertilizers on growth, yield and economics of Coriander (*Coriandrum sativum* L.). *International Journal Seed Spices*, 4(2): 77-80.

Javiya, P. P. Solanki, J. N. Kaneria, S.C. and Rupareliya V.V. (2017).Response of Coriander (*Coriandrum sativum* L.) to nitrogen and phosphorus in south saurashtra condition. *International Journal of Pure and Applied Bioscience*, 5(4): 860-866.

Kamrozzaman, M. M., Ahmed, S. and Quddus, A. F. (2016). Effect of fertilizer on coriander seed production. *Bangladesh Journal Agricultural Res*earch, 41(2): 345-352.

Kumar, R., Sahay, S., Mishra, P. K., Kumari R. (2015). Effect of Nitrogen Phosphorus and Potash on coriander Yield. *Environment & Ecology*, 34(1A): 360-364.

Lal, G., Vashisth, T., Mehta,R.S. andAli, S.F. (2012). Studies on different organic modules for yield and quality of Coriander (*Coriandrum sativum* L.). *International Journal Seed Spices*, 2(1): 1-6.

Mehta, R. S., Anwer, M.M. and Malhotra, S.K.(2012[a]). Influence of sheep manure, vermicompost and biofertilizer on growth, yield and profitability of Cumin (*Cuminum cyminum* L.). *Journal of Spices and*

Aromatic Crops, Vol. 21(1): 16–19.

Mehta, R.S., Anwer, M. M., Malhotra, S.K., Lal, G., Aishwath, O. P., Meena, S. S., Kant, K. and Khan, M.A. (2011[a]). Growth and yield of Coriander (*Coriandrum sativum* L.) as affected by sheep manure, vermicompost and bio-fertilizer, *International Journal Seed Spices* 1(1): 22-28.

Nayak, B. R., Samanta, P. K., Dash, A.K. and Swain, S.K. (2013). Growth and yield of Coriander (*Coriandrum sativum* L.) as influenced by different levels of farm yard manure, nitrogen and plant spacings. *An Asian Journal of Soil Science,* Volume 8: 198-201.

Patel, C. B., Amin, A.U. and Patel, A.L. (2013[a]).Effect of varying levels of nitrogen and sulphur on growth and yield of Coriander (*Coriandrum sativum* L.). *An international quarterly journal of science,* 8(4): 1285-1289.

Patel, S. G., Amin, A. U., Patel, S. P. Agalodiya, A.V. and Patel, S.M. (2013[b]). Effect of different sources of organic manures with and without bio fertilizers in Cumin (*Cuminum cyminum*L.). *International journal Seed Spices,* 3(2): 54-58.

Patel, S.M., Amin, A. U., Patel, H.B. and Patel, J.A. (2019). Impact of FYM enriched iron and zinc on yield, quality, economics and nutrient uptake of Fennel (*Foeniculum vulgare* Miller.). *International Journal Seed Spices*, 9(2): 21-28.

Patidar, L., Ranjan, J. K., Singh, B., Mishra, B. K., Aiswath, O. P., Kant, K., Sharma, B. and Rai, R.V. (2016). Influence of integrated supply of AM, PSB, *Azotobacter* and inorganic fertilizer on growth, yield and quality in Coriander (*Coriandrum sativum* L.) and micro-flora population in the soil. *Indian Journal of Agricultural Sciences*, 86(9): 1140–4.

Sahu, R. L., Sahu, H. and kashyap, P. (2013).Effects of biofertilizer on the growth characters, yield attributes and quality of Coriander (*Coriandrum sativum* L.). *An Asian Journal of Soil Science,* Vol. 8: 330-333.

Sanwal, R. C., Sharma, Y., Singh, A., Reager, M.L. and Dayanand (2017).Impact of vermicompost, nitrogen and phosphorus on yield, quality and uptake of Coriander (*Coriandrum sativum* L.) under arid condition. *International Journal of Chemical Studies*, 5(6): 1698-1702.

Singh, M. (2011).Effect of vermicompost and chemical fertilizers on growth, yield and quality of Coriander (*Coriandrum sativum* L.) in a semi-arid tropical climate. *Journal of Spices and Aromatic Crops,* Vol. 20(1): 30–33.

Singh, S.P. (2014). Effect of biofertilizer *azospirillium* on growth and yield parameters of Coriander (*Coriandrum sativum* L.) cv. Pant haritima. *International Journal Seed Spices,* 4(2): 73-76.

Singh, S.P. (2015). Effect of organic manures on growth, yield and economics of Coriander (*Coriandrum sativum* L.). *Journal of Eco-friendly Agriculture*, 10(2): 124-127.

Yousuf, M. N., Brahma, S., Kamal, M. M., Akter, S. and Chowdhury, M.E. (2014). Effect of nitrogen, phosphorus, potassium, and sulphur on the growth and seed yield of Coriander (*Coriandrum sativum* L.). *Bangladesh journal Agricultural Res*earch, 39(2): 303-309.