

Effect of Farm Yard Manure, Nitrogen and Plant Spacings on Yield and Attributing Character of Coriander (*Coriandrum sativum* L.)

BISWA RANJAN NAYAK, SWARAN SINGH SAINI AND GAURI SHANKAR SAHU¹

Department of Agronomy & Agrometeorology, College of Agriculture, Punjab Agricultural University Ludhiana 141004, India

¹*Department of Horticulture, Orissa University of Agriculture & Technology Bhubaneswar 751003, India*

E-mail : biswa.nayak@yahoo.co.in

Abstract

A field experiment was carried out on coriander (*Coriandrum sativum* L.) during *rabi* of 2005-06 on loam sand soil. The experiment was laid out in split-plot design having 24 treatments comprised eight combinations i.e. two levels of FYM (F_0 and F_{20}), four levels of nitrogen (N_0 , N_{25} , N_{50} and N_{75}) in main plots and three levels of plant spacing viz. recommended (solid row, S_R), 10 cm (S_{10}) and 15 cm (S_{15} cm) in sub-plots with 30 cm row spacing replicated four times. The application of FYM (F_{20}) produced significantly higher seed and straw yield, number of branches per plant, number of umbels per plant and seed weight per plant over control, whereas number of seeds per umbel and test weight were not affected significantly with application of FYM. Application of N_{75} gave significantly higher straw yield, number of umbels per plant and seed weight per plant than all other lower levels of nitrogen and also gave significantly higher seed yield, number of branches per plant and number of seeds per umbel than N_0 and N_{25} but statistically at par with N_{50} , whereas test weight was not affected significantly with application of nitrogen. The recommended plant spacing (S_R) resulted in significantly higher seed and straw yield as compared to S_{10} and S_{15} , whereas number of branches per plant, number of umbels per plant and seed weight per plant significantly higher under wider plant spacing i.e. S_{15} , but test weight of seed was not affected significantly under various plant spacings.

Key words : FYM, Nitrogen, Plant spacing, Yield, Solid row.

Coriander (*Coriandrum sativum* L.) is one of the most important spice crop of the world and also the earliest seed spices known to mankind. It is the small seeded aromatic annual herb having diploid chromosome number ($2n=22$), belonging to the family Umbelliferae. Its seeds are extensively used as condiment and major constituent of curry powder. It is used in medicine and cosmetic industries. The economy of India is primarily based on cereal production and due to rise of prices of farm inputs, severe ecological destruction and limitation of monoculture have forced the farmers to diversify their existing cropping pattern by introducing remunerative crops such as medicinal, aromatics and spice crops. Among various agronomic practices such as farm yard manure, nitrogen fertilization and plant spacing are the important deciding factors. The application of FYM in soil had supplied available nutrients to the plants and brought about a favorable soil environment, which ultimately increased the nutrient and

water holding capacity of soil for longer time resulting in better growth and yield attributes. The application of nitrogen (N) increases the vegetative growth, chlorophyll formation and promotes carbohydrate synthesis. Optimum crop geometry is one of the important factors for higher production, by efficient utilization of under ground resources and also harvesting as much as radiation and in turn better photosynthate formation. Therefore, present research work was made to study the effect of farm yard manure, nitrogen and plant spacings on yield and attributing characters of coriander (*Coriandrum sativum* L.).

Methods

A field experiment was conducted in Punjab Agricultural University, Ludhiana during *rabi* of 2005-06 on loamy sand soil with coriander as test crop. Representative sample of surface soil (0—15

Table 1. Effect of farm yard manure, nitrogen and plant spacing on yield and attributing characters of coriander at harvest. NS—Non-significant, P + S + T = primary + secondary + tertiary branches.

Treatment	Branches/ plant (P+S+T) (no.)	Umbels/ plant (no.)	Seeds/ umbel (no.)	Seed weight/ plant (no.)	Test weight (g) (weight of 1000 seeds)	Seed yield (q/ha)	Straw yield (q/ha)
Farm Yard Manure (t/ha)							
F ₀	34.26	15.90	25.56	3.70	9.20	9.00	19.22
F ₂₀	36.49	16.81	26.51	4.07	9.27	9.80	20.54
CD (<i>P</i> = 0.05)	1.40	0.71	NS	0.20	NS	0.70	0.74
Nitrogen (kg/ha)							
N ₀	32.73	13.83	24.04	3.04	9.14	7.56	15.63
N ₂₅	34.30	15.85	25.38	3.58	9.21	9.54	19.28
N ₅₀	36.30	17.12	26.89	4.25	9.26	9.78	21.65
N ₇₅	38.20	18.60	27.84	4.70	9.31	10.73	22.96
CD (<i>P</i> = 0.05)	1.98	1.00	1.95	0.29	NS	1.00	1.05
Plant Spacings (cm)							
S _R	28.53	13.64	23.68	2.83	9.09	14.29	32.75
S ₁₀	36.65	17.07	26.74	4.17	9.26	7.60	14.56
S ₁₅	40.96	18.34	27.70	4.68	9.34	6.31	12.34
CD (<i>P</i> = 0.05)	1.33	0.71	1.61	0.20	NS	0.62	1.10

cm depth) collected from the experimental field before start of the experiment was analyzed. The pH and organic carbon content were 8.0 and 0.34% and available N, P and K (kg/ha) were 187.0, 15.4 and 152.0, respectively. The total nitrogen, phosphorus and potassium content of FYM were 0.53, 0.18 and 0.42%, respectively and moisture content in FYM was 71% on oven dry weight basis. The experiment was laid out in split-plot design with farm yard manure (0 and 20 tonnes/ha) and nitrogen (0, 25, 50 and 75 kg/ha) in the main plots and plant spacing i.e. recommended (solid row), (10 cm and 15 cm) with 30 cm fixed row spacing in sub-plots. Thus, there were total 24 treatments, which were replicated four times. The experimental field was divided into 96 plots of each 15m² (6 × 2.5 m) size. Coriander seed sowing was done on 12 November 2005 and harvested on last week of April, 2006. The FYM was applied before sowing based on treatments and also all phosphorus (P) and potassium (K) were applied during final land preparation as basal. The nitrogen was applied following treatment in two splits i.e. at 15 days after

sowing and at the time of flower initiation. All necessary intercultural operations were done as needed by the experiment. Data on different parameters from five randomly selected plants from each treatment were recorded in time. The recorded data for various parameters were statistically analyzed at 5% level of significance.

Results and Discussion

Effect of Farm Yard Manure at Harvest

The main effects of FYM on yield and its attributes of coriander are presented in Table 1. Application of 20 tonnes/ha FYM significantly increased number of branches/plant number of umbels/plant, seed weight/plant over control. However doses of 20 tonnes/ha FYM did not significantly affect number of seeds/umbel and test weight over control. Likewise, application of 20 tonnes/ha of FYM significantly increased the seed and straw yield over control. The FYM (20 t/ha) produced 8.9% higher

seed yield than those of control. The improvement of yield attributing characters might be due to proper mixing of FYM in soil which had supplied available nutrient to plants and brought about a favorable soil environment, which ultimately increased the nutrient and water holding capacity for longer time which resulted in better yield attributes. This integrated effect of all yield attributing characters resulted in higher seed yield of coriander. Tiwari and Agarwal (2004) observed in coriander that application of 10–20 t/ha of FYM resulted better growth, yield and yield attributing characters. Similar results were reported by Khiriya and Singh (2003) in fenugreek and Mahajan et al. (1974) in celery.

Effect of Nitrogen at Harvest

The main effects of nitrogen on yield and its attributing characters of coriander are presented in Table 1. Total number of branches per plant and number of seed per umbel were found to be maximum at highest level of nitrogen (75 kg N/ha), which was at par with 50 kg N/ha and significantly superior over all other lower levels of nitrogen. But there were significant increase in number of umbels per plant and seed weight per plant with successive increase in nitrogen level. However, different nitrogen level had no effect on test weight of seed. The increase in yield attributing characters may be due to more number of branches per plant. Increase in yield attributing characters with application of nitrogen have also been reported by Ghosh et al. (1985) and Singh et al. (1971) in coriander and Ahmed et al. (1988) in fennel. Table 1 shows that the straw yield increased significantly with the each successive increase in nitrogen up to the highest level of 75 kg N/ha. But highest seed yield (10.73 q/ha) was recorded at the application of 75 kg N/ha which was statistically at par with 50 kg N/ha but significantly superior over all other lower levels of nitrogen. The seed yield increased was 41.9, 12.5 and 9.7% with 75 kg N/ha over 0, 25 and 50 kg N/ha, respectively. The probable reason assigned for non-significant increase in seed yield after adding nitrogen above 25 kg/ha was promoted that it luxuriant vegetative growth that resulted in lodging of crop and considerably reduced the seed yield. The increase in nitrogen increased seed yield non-significantly have been reported by

Raghavaiah et al. (1985) in coriander. They observed that application of 45 kg N/ha produced the maximum seed yield but further increase in nitrogen rate did not prove beneficial. Similar results are reported by Bhati (1988) and Singh et al. (1979) in coriander.

Effect of Plant Spacing at Harvest

The yield attributing characters likes total number of branches per plant, number of umbels per plant and seed weight per plant were significantly increased with increase in plant spacing (Table 1). However, number of seeds per umbel was recorded to be maximum at 15 cm plant spacing which was at par with 10 cm plant spacing and significantly superior over recommended. Different plant spacings had no effect on test weight of seed. The reasons for increase in yield attributing characters may be due to that wider plant spacing results in less intraplant competition for space, light, nutrient and moisture. The seed and straw yield were significantly decreased with increase in plant spacing. The highest seed yield (14.29 q/ha) was obtained at recommended plant spacing, which gave 88.0 and 126.4% higher seed yield than those of 10 and 15 cm plant spacing, respectively. This was mainly due to the reason of decreased plant population with increased plant spacing from recommended 15 cm. Singh et al. (1977) reported that spacings of 30 × 25 cm gave more seed yield in celery as compared to 45 × 25 cm and 60 × 25 cm spacing. They also reported that yield attributes increased significantly at wider spacings. Similar result was reported by Baswana et al. (1989) in coriander and they observed that coriander under closer spacing of 20 × 20 cm produced the highest seed yield (12.5 q/ha) as compared to other wider spacings of 30 × 20 cm and 40 × 20 cm.

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