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Influence of integrated nutrient management on growth parameters of coriander (*Coriandrum sativum* L.) cv. Pant Haritima

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Abstract
A field experiment on "Influence of integrated nutrient management on growth parameters of coriander (*Coriandrum sativum* L.) cv. Pant Haritima". was conducted during *Rabi* season 2020-2021 at Krishi Vigyan Kendra farm Newari, Kawardha under Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The field study used a randomized block design (RBD) with ten treatments (absolute control and varying proportion of organic and inorganic sources of nutrients) that were repeated three times. The results of the present study showed that the application of 60:40:30 kg NPK/ha+ Azotobacter +PSB was recorded the maximum plant height (112.00 cm), fresh weight (43.55 g) and dry weight (13.88 g) of plant. However number of primary branches (10.00) and number of secondary branches (23.86) per plant were noticed highest with the application of 30:20:15 kg NPK/ha + VC @ 1.5 t/ha. The number of days taken to 50% flowering (59.94), days taken to fruit set (70.00) and days taken to complete maturity (99.99) were found minimum under the application of 30:20:15 kg NPK/ha + FYM @ 5 t/ha. .Data revealed that in general integration of organics with inorganic source of nitrogen (urea) exhibited a significant influence on various growths and yield attributes as compared to sole application of various levels of nitrogen through urea.

Keywords: Coriander, FYM, vermicompost, azotobacter, PSB, growth

Introduction
Coriander is one of the important spice crop grown throughout the world and botanically known as *Coriandrum sativum* Linn. It belongs to the family Apiaceae. Coriander is an annual herb and the name of coriander is derived from the Greek word 'koris' meaning "bad bug" because of the unpleasant odour of green and unripened fruits. It is a thin- stemmed, small bushy herb, much branched, grows about 25 to 50 cm tall with alternate and compound leaves become highly segmented and linear as they reach upper extremities. Inflorescence is a compound "umbel" and usually comprises about seven smaller umbellets. Fruits are globular, yellow brown when ripened and are 3 to 4 mm in diameter. The fruits consist of two halves, the single seeded mericarps. The fruits have a fragrant odour and pleasant aromatic taste. The odour and taste are due to the compound containing d-linalool or coriandrol. (Rathee *et al.,* 2017) [17]. All parts of the plant are edible but the fresh leaves and the dried seed powder are most commonly used in cooking for adding taste and flavouring the food stuff. Its fruits are also known for their medicinal properties and considered carminative and diuretic. An infusion of coriander seed is useful in flatulence, indigestion, vomiting and other intestinal disorders. It is also used for curing bleeding piles, rheumatism, neurologin, ciphalgia and locally in eye infection (Agarwal *et al*., 1991) [1]. Thus, biochemical and medicinal properties make this spice crop very important.
Coriander crop responds well to the application of both organic manures and inorganic fertilizers (Munnu Singh, 2011) [11]. Organic manures supply the major nutrients, micronutrients, besides improving soil health. 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. No single source of nutrient is capable of supplying plant nutrients in adequate amount and balanced proportion. The integrated 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 & Parihar *et al.*, 2010) [13, 15].

The gap between the nutrient demand and supply cannot be bridged by fertilizers alone. It can be filled only through integrated nutrient management (INM) which refers to appropriate combination of mineral fertilizers, organic manures, compost, N-fixing crops and microorganisms.

The higher productivity could be determined by selection of suitable varieties, balance nutrition, optimum water management and timely plant protection measures. Among these factors, the use of organic manures and biofertilizers such as vermicompost and nitrogen fixing bacteria has led to a decrease in application of chemical fertilizers and has provided high quality products free of harmful agrochemicals for human safety (Khalid *et al.*, 2005) [9]. Vermicomposts are the products of the degradation of organic matter through interactions between earthworms and micro-organisms. Vermicomposts are finely divided peat-like materials with high porosity, aeration, drainage, and water-holding capacity and usually contain most nutrients in the available forms such as nitrates, phosphates, exchangeable calcium and soluble potassium (Arancon *et al.*, 2005) [3]. Free-living nitrogen fixing bacteria such as; *Azotobacter chroococcum* and *Azospirillum lipoferum*, were found to have not only the ability to fix nitrogen but also the ability to release phytohormones similar to gibberellic acid and indole acetic acid, which could stimulate plant growth, absorption of nutrients and photosynthesis (Mahfouz *et al.*, 2007) [10]. The management practices by using organic manures and biofertilizers influence agricultural sustainability by improving physical, chemical and biological properties of soils and subsequently can be increased yield and essential oil of medicinal plants (Darzi *et al.*, 2013) [5].

Materials and Methods

The field investigation was conducted during *Rabi* season 2020-21 at Krishi Vigyan Kendra farm Newari, Kawardha under Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The Kawardha has the tropical climate. It comes under the CG Plains agro-climatic zone. It is located at North latitude of 22.32 ° to 22.28° and 80.48° to 81.25° East longitude and an altitude of 353 meters above mean sea level (MSL). The experiment was conducted in a RBD with 10 treatments and replicated thrice. Total numbers of plots were 30, each with plot size of: 2.0 m × 1.8 m = 3.6 m^2 .planting was made at a spacing of 30 cm × 10 cm. The experimental data was analyzed statistically by the method of analysis of variance as out lined by (Panse and Sukhatme, 1985) [14].

Table 1: Physio-chemical properties of the soil.

S. No.	Composition	Content	Category	Method of Determination
(A) Physical Properties				
1	Sand (%)	25.60	-	International Pipette Method (Black, 1956)
2	Silt (%)	31.56	-	
3	Clay (%)	40.78	-	
(B) Chemical Properties				
1	Soil ph	7.88	Neutral	Glass electronic Ph meter (Piper,1967)
2	Electric conductivity (dSm-1)	0.4		EC Meter
3	Available nitrogen (Kg/ha)	277.5	Low	Alkaline Permanganate Method
4	Available phosphorus(Kg/ha)	10.72	Medium	Olsen's Method (Olsen, 1954)
5	Available potassium(Kg/ha)	595.9	High	Flame Photometer Method (Jackson, 1973)
6	Organic carbon	1.92%		Walkley and Blacks Rapid Titration Method

Table 2: Treatment Details

S. No.	Treatment no.	Description
1	T_1	Absolute control
2	T_2	100% RDF(60:40:30 kg NPK /ha)
3	T_3	VC @ 3 t/ha
4	T_4	FYM @ 10 t/ha
5	T_5	(30:20:15 kg NPK/ha) + VC @ 1.5 t/ha
6	T_6	(30:20:15 kg NKP/ha) + FYM @ 5 t/ha
7	T_7	VC @ 1.5 t/ha + FYM @ 5 t/ha
8	T_8	(60:40:30 kg NPK/ha) + Azotobacter + PSB
9	T_9	VC @ 3 t/ha + Azotobacter + PSB
10	T_{10}	FYM @ 10 t/ha + Azotobacter + PSB

- RDF- Recommended dose of fertilizers.
- VC- Vermi compost.
- FYM- Farm yard manure.
- PSB- Phosphate solubilizing bacteria (5 gm/kg seed as seed inoculation + 5 kg/ha as soil application).
- Azotobacter- (5 gm/kg seed as seed inoculation + 5 kg/ha as soil application).

Table 3: Nitrogen, phosphorus and potassium contents (%) in organic manures

Organic sources	Nitrogen (%)	Phosphorus (%)	Potassium (%)
FYM	0.6	0.4	0.33
Vermi-compost	2	1.3	1

Results and Discussion

Effect of integrated nutrient management on plant height (cm)

The data regarding plant height at 30, 45, 60, 90 DAS and at harvest are given in (Table 4). Plant height was significantly affected at 30 DAS, 45 DAS and 90 DAS by various treatments while showed statistically non significant at 60 DAS and at harvest. Maximum plant height at all the stages of growth (11.85, 25.12, 55.27, 98.94 and 112 cm, respectively) was recorded with T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB), followed by treatment T_2 100% RDF (60:40:30 kg NPK/ha). The lowest plant height was recorded under T_1 (absolute control) which were 9.03, 18.71, 43.33, 74.83 and 97.66 cm on the observation at 30, 45, 60, 90 DAS and at harvest respectively.

The maximum plant height was recorded under T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB) followed by treatment T_2 100% RDF (60:40:30 kg NPK/ha) may be due to quick and adequate availability of NPK through inorganic fertilizer in proper dose resulted good growth. Azotobacter and PSB also helped in better nutrient absorption and proper utilization in plant growth which enhanced plant height of coriander. The results are in accordance with the findings of Rahimi *et al.* (2009) [16], Aishwath *et al.* (2012) [2], Godara *et al.* (2014) [7], Sahu *et al.* (2014) [18] and Nisarata *et al.* (2020) [12]. They reported that the higher plant height was observed with the application of bio-fertilizers along with recommended dose of nitrogen in coriander.

Effect of integrated nutrient management on number of primary branches

The data for number of primary branches per plant at different growth stages (45 DAS, 60 DAS and at harvest) are given in (Table 5) revealed that the different combination of nutritional sources significantly influenced the primary branches per plant. Maximum number of primary branches was recorded (6.0) at 45 DAS under T_5 (30:20:15 kg NPK/ha + VC@ 1.5 t/ha) which was at par with T_6 (30:20:15 kg NPK/ha + FYM@ 5 t/ha), T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB), T_7 (VC @ 1.5 t/ha + FYM @ 5 t/ha) and T_2 100% RDF (60:40:30 kg NPK/ha). While minimum were recorded under T_1 (absolute control).

In case of 60 DAS, the maximum number of primary branches (8.0) was recorded under T_5 (30:20:15 kg NPK/ha + VC@ 1.5 t/ha) which was at par with T_6 (30:20:15 kg NPK/ha + FYM@ 5 t/ha), T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB), T_7 (VC @ 1.5 t/ha + FYM @ 5 t/ha), T_2 100% RDF (60:40:30 kg NPK/ha), T_9 (VC @ 3 t/ha + Azotobacter + PSB) and T_{10} (FYM @ 10 t/ha + Azotobacter + PSB). The minimum number of primary branches was noted in absolute control.

At the time of harvest, the maximum number of primary branches (10.0) was recorded under T_5 (30:20:15 kg NPK/ha + VC@ 1.5 t/ha) and at par with all the tested treatments except T_1 (absolute control), T_4 (FYM @ 10 t/ha) and T_3 (VC @ 3 t/ha).

An application of both inorganic and organic fertilizer might have enhanced the availability of nutrients, which resulted in increased photosynthetic activity and this may be due to the cause of higher growth attributes i.e. plant height and number of branches. The combination of organic manures and fertilizer as source of nutrients ensured readily availability of nutrients for initial requirement through fertilizers and slow release in long term through organic source throughout the crop growth period. The results of present study confirms findings of Gangadharrao (2006) [6], Yadav (2010) [21], Hnamate *et al.* (2013) [8], Godara *et al.* (2014) [7] and Dadiga *et al.* (2015) [4] in coriander.

Effect of integrated nutrient management on number of Secondary branches

The data for number of secondary branches per plant at different growth stages (45 DAS, 90 DAS and at harvest) are given in (Table 6) revealed that the different combination of nutritional sources significantly influenced the secondary branches per plant. Maximum number of secondary branches 10.38 was recorded at 45 DAS under T_5 (30:20:15 kg NPK/ha + VC@ 1.5 t/ha) which was at par with T_6 (30:20:15 kg NPK/ha + FYM@ 5 t/ha), T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB), T_2 100% RDF (60:40:30 kg NPK/ha) and T_7 (VC @ 1.5 t/ha + FYM @ 5 t/ha). While minimum were recorded under T_1 (absolute control).

In case of 90 DAS, the maximum number of secondary branches (19.99) was recorded under T_5 (30:20:15 kg NPK/ha + VC@ 1.5 t/ha) which was at par with T_6 (30:20:15 kg NPK/ha + FYM@ 5 t/ha), T8 (60:40:30 kg NPK/ha + Azotobacter + PSB), T_7 (VC @ 1.5 t/ha + FYM @ 5 t/ha), T_2 100% RDF (60:40:30 kg NPK/ha), T_9 (VC @ 3 t/ha + Azotobacter + PSB) and T_{10} (FYM @ 10 t/ha + Azotobacter + PSB). The minimum number of secondary branches was noted in T_1 (Absolute control).

At the time of harvest, the maximum number of secondary branches (23.86) was recorded under T_5 (30:20:15 kg NPK/ha + VC @ 1.5 t/ha) and at par with all the tested treatments except T_1 (absolute control) and T_3 (VC @ 3 t/ha).

The secondary branches were noted more in those treatments which have inorganic fertilizers alone or with organic fertilizer, except under T_3 *i.e.* (VC @ 3 t/ha). Singh and Verma (2002) [20] also reported that the application of inorganic alone or with combination of FYM recorded maximum plant height and branches per plant in Coriander. Similar finding was also reported by Sharma *et al.*, (2006) [19].

Effect of integrated nutrient management on fresh weight of plants

The result of fresh weight of plants is given in (Table 7). There was significant difference in various treatments for fresh weight of plants. The maximum fresh weight of plants (43.55 g) was recorded under T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB), followed by treatment T_2 100% RDF (60:40:30 kg NPK/ha) and T8 which at par with each other. The lowest fresh weight of plants was noted under T_1 (Absolute control).

Treatments having inorganic fertilizers or combination with organic or bio-fertilizer were recorded maximum fresh weight. Sahu *et al.* (2014) [18] reported cumulative increase in fresh weight of coriander by the use of bio-fertilizers along with the appropriate doses of inorganic fertilizers.

Effect of integrated nutrient management on dry weight of plants

The data regarding the dry weight of plants are given in (Table 7). There was significant difference in various treatments for dry weight of plants. The maximum dry weight of plants (13.88 g) was recorded with T_8 (60:40:30 kg NPK/ha + Azotobacter + PSB) followed by treatment T_2 100% RDF (60:40:30 kg NPK/ha), while lowest dry weight of plants were taken under T_1 (absolute control).

The maximum dry weight of plants in coriander perhaps may be due to recorded more in those treatments which have more fresh weight of plants. This might be due to enhanced availability of nutrients to the plants. Similar finding was also reported by Sahu *et al.* (2014) [18] and Rahimi *et al.* (2009) [16].

Table 4: Effect of various treatments on plant height at 30, 45, 60, 90 DAS and at harvest

	Treatments	30 DAS	45 DAS	60 DAS	90 DAS	At Harvest
T_1	Absolute Control	9.03	18.71	43.33	74.8	97.66
T_2	100% RDF (60:40:30 kg NPK/ha)	11.55	24.05	53.49	95.77	111.00
T_3	VC @ 3 t/ha	10.38	20.30	45.08	79.05	101.00
T_4	FYM @ 10 t/ha	10.06	20.77	46.00	76.72	100.01
T_5	(30:20:15 kg NPK/ha) + VC @ 1.5 t/ha	11.08	23.82	50.77	92.83	109.60
T_6	(30:20:15 kg NPK/ha) + FYM@ 5 t/ha	10.70	22.68	49.27	87.33	106.16
T_7	VC @ 1.5 t/ha + FYM @ 5 t/ha	10.92	22.31	52.15	90.98	107.31
T_8	(60:40:30 kg NPK/ha) + Azotobacter + PSB	11.85	25.12	55.27	98.94	112.00
T_9	VC @ 3 t/ha + Azotobacter + PSB	11.09	21.74	48.38	85.76	105.16
T10	FYM @ 10 t/ha + Azotobacter + PSB	10.69	21.64	49.33	81.16	103.75
	C.D.	1.50	3.56	N/A	12.48	N/A
	SE(m)	0.50	1.19	4.80	4.16	4.96
	SE(d)	0.71	1.68	6.78	5.89	7.02
	C.V.	8.12	9.32	16.85	8.36	8.16

Table 5: Effect of various treatments on number of primary branches at 45 DAS, 60 DAS and at harvest

	Treatments	45 DAS	60 DAS	At Harvest
T_1	Absolute Control	3.87	4.76	6.63
T_2	100% RDF (60:40:30 kg NPK/ha)	5.16	7.05	8.61
T_3	VC @ 3 t/ha	4.84	5.87	7.36
T_4	FYM @ 10 t/ha	4.96	5.88	7.16
T_5	(30:20:15 kg NPK/ha) + VC @ 1.5 t/ha	6.00	8.00	10.00
T_6	(30:20:15 kg NPK/ha) + FYM@ 5 t/ha	5.80	7.90	9.33
T_7	VC @ 1.5 t/ha + FYM @ 5 t/ha	5.27	7.22	9.34
T_8	(60:40:30 kg NPK/ha) + Azotobacter + PSB	5.52	7.33	9.27
T_9	VC @ 3 t/ha + Azotobacter + PSB	5.03	6.92	8.93
T10	FYM @ 10 t/ha + Azotobacter + PSB	4.96	6.87	8.73
	C.D.	0.86	1.26	2.03
	SE(m)	0.28	0.42	0.68
	SE(d)	0.40	0.59	0.96
	C.V.	9.67	10.77	13.80

Table 6: Effect of various treatments on number of secondary branches at 45 DAS, 90 DAS and at harvest

	Treatments	45 DAS	90 DAS	At Harvest
T_1	Absolute Control	7.11	15.34	18.27
T_2	100% RDF (60:40:30 kg NPK/ha)	9.38	18.33	22.90
T_3	VC @ 3 t/ha	8.35	16.22	19.63
T_4	FYM @ 10 t/ha	8.12	16.77	20.88
T_5	(30:20:15 kg NPK/ha) + VC @ 1.5 t/ha	10.38	19.99	23.86
T_6	(30:20:15 kg NPK/ha) + FYM@ 5 t/ha	9.94	19.94	23.00
T_7	VC @ 1.5 t/ha + FYM @ 5 t/ha	9.27	18.83	22.66
T_8	(60:40:30 kg NPK/ha) + Azotobacter + PSB	9.38	19.29	22.94
T_9	VC @ 3 t/ha + Azotobacter + PSB	8.66	18.00	21.88
T10	FYM @ 10 t/ha + Azotobacter + PSB	8.41	17.80	21.90
	C.D.	1.30	2.97	3.09
	SE(m)	0.43	0.99	1.03
	SE(d)	0.61	1.40	1.46
	C.V.	8.45	9.5	8.22

Table 7: Effect of various treatments on fresh weight and dry weight of plants

	Treatments	Fresh weight(gm)	Dry weight(gm)
T_1	Absolute Control	20.36	6.98
T_2	100% RDF (60:40:30 kg NPK/ha)	38.27	12.66
T_3	VC @ 3 t/ha	25.60	8.66
T_4	FYM @ 10 t/ha	24.14	7.88
T_5	(30:20:15 kg NPK/ha) + VC @ 1.5 t/ha	37.66	11.85
T_6	(30:20:15 kg NPK/ha) + FYM@ 5 t/ha	36.72	11.86
T_7	VC @ 1.5 t/ha + FYM @ 5 t/ha	34.74	11.16
T_8	(60:40:30 kg NPK/ha) + Azotobacter + PSB	43.55	13.88
T_9	VC @ 3 t/ha + Azotobacter + PSB	32.30	9.77
T10	FYM @ 10 t/ha + Azotobacter + PSB	29.30	9.44
	C.D.	6.34	3.11

	SE(m)	2.12	1.03
	SE(d)	2.99	1.46
	C.V.	11.38	17.27

Conclusions
Based on the present study it can be concluded that the application of 100 per cent recommended dose of nitrogen (60 kg per ha) through inorganic sources along with biofertilizers (*Azotobacter* and PSB) showed superior performance over other treatments recording significantly higher values for all the growth, yield attributes, net returns.

Author's Contribution
Conceptualization of research (NS, SSP); Designing of the experiments (NS); Contribution of experimental materials (SSP, RS, KS); Execution of field/lab experiments and data collection (SSP, RS, KS); Analysis of data and interpretation (SSP); Preparation of manuscript (SSP, NS).

Declaration
The authors declare that they have no conflict of interest.

References

1. Agarwal S, Sharma RK, Bhatt BN. Quality evaluation in coriander. Indian Cocoa, Arecanut and Spices Journal. 1991;14(4):137.
2. Aishwath OP, Lal G, Kant K, Sharma YK, Ali SF, Nainuddin. Influence of bio-fertilizers on growth and yield of coriander under TypicHaplustepts Intl. of j. spices. 2012;2(2):9-14.
3. Arancon NQ, Edwards CA, Bierman P, Metzger JD, Lucht C. Effects of vermicomposts produced from cattle manure, food waste and paper waste on the growth and yield of peppers in the field. Pedobiologia. 2005;49(4):297-306.
4. Dadiga A, Kadwey S, Prajapati S. 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 of Agricultural Research. 2015;49(6):577-580.
5. Darzi MT, Shirkhodaei M, Hadi MHS. Effects of Vermicomost and *Azotobacter* and *Azospirillum* bacteria on quantity and quality of essential oil of coriander (*Coriandrum sativum* L.). International Journal of Farming and Allied Sciences. 2013;2(S):1277-1283.
6. Gangadharro BS. Effect of organic and inorganic fertilizers on growth and seed yield of coriander (*Coriandrum Sativum* L.) cv. Pant Haritama (Doctoral dissertation, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani); c2006.
7. Godara AS, Gupta US, Lal G, Singh R. Influence of organic and inorganic source of fertilizers on growth, yield and economics of coriander (*Coriandrum sativum* L). International Journal of Seed Spices. 2014;4(2):77-80.
8. Hnamte V, Chatterjee R, Tania C. Growth, flowering, fruit setting and maturity behaviour of coriander (*Coriandrum sativum* L.) with organics including biofertilizers and inorganics. The Bioscan. 2013;8(3):791-793.
9. Khalid KA, Shafei AM. Productivity of dill (*Anethum graveolens* L.) as influenced by different organic manure rates and sources. Arab Universities of Journal of Agricultural Sciences.2005;13(3):901-913.
10. Mahfouz SA, Sharaf Eldin MA. Effect of mineral vs. biofertilizer on growth, yield, and essential oil content of fennel (*Foeniculum vulgare* Mill). International Agrophysics. 2007;21(4):361-366.
11. Munnu Singh. 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. 2011;20(1):28-31.
12. Nisarata NV, Patel KM, Muniya SS, Chaudhari GI, Chauhan ZY. Influence of Organic and Inorganic Sources of Nutrients on Growth and Yield of Coriander (*Coriandrum sativum* L.). International Journal of Current Microbiology and Applied Sciences. 2020;11:2215-2223.
13. Pandey N, Verma AK, Anurag and Tripathi RS. Integrated nutrient management in transplanted hybrid rice (*Oryza sativa*). Indian J. Agron. 2007;52(1):40-42.
14. Panse VG, Sukhatme PV. Statistical method for agricultural workers. 4th Enlarged Edition. ICAR Publication, New Delhi; c1985.
15. Parihar CM, Rana KS, Kantwa SR. Nutrient management in pearlmillet (*Pennisetum glaucum*)-mustard (*Brassica juncea*) cropping system as affected by land configuration under limited irrigation. Indian J. Agron. 2010;55(3):191-196.
16. Rahimi AR, Mashayekhi K, Amini S, Soltani E. Effect of mineral vs. bio fertilizer on the growth, yield and essential oil content of Coriander (*Coriandrum sativum* L.). Medicinal and Aromatic Plant Science and Biotechnology. 2009;3(2):82-84.
17. Rathee P, Kaushik N, Khajuria S, Singh P, Manjeet. Performance of Coriander and fenugreek as Intercrops under Different Spacings of Poplar Plantations in North-Western, India. Int. J. Pure App. Biosci. 2017;5(1):857-863.
18. Sahu RL, Sahu H, Kumar S. Effect of application of inorganic fertilizers and biofertilizers on growth components and yield traits of coriander (*Coriandrum sativum* L). International Journal of Agricultural Sciences. 2014;10(1):433-436.
19. Sharma DK, Dashora LK, Sen NL. Influence of phosphorus rich organic manure (PROM), PSB and Rhizobium inoculation on growth and yield of fenugreek (*Trigonella foenum graecum* L.) cv. Rmt-1.Orissa Journal of Horticulture. 2006;34(1):52-58.
20. Singh NB, Verma KK. Response of coriander (*Coriandrum sativum L.*) to application of organic and inorganic in eastern Uttar Pradesh. Indian Journal of Agronomy. 2002;47(1):81-85.
21. Yadav DR. Effect of integrated nitrogen management on soil properties and performance of coriander (*Coriandrum sativum* L.) in loamy sand soil (Doctoral dissertation, Swami Keshwanand Rajasthan Agricultural University); c2010.