

## Effect of foliar application of organics on growth and yield of coriander (*Coriander sativum*)

Suvarna, P. P. Bhalerao\* and S. T. Bhatt

ASPEE College of Horticulture, NAU, Navsari (Gujarat) India

### ABSTRACT

A field experiment was conducted to find out the effect of foliar application of organics on growth and yield of coriander (*Coriander sativum* L.) var. GDLC-1 at Regional Horticultural Research Station, ASPEE College of Horticulture, NAU, Navsari, Gujarat during *rabi* season of 2022-2023. The experiment was laid out in randomized block design with three replications and nine treatments, *viz.* *Panchagavya* @ 1.5 % (T<sub>1</sub>), *Panchagavya* @ 3 % (T<sub>2</sub>), novel organic liquid nutrients @ 1.5 % (T<sub>3</sub>), novel organic liquid nutrients @ 3 % (T<sub>4</sub>), vermiwash @ 1.5 % (T<sub>5</sub>), vermiwash @ 3 % (T<sub>6</sub>), cow urine @ 1.5 % (T<sub>7</sub>), cow urine @ 3 % (T<sub>8</sub>) and the control (T<sub>9</sub>). The foliar spray was given 20 and 45 days after sowing. The foliar application of novel organic liquid nutrients @ 1.5 % (T<sub>3</sub>) showed maximum total chlorophyll content (1.64 mg/g and 1.71 mg/g), photosynthetic rate (12.24  $\mu\text{mol m}^{-2} \text{s}^{-1}$  and 13.10  $\mu\text{mol m}^{-2} \text{s}^{-1}$ ), transpiration rate (3.48  $\text{m mole m}^{-2} \text{s}^{-1}$  and 3.69  $\text{m mole m}^{-2} \text{s}^{-1}$ ) and stomatal conductance (0.21  $\text{mol m}^{-2} \text{s}^{-1}$  and 0.22  $\text{mol m}^{-2} \text{s}^{-1}$ ) 30 and 50 DAS, respectively. The maximum plant height (39.14 cm and 27.87 cm), number of branches/plant (11.73 and 20.20), petiole length (18.57 cm and 10.07 cm), leaf length (3.93 cm and 3.77 cm) and leaf width (4.05 cm and 3.84 cm) were observed under the same treatment. Among treatments, foliar application of novel organic liquid nutrients @ 1.5 % (T<sub>3</sub>) recorded significantly minimum days taken for first cutting (30.00) with maximum fresh weight of herbage/plant (18.47 g and 24.40 g), herbage yield at first and second cutting (9.13 t/ha and 11.70 t/ha) 30 and 50 DAS as well as total fresh weight of herbage (20.83 t/ha) at both the cuttings. The maximum net income of ₹632592.00/ha with a benefit:cost ratio of 6.56 was also calculated with same treatment.

**Key words:** Foliar, Organics, Growth, Economic return, Yield, Liquid nutrients

**C**oriander (*Coriander sativum* L.) having chromosome number  $2n=2x=22$ , belongs to family Apiaceae (Umbelliferae). In India, it is grown in Madhya Pradesh, Gujarat, Rajasthan, Assam, West Bengal, Orissa, Uttar Pradesh and Andhra Pradesh (MA FW, 2021). Foliar fertilization or foliar feeding entails the supply of nutrients, plant hormones, stimulants and other beneficial substances in liquid form to plant through leaves and stems. *Panchagavya* an organic input, can act as a growth stimulant and immunity booster. Vermiwash is liquid extract of organic waste material of earthworm culture and it is used as a major nutritive for promoting growth of all green plants (Nath *et al.*, 2009). Cow urine contains 95 % water, 2.5 % urea and remaining 2.5 %, a mixture of salts, hormones, enzymes and minerals (Bhadauria, 2002). Novel organic liquid nutrients is a growth booster (Jadhav *et al.*, 2014). Since, organic liquid fertilizers prove beneficial in addressing transient nutrient deficiencies and promoting plant growth throughout the season, an experiment was conducted to find out the effect of foliar application of organics on growth and yield of coriander.

### MATERIALS AND METHODS

The experiment was conducted on coriander var. GDLC-1 during *rabi* season of 2022-2023 at Regional

Horticultural Research Station, ASPEE College of Horticulture, NAU, Navsari, Gujarat, in randomized block design with three replications and eleven treatments, *viz.* *panchagavya* @ 1.5 % (T<sub>1</sub>), *panchagavya* @ 3 % (T<sub>2</sub>), novel organic liquid nutrients @ 1.5 % (T<sub>3</sub>), novel organic liquid nutrients @ 3 % (T<sub>4</sub>), vermiwash @ 1.5 % (T<sub>5</sub>), vermiwash @ 3 % (T<sub>6</sub>), cow urine @ 1.5 % (T<sub>7</sub>), cow urine @ 3 % (T<sub>8</sub>) and the control (T<sub>9</sub>). The foliar spray was given 20 and 45 days after sowing as per the treatments. The soil of experimental site was dark greyish black type having medium to poor drainage and high water-holding capacity. The experimental plots were prepared by one deep ploughing followed by one harrowing. Flat beds of 2.4 m x 2.4 m size were prepared and seeds were sown at 20 cm x 10 cm spacing during last week of November 2022. The cultural practices and nutrient management (FYM @ 10 t/ha with RDF @ 20:10:00 NPK kg/ha) were carried out as per the recommendations. Observations on different physiological attributes and growth parameters were recorded 30 and 50 days after sowing from five randomly selected plants, whereas yield attributing characters were recorded after harvesting. Statistical analysis of data was done as per Panse and Sukatme (1985).

### RESULTS AND DISCUSSION

The foliar application of novel organic liquid nutrients 1.5 % (T<sub>3</sub>) recorded maximum total chlorophyll

**Corresponding author:** pankaj5bhalerao@nau.in

content (1.64 mg/g and 1.71 mg/g), photosynthetic rate (12.24  $\mu\text{mol m}^{-2} \text{s}^{-1}$  and 13.10  $\mu\text{mol m}^{-2} \text{s}^{-1}$ ), transpiration rate (3.48  $\text{m mole m}^{-2} \text{s}^{-1}$  and 3.69  $\text{m mole m}^{-2} \text{s}^{-1}$ ) and stomatal conductance (0.21  $\text{mol m}^{-2} \text{s}^{-1}$  and 0.22  $\text{mol m}^{-2} \text{s}^{-1}$ ) 30 and 50 days after sowing (Table 1). It might be due to presence of nitrogen, gibberellic acid and cytokinin in novel organic liquid nutrients. Chlorophyll component is made up from nitrogen and it is functioning in promoting vegetative growth and green colouration of plant foliage. Nitrogen involve in the formation of chlorophyll which lead to an effective photosynthesis rate of plant (Yadav *et al.*, 2013). The transpiration and photosynthetic rate might be due to opening of stomata to escape the water at the time of transpiration. Simultaneously, exchange of gases crucial for occurrence of photosynthesis. Increase in photosynthetic rate might be due to iron (Fe) which is highly associated with chlorophyll synthesis which later on boosted up to the photosynthesis (Pinal *et al.*, 2017). Value of stomatal conductance showed the passage rate of carbon dioxide ( $\text{CO}_2$ ) entering the leaf stomata and value of water vapour exiting through stomata.

The foliar application of novel organic liquid nutrients at 1.5 % ( $T_3$ ) gave maximum plant height (39.14 cm and 27.87 cm), number of branches/plant (11.73 and 20.20), petiole length (18.57 cm and 10.07 cm), leaf length (3.93 cm and 3.77cm) and leaf width (4.05 cm and 3.84 cm) 30 and 50 days after sowing. This might be due to nitrogen which present in novel organic liquid fertilizer increased the rate of vegetative growth, which resulted in maximum leaves and leaf area. Moreover, nitrogen increased the cation exchange capacity of plant roots and that make them efficient in absorbing other nutrients ions like phosphorus, potassium *etc.* It also accelerates the synthesis of chlorophyll, proteins and amino acids, which are essential components of the major photosynthesis process in plants. Spraying of novel organic liquid nutrients, which contain plant growth regulators such as NAA, gibberellic acid, cytokinin, along with a balanced composition of macronutrients and micronutrients. This formulation effectively stimulates cell elongation, contributing to a notable enhancement in plant growth. The same effects in vegetative growth have also been reported by Parikh *et al.* (2023).

The foliar application of novel organic liquid nutrients at 1.5 % ( $T_3$ ) recorded maximum yield 30 and 50 days after sowing. The minimum days taken for first cutting was 30.00 days and with maximum fresh weight of herbage/plant (18.47 g and 24.40 g), herbage yield first and second cutting (9.13 t/ha and 11.70 t/ha) 30 and 50 days after sowing with herbage yield at both cuttings (20.83 t/ha) (Table 2). The higher yield per plant and total yield might be due to higher production of dry matter, height of plant and branches produced per plant. All these factors are very closely related to crop yield. The other reasons may be effect of novel organic liquid nutrients which contain macro and micronutrients. The nutrients N and K at higher rate exerted a significant positive influence on yield. The enhancement of yield could have been further facilitated

Table 1: Effect of foliar application of organics on physiological parameters and growth attributes of coriander

Treatment	Total chlorophyll content (mg/g)		Photosynthetic rate ( $\mu\text{mol m}^{-2} \text{s}^{-1}$ )		Transpiration rate ( $\text{m mole m}^{-2} \text{s}^{-1}$ )		Stomatal conductance ( $\text{mol m}^{-2} \text{s}^{-1}$ )		Plant height (cm)		Number of branches/plant		Petiole length (cm)		Leaf length (cm)		Leaf width (cm)	
	30	50	30	50	30	50	30	50	30	50	30	50	30	50	30	50	30	50
	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS	DAS
$T_1$	1.39	1.45	9.39	9.47	2.70	2.88	0.16	0.17	35.40	24.28	9.73	17.53	15.74	8.19	3.19	3.24	3.49	3.41
$T_2$	1.41	1.59	10.08	10.28	2.81	2.93	0.16	0.18	34.21	23.23	10.13	18.07	16.84	8.37	3.32	3.45	3.52	3.45
$T_3$	1.64	1.71	12.24	13.10	3.48	3.69	0.21	0.22	39.14	27.87	11.73	20.20	18.57	10.07	3.93	3.77	4.05	3.84
$T_4$	1.47	1.61	10.46	11.06	2.92	2.98	0.17	0.18	34.95	24.05	9.47	17.40	18.06	8.59	3.39	3.53	3.69	3.48
$T_5$	1.59	1.66	10.88	11.24	3.17	3.21	0.17	0.19	35.74	25.15	9.80	17.93	16.99	8.82	3.42	3.35	3.78	3.59
$T_6$	1.62	1.66	11.71	12.22	3.34	3.56	0.20	0.21	37.00	25.69	10.73	18.60	18.19	9.47	3.62	3.65	3.93	3.72
$T_7$	1.21	1.44	8.66	8.80	2.45	2.67	0.15	0.16	32.86	22.40	8.80	16.80	15.47	7.69	3.13	3.24	3.39	3.36
$T_8$	1.35	1.52	9.81	9.74	2.69	2.84	0.16	0.17	33.83	23.11	9.27	17.27	16.87	8.33	3.24	3.37	3.58	3.45
$T_9$	1.10	1.21	8.29	8.31	2.33	2.51	0.13	0.16	30.61	21.74	8.67	14.53	15.03	7.33	3.07	3.16	3.23	3.11
<b>S.E.m. (<math>\pm</math>)</b>	0.05	0.06	0.40	0.39	0.14	0.13	0.01	0.01	1.23	1.13	0.51	0.74	0.49	0.42	0.17	0.12	0.15	0.13
<b>CD (5%)</b>	0.16	0.18	1.19	1.17	0.42	0.39	0.02	0.03	3.68	3.40	1.54	2.21	1.47	1.26	0.50	0.36	0.45	0.38
<b>CV (%)</b>	6.59	6.76	6.73	6.43	8.43	7.48	8.05	8.00	6.10	8.12	9.04	7.27	5.03	8.50	8.53	6.16	7.19	6.29

Table 2: Effect of foliar application of organics on yield and economics of coriander var. GDLC-1

Treatment	Days taken for first cutting	Days taken for second cutting	Fresh weight of herbage/plant (g)			Herbage yield (t/ha)			Cost of production (₹/ha)	Cost of treatments (₹/ha)	Fixed cost (₹/ha)	Total cost (₹/ha)	Gross income (₹/ha)	Net income (₹/ha)	BCR
			30 DAS	50 DAS	30 DAS	50 DAS	Both cuttings								
T <sub>1</sub>	31.33	51.67	13.47	20.13	7.07	9.77	16.84	40910	11800	38311	91021	589400	498379	5.48	
T <sub>2</sub>	31.33	51.00	15.20	21.60	7.43	10.80	18.23	40910	22200	41473	104583	638050	533467	5.10	
T <sub>3</sub>	30.00	50.33	18.47	24.40	9.13	11.70	20.83	40910	8160	47388	96458	729050	632592	6.56	
T <sub>4</sub>	31.00	52.00	15.67	21.33	7.97	10.50	18.47	40910	14920	42019	97849	646450	548601	5.61	
T <sub>5</sub>	30.67	51.33	16.47	21.40	8.03	10.67	18.70	40910	4520	42543	87973	654500	566528	6.44	
T <sub>6</sub>	30.67	51.00	17.33	22.20	8.80	11.23	20.03	40910	7640	45568	94118	701050	606932	6.45	
T <sub>7</sub>	32.33	52.33	13.60	17.20	6.80	8.47	15.27	40910	2440	34739	78089	534450	456361	5.84	
T <sub>8</sub>	32.33	52.67	14.07	19.27	7.03	9.77	16.80	40910	3480	38220	82610	588000	505390	6.12	
T <sub>9</sub>	33.67	52.33	12.33	16.73	6.50	8.37	14.87	40910	0	33829	74739	520450	445711	5.96	
S.E.m. <sub>±</sub>	0.68	1.10	0.70	0.88	0.44	0.62	0.72								
C.D. at 5%	2.04	NS	2.09	2.64	1.33	1.87	2.15								
C.V. %	3.74	3.70	7.97	7.45	10.08	10.64	6.99								

Selling price of coriander: 35 ₹/kg

by optimizing the synthesis of carbohydrates and their efficient translocation to the potential storage organs through better growth and more number of branches per plant. This process also facilitates the ready availability of essential nutrients, leading to enhanced photosynthetic activity and increased the yield. Similar findings were also reported by Patil *et al.* (2017) and Vashi *et al.* (2022).

The higher net realization and maximum benefit:cost ratio, ₹ 632592.00/ha and 6.56, respectively were recorded under 1.5% novel organic liquid nutrients (T<sub>3</sub>). This might be due investment cost was less and yield was higher in this treatment which gives higher benefit cost ratio. This finding is in agreement with Parikh *et al.* (2023).

REFERENCES

Bhadauria, H. 2002. Cow urine a magical therapy. *Vishwa Ayurveda Parishad. International J. Cow Sci.* **1**: 32-36.

Jadhav, P. B.; Singh, A.; Mangave, B. D.; Patil, N. B.; Patel, D. J. and Dekhane, S. S. 2014. Effect of organic and inorganic fertilizers on growth and yield of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gaiinda. *International J. Trop. Agril.* **32**(3-4): 547-51.

MA and F W, New Delhi. 2021. Poket Book of Agricultural Statistics. Ministry of Agriculture and farmers Welfare, Department of Agriculture, Cooperation and FarmersWelfare, Department of Economics and Statistics.

Nath, G.; Singh, K.; Singh, D. K. 2009. Chemical analysis of vermicompost/vermiwash of different combinations of animal, agro and kitchen wastes. *Australian J. Basic Applied Sci.* **3**(4): 3672-76.

Panse, V. G. and Sukhatme, P. V. 1985. "Statistical Methods for Agricultural Workers". *Indian Council of Agricultural Research*, New Delhi, India, p. 381.

Parikh, R. P.; Bhalerao, P. P. and Patil, S. J. 2023. Effect of foliar application of organic liquids on yield and quality of turmeric (*Curcuma longa*). *Current Horticulture* **11**(1): 30-32.

Pinal Parmar; Patil, S. J.; Kumar, S.; Ahir, U. and Tandel, B. M. 2017. Response of fertilizer application on quality and shelf life of papaya var. Red Lady. *International J. Chem. Stud.* **5**(4): 1608-10.

Patil, S. J.; Gurjar, T. D.; Patel, K. A. and Patel, K. 2017. Effect of foliar spraying of organic liquid fertilizer and micronutrients on flowering, yield attributing characters and yield of banana (*Musa paradisiaca*) cv. Grand Naine. *Current Horticulture* **5**(1): 49-52.

Vashi, J. M.; Patel, A. I.; Chaudhari, B. N. and Intwala, C. G. 2022. Response of okra (*Abelmoschus esculentus* L.) to foliar application of novel organic liquid nutrients and micronutrients. *J. Pharm. Innov.* **11**(11): 1217-20.

Yadav, A.; Gupta, R. and Garg, V. K. 2013. Organic manure production from cow dung and biogas plant slurry by vermicomposting under field conditions. *International J. Recycl. Org. Waste Agric.* **2**(1): 1-7.