PLANT SCIENCE TODAY
Vol x(x): xx–xx
https://doi.org/10.14719/pst.6447

eISSN 2348-1900

RESEARCH ARTICLE

Effect of different orgopriming and foliar spraying treatments on seed yield and its components of coriander (*Coriandrum sativum* L.)

D B Kothadiya[1*], C A Babariya[1], D B Bheda[2], R B Mori[1] & J R Sondarva[1]

[1]Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh 362 001, Gujarat, India
[2]Department of Genetics and Plant Breeding, College of Agriculture, Junagadh Agricultural University, Junagadh 362 001, Gujarat, India

*Correspondence email - kothadiyadharmil96@gmail.com

Received: 01 December 2024; Accepted: 12 March 2025; Available online: Version 1.0: 29 April 2025

Cite this article: Kothadiya DB, Babariya CA, Bheda DB, Mori RB, Sondarva JR. Effect of different orgopriming and foliar spraying treatments on seed yield and its components of coriander (*Coriandrum sativum* L.) . Plant Science Today (Early Access). https:/doi.org/10.14719/pst.6447

Abstract

Coriander is one of the most essential spices in India. Coriander's extended germination period often delays crop establishment. The largest coriander-producing country, India must explore innovative agronomic practices to accelerate early growth and enhance overall productivity. So, a field experiment was conducted at *Sagdividi* Farm, Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh, during the *Rabi* season of 2023-24 to evaluate the effects of orgopriming and foliar spray treatments on the growth and yield attributes of coriander variety Gujarat Coriander-3 (GC-3). The experiment was designed in a factorial randomized block design (FRBD), comprising six priming agents with control and three foliar spray treatments with a control, applied at 35 and 55 DAS (days after sowing). The results indicated that orgopriming with tender coconut water significantly increased field emergence by 25.37 %, plant height by 19.62 %, number of umbels per plant by 23.99 %, number of umbellate per umbel by 21.04 %, number of seeds per umbellate by 25.06 %, number of seeds per umbel by 19.58 %, 1000 seed weight by 12.04 %, seed yield per plant by 15.13 % and reduced number of days to 50 % flowering by 12.38 % as compared to control. Foliar spraying with *Jivamrut* (10 %) significantly increased plant height by 5.80 %, number of umbels per plant by 8.98 %, number of umbellates per umbel by 8.75 %, number of seeds per umbellate by 19.38 %, number of seeds per umbel by 12.02 %, 1000-seed weight by 8.57 % and seed yield per plant by 9.42 % compared to the control. The interaction of *Bijamrut* (10 %) priming and *Jivamrut* (10 %) foliar spraying produced the highest plant height with an increase of 40.48 % compared to control. Therefore, priming coriander seeds with tender coconut water and foliar application of *Jivamrut* (10 %) can enhance seed yield and its related traits.

Keywords: Coriander; *Jivamrut;* orgopriming; tender coconut water; yield enhancement

Introduction

India is known as a land of spices, where these plant-derived ingredients add rich flavours to food, making every meal a delightful experience, from the famous masala tea to various gravies and curries. Among these, coriander stands out as an essential spice, valued for its distinct aromatic flavour, versatile use in both fresh and dried forms and its ability to balance and enhance the taste of Indian curries, chutneys and dals while also holding significance in Ayurvedic cooking for its digestive and health benefits (1). Coriander (*Coriandrum sativum* L.), having a chromosome number of 2n = 2x = 22, belongs to the *Apiaceae* (*Umbelliferae*) family and is commonly referred to as "Dhania". Coriander's characteristic aroma and flavour are attributed to its essential oil component, "linalool" (2). Globally, India leads in coriander production, consumption and export. Around 80 % of global coriander production originates in India. (3).

Coriander seeds often encounter challenges in germination, as even after splitting, they require a relatively long time to germinate. Although germination occurs, uneven emergence in the field is commonly observed due to variations in seed vigour. Seed priming has the potential to address these germination and vigour issues. Orgopriming involves soaking seeds in solutions of organic substances individually or in combination (4). The application of nutrients through soil and foliar sprays is recognized as an efficient and cost-effective method to meet the nutrient demands of crops at critical growth stages (5). Foliar application of organic nutrients involves supplying essential plant hormones and nutrients in liquid form through aerial parts of the plant, such as leaves, stems and other sites. Organic inputs, being nutrient-rich, improve the physical and chemical properties of the soil, ultimately contributing to increased seed yield (6).

Coriander's extended germination period often delays crop establishment. So, exploring practices that can accelerate early growth and enhance overall productivity is necessary. Excessive use of chemical inputs in agriculture has led to soil degradation, reduced microbial diversity and long-term fertility loss, necessitating a shift towards sustainable organic practices (7). The emerging era of natural and organic farming promotes soil health, enhances nutrient cycling and reduces environmental pollution, ensuring long-term agricultural sustainability (8). The reason behind selecting organic compounds as priming agents is that they leverage natural bioactive compounds - such as growth hormones, vitamins and amino acids found in substances like tender coconut water - to enhance seed germination and seedling vigour in an eco-friendly manner while avoiding the potential environmental hazards, chemical residues and dependency on synthetic inputs associated with chemical priming agents. The orgoprimers (9) and foliar treatments were selected due to their higher nutrient composition, presence of various vitamins, phytohormones, necessary micro-organisms and disease-resistance properties. Keeping these aspects in view, the present investigation was undertaken to enhance the seed yield attributes of coriander seed.

Materials and Methods

Geographically, Junagadh (Gujarat - India) is situated at 21.5° N latitude and 70.5° E longitude with an altitude of 60 meters above mean sea level on the western side at the foothill of mountain Girnar Sierra. The average minimum and maximum temperature ranges between 19.8°C and 33.06°C, respectively. Soils are medium black, having an average depth of 45 cm. So far, the NPK status is concerned and the soil contains low to medium Nitrogen and Phosphorus and medium to high Potash. The pH of soils is 7.5 to 8.0 and the EC value is around 0.35 ds/m.

Genetically pure seeds of Gujarat Coriander-3 (GC-3) were obtained from the Research Scientist (G&O), Vegetable Research Station, Junagadh Agricultural University, Junagadh. This experiment was conducted during *Rabi* 2023 -24 at *Sagdividi* Farm, Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh. Six different priming agents along with control were used for orgopriming *viz*., P_0: Control (untreated dry seeds), P_1: *Panchagavya* - 6 %, P_2: *Bijamrut* - 10 %, P_3: *Jivamrut* - 10 %, P_4: Cow urine - 3 %, P_5: *Trichoderma harzianum* - 4 %, P_6: Tender coconut water. Different foliar spraying treatments (F_0: No spray, F_1: Cow urine - 50 %, F_2: *Jivamrut* - 10 %, F_3: Buttermilk) were also evaluated as the second factor. The experiment was conducted with three replications at 30 × 15 cm spacing, with a gross plot size of 25 × 22.4 m^2 and a net plot size of 18 × 16.8 m^2. The preparation of different orgopriming agents and their nutrient content is mentioned below. Seeds were soaked in different priming solutions for eight hours at room temperature. Afterwards, the seeds were removed from the solutions and dried in the shade at room temperature until they returned to their original moisture content. The sowing of seeds was done on 18th November, 2023. Foliar spraying was done twice, each at 35 and 55 days after sowing.

Preparation of orgopriming agents

Panchagavya

Mix cow dung (7 kg) and cow ghee (1 kg) thoroughly in the morning and evening and keep it for 3 days. After 3 days, mix cow urine (10 L) and water (10 L) and keep it for 15 days, with regular mixing, in the morning and evening. After 15 days, mix cow milk (3 L), cow curd (2 L), tender coconut water (3 L), jaggery (3 kg), well-ripened bananas (12 nos.) and *Panchagavya* will be ready after 30 days (Table 1).

Bijamrut

Take 5 kg of cow dung in a cloth and bind it using tape. Hang the cloth in 20 L water for up to 12 hours. Simultaneously, 1 L water and 50 g lime should be added to keep it stable overnight. Next morning, continuously squeeze the bundle in the water thrice so that all the essence of cow dung is mixed in the water. Add a handful of soil, approximately 1 kg, to the water solution and stir well. Add 5 L cow urine to the solution and limewater and stir it well (Table 1).

Jivamrut

Add 100 L of water in a barrel, 10 kg of cow dung and 10 L of cow urine. Mix well with the help of a wooden stick and add 2 kg of jaggery and 2 kg of gram or pulse flour. Mix this solution well with a wooden stick. Shake the solution regularly, three times a day. Keep this solution for fermentation for 5 to 7 days and *Jivamrut* will be ready (Table 1).

Nutrient content of different orgopriming agents

Tender coconut water contains: protein: 0.72 g/100 g, carbohydrates: 3.71 g/100 g, total sugar: 5.23 g/100 g, calcium: 24 mg/100 g, magnesium: 25 mg/100 g, phosphorus: 20 mg/100 g, potassium: 250 mg/100 g, sodium: 105 mg/100 g, auxin: 150.6 nM, cytokinins: 186.12 nM, Gibberellins: 54.5 nM and abscisic acid: 65.5 nM (10).

Table 1. Nutrient content and microbial load of *Panchagavya*, *Bijamrut*, *Jivamrut* and cow urine (11, 12)

Component	*Panchagavya*	*Bijamrut*	*Jivamrut*	Cow urine
Total N	0.1 %	4.0 %	770 ppm	1.1 %
Total P	175.4 ppm	155.3 ppm	166 ppm	0.22 %
Total K	194.1 ppm	252 ppm	126 ppm	1.04 %
Total Zn	1.27 ppm	2.96 ppm	4.29 ppm	-
Total Cu	0.83 ppm	0.52 ppm	1.58 ppm	-
Total Fe	29.71ppm	15.35 ppm	282 ppm	-
Total Mn	1.81 ppm	3.32 ppm	10.7 ppm	-
Bacteria	26.1×10^5 cfu/mL	15.4×10^5 cfu/mL	20.4×10^4 cfu/mL	51.3×10^5 cfu/mL
Fungi	18.0×10^3 cfu/mL	10.5×10^3 cfu/mL	13.8×10^3 cfu/mL	-
Actinomycetes	4.2×10^3 cfu/mL	6.8×10^3 cfu/mL	3.6×10^3 cfu/mL	-
P solubilizers	5.7×10^2 cfu/mL	2.7×10^2 cfu/mL	4.5×10^2 cfu/mL	2×10^5 cfu/mL
Free-living N_2 fixers	2.7×10^2 cfu/mL	3.1×10^2 cfu/mL	5.0×10^2 cfu/mL	22×10^5 cfu/mL

The following parameters were recorded for the study: field emergence (%), days to 50 % flowering, plant height (cm), number of umbels per plant, number of umbellates per umbel, number of seeds per umbellate, number of seeds per umbel, 1000 seed weight (g) and seed yield per plant (g). Five selected plants were tagged from each replication treatment for recording observations. The mean of five plants for each character was used for statistical analysis. Observations were recorded at the maturity stage of plant growth on all the quantitative characters. The experimental data was analyzed statistically by adopting a randomized block design described per the standard methods for field emergence. A randomized block design (Factorial) ANOVA was used to assess treatment effects.

Results and Discussion

The results of different parameters are given in Table 2-10. Irrespective of foliar spraying, there was a significant difference among priming treatments for all the characters studied. Seeds primed with tender coconut water (P_6) recorded significantly higher field emergence (82.33 %, a 25.37 % increase), plant height (76.39 cm, a 19.62 % increase), number of umbels per plant (20.88, a 23.99 % increase), number of umbellates per umbel (8.17, a 21.04 % increase), number of seeds per umbellate (10.68, a 25.06 % increase), number of seeds per umbel (61.44, a 19.58 % increase), 1000 seed weight (12.56 g, a 12.04 % increase) and seed yield per plant (12.48 g, a 15.13 % increase), while also reducing the number of days to 50 % flowering (50.50) by 12.38 % compared to the control. *Bijamrut* showed at par effect (19.28 %, 17.08 %, 19.54 %, 19.26 %, 21.66 %, 16.00 %, 9.19 % and 11.72 % increase respectively) compared to control. Control seeds showed the lowest result for all the above-mentioned characters.

Table 2. Effect of orgopriming on field emergence (%) of coriander

Treatments	Field emergence (%)
P_0	65.67
P_1	73.67
P_2	78.33
P_3	72.67
P_4	74.00
P_5	68.33
P_6	82.33
S. Em. ±	4.64
C. D. at 5 %	13.64
C. V. %	4.13

Table 3. Effect of orgopriming, foliar spraying and their interaction on days to 50 % flowering of coriander

Characters	Days to 50 % flowering				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	59.00	56.67	54.67	56.67	56.75
P_1	53.00	52.33	52.67	57.33	53.83
P_2	52.33	52.00	51.00	52.00	51.83
P_3	56.33	56.00	56.33	54.00	55.67
P_4	55.00	55.67	55.33	54.00	55.00
P_5	56.33	56.33	55.33	55.67	55.92
P_6	50.33	50.33	49.33	52.00	50.50
Mean (F)	54.62	54.19	53.52	54.52	54.11
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.83	2.34	3.35		
F	0.62	NS	**S.E.**	5.29	
P × F	1.65	NS	0.37		

Table 4. Effect of orgopriming, foliar spraying and their interaction on plant height of coriander

Characters	Plant height (cm)				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	57.64	66.62	65.31	65.87	63.86
P_1	67.94	67.50	76.94	68.59	70.24
P_2	75.76	76.08	80.97	66.27	74.77
P_3	68.11	69.33	65.54	69.93	68.23
P_4	68.57	68.25	75.33	67.45	69.90
P_5	68.40	67.93	65.41	69.12	67.71
P_6	72.34	78.48	77.05	77.67	76.39
Mean (F)	68.39	70.60	72.36	69.27	70.45
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	1.37	3.88	6.44		
F	1.03	2.93	**S.E.**	6.73	
P × F	2.74	7.76	0.70		

Table 5. Effect of orgopriming, foliar spraying and their interaction on number of umbels per plant of coriander

Characters	Number of umbels per plant				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	16.07	16.87	17.80	16.63	16.84
P_1	18.60	19.10	20.17	18.90	19.19
P_2	19.53	19.93	21.00	20.03	20.13
P_3	17.67	18.20	19.27	17.93	18.27
P_4	18.03	18.70	19.53	18.50	18.69
P_5	17.17	17.77	18.93	17.70	17.89
P_6	20.07	21.00	21.80	20.67	20.88
Mean (F)	18.16	18.80	19.79	18.62	18.91
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.45	1.28	1.90		
F	0.34	0.97	**S.E.**	8.28	
P × F	0.90	NS	0.21		

Table 6. Effect of orgopriming, foliar spraying and their interaction on number of umbellates per umbel of coriander

Characters	Number of umbellates per umbel				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	6.60	6.63	7.00	6.77	6.75
P_1	7.27	7.67	8.03	7.53	7.63
P_2	7.80	8.07	8.43	7.90	8.05
P_3	6.87	7.23	7.60	7.07	7.19
P_4	7.23	7.60	7.97	7.50	7.58
P_5	6.73	6.90	7.20	6.83	6.92
P_6	7.87	8.13	8.57	8.10	8.17
Mean (F)	7.20	7.46	7.83	7.39	7.50
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.16	0.47	0.73		
F	0.12	0.35	**S.E.**	7.60	
P × F	0.33	NS	0.08		

Table 7. Effect of orgopriming, foliar spraying and their interaction on the number of seeds per umbellate of coriander

Characters	Number of seeds per umbellate				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	7.83	8.70	9.23	8.40	8.54
P_1	8.93	10.00	11.07	9.73	9.93
P_2	9.50	10.53	11.23	10.30	10.39
P_3	8.43	9.43	10.23	9.30	9.35
P_4	8.67	9.77	10.37	9.43	9.56
P_5	7.87	8.83	9.30	8.63	8.66
P_6	9.80	11.00	11.47	10.47	10.68
Mean (F)	8.72	9.75	10.41	9.47	9.63
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.23	0.65	1.18		
F	0.17	0.49	**S.E.**	8.27	
P × F	0.46	NS	0.13		

Table 8. Effect of orgopriming, foliar spraying and their interaction on the number of seeds per umbel of coriander

Characters	Number of seeds per umbel				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	48.07	52.27	55.23	49.93	51.38
P_1	54.27	58.37	60.50	55.97	57.28
P_2	56.77	60.47	62.40	58.77	59.60
P_3	51.47	55.23	57.13	55.73	54.89
P_4	53.07	56.93	58.97	54.97	55.98
P_5	49.13	53.77	55.80	51.20	52.48
P_6	58.07	62.27	65.40	60.03	61.44
Mean (F)	52.98	57.04	59.35	55.23	56.46
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	1.39	3.94	5.74		
F	1.05	2.98	**S.E.**	8.52	
P × F	2.78	NS	0.63		

Table 9. Effect of orgopriming, foliar spraying and their interaction on 1000 seed weight of coriander

Characters	1000 seed weight(g)				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	10.89	11.38	11.57	11.01	11.21
P_1	11.59	12.05	12.62	11.82	12.02
P_2	11.86	12.35	12.78	11.97	12.24
P_3	11.06	11.68	12.19	11.36	11.57
P_4	11.57	12.05	12.56	11.72	11.97
P_5	10.95	11.58	12.07	11.19	11.45
P_6	12.07	12.68	13.10	12.39	12.56
Mean (F)	11.43	11.97	12.41	11.64	11.93
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.15	0.43	0.73		
F	0.12	0.33	**S.E.**	4.43	
P × F	0.31	NS	0.08		

Table 10. Effect of orgopriming, foliar spraying and their interaction on seed yield per plant of coriander

Characters	Seed yield per plant (g)				
Factor	**F_0**	**F_1**	**F_2**	**F_3**	**Mean (P)**
P_0	10.43	11.08	11.27	10.58	10.84
P_1	11.32	11.87	12.35	11.54	11.77
P_2	11.69	12.16	12.74	11.86	12.11
P_3	10.74	11.39	11.91	11.07	11.28
P_4	11.27	11.78	12.29	11.45	11.70
P_5	10.65	11.28	11.78	10.92	11.16
P_6	11.96	12.68	13.07	12.23	12.48
Mean (F)	11.15	11.75	12.20	11.38	11.70
	S. Em. ±	**C. D. at 5 %**	**S.D.**	**C.V. %**	
P	0.23	0.66	0.94		
F	0.18	0.50	**S.E.**	6.89	
P × F	0.47	NS	0.10		

The significant increase in plant growth and yield attributes in seeds primed with tender coconut water (P_6) and *Bijamrut* (P_2) might be due to its content of growth hormones, especially auxins, cytokinin and gibberellins. These plant hormones promote cell elongation in stems (15), accelerating germination and early seedling growth. Installing metabolic pathways triggered by coconut water promotes starch hydrolysis and increases energy availability, facilitating faster radicle emergence and more substantial seedling growth (10). Additionally, natural sugars and electrolytes help maintain osmotic balance during seed hydration, preventing imbibitional shock and ensuring uniform germination (16). Coconut water also possesses antioxidant properties due to its high content of vitamins and phenolic compounds, which reduce oxidative stress and protect seed cells from damage during germination (17).

Furthermore, it supplies essential nutrients such as potassium, magnesium and calcium, which enhance enzymatic activity and energy metabolism, leading to better seedling establishment (10). This can lead to a considerable increase in plant growth, development and yield components, which play a role in flower and fruit/pod development. Tender coconut water and *Bijamrut* as priming agents increased plant growth and yield attributes in okra and cowpea, respectively (18, 19). Irrespective of orgopriming, days to 50 % flowering recorded non-significant differences due to different foliar spraying treatments. Foliar spraying with *Jivamrut* (10 %) (F_2) significantly increased plant height, number of umbels per plant, number of umbellates per umbel, number of seeds per umbellate, number of seeds per umbel, 1000-seed weight and seed yield per plant with values of 72.36 cm (+5.80 %), 19.79 (+8.98 %), 7.83 (+8.75 %), 10.41 (+19.38 %), 59.35 (+12.02 %), 12.41 g (+8.57 %) and 12.20 g (+9.42 %) respectively, compared to control followed by cow urine (50 %) (F_1). While significant minimum plant height (68.39 cm), number of umbels per plant (18.16), number of umbellates per umbel (7.20), number of seeds per umbellate (8.72), number of seeds per umbel (52.98), 1000 seed weight (11.43 g) and seed yield per plant (11.15 g) were recorded in no foliar spraying (F_0).

Jivamrut enhances plant growth and productivity as a foliar spray by improving nutrient availability, microbial activity and plant metabolism. It provides essential nutrients like nitrogen, phosphorus and potassium, which are readily absorbed through leaves, improving chlorophyll synthesis and photosynthesis (20). Beneficial microbes in *Jivamrut* aid in nutrient solubilization and disease suppression (21). It also contains plant growth hormones such as auxins and gibberellins, promoting vegetative growth and flowering (22). Additionally, its organic compounds enhance stress tolerance and seed yield (23). Applying *Jivamrut* as foliar spraying improved all mentioned characteristics in maize (24). Similar results were obtained in cowpeas using *Jivamrut* as a foliar spraying agent (25). In rice, foliar spraying of *Jivamrut* (10 %) improved plant growth and yield attributes (26).

The interaction effect of priming and foliar spraying treatments was found non-significant for days to 50 % flowering, number of umbels per plant, number of umbellates per umbel, number of seeds per umbellate, number of seeds per umbel, 1000 seed weight and seed yield per plant except plant height which showed significant difference due to interaction effect. Significant maximum and minimum plant heights (80.97 cm and 57.64 cm) were recorded in treatment combination P_2F_2 (seeds primed with *Bijamrut*- 10 % and foliar spraying of *Jivamrut* - 10 %) and P_0F_0 (control seeds with no foliar spray). An increase of 40.48 % was recorded in P_2F_2 as compared to P_0F_0.

Conclusion

Results showed that orgopriming with tender coconut water and foliar spraying with *Jivamrut* (10 %) significantly enhanced field emergence, plant height and various yield components. The interaction between different priming and foliar spraying treatments was not statistically significant except for plant height, which recorded a substantial difference. This indicates that orgopriming and foliar spraying had independent effects on most traits. These organic

treatments provide a cost-effective and environmentally sustainable alternative to chemical inputs, making them easily adaptable for farmers. Since tender coconut water and *Jivamrut* are locally available and inexpensive, their use can reduce input costs while enhancing productivity. Overall, looking at the result, it could be suggested that coriander seeds primed with tender coconut water and foliar spraying of *Jivamrut* (10 %) will give a higher seed yield and its components independently. Future studies should assess their long-term impact on soil health, microbial activity and crop yield while exploring their integration with organic practices and validation across agro-climatic regions.

Acknowledgements

The authors thank the College of Agriculture, Junagadh Agricultural University, for providing the necessary infrastructure and resources.

Authors' contributions

DK experimented, collected data, performed statistical analysis and drafted whole manuscript. CB advised and supervised the full research work critically. DB helped in data collection and statistical analysis. RM assisted in manuscript editing and conducted review of the article. JS reviewed the manuscript and offered critical feedback. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

References

1. Sahib NG, Anwar F, Gilani AH, Hamid AA, Saari N Alkharfy KM. Coriander (*Coriandrum sativum* L.): A potential source of high value components for functional foods and nutraceuticals review. Phytother Res. 2013;27(10):1439–56. https://doi.org/10.1002/ptr.4897
2. Nadeem M, Anjum FM, Khan MI, Tehseen S, Sultan JI. Nutritional and medicinal aspects of coriander (*Coriandrum sativum* L.): A review. Brit Food J. 2013;115(5):743–55. https://doi.org/10.1108/00070701311331526
3. D'Souza R, Shah K. Coriander - crop survey and analysis. 2016; p.4 https://www.nirmalbang.com/Upload/Coriander_Crop_Survey_and_Analysis_2016.pdf
4. Khan AA. Preplant physiological seed conditioning. In: Janick J, editor. Horticultural reviews. New York: John Wiley & Sons; 1992. p. 131–81. https://doi.org/10.1002/9780470650509.ch4
5. Chandrasekhar CN, Bangarusamy U. Maximizing the yield of mungbean by foliar application of growth regulating chemicals and nutrients. Mysore J Agric Sci. 2003;90(1):142–5.
6. Manonmani V, Srimathi R. Influence of seed priming on physiological performance of foxtail, little and proso millets. Int J Agric Sci Res. 2016;6(4):176–86.
7. Zhou W, Li M, Achal V. A comprehensive review on environmental and human health impacts of chemical pesticide usage. Emerg Contam. 2024;11(1):1–13. https://doi.org/10.1016/j.emcon.2024.100410
8. Qamar R, Ashraf S, Javeed HMR, Rehman A, Yaseen M, Khan BA, et al. Regenerative organic farming for encouraging innovation and improvement of environmental, social and economic sustainability. In: Kumar S, Meena RS, Sheoran P, Jhariya MK, editors. Regenerative agriculture for sustainable food systems. Singapore: Springer; 2024. p. 175–216 https://doi.org/10.1007/978-981-97-6691-8_6
9. Mori RB, Patel JB, Vaghasiya KP, Bhoot HV, Barad AV. Effect of seed priming on germination and seedling growth of sesame (*Sesamum indicum* L.). Biol Forum. 2024;16(3):78–82.
10. Yong JW, Ge L, Ng YF, Tan SN. The chemical composition and biological properties of coconut (*Cocos nucifera* L.) water. Molecules. 2009;14(12):5144–64. https://doi.org/10.3390/molecules14125144
11. Pathak RK, Ram RA. Bio-enhancers: A potential tool to improve soil fertility and plant health in the organic production of horticultural crops. Prog Hort. 2013;45(2):237–54.
12. Naik AH, Umesha S, Madhu BM. Chemical and microbiological status of cow dung and cow urine of desi and hf breed in dairy farm of Zahrs, Babbur farm, Hiriyur. The Bioscan. 2020;15(4):429–32.
13. Panse VG, Sukhatme PV. Statistical methods for Agricultural Workers, New Delhi: Indian Council of Agricultural Research,. 1995.
14. Cochran WG, Cox GM. Experimental Designs, 2nd edition. New York: John Wiley & Sons. 1957. https://www.wiley.com/en-us/
15. Dunsin O, Aboyeji CM, Nayan G. Influence of moringa leaf extract and coconut water as priming agent to improves the emergence and early seedling growth in cucumber. Int J Org Agric Res Dev. 2016;12(1): 39–46.
16. McDonald MB. Seed priming. In: Black M, Bewley JD, editors. Seed technology and its biological basis. Sheffield: Sheffield Academic Press; 2000. p. 287–325.
17. Ramesh SV, Praveen S. Bio-nutritional constituents of coconut. In: Ramesh S, Praveen S, editors. Coconut-based nutrition and nutraceutical perspectives. Springer, Singapore; 2024. p. 17–42. https://doi.org/10.1007/978-981-97-3976-9_2
18. Lakmali KN, Seran TH. Impact of seed priming with king coconut water on growth and yield of okra (*Abelmoschus esculentus* L.). J Sci Food Agric. 2022;15(2):27–46. https://doi.org/10.4038/jfa.v15i2.5271
19. Devaraj G, Rai PK. Standardization of selected organic seed priming treatment on growth, yield and yield attributing traits of cowpea (*Vigna unguiculata* L.) var. C-152. Front Crop Improv. 2022;10(3):1255–9. https://www.researchgate.net/publication/
20. Sivagamy K, Parasuraman P, Karunakaran V, Ananthi K, Rajesh M, Balaji T, et al. Effect of organic manures and foliar application of different organic sources of nutrients on irrigated finger millet in the semi-arid region of southern India. App Ecol Environ Res. 2024;22(2):11149–58. https://doi.org/10.15666/aeer/2202_11491158
21. Gurjar RPS, Bhati D, Singh SK. Impact of *Jeevamrut* formulations and biofertilizers on soil microbial and chemical attributes during potato cultivation. J Appl Biol Biotechnol. 2024;12(4):158–71. https://doi.org/10.7324/JABB.2024.165084
22. Brar PS, Kaushal R, Bhardwaj G. A review on beneficial effects of PGPR and noble liquid manures in enhancing soil fertility and sustainability. Int J Curr Microbiol Appl Sci. 2019;8:409–15. https://doi.org/10.20546/ijcmas.2019.804.045
23. Mevada K, Makwana BD. Efficiency of plant nutrient enhancer for sustainable agriculture in diverse agro-ecosystem. J Agric Ecol. 2023;16:99–104. https://doi.org/10.58628/jae-2316-219
24. Ramesh S, Sudhakar P, Elankavi S. Effect of organic foliar

nutrition on growth and yield of maize (*Zea mays* L.). Int J Res Anal Rev. 2018;5(3):64–7.

25. Sutar R, Sujith GM, Devakumar N. Growth and yield of cowpea [*Vigna unguiculata* (L.) Walp] as influenced by *Jivamrut* and *Panchagavya* application. Legume Res. 2019;42(6):824–8. https://doi.org/10.18805/LR-3932

26. Thakare UE, Chavan AP, Bodake PS, Mahadkar UV, Sawardekar SV, Salvi VG. Influence of organic manures and organic sprays on growth and yield of rice *(Oryza sativa* L.). J Pharm Innov. 2023;12(7):2568–71.

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

Reprints & permissions information is available at https://horizonepublishing.com/journals/index.php/PST/open_access_policy

Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS, UGC Care, etc
See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

Publisher information: Plant Science Today is published by HORIZON e-Publishing Group with support from Empirion Publishers Private Limited, Thiruvananthapuram, India.