Biological Forum – An International Journal **16(12): 78-82(2024)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Effect of Different Orgopriming Treatments on Seed Germination and Quality Characters of Coriander (*Coriandrum sativum* L.)

D.B. Kothadiya[1]*, C.A. Babariya[2], R.B. Mori[3] and D.B. Bheda[4]

[1]Junior Research Fellow, Department of Seed Science and Technology, College of Agriculture, JAU, Junagadh, (Gujarat), India.
[2]Assistant Professor, Department of Seed Science and Technology, College of Agriculture, JAU, Junagadh, (Gujarat), India.
[3]Senior Research Fellow, Department of Seed Science and Technology, College of Agriculture, JAU, Junagadh, (Gujarat), India.
[4]Department of Genetics and Plant Breeding, College of Agriculture, JAU, Junagadh, (Gujarat), India.

(Corresponding author: D.B. Kothadiya)*
(Received: 10 September 2024; Revised: 12 October 2024; Accepted: 08 November 2024; Published: 14 December)
*(Published by Research

ABSTRACT: With a view to find out the effect of orgopriming on germination and other seed quality characters in coriander (*Coriandrum sativum* L.), a laboratory experiment was conducted during 2023-24 in Seed Testing Laboratory, Department of Seed Science and Technology, Junagadh Agricultural University, Junagadh based on completely randomized block design (CRD) with Gujarat Coriander-3 (GC-3) variety. Six different priming agents (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) along with control (P0) were evaluated. The observations on germination (%), root length (cm), shoot length (cm), seedling length (cm), seedling fresh weight (mg), seedling dry weight (mg), seedling vigour Index-I and seedling vigour Index-II were recorded. Among the all priming treatments, Tender coconut water recorded maximum germination (81.25 %), root length (6.08 cm), shoot length (8.31 cm), seedling length (14.39 cm), seedling fresh weight (397.70 mg), seedling dry weight (32.18 mg), seedling vigour index-I (1168.97) and seedling vigour index-II (2614.51). It was followed by seeds primed with *Bijamrut* – 10% (P_2) for all the traits. Significantly the lowest germination (66.75 %), root length (4.29 cm), shoot length (6.36 cm), seedling length (10.65 cm), seedling fresh weight (326.25mg), seedling dry weight (24.66 mg), seedling vigour index-I (710.46) and seedling vigour index-II (1643.88) was recorded in control (P_1). This proved that orgopriming with tender coconut water can be an effective way to enhance the seed quality in coriander.

Keywords: Tender coconut water, Orgopriming, Coriander, Germination.

INTRODUCTION

Coriander (*Coriandrum sativum* L.), commonly referred to as 'Dhania', is a plant in the Apiaceae family with a chromosome number of 2n=2x=22. The aroma and flavour of coriander arise primarily from its "Linalool" essential oil content. Coriander holds an esteemed standing in Ayurvedic medicine. The cosmetic industries use essential oils (0.03 to 2.6%) and fatty oils present in it. The dried ground fruits are used as condiments and are variably a major constituent of curry powder employed for flavour (Nadeem *et al*., 2013). The dried ground fruits are used as condiments and are variably a major constituent of curry powder employed for flavour. The whole fruit is also used to flavour fruits like pickles, sauce and confectionery (Verma *et al*., 2020).

Coriander seed oil is included among the 20 major essential oils in the world market (Chahal *et al*., 2017). Depending on the climate, coriander is grown as a summer or winter annual herb. India leads in the global production, consumption, and exportation of coriander. Approximately 80 per cent of the world's coriander is produced in India (D'Souza and Shah 2016).

Coriander seeds face difficulties in seed germination, even after splitting seed requires a relatively long time for germination, Seeds are germinated but uneven germination seen in the field because of vigour difference. Seed priming might help with the germination and vigour problem. Heydecker (1978) defined seed priming as "a pre-sowing treatment in which seeds are soaked in an osmotic solution that allows them to imbibe water and go through the first stage of germination, but does not permit radical protrusion through the seed coat".

There are several seed priming agents for improving the germination and breaking dormancy like potassium nitrate and phytohormones like GA_3, *etc*. But the chemical treatments can cause residual effects while consuming as food or as medicine. So, the priming with organic materials can be a better alternative. Orgopriming refers to soaking of seeds in solutions of various organics *viz.*, coconut water, cow urine, *Panchagavya*, *Trichoderma*, *Bijamrut*, *Jivamrut etc*. either alone or in combinations (Khan, 1992). Priming helps in improved germination by different solutions when imbibed by the seed (Harish *et al.*, 2014).

Keeping these aspects in view, the present investigation was undertaken to enhance seed quality parameters of coriander seed.

MATERIALS AND METHODS

The laboratory experiment entitled "Effect of different orgopriming treatments on seed germination and quality characters of coriander (*Coriandrum sativum* L.)" was carried out during *Rabi* 2023-24 at the Seed Testing Laboratory, Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh. Genetically pure seeds of variety Gujarat Coriander-3 (GC-3) were obtained from Research Scientist (G & O), Vegetable Research Station, Junagadh Agricultural University, Junagadh.

The laboratory germination test was conducted as per ISTA (ISTA, 2015) procedure by adopting top of the paper method. 100 seeds in four replications were taken at random from the seed lot of each treatment, placed uniformly on germination paper and kept in the control environment, where the temperature was maintained at 25 ± 0.50°C. The final counts were made on the 21st day of the germination test for normal seedlings and germination was expressed in percentage. Ten normal seedlings were selected randomly from the germination paper (T.P) on final day of counting germination and root and shoot length were measured from the tip of primary root to the tip of shoot. The mean root and shoot length were expressed in centimeters. Seedling length was measured by adding root and shoot length in centimeters. To record seedling fresh weight ten seedlings were counted, cut free from their cotyledon and weighted while still moist. Their weights were recorded in milligram. These seedlings were kept in a hot air oven for 24 hours at a temperature of 100℃ as described by Gupta (1993). The weight of the dried seedlings was recorded and expressed in milligram. Seedling vigour index-I and II were computed using following formula suggested by Abdul-Baki and Anderson (1973) and mean values were expressed in the whole number.

Vigour index I = Germination (%) × Seedling length (cm)

Vigour index II = Germination (%) × Seedling dry weight (mg)

The data were analyzed statistically adopting the procedure described by Panse and Sukhatme (1995).

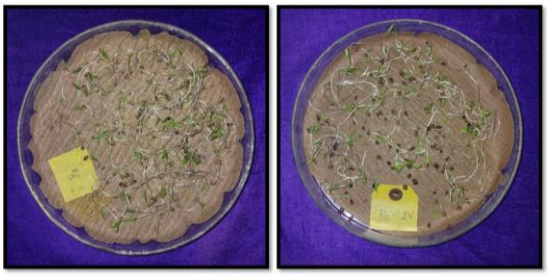

Fig. 1. Germination in tender coconut water (P_6) and control (P_1).

RESULTS AND DISCUSSION

Germination (%). There were significant differences in seed germination of primed seeds as compared to control (P_0) (66.75%) which was having lowest germination percentage (Table 1). The seeds primed with tender coconut water (P_6) showed the highest germination (81.25%) (Fig. 1) which was at par with the seeds primed with *Bijamrut* (10%) (P_2). Seed priming with *Panchagavya* (6%) (P_1) (77.75 %), cow urine (3%) (P_4) (76.75 %) and *Jivamrut* (10%) (P_3) (74.25 %) were the next best treatments. The significantly highest germination (%) recorded in seeds primed with tender coconut water might be due to its content of enzymes, phytohormones and growth promoting substances especially cytokinin that promotes cell wall degradation. This can help soften hard seed coats, allowing the radicle (root) and plumule (shoot) to emerge more easily during germination. Similar results were reported earlier by Bhavyasree and Vinothini (2019), who enhanced germination and quality parameters by priming the seeds with coconut water in brinjal. Vinothini and Bhavyasree (2019) also observed highest germination when seeds primed with coconut water compared to control in groundnut, Jha *et al.* (2021) in major legumes and cucurbits, Vaishnavi *et al.* (2021) in chickpea, Lakmali and Seran (2022) in okra and Reddy and Chaurasia (2022), who observed higher germination percentage with seed priming of *Bijamrut* in okra. Mori *et al.* (2024) also discovered the higher germination percentage when sesame seeds primed with tender coconut water.

Root length (cm). The effect of priming treatment on root length (cm) was found significant (Table 1). Root length (6.08 cm) was found significantly maximum when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (5.98 cm) and followed by *Panchagavya* (6%) (P_1) (5.67 cm), cow urine (3%) (P_4) (5.45 cm) and *Jivamrut* (10%) (P_3) (5.10 cm). The significantly lowest root length (4.29 cm) was noticed when seeds remained unprimed (P_0).

The data revealed that higher root length (cm) was recorded in seeds primed with tender coconut water (P_6) due to its content of growth promoting enzymes like cytokinin. Cytokinin promotes cell division and increases cell expansion in plant roots and shoots. Similar results were reported earlier by Dunsin *et al.* (2016) in cucumber, Bhargavi *et al.* (2019) in blackgram, Bhavyasree and Vinothini (2019) in brinjal, Jha *et al.* (2021) in major legumes and cucurbits, Vaishnavi *et al.* (2021) in chickpea, Lakmali and Seran (2022) in okra and Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) also noticed higher root length in sesame seeds when primed with coconut water.

Shoot length (cm). Priming treatment exerted significant difference for shoot length (cm) (Table 1). The significantly maximum shoot length (8.31 cm) was recorded when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (8.14 cm) and followed by cow urine (3%) (P_4) (7.69 cm), *Panchagavya* (6%) (P_1) (7.58 cm) and *Jivamrut* (10%) (P_3) (7.15 cm). The significantly minimum shoot length (6.36 cm) was noticed when seeds remained unprimed (P_0).

The significantly highest shoot length (cm) recorded might be due to stimulating production of plant hormones within the seed. These hormones, like gibberellins, can trigger cell elongation leading to longer shoots. This result is in agreement with the reports of Bhargavi *et al.* (2019) in blackgram, Bhavyasree and Vinothini (2019) in brinjal, Vinothini and Bhavyasree (2019) in groundnut, Jha *et al.* (2021) in major legumes and cucurbits, Vaishnavi *et al.* (2021) in chickpea, Lakmali and Seran (2022) in okra and Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) discovered the same results in sesame seeds.

Table 1: Effect of seed priming on germination (%), shoot length (cm), root length (cm) and seedling length (cm).

Treatment	Germination (%)	Shoot length (cm)	Root length (cm)	Seedling length (cm)
P_0	66.75	4.29	6.36	10.65
P_1	77.75	5.67	7.58	13.25
P_2	80.50	5.98	8.14	14.13
P_3	74.25	5.10	7.15	12.25
P_4	76.75	5.45	7.69	13.14
P_5	70.50	4.82	6.72	11.53
P_6	81.25	6.08	8.31	14.39
S. Em. ±	0.99	0.11	0.16	0.20
C. D. at 5%	2.90	0.33	0.48	0.60
C. V. %	2.62	4.21	4.41	3.20

Seedling length (cm). Analysis of data showed that different priming treatments have produced significant influence on seedling length (cm) of coriander (Table 1). Seedling length (cm) was significantly higher and lower (14.39 cm and 10.65 cm) when seeds primed with tender coconut water (P_6) and control (P_0), respectively. Seeds primed with tender coconut water (P_6) were at par with seeds primed with *Bijamrut* (10%) (P_2) (14.13 cm). Seeds primed with *Panchagavya* (6%) (P_1) and cow urine (3%) (P_4) were the next best treatments recorded 13.25 cm and 13.14 cm seedling length, respectively.

The significant increase in seedling length (cm) due to increase in shoot length and root length. Similar results were reported earlier by Amarnath *et al.* (2018) in sorghum, Bhavyasree and Vinothini (2019) in brinjal, Jha *et al.* (2021) in major legumes and cucurbits, Vaishnavi *et al.* (2021) in chickpea, Lakmali and Seran (2022) in okra and Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) also observed the same findings with coconut water in sesame.

Seedling fresh weight (mg). Priming treatment exerted significant difference for seedling fresh weight (mg) (Table 2). The significantly maximum fresh weight (397.70 mg) was recorded when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (392.83 mg). Seeds primed with cow urine (3%) (P_4) and *Panchagavya* (6%) (P_1) were the next best treatments recorded 379.28 mg and 378.70 mg seedling fresh weight, respectively. The significantly minimum fresh weight (326.25 mg) was noticed when seeds remained unprimed (P_0).

The significant increase in seedling fresh weight (mg) might be due to influence of production or activity of plant hormones, particularly gibberellins. These hormones promote cell division and cell elongation, leading to increased seedling size and weight. Similar results were reported earlier by Dunsin *et al.* (2016) in cucumber, Jha *et al.* (2021) in major legumes and cucurbits, Lakmali and Seran (2022) in okra and Reddy and Chaurasia (2022) in okra.

Seedling dry weight (mg). The effect of priming treatment on seedling dry weight (mg) was found significant (Table 2). Seedling dry weight (32.18 mg) was found significantly maximum when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (31.67 mg) and followed by cow urine (3%) (P_4) (29.49 mg), *Panchagavya* (6%) (P_1) (29.41 mg) and *Jivamrut* (10%) (P_3) (27.35 mg). Significantly lowest dry weight (24.66 mg) was noticed when seeds remained unprimed (P_0).

The significant increase in seedling dry weight (mg) might be due to increased cell division within the apical meristem of seedling roots from the phytohormones found in the coconut water and *Bijamrut.* Similar results were reported earlier by Dunsin *et al.* (2016) in cucumber, Bhavyasree and Vinothini (2019) in brinjal, Vinothini and Bhavyasree (2019) in groundnut, Vaishnavi *et al.* (2021) in chickpea and Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) noticed the higher seedling fresh weight in sesame seeds when primed with coconut water.

Table 2: Effect of seed priming on Seedling fresh weight (mg), seedling dry weight (mg), seedling vigour index I and seedling vigour index II.

Treatment	Seedling fresh weight (mg)	Seedling dry weight (mg)	Seedling vigour index I	Seedling vigour index II
P_0	326.25	24.66	710.46	1643.88
P_1	378.70	29.41	1030.58	2286.09
P_2	392.83	31.67	1137.19	2548.66
P_3	364.50	27.35	909.07	2029.01
P_4	379.28	29.49	1008.63	2261.76
P_5	350.45	26.75	813.08	1886.14
P_6	397.70	32.18	1168.97	2614.51
S. Em. ±	4.80	0.70	20.21	46.69
C. D. at 5%	14.11	2.05	59.44	137.35
C. V. %	2.59	4.84	4.17	4.28

Seedling vigour index-I. It is evident from the result that the effect of priming treatment on seedling vigour index-I was found significant (Table 2). The significantly maximum vigour index-I (1168.97) was noticed when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (1137.19) and followed by *Panchagavya* (6%) (P_1) (1030.58), cow urine (3%) (P_4) (1008.63) and *Jivamrut* (10%) (P_3) (909.07). The significantly minimum vigour index-I (710.46) was noticed when seeds remained unprimed (P_0).

The data revealed that higher seedling vigour index-I was recorded in seeds primed with tender coconut water (P_6) and *Bijamrut* (P_2) due to higher seed germination (%) and seedling length (cm). While minimum seedling vigour index-I was observed in control (P_0) due to poor seed germination (%) and seedling length (cm). This result agrees with reports of Bhargavi *et al*. (2019) in blackgram, Bhavyasree and Vinothini (2019) in brinjal, Vinothini and Bhavyasree (2019) in groundnut, Vaishnavi *et al.* (2021) in chickpea, Jha *et al.* (2021) in major legumes and cucurbits, Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) noticed the higher seedling vigour index I in sesame seeds when primed with coconut water.

Seedling vigour index-II. The result indicated that the effect of priming treatment on seedling vigour index-II was found significant (Table 2). Significantly maximum seedling vigour index-II (2614.51) was noticed when seeds primed with tender coconut water (P_6), which was at par with seeds primed with *Bijamrut* (10%) (P_2) (2548.66). Seeds primed with *Panchagavya* (6%) (P_1), cow urine (3%) (P_4) and *Jivamrut* (10%) (P_3) were the next best treatments recorded 2286.09, 2261.76 and 2029.01 seedling vigour index-II, respectively. Significantly minimum seedling vigour index-II (1643.88) was noticed when seeds remained unprimed (P_0).

Seedling vigour index-II was found higher in seeds primed with tender coconut water (P_6) and *Bijamrut* (P_2) due to higher seed germination (%) and seedling dry weight (mg). While minimum seedling vigour index-II was observed in control (P_0) due to poor seed germination (%) and seedling dry weight (mg). The result is in agreement with the reports of Bhavyasree and Vinothini (2019) in brinjal, Vinothini and Bhavyasree (2019) in groundnut seeds, Vaishnavi *et al.* (2021) in chickpea and Reddy and Chaurasia (2022) in okra. Mori *et al.* (2024) observed the same results in sesame seeds when primed with coconut water.

CONCLUSIONS

The study concludes that orgopriming, a process of stimulating seeds with organic solutions, can be an effective method to improve seed quality in coriander. Tender coconut water proved to be the most successful priming agent among those tested, significantly increasing germination rate, seedling size, weight, and vigor index compared to the control. *Bijamrut* solution was also shown to be beneficial. These findings suggest that orgopriming with organic solutions like tender coconut water can potentially enhance coriander seed quality.

FUTURE SCOPE

Using coconut water for priming coriander seeds boosts germination, strengthens seedling growth, and increases overall crop yield, contributing to more productive and sustainable agriculture. Moreover, exploring advanced priming strategies and crafting tailored formulations could enhance coriander seed cultivation, making it more adaptable to environmental challenges.

Acknowledgement. The author was graceful to my Hon'ble Major Guide, Dr. C.A. Babariya, Assistant Professor, Department of Seed Science and Technology, College of Agriculture, JAU, Junagadh, for his most valuable and inspiring guidance and all the laboratory members to Department of Seed Science and Technology, College of Agriculture, JAU, Junagadh for the support to conduct the experiment.

Conflict of Interest. None.

REFERENCES

Abdul-Baki, A. A. & Anderson, J. D. (1973). Vigour determination in soybean seed by multiple criteria. *Crop Science*, *13*(6), 630-633.

Amarnath, B. H., Chaurasia, A. K. & Kumar, A. (2018). Effect of priming with botanicals and animal waste on germination and seedling length of sorghum (*Sorghum bicolor* L.) Seeds. *International Journal of Current Microbiology and Applied Sciences*, *7*, 2917-2923.

Bhargavi, Y., Sudhakar, P., Rajeswari, V. R. & Krishna, T. G. (2019). Effect of *Bijamrut* on seed germination, vigour and enzyme activity in blackgram seeds. *Andhra Pradesh Journal of Agricultural Science*, *5*(2), 142-145.

Bhavyasree, R. K. & Vinothini, N. (2019). Enhancement of seed quality through orgopriming in brinjal (*Solanum melongena* L.). *International Journal of Chemical Studies*, *7*(1), 242-244.

Chahal, K. K., Singh, R., Kumar, A. & Bhardwaj, U. (2017). Chemical composition and biological activity of *Coriandrum sativum* L.: a review. *Indian Journal of Natural Products and Resources, 8*(3), 193-203.

D'Souza, R. & Shah, K. (2016). Coriander - crop survey and analysis 2016: p.4

Dunsin, O., Aboyeji, C. M. & Nayan, G. (2016). Influence of moringa leaf extract and coconut water as priming agent to improves the emergence and early seedling growth in cucumber. *International Journal of Organic Agriculture Research and Development*, *12*(1), 39-46.

Gupta, P. C. (1993). Seed vigour testing. *Handbook of Seed Testing*. New Delhi, pp. 242-249.

Harish, K. K., Shakuntala, N. M., Vasudevan, S. N. & Sangeeta, I. (2014). Organic priming in pigeanpea-an ecofriendly approach for sustainable agriculture. *The Ecoscan*, *6*, 235-241.

Heydecker, W. (1978). Primed seeds for better crop establishment. *Span*, *21*(1), 12-14.

ISTA (2015). International Rules for Seed Testing. The International Seed Testing Association, *1*(10), 215.

Jha, B., Kumar, O., Naik, S., Sarkar, P. K., Choudhary, J. & Shinde, R. (2021). Efficacy of seed treatment with *bijamrita* and bavistin on seedling growth of cucurbits and legumes. *The Bioscan*, *16*(2), 123-128.

Khan, A. A. (1992). Preplant physiological seed conditioning. pp. 131-181. In Janick, J. (Ed.) Horticultural reviews. New York, John Wiley & Sons.

Lakmali, K. N. & Seran, T. H. (2022). Impact of seed priming with king coconut water on growth and yield of okra (*Abelmoschus esculentus* L.). *Journal of Food and Agriculture*, *15*(2), 27-46.

Mori, R. B., Patel, J. B., Vaghasiya, K. P., Bhoot H. V. & Barad A. V. (2024). Effect of Seed Priming on Germination and Seedling Growth of Sesame (*Sesamum indicum* L.). *Biological Forum – An International Journal*, *16*(3), 78- 82.

Nadeem, M., Anjum, F. M., Khan, M. I., Tehseen, S. & Sultan, J. I. (2013). Nutritional and medicinal aspects of coriander (*Coriandrum sativum* L.) A review. *British Food Journal*, *115*(5), 743-755.

Panse, V. G. & Sukhatme, P. V. (1995). Statistical methods for Agricultural Workers, Indian Council of Agricultural Research, New Delhi.

Reddy, T. M. K. & Chaurasia, A. K. (2022). Influence of organic and botanical priming on seed quality parameters of okra (varieties) Arka anamika and Punjab no. 13 (*Abelmoschus esculentus*). *Environment and Ecology*, *40*(2), 219-224.

Vaishnavi, D., Chaurasia, A. K., Kerketta, A., Jyothi, M. & Navya, V. (2021). Effects of *Panchagavya*, *Bijamrut*, botanical seed treatment on seed quality parameters in chickpea (*Cicer arietinum* L.). *Asian Journal of Microbiology, Biotechnology and Environmental Sciences*, *23*(4), 573-577.

Verma, P. K., Singh, V. B., Kumar, S., Kumar, Y. & Yadav, S. (2020). Response of various doses of organic manure on growth and yield of coriander (*Coriandrum sativum* L). *International Journal of Chemical Studies*, *8*(6), 550-553.

Vinothini, N. & Bhavyasree, R. K. (2019). Orgopriming to enhance seed germination in groundnut (*Arachis hypogaea* L.). *Research Journal of Agricultural Sciences*, *10*(1), 231-233.

How to cite this article: D.B. Kothadiya, C.A. Babariya, R.B. Mori and D.B. Bheda (2024). Effect of Different Orgopriming Treatments on Seed Germination and Quality Characters of Coriander (*Coriandrum sativum* L.). *Biological Forum – An International Journal, 16*(12): 78-82.