IOCAG 2025 Conference
The 3rd International Online Conference on Agriculture
22–24 October 2025 | Online
MDPI

Recent trends in organic priming for germination enforcement: enhancing crop yield with sustainable agricultural practices

Jay Singh[1], CL Maurya[2]
Research Scholar[1], Professor[2], Department of Seed Science and Technology, CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh (208002), India

INTRODUCTION & AIM

- Coriander is one of the important spice crops, which is favored for its tender green leaves as well as dried seeds, having various uses in different foods and industrial products.
- Coriander (*Coriandrum sativum* L.), popularly known as cilantro or Chinese parsley, is a feathery annual plant of the parsley family, Umbelliferae (Apiaceae). It has 2n=22 chromosomes and reproduces via cross-pollination. The genus *Coriandrum* includes both domesticated and wild species (*Coriandrum tordylium* L.).
- Globally, India has the largest area and production, followed by Iran, Morocco, China, Russia, Egypt, Ukraine, Mexico, and Pakistan. India produces 8,69,443 metric tonnes of coriander seeds from an area of 6,27,008 hectares. The states of Madhya Pradesh, Gujarat, Rajasthan, Assam, West Bengal, Odisha, Uttar Pradesh, and Andhra Pradesh produced 4,59,650 MT, 2,06,655 MT, 1,12,438 MT, 34,694 MT, 16,125 MT, 12,953 MT, 4813 MT, and 1568 MT respectively, from an area of 3,18,331 ha, 1,39,475 ha, 77,932 ha, 31,371 ha, 12,082 ha, 20,402 ha, 7,452 ha, and 2,339 ha (Anonymous, 2025).
- Due to its potential to increase crop yield and support sustainable farming methods, organic priming, the technique of treating seeds with advantageous naturally occurring substances or organic formulations before sowing, has drawn much interest in contemporary agriculture. Seed priming is a cost-effective, environmentally friendly and feasible technique to oppose the adverse impact of abiotic stress. Many organic priming formulations, viz., vermiwash, cow urine, panchgavya and humic acid, are environmentally friendly priming materials used to activate the natural stress reduction mechanisms and to improve the seed yield and quality without any harmful effect on plants. However, the period of soaking seeds and the concentration of treatments vary crop to crop and species to species. The average time taken by coriander seeds to germinate is about 21 days. This germination time is too long, resulting in non-uniform germination under field conditions.
- Priming enhances seed germination and the establishment of healthy seedlings by enhancing the characteristics that contribute to seed production, such as the emergence, number of branches, umbels, seed umbel^{-1}, seed yield, etc.

METHOD

- An experiment was conducted at the Vegetable Research Farm (Kalyanpur), Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh 208002, India, using a Randomized Block Design.
- The research was carried out on coriander cv. Azad Dhania-1 during 2023-24 and 2024-25 by taking different priming treatments, viz. control (without priming), hydropriming for 24 h soaking, vermiwash (15% for 24 h soaking), cow urine (20% for 24 h soaking), panchgavya (20% for 24 h soaking), humic acid (20% for 24 h soaking), GA_3 (50 ppm for 24 h soaking), IAA (50 ppm for 24 h soaking), Cytokinin (100 ppm for 16 n h soaking), KNO_3 (3% for 16 h soaking), and NaCl (4 gl^{-1} for 16 h soaking).
- In this study, I took parameters *viz*., number of primary branches, number of secondary branches, number of tertiary branches, number of umbels plant^{-1}, number of seeds umbel^{-1}, raw seed yield plant^{-1}, graded seed yield plant^{-1}, raw seed yield plot^{-1}, graded seed yield plot^{-1}, raw seed yield hectare^{-1}, and graded seed yield hectare^{-1}.
- Coriander seeds were primed as per the treatments and dried in shade, utilising thin paper to reduce the moisture for proper handling and sowing. The seeds were sown at a spacing of 15 cm within the rows with 20 cm spacing between the rows. The recommended dose of fertilizers was applied in ratio of 80:40:40 N: P_2O_5: K_2O kg ha^{-1}, one third dose of nitrogen and full dose of phosphorus and potash was applied during field preparation (before last ploughing) and one third dose of nitrogen was applied at 40-50 days (growth stage) of sowing and one third dose of nitrogen was applied before flowering stage.
- Data collected on different parameters were analysed for a randomized block design by using OPState software to find the significant difference at 5% level. This was utilized to test for significant differences among 11 treatment means.

RESULTS & DISCUSSION

The data presented in Figures 1, 2 & 3. The interpretation of data related to seed priming treatments showed significant influence on number of primary branches, number of secondary branches, number of tertiary branches, number of umbels plant^{-1}, number of seeds umbel^{-1}, raw seed yield plant^{-1}(g), graded seed yield plant^{-1}(g), raw seed yield plot^{-1} (kg), and graded seed yield plot^{-1} (kg), raw seed yield hectare^{-1} (kg) and graded seed yield hectare^{-1} (kg) in pooled basis (2023-24 and 2024-25). However, the maximum field emergence was observed in T_5-humic acid 20% soaking for 24 h (83.33%), followed by T_4-panchgavya 20% soaking for 24 h (82.33%). The highest number of primary branches and number of secondary branches (7.61, 10.89) was obtained in T_4-panchgavya 20% soaking for 24 h treatment, which was statistically at par with T_5-humic acid 20% soaking for 24 h (7.35, 10.11). T_5-humic acid 20% soaking for 24 h was significantly performed for the number of tertiary branches (4.06), followed by T_8-Cytokinin 100 ppm for 16 h soaking (3.83). The significantly higher number of umbel plant^{-1} and number of seeds umbel^{-1} (42.94, 41.88) was recorded in T_5-humic acid 20% soaking for 24 h treatment, followed by T_4-panchgavya 20% soaking for 24 h (37.90, 40.86). The treatment T_5-humic acid 20% soaking for 24 h was significantly performed for raw seed yield plant^{-1} (11.63) at par with T_4-panchgavya 20% soaking for 24 h (11.45) compared to the T_0-control (without priming).

The highest raw seed yield plant^{-1} and graded seed yield plant^{-1} were observed in T_5, where seeds were soaked in 20% humic acid for 24 hours, with values of 11.63 g and 10.48 g, respectively. This was comparable to T_4, where seeds were soaked in 20% panchgavya for the same duration, yielding 11.45 g and 10.20 g. Both treatments outperformed the control group (T_0), which did not involve any priming. The maximum raw seed yield per plot (0.767 kg), along with the graded seed yield plot^{-1}, raw seed yield hectare^{-1}, and graded seed yield hectare^{-1} (0.767 kg, 0.692 kg, 1534.72 kg, and 1383.84 kg, respectively) were recorded in T5, with seeds soaked in 20% humic acid for 24 hours. Following this, T_4 (20% panchgavya for 24 hours) showed yields of 0.756 kg, 0.673 kg, 1511.84 kg, and 1346.53 kg, respectively. In contrast, the lowest yields were found in T_8, where seeds were soaked in 100 ppm cytokinin for 16 hours. These findings are consistent with the results reported by Vighneshawaran *et al*. (2020) and Rai and Samatha *et al*. (2022).

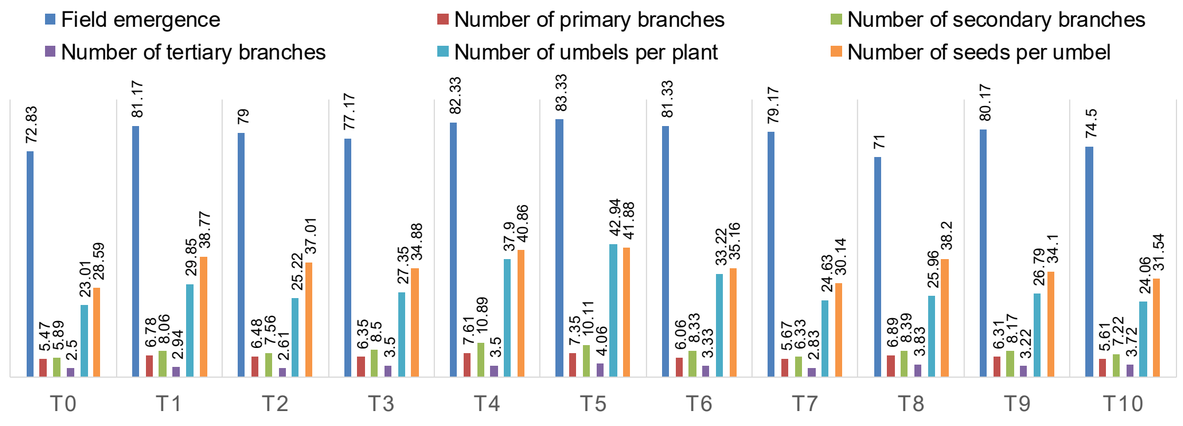

Figure 1: Effect of seed priming treatments on Field emergence, number of primary branches, number of secondary branches, number of tertiary branches, number of umbels plant^{-1} and number of seeds umbel^{-1} of coriander in pooled (2023-24 and 2024-25)

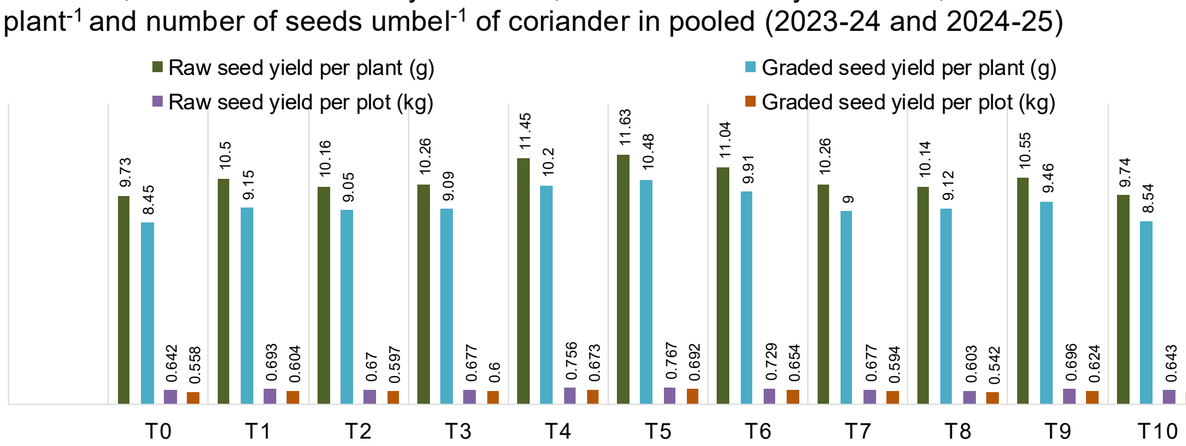

Figure 2: Effect of seed priming treatments on raw seed yield plant^{-1}(g), graded seed yield plant^{-1}(g), raw seed yield plot^{-1} (kg), and graded seed yield plot^{-1} (kg) of coriander in pooled (2023-24 and 2024-25)

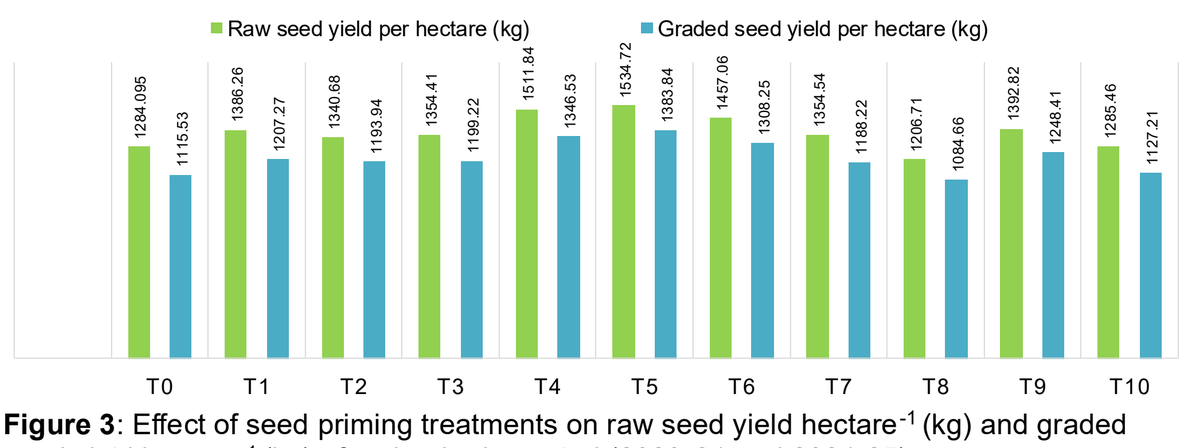

Figure 3: Effect of seed priming treatments on raw seed yield hectare^{-1} (kg) and graded seed yield hectare^{-1} (kg) of coriander in pooled (2023-24 and 2024-25)

CONCLUSION

In Conclusion, the study demonstrated that seed priming with humic acid (20%) and Panchgavya (15%) significantly improved growth, yield traits, and seed quality in coriander. Humic acid showed the best performance, followed by Panchgavya, indicating their effectiveness in enhancing physiological efficiency, nutrient uptake, and metabolic activity. These organic priming agents promoted early emergence, better seedling establishment, and uniform flowering, leading to higher seed yield.

REFERENCES

- ✓ Anonymous. Major spices/state-wise area and production of spices, Spices Board of India, Kochi, Kerala, 2025.
- ✓ Vighneshawaran G, Rajan REB, Kumar PS, Ruban SJ, Joshi JL, Muraleedharan A. Effect of Different Seed Priming Methods on Field Performance and Seed Quality of Black Gram (*Vigna mungo* L.). cv. VBN 5 G. *Recent Trends in Agriculture towards Food Security & Rural Livelihood Volume II*, 2020;20(2):1672-1674.
- ✓ Rai PK, Samatha B. Standardization of different pre-sowing seed treatments with Jeevamrutha, Panchagavya, neem oil and vermiwash on plant growth yield and yield attributing traits of cowpea (*Vigna unguiculata* L.) var. SSC-06. *International Journal of Plant & Soil Science*, 2022;458-465.