

Original Research Article

Standardization of hormone-based seed coating formulation for coriander Dosage and Formulation optimization

ABSTRACT

Aims: To standardize the dosage of hormone-based seed coating formulation for enhanced germination and seedling growth of coriander seeds.

Study design: Completely Randomized Design.

Place and Duration of Study: Department of seed science and technology, Tamil Nadu Agricultural University, Coimbatore, India.

Methodology: Coriander seeds were coated with different concentration of Hormone based seed coating polymer and germination study was conducted in roll towel method with four replications.

Results: The hormone-based seed coating formulation has recorded significantly higher germination% (69%), root length (16.75 cm), shoot length (7.9 cm), dry matter production (0.058 g/10 seedlings), Vigour Index I (1706) and II (3.9) at 10g polymer/kg of seed and 290ml of water.

Conclusion: Seed Coating with 10 g hormone-based seed coating formulation dissolved in 290 ml of water enhanced the seed germination and seedling growth

Keywords: [Coriandrum sativum, Seed coating, Dosage, Germination, Vigour]

1. INTRODUCTION

Coriandrum sativum belongs to the family Apiaceae. It is commonly known as Cilantro and one of the most important spices crops in India. Its leaves were used for culinary purpose[1]. It is cultivated worldwide for seed and leaf purpose seed is used as scented fruit, and flavoring agent[2].

Coriander has wide range medicinal properties, including sedative-hypnotic, anxiolytic, anticonvulsant effects, and antidepressant. It also enhances memory, progresses orofacial dyskinesia, and offers antibacterial, neuroprotective, antifungal, and anthelmintic benefits. Additionally, coriander demonstrates insecticidal, antioxidant, anti-inflammatory, hypolipidemic, cardiovascular, antidiabetic, and analgesic properties[3].

Seed enhancements refer to post-harvest treatments which are essential to germination improvement, growth of seedling and ease delivery of seeds at the time of sowing [4]. Seed coating is considered as an effective approach for promoting sustainable agriculture by enhancing the physiological and physical qualities of seeds. This process helps to improve planting efficiency, boosts growth parameters, and mitigates both abiotic and biotic stresses[5].

Seed coating includes application exogenous materials such as nutrients, microorganisms, plant growth regulators etc., which helps in positive regulation of seed germination, speed of germination and seedling growth [6].

Concentration of the seed coating agent have noticeable influence on physiology and growth of various crops under different environmental condition [7].

Nutrient requirement is a very important during the initial stages of plant life cycle. Nutrient required largely based on the size of seeds and type of seeds. In general, smaller seeds require small amount as compare to larger seeds [8].

As chemicals applied to seeds will be in safe and effective manner. The exact dosage required will be depends on the product applied, targeted seed and application method.

Considering the above discussion the present study was carried out for standardize the dosage of hormone-based seed coating polymer in order to improve the germination and seedling growth of Coriander seeds.

2. MATERIAL AND METHODS

2.1 Seed and polymer source

Coriander seeds of var CO5 were procured from the Department of Spices and Plantation Crops, Tamil Nadu Agricultural University, Coimbatore. The laboratory experiments were conducted in Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore. The polymer source used for the conduct of experiment was TNAU VidhaiAmirtham, which is a hormone-based seed coating polymer[9].

2.2 Germination Test

Coriander seeds were placed as four replicates of hundred seeds in paper media implementing Roll towel method (between paper method) and Germination test was conducted in germination room with $25\pm 1^{\circ}\text{C}$ and 95 ± 2 per cent RH. Illuminated using fluorescent light. (ISTA, 1999) Seedling evaluation was done after 21 days from sowing.

2.2.1 Germination (%)

Germination % = $\frac{\text{No.of seeds germinated}}{\text{Total No.of seeds sown}}$

2.2.2 Root length (cm)

Ten normal seedlings were selected from each replication, Root lengths were measured from tip of the primary roots to the collar region using measuring scale and mean of the root lengths were expressed in centimeter.

2.2.3 Shoot length (cm)

Ten normal seedlings were selected from each replication, Root lengths were measured from tip of the primary leaf to the collar region using measuring scale and mean of the shoot lengths were expressed in centimeter.

2.2.4 Dry matter production (g/10 seedlings)

Seedlings used to measure root and shoot lengths were dried at $85\pm 2^{\circ}\text{C}$ in hot air oven for 12 hrs and cooled for 30 mins in a desiccator and weighed in electronic balance. The results were expressed as g/10 seedlings.

2.2.5 Vigour index

Vigour index I and II were calculated as per Abdul-Baki and Anderson, (1973) implementing the following formula [10]

$$\text{Vigour Index I} = \text{Germination \%} \times \text{Total seedling length}$$

$$\text{Vigour Index II} = \text{Germination \%} \times \text{Dry Matter production}$$

Treatment details

Coriander seeds were coated with TNAU- Vithaiamirtham polymer at different concentration given below and tested for germination parameter.

Treatment No.	Treatment details
T ₁	Control
T ₂	8 g polymer + 92 ml water
T ₃	8 g polymer + 192 ml water
T ₄	8 g polymer + 292 ml water
T ₅	10 g polymer + 90 ml water
T ₆	10 g polymer + 190 ml water
T ₇	10 g polymer + 290 ml water
T ₈	12 g polymer + 88 ml water
T ₉	12 g polymer + 188 ml water
T ₁₀	12 g polymer + 288 ml water

Statistical analysis

Analysis of Data were done by analysis of variance (ANOVA) as a Completely randomized design. Separation of means were based on the least significant difference (LSD). If the F-test from the ANOVA for the treatments was significant at the 0.05 or 0.01 probability level.

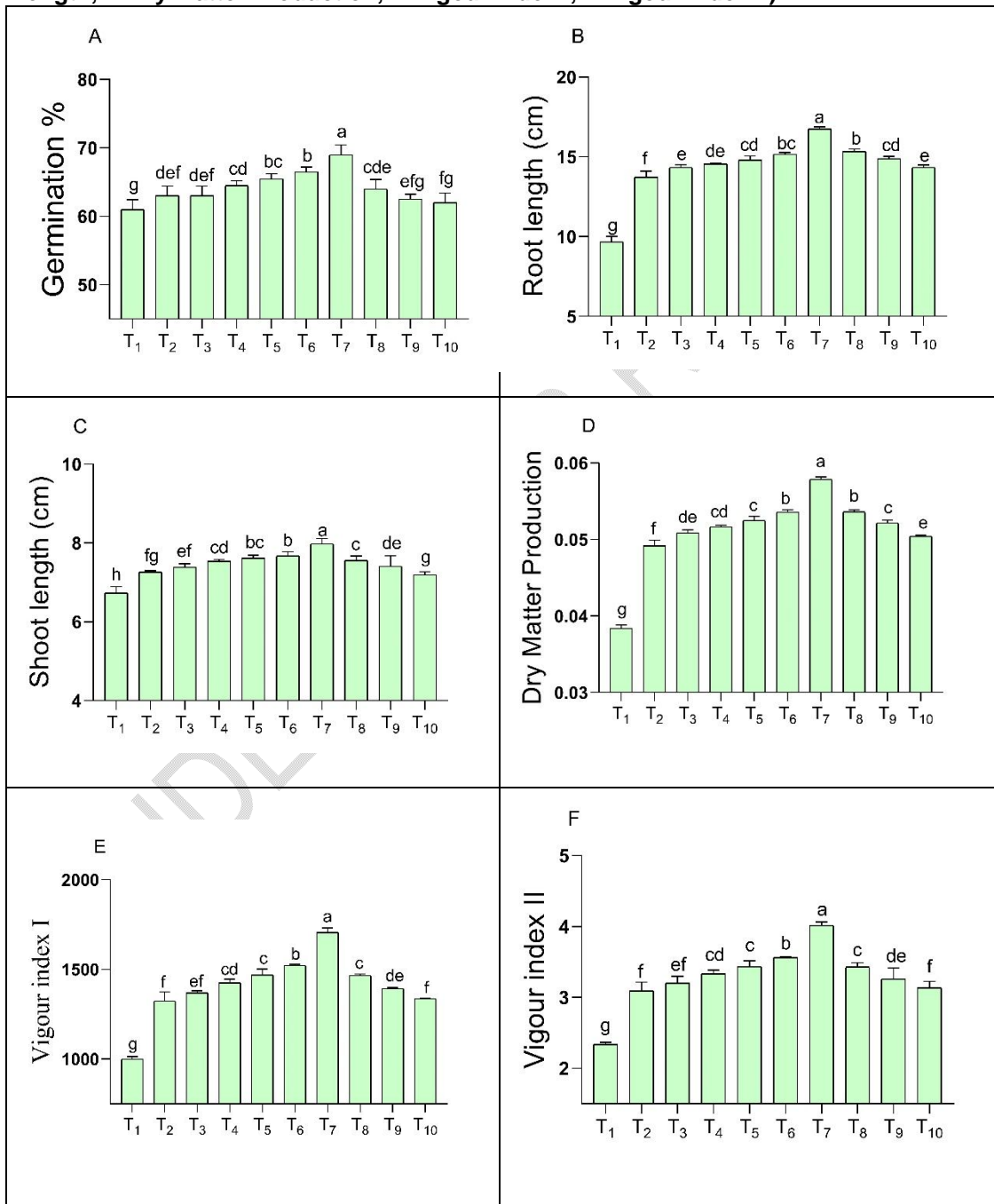
3. RESULTS AND DISCUSSION

The objective of the experiment was to evaluate the effect of seed coating formulation on germination percentage, root length, shoot length, dry matter production and vigour index of coriander. The obtained result showed highly significant variations among the treatments in seedling growth parameters. The results revealed that germination percentage was recorded higher in 10g polymer/kg of seed and 290ml of water (69%) followed by 10 g +190 ml water (66%) and least germination percentage was recorded in control (61%). Similarly, Bhaskaran et al., 2017 also found that in cotton seeds treated with 40 g kg⁻¹ polymer showed higher seed germination percentage (83%) [11]. The root length was also higher in 10 g + 290 ml water (16.75 cm) followed by 12 g + 88 ml water (15.35 cm) least was observed in control (9.67 cm). The shoot length was also higher in 10 g + 290 ml water (7.99 cm) followed by 10 g +190 ml water (7.72 cm) and least was observed in control (6.730 cm). The dry matter production was higher in 10g polymer/kg of seed and 290ml of water (0.058 g/10seedlings), followed by 10g polymer/kg of seed and 90ml of water has (0.054 g/10seedlings) and significant from control (0.038 g/10seedlings). Vigour index i was recorded higher in 10g polymer/kg of seed and 290ml of water (1706) followed by 10g polymer/kg of seed and 190ml of water (1522) least was recorded in control has (1000). Vigour index ii was recorded higher in 10g polymer/kg of seed and 290ml of water (3.99)

followed by 10g polymer/kg of seed and 190ml of water (3.560) and least was recorded in control (2.340).

Based on the results 10g polymer/kg of seed and 290ml of water were standardized for the seed coating dosage. Similar results were reported by Leelavathi P and Umarani R. (2017) in ridge gourd [12]and Kokila et al., 2023 inrice [13].

Fig. 1. Effect of different doses hormone-based seed coating formulation for seed quality parameters of coriander seeds. (A-Germination%, B-Root length, C-Shoot length, D-Dry Matter Production, E-Vigour Index I, F-Vigour Index II)



4. CONCLUSION

The hormone-based seed coating formulation @10g polymer/kg of seed and 290ml of water has significantly increased the germination, seedling growth and Vigour. Hence 10g polymer/kg of seed and 290ml of water will be standardized for Coriander seeds.

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