Int.J.Curr.Microbiol.App.Sci (2019) *8*(9): 1213-1219

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 8 Number 09 (2019)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2019.809.139

Effect of Fungicides and Plant Growth Regulators on Seed Quality Parameters of Coriander (*Coriandrum sativum L.*) Seeds

Anshu Pranay*, Bineeta M. Bara, Prashant Kumar Rai and Indrajit. P. Girase

Department of Genetics and Plant Beeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007 U. P., India

**Corresponding author*

Keywords

Coriander, Aged seed, Fungicide and Plant Growth Regulator

Article Info

Accepted:
18 August 2019
Available Online:
10 September 2019

A B S T R A C T

The experiment was conducted for overcoming the problems related to poor germination and seedling establishment of coriander seeds at post graduate Seed Testing Laboratory, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj (U.P.) during rabi season 2018, in order to standardize the best treatment of fungicide and PGRs to Coriander (var.). Two method of pre-sowing treatment viz-fungicide and plant growth regulators with control (Unprimed) were evaluated by screening 12 hour duration and different concentrations viz.,- To- Control (untreated), T1- Captan (3 gm/kg), T2- Captan (5 gm/kg), T3- Thiram (3 gm/kg), T4- Thiram (5 gm/kg), T5- Carbendazim (3 gm/kg), T6- Carbendazim (5 gm/kg), T7- GA3 (50 ppm), T8- GA3 (100 ppm), T9- NAA (50 ppm), T10-NAA (100 ppm), T11- IAA (25 ppm), T12- IAA (50 ppm). It was found that all the priming treatment showed significance difference with the control and the highest germination per cent, seedling length, seedling fresh weight, seedling dry weight, vigour indices were observed for Gibberellic Acid (100 ppm). Highest germination was observed in Gibberellic Acid (100 ppm) and Captan (5gm/kg). Seed pre-sowing treatment, its simplicity and no requirement for expensive equipment and chemical could be used as a simple method for overcoming related to a poor germination and seedling establishment and helps in sustaining agriculture and cost effective and economic, non- toxic, eco-friendly sources.

Introduction

Coriander is an annual herb, which belongs to the family Apiaceae and generally grown in winter season as main crop in India. The name of the plant is in fact derived from the Greek word, 'Korion' which mean bug. In the food industry, coriander is approved for food use by the US Food and Drug Administration, the Flavor and Extract Manufacturers Association and the Council of Europe, and the plant can be used as spice, medicine and a raw material in food, beverage and pharmaceutical industries. All parts of the plant are edible, but the fresh leaves and dried seeds are most commonly used in cooking. The essential oil content of the dried seeds varies from 0.03% to 2.7% (Purseglove *et al.,* 1981; Bandara *et*

al., 2000**).** The green leaves are consumed as fresh herbs, in salads and as garnishes due to its attractive green color and aroma (Norman 1990; Kamat *et al.,* 2003**).** In Ayurvedic medicine, the seeds are combined with caraway and cardamom seeds or with caraway, fennel and anise seeds in eastern medicine to treat digestive complaints (Aggarwal and Kunnumakkara, 2009**).**

The theory of seed priming was proposed by (Heydecker, 1973). Basically it is a pre sowing treatment in which seeds are soaked in some way to a moisture level sufficient to initiate the early events of germination (imbibitions) but not sufficient to permit radical protrusion. In the hormonal priming gibberellin (GA3) and cytokinins (CKs) control different developmental processes in plants (Pospisilova, 2003). CKs act early during shoot initiation and control meristem activity, while All phytohormones exert their regulatory role in close relation with each other. During storage, a number of physiological and physicochemical changes occur, termed aging (Silva *et al.,* 2005; Sisman, 2005). Seed deterioration can be defined as the loss of quality, viability and vigour either due to aging or effect of adverse environmental factors. Progress of technology and industrialization of agricultural production increased opportunities for long term seed storage. The present experiment carried out to evaluate the effect of different fungicide and PGR treatment on seed quality parameters of coriander seeds.

Materials and Methods

Seed of coriander variety Sicco, used for conducting experiment. Present investigation was carried out at Post-Graduate Laboratory of Department of Genetics and Plant Breeding, Sam Higginbottom, University of Agriculture, Technology and Sciences, Paryagraj (U.P.).

Procedure for Preparation of Solutions

Prepared solutions of the PGR and Fungicides, one gram of each chemical taken in a beaker. These chemicals will be added in 1000 ml. of distilled water with constant stirring. The volume of solution will finally constituted to one litter, then it became 1000 ppm stock solution of each chemical. Ten gram of each chemical will be taken in a beaker. These chemicals will be added in 1000 ml. of distilled water with constant stirring. The volume of solution will finally constituted to one litter, then it became 1% stock solution of each chemical.

Soaking of Seeds in Solution

After preparation of solution of GA3, NAA, IAA and Thiram, Captan, *Carbendazim*, Coriander seeds will be soaked in required solution for 12 hour at 25^0C temperature. Untreated seed is called as control. After 12 hrs of soaking the solution will be drained out from the beaker and presoaked were air dried to original weight and then placed for germination in laboratory under controlled condition.

Treatments details

S.No.	Treatment	Treatment combinations	Duration
1	**T0**	Control	-
2	**T1**	Captan (3gm/kg)	12 hours
3	**T2**	Captan (5gm/kg)	12 hours
4	**T3**	Thiram (3gm/kg)	12 hours
5	**T4**	Thiram (5gm/kg)	12 hours
6	**T5**	Carbendazim (3gm/kg)	12 hours
7	**T6**	Carbendazim (5gm/kg)	12 hours
8	**T7**	Gibberellic Acid (50 ppm)	12 hours
9	**T8**	Gibberellic Acid (100 ppm)	12 hours
10	**T9**	Napthyl AceticAcid (50 ppm)	12 hours
11	**T10**	Napthyl AceticAcid (100 ppm)	12 hours
12	**T11**	Indole Acetic Acid (25 ppm)	12 hours
13	**T12**	Indole Acetic Acid (50 ppm)	12 hours

Data Analysis

In order to calculate the Speed of Germination, Germination Percentage, Root, Shoot and Seedling length, Seedling Fresh and Dry Weight, Vigour Index (I and II) and Electrical conductivity by using the following formulas.

$$S.P\frac{G_1G_2.....G_n}{D_1D_2D_n}$$

Root and shoot length:

Root and shoot length of five fresh seedlings was measured in centimeters up to one decimal. Total seedling length was calculated by adding root and shoot length.

Seedling dry weight:

The seedlings used for recording were dried in an oven at 103^0C for 12 hours. Measurement of dried samples was record on an electronic balance upto three decimals in gm.

V.I. (I) = Germination percentage (Normal seedling) X Seedling length (cm)

V. I. (II) = Germination percentage (Normal seedling) X Dry weight of the seedling (gm)

E.C = Four replication of 25 seeds from each treatment was drawn and pre-washed thoroughly with distilled water to remove the adhering chemical and then soaked in 50 ml of distilled water for 16 hours at room temperature (25^o C). After soaking the seed steep water was decanted to obtain the seed leachate.

Results and Discussion

Effect of different fungicide and PGRs on germination

Pre-sowing seed treatment (priming) has been used to improve germination, reduce seedling emergence time, improve stand establishment and yield. The beneficial effects of priming have been demonstrated for many field crops. It is the best solution of germination related problems especially when crops are grown under unfavorable conditions. It can enhance rates and percentage of germination and seedling emergence which ensure proper stand establishmentunder a wide range of environmental conditions.GA3 are responsible for expansion and cell division in shoot elongation, flowering and seed germination.

In the present study, seeds of Coriander priming with different fungicide and PGRs and used for sowing. Primed seed with Gibberellic Acid (100 ppm) (T_8) reported maximum speed of germination and germination percentage (0.3387 and 92.00%) respectively. The minimum speed of germination and germination percentage observed in T_0 (0.2779 and 67.00%) respectively with control.

Table.1 Effect of different fungicides and PGRs on seed quality parameters of oriander

S. NO.	Treatments	Speed of Germination	Germination %	Root Length (cm)	Shoot Length (cm)	Seedling Length (cm)	Fresh Weight of Seedling (mg)	Dry Weight of Seedling (mg)	Seed Vigour Index-I	Seed Vigour Index-II	Electrical Conductivity
1	T_0	0.2779	67.00	3.22	2.22	5.44	226.25	63.25	365.15	4245.25	0.511
2	T_1	0.3328	87.25	5.35	3.95	9.30	385.00	91.00	811.42	7939.75	0.371
3	T_2	0.3329	89.25	5.77	4.35	10.12	401.00	94.25	903.68	8411.81	0.368
4	T3	0.3213	83.00	4.80	3.77	8.57	354.75	85.00	711.72	7055.00	0.377
5	T4	0.3181	82.00	4.70	3.42	8.12	311.25	77.50	666.25	6355.00	0.396
6	T_5	0.2954	75.75	4.40	3.07	7.47	288.75	73.25	566.22	5548.68	0.420
7	T6	0.3053	77.00	4.07	4.23	8.30	317.00	78.25	639.10	6025.25	0.413
8	T_7	0.3357	90.00	5.92	4.42	10.34	418.25	94.50	931.50	8505.00	0.321
9	T8	0.3387	92.00	6.15	4.80	10.95	492.75	109.50	1007.40	10074.00	0.318
10	T_9	0.2905	71.25	3.60	2.65	6.25	269.50	70.00	445.30	4987.50	0.464
11	T10	0.2811	70.00	3.47	2.38	5.85	243.75	72.25	409.50	5057.50	0.474
12	T11	0.3331	88.00	5.42	4.03	9.45	387.50	91.75	833.85	8074.00	0.392
13	T12	0.3318	85.75	5.17	3.80	8.97	361.75	87.50	769.60	7503.12	0.380
Grand Mean		**0.3150**	**81.40**	**4.77**	**3.62**	**8.39**	**342.88**	**83.69**	**696.97**	**6906.29**	**0.400**
C.D.(5%)		0.022	7.64	0.87	0.73	1.53	64.80	11.91	122.46	1008.65	0.05
SE(m)		0.007	2.67	0.30	0.25	0.53	22.65	4.16	42.81	352.61	0.01
SE(d)		0.011	3.77	0.43	0.36	0.75	32.03	5.89	60.54	498.66	0.02
C.V.		4.955	6.56	12.77	14.24	12.75	13.21	9.95	12.28	10.21	8.87

Similar results of Speed of germination was observed by Greipsson (2001); Nehara *et al.*, (2000); Pallaoro (2016); Jafri *et al.*, (2015); Sebastian *et al.*, (2014); Verma and Sen (2008) and Shetty and Rana (2012) as well as Dotto and Silva (2017); Amrutavalli (1979); Dissanayake *et al.*, (2010); Ma *et al.*, (2010) and Sarada *et al.*, (2008) founded similar results in germination percentage.

Effect of different fungicide and PGRs on seedling characters

Highest root length, shoot length and seedling length was observed in (T8) Gibberellic Acid (100 ppm) primed coriander seeds (6.15 cm, 4.80 cm, 10.95 cm) respectively. As well as minimum root shoot and seedling length was recorded in (T0) unprimed coriander seeds (3.22 cm, 2.22 cm and 5.44 cm).

Similar results of Seedling length was observed by Jafri *et al.*, (2015); Stephen and Jaybalan (1998); Verma and Sen (2008); Nehara *et al.*, (2000); Amrutavalli (1979); Meenaria and Maliwal (2007); Moniruzzaman (2011) and Singh (2014). Significantly highest seedling fresh weight, dry weight, vigour index I and II also reported in T8 Gibberellic Acid (100 ppm) priming coriander seeds (492.75 mg, 109.50 mg, 1007.40 and 10074.00) respectively, Minimum seedling fresh weight, dry weight, vigour index I and II observed in (T0) unprimed coriander seeds (226.25 mg, 63.25 mg, 365.15 and 4245.25) respectively.

Dissanayake *et al.,* (2010); Dhanapakiam *et al.,* (2008); Ghodrat *et al.,* (2012); Pallaoro (2016); Hussain *et al.,* (2008) and Rajesh *et al.,* (2014) are also founded similar results about Vigours parameters.

Effect of different fungicide and PGRs on electrical conductivity $^{-}$ dsm-1

Minimum electrical conductivity was recorded by T8 (0.318) with application of Gibberellic Acid (100 ppm) and highest electrical conductivity (0.511) was reported in the priming with T0 with control (100 ppm) in coriander seed.

Many researchers also founded such type results about electrical conductivity like Saxena (1989);Verma and Sen (2008); Nehara *et al.,* (2000); Amrutavalli (1979) and Sebastian *et al.,* (2014)

The conclusion revealed that, pre-sowing treatment with fungicide and PGRs effective on germination and seed quality parameters, increases the germinability and vigour of aged coriander seed. In this experiment Gibberellic Acid T8 (100 ppm) followed by Gibberellic Acid T7 (50 ppm) and Captan T2 (5gm/kg) significantly increase the germination and vigour parameters of aged coriander seed compare with all treatments and control. GA3 (100 ppm) showed maximum increase germination and other parameters of aged coriander seed, so GA3 was effective on aged seed and enhance germination and seedling parameters of coriander seed. These conclusions are based on the results of six months investigation and therefore further investigation is needed to arrive at valid recommendations.

Acknowledgement

Authors are thankful to Department of Genetics and Plant Beeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj**,** for providing seeds of coriander and gave permission to perform the research work at Post-Graduate Laboratory of University.

References

Aggarwal BB, Kunnumakkara AB. (2009). Molecular targets and therapeutic uses of spices-modern uses for ancient medicine. World Scientific Publishing: Singapore.

Amrutavalli I (1979). Gibbererellic acid (GA3) induced enhancement of flowering in Bulgarian coriander (*Coriandrum Sativum* L.) in relation to changes in carbohydrate metabolism. *Curr. Sci.* 48: 5-6.

Bandara M, Wildschut C, Russel E, Ost L, Simo T, Weber J (2000). Special crops program (Brooks). Alberta, Agriculture, Food, and Rural Development. Crop Diversification Centre 2000 Annual Report. Alberta, Canada.

Dhanapakiam P, Joseph JM, Ramaswamy VK, (2008). The cholesterol lowering property of coriander seeds (*Coriandrum sativum*): mechanism of action. *J Environ Biol*. 29(1):53–56.

Dissanayake, P., George, D. L. & Gupta, M. L. (2010). Effect of light, gibberellic acid and abscisic acid on germination of guayule (Parthenium argentatum Gray) seed. *Ind. Crop Prod.* 32, 111–117.

Dotto, L. & Silva, V. N. (2017). Beet seed priming with growth regulators. *Semina: Ciencias Agrarias.* 38, 1785–1798.

Ghodrat, V. & Rousta, M. J. (2012). Effect of Priming with Gibberellic Acid (GA3) on Germination and growth of corn (Zea mays L.) under saline conditions. *Intl. J. Agri. Crop Sci.* 4, 882–885.

Greipsson, S. (2001). Effects of stratification

and GA3 on seed germination of a sand stabilising grass *Leymus arenarius* used in reclamation. *Seed Sci. Technol.* 29, 1–10.

Heydecker W. and Coolbear P. (1977). Seed priming and performance survey and attempted prognosis. *Seed Science and Technology*.5:353-425.

Hussain M, Malik MA, Farooq M, (2008). Improving Drought tolerance by exogenous application of glycinebetaine and salicylic acid in sunflower. *J Agron Crop Sci*. 94(3):193–199

Jafri, N., Mazid, M. & Mohammad, F. (2015). Responses of seed priming with gibberellic acid on yield and oil quality of sunflower (Helianthus annus L.). *Indian J. Agric. Res.* 49, 235.

Kamat A, Pingulkar K, Bhushan B, Gholap A, Thomas P. (2003). Potential application of low dose gamma irradiation to improve the microbiological safety of fresh coriander leaves. Food Cont 4: 529–537.

Ma, H. Y., Liang, Z. W., Wu, H. T., Huang, L. H. & Wang, Z. C. (2010). Role of endogenous hormones, glumes, endosperm and temperature on germination of *Leymus chinensis* (Poaceae) seeds during development. *J. Plant Ecol.* 3, 269–277.

Meenaria B L & Maliwal P L (2007). Quality of fennel as influenced by plant density, Fertillization and plant growth regulators. *Indian Journal of Plant Physiology*. 12(1) 57-62.

Moniruzzaman M, (2011). Foliage and seed production technology of coriander (Doctoral Dessertation, Dept. of Hort., Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Salna, Gazipur.

Nehara K C, Kumawat P D & Singh B P (2000). Response of Fenugreek (*Trigonella foenumgraceum*) to phosphorus, sulphur and plant growth regulators under semi arid eastern plains zone of Rajasthan. *Indian Journal of Agronomy*, 51(1) 73-76.

Norman J. (1990). The complete book of spices. Dorling Kindersley Limited: London.

Pallaoro, D. S. (2016). Priming corn seeds with plant growth regulator. *J. Seed Sci.* 38, 227–232.

Purseglove JW, Brown EG, Green CL, Robbins SRJ (1981). Spices.

Rajesh, K., Reddy Narender, S., Reddy Pratap Kumar, A. and Singh Gopal, B. (2014). A comparative study of plant growth regulators on morphological, seed yield and quality parameters of greengram. *International J. Applied Biology and Pharmaceutical Technology*. 5 (3): 103-109 (ISSN 976-4550).

Sarada, C., Giridhar, K. and Yellamanda Reddy, T. (2008). Effect of bio-regulators and their time of application on growth and yield of corian-der (*Coriandrum sativum). J. Spices Arom. Crops.*, 17 : 183-86.

Sebastian, J., Wong, M. K., Tang, E. & Dinneny, J. R. (2014). Methods to promote germination of dormant setaria viridis seeds. *PLOS ONE* 9, e95109.

Shetty, A.A. and Rana, M. K. (2012). Effect of Gibberellic acid on yield and seed quality of ajowain (*Trachyspermum ammi* L.). *BIOINFOLET.*, 9 : 190- 194.

Sisman, C. (2005). Quality losses in temporary sunflower stores and influences of storage conditions on quality losses during storage. *Journal of Central European Agriculture*.6: 143-150.

Stephen, R. and Jaybalan, N. (1998). *In vitro* flowering and seed setting formation of coriander. *Curr Science* 74:195-198.

Verma & Sen N L (2006). Effect of plant growth regulators on vegetative growth and seed yield of Coriander (*Coriandrum Sativum* L.) CV. RCR-435 *Journal of Spices and aromatic Crops* Vol.15(2) : 118-122.

How to cite this article:

Anshu Pranay, Bineeta M. Bara, Prashant Kumar Rai and Indrajit. P. Girase 2019. Effect of Fungicides and Plant Growth Regulators on Seed Quality Parameters of Coriander (*Coriandrum sativum L.*) Seeds. *Int.J.Curr.Microbiol.App.Sci.* 8(09): 1213-1219.
doi: https://doi.org/10.20546/ijcmas.2019.809.139