RESEARCH ARTICLE

Effect of Gamma radiation on Seed Germination, Seedling Height and Seedling Injury in *Coriandrum sativum* Linn.

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Manuscript details:

Received: 16 July, 2014
Revised : 29 August, 2014
Revised received: 06 September, 2014
Accepted: 07 September, 2014
Published: 30 September, 2014.

Editor: Dr. Arvind Chavhan

Citation this article as:
Salve KM and More AD (2014) Effect of Gamma radiation on Seed Germination, Seedling Height and Seedling Injury in *Coriandrum sativum* Linn. *Int. J. of Life Sciences*, 2(3): 223-225.

ABSTRACT

The seeds of *Coriandrum sativum*, Linn. (Coriander) Var. CS-287 were selected and used for following investigations. The healthy, dry and uniform seeds were treated with different doses of Gamma rays like 10kR, 20kR, 30kR and 40kR. Germination parameters like seed germination percentage, seedling height and seedling injury were studied. Seed germination percentage in control was 86 %. Seed germination percentage revealed gradual decrease from lower doses to higher doses in given treatments of Gamma rays. In case of seedling height there was dose dependent deduction after treatment of Gamma rays. In Gamma rays treated seeds seedling height was in the range 10.90 cm to 10.18 cm and seedling injury varied from 1.67 % to 8.15%. In conclusion it can be said that use of physical mutagens has succeeded in inducing M_1 Biological parameters.

Keywords – *Coriandrum sativum* Linn, Gamma rays, seedling injury.

INTRODUCTION

Coriandrum sativum Linn. (2n=22) commonly known as Coriander is widely cultivated because of its economic importance Das and Mallick (1989). It emits characteristic aroma when rubbed. The whole plant and especially the unripe fruit is characterized by a strong disagreeable odour, hence the name coriander (from the Greek Koris, a bedbug). First attested in English late 14th century, the word coriander derives from the Old French "*coriandre*", which comes from Latin coriandrum, in turn from Greek κορίαννον (koriannon). It is also known as Chinese parsley or, particularly in the Americas, cilantro (Verma *et al.,* 2011). It is native to Mediterranean region Jamali (2012). It is commercially grown in India, Morocco, erstwhile USSR, Hungary, Poland, Romania, Mexico, USA, etc. in India, major production centers are Rajasthan, Maharashtra, Gujarat and Karnataka Anonymous (2001) and Bhandari and Gupta (1991). It grows best under cool conditions while hot weather encourages it to flower. Coriander is a very common green spice used in every part of India, popular as Dhania. In Maharashtra it is pronounced as Kothembiri. Coriander seeds and leaves are used as

common food flavoring agent. It has great economic and nutritional value in Indian agriculture.

It is well known medicine in traditional medicinal stem like Ayurveda. It has been used as a folk medicine for the relief of anxiety and insomnia in Iran. Coriander seeds are used in traditional Indian medicine as a diuretic. In holistic and traditional medicine, it is used as a carminative and as a digestive aid also has been documented as a traditional treatment for diabetes. Its main ingredients are volatile oils, vitamin C, linalool are main chemical constituents. Considering its importance and for development of interest amongst cultivators it is important to develop better varieties. Therefore mutagenesis has been carried out in recent paper. Any mutagen that induces single base pair mutations or small deletions/insertions is effective for tilling. Radiation is the mutagen we have employed for the following reasons. Its effects have been well studied and it is known to generate point mutations. These mutations may lead to a complete or partial loss of gene function or, less frequently, to some other alteration of normal gene function. Mutations are randomly distributed in the genome. A high degree of mutation saturation can be achieved with a mutagen like Gamma rays that does not cause a lot of collateral DNA damage (Bhosale and More, 2013).

MATERIALS AND METHODS

The seed material of *Coriandrum sativum* Linn*,* variety CS-287 was released by Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu and same variety was used for the present investigation.

Mutagen used – (Physical) Gamma radiation.

Mode of treatment with mutagenic agents**:** The doses of Gamma rays were decided according to LD^{50} treatments.

Treatments**:** Dry seed material of *Coriandrum sativum* Linn. variety CS-287 were exposed to different doses of Gamma rays obtained from Co^{60}. Facility was availed from Department of Nuclear Chemistry, Department of Chemistry, University of Pune.

Seeds germination percentage**:** From each treatment 100 seeds material were kept in tray with sterile soil. After one week seeds germination percentage was recorded.

Seedling height and seedling injury: The seedling height was recorded at the end of first week and the percentage seedling injury was calculated from the data of seedling height.

RESULTS AND DISCUSSION

1. Germination Percentage (Table 1)

In control maximum number of seeds germinated after one week of sowing. The percentage of germination was 86. Germination percentage showed gradual decrease from lower to higher doses of Gamma radiations which were 71%, 68%, 63%, and 57% for 10kR, 20kR, 30kR and 40kR respectively. In the present investigation, the germination percentage was decreased with increase in dose of Gamma rays. Relationship between mutagenic dose and germination percentage was inversely proportional. Same result has been recorded by (Mahla *et al.,* 1999) in Coriander, (Sikder *et al.,* 2013) in *Solanum lycopersicum* L., Hakande (1992) in Winged bean, Shinde (2013) in Cluster bean; Gaikwad (2013) in Cowpea and Bhosale and More (2014) in *Withania somnifera.*

Table 1: Effect of mutagen on seed germination in *Coriandrum sativum* Linn.

Mutagen	Dose	Seed Germination (%)	±SE
Control	**-**	86	± 0.12
Gamma Radiation	**10kR**	71	±0.14
	20kR	68	±0.18
	30kR	63	±0.22
	40kR	57	±0.35

Table 2: Effect of mutagen on Seedling Height and Seedling Injury in *Coriandrum sativum* Linn.

Mutagen	Dose	Average Seedling Height (cm)	Seedling Injury (%)	±SE
Control	**-**	11.08	-	± 0.12
Gamma Radiation	**10kR**	10.90	1.67	±0.17
	20kR	10.66	3.76	±0.16
	30kR	10.50	5.20	±0.21
	40kR	10.18	8.15	±0.32

2. Seedling Height and Seedling Injury (Table 2)

The results show the decrease in the seedling height and increase in seedling injury in all doses of gamma rays. Seedling height was dose dependent. As the dose of Gamma rays increased from 10kR to 40kR there was gradual decrease in seedling height and increase in seedling injury. This indicated that with increase in dose of Gamma rays, damage in seedling increases. These observations were supported by results of many researchers like Hakande (1992) in Winged bean and (Sikder *et al.,* 2013) in *Solanum lycopersicum* L., Shinde (2013) in Cluster bean, Gaikwad (2013) in Cowpea, Bhosale and More (2014) in *Withania somnifera* and in Isabgol (*Plantago ovate,* Forsk) Mishra and Singh (2014).

CONCLUSION

It can be concluded that Gamma rays is capable in inducing damage to plants at molecular level and is capable of inducing mutation. The higher dose of gamma rays more will be damage and chances of getting more variables may increase. The present investigation clearly demonstrated that induced mutation can be successfully utilized to create genetic variability when it is desired to improve specific traits in plants. It can be said that all physical mutagenic treatments tried in the present research work have succeeded in inducing significant alteration in growth and metabolism of Coriander.

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