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Original Article

Effect of ethyl methane sulphonate on seed germination of Linum usitatissimum L

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Abstract

Flaxseed is also known as Linseed belongs to the family Linaceae. In this investigation the chemical mutagene ethyl methane sulphonate were used to develop new and improved mutant lines of Linum usitatissimum L. The chemical mutagene EMS impact on developing new linseed mutants. The seeds of Linum usitatissimum L. (Linseed) var. PKV NL 260 were selected and treated with EMS then used for subsequent investigations. Seeds were procured from Dr. Panjabarao Deshmukh Krishi Vidyappeth, Akola, Maharashtra. Healthy, dry and uniform seeds were treated with various doses 100 mM, 200 mM, 300 mM and 400 mM of ethyl methane sulphonate and untreated (control) to induce mutation. This induced mutation aimed to develop improved yield mutants lines in linseed (Linum usitatissimum L. var. PKV NL 260). Germination parameters such as seed germination percentage, seedling height, and seedling injury were studied. Seed germination percentage of control was 96 %. The seed germination percentage gradually decreased from lower to higher doses in the given ethyl methane sulphonate treatments. In conclusion, the use of chemical mutagens (ethyl methane sulphonate) successfully induced M1 Biological parameters.

Keywords *Linum usitatissimum L., Germination percentage, Ethyl Methane sulphonate, Linseed.*

Introduction

Linum usitatissimum L. (2n=30) is commonly known as a linseed or Flaxseed. *Linum usitatissimum* L. is a rich source of antioxidant and antidiabetic phytochemical compounds such as lignans, phenolic acids, and flavonoids and hence has a significant role in medicinal field (Sarfraz and Ahmad, 2024). It is an economically important plant cultivated for its seeds and fibers (Rahinj AV, Salve. KM. 2025). The name *Linum usitatissimum* L.is comes from Latin word, Linum means 'thread' and genus *usitatissimum* refers "most used." Flax was first introduced in the United States by colonists, primarily to produce fibers, for clothing (Laux 2011). Linseed helps prevents diseases by removing of molecules known as free radicals from the body (Jahan et al., 2020).

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Flaxseed oil, fibers and flax lignans have potential health benefits such as the reduction of cardiovascular disease, atherosclerosis, diabetes, cancer, arthritis, osteoporosis, and autoimmune and neurological disorders (Goyal et al., 2014). Gamma Radiation is the mutagen used for the following reasons. Its effects have been well studied, and it is known to generate point mutations (Salve and More, 2014). The increasing global demand and exploitation of linseed for several use researchers are focused on boosting linseed production (Sharma N et al., 2025). These mutations may lead to a complete or partial loss of gene function or, less frequently, to other alterations in normal gene function. Mutations are randomly distributed throughout the genome (Salve and More, 2014).

Materials And Methods

The seed material of Linseed (Linum usitatissimum L.) var. PKV NL 260 was procured from Dr. Panjabarao Deshmukh Krishi Vidyappeth, Akola, Maharashtra- 444104. and the same variety was used for the seed germination percentage.

Mutagen used – (Chemical) Ethyl Methane Sulphonate.

Mode of treatment with mutagenic agents: The doses of ethyl methane sulphonate were 100mM, 200mM, 300mM and 400mM.

Treatments: Healthy and dry seed material of *Linum usitatissimum* L. variety PKV NL 260 were used to different doses of Ethyl Methane Sulphonate.

Seeds germination percentage: One hundred seed materials were kept in a tray with sterile soil from each chemical mutagene treatment. The seed germination percentage was recorded after ten days of seed sowing.

Results And Discussion

1. Germination Percentage (Table 1)

After ten days of seed sowing, the maximum number of seeds germinated from the control. The percentage of germinated seed is 96. Germination percentage showed gradual decrease from lower to higher doses of ethyl methane sulphonate which were 92%, 87%, 82%, and 73% for 100 mM, 200 mM, 300 mM and 400 mM respectively. In this study, the germination percentage decreased with an increase in the dose of ethyl methane sulphonate. The mutagenic dose and germination percentage were found to be inversely proportional (Rahinj AV, Salve. KM. 2025). The same result has been reported 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; and Gaikwad (2013) in Cowpea; Bhosale and More (2014) in *Withania somnifera* , Salve and More (2014) in Coriander and Rahinj AV, Salve. KM. (2025) in Linseed.

Table 1: Effect of mutagen on seed germination in *Linum usitatissimum* L.

Mutagen	Dose	Seed Germination (%)	±SE
Control	-	96	± 0.6
Ethyl Methane Sulphonate	100 mM	92	±0.8
	200 mM	87	±0.10
	300 mM	82	±0.11
	400 mM	73	±0.13

±SE= Standard Error

Coclusion

It can be concluded that chemical mutagene (ethyl methane sulphonate) is capable in inducing damage to plants at molecular level and is capable of inducing mutation. In this study it was clearly demonstrated that induced mutations can be successfully utilized to create genetic variability when it is desired to improve specific traits in plants. All chemical mutagenic treatments tried in the present study have successfully induced significant alterations in the growth and metabolism of Linseed (*Linum usitatissimum* L).

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Conflicts Of Interrests:

The authors declare that there are no conflicts of interest related to this article.

References:

1. Bhosale RS and More AD (2014) Effect of Gamma radiation on Seed Germination, Seedling Height and Seedling Injury in *Withania somnifera*, (L.) Dunal. *Int. J. of Life Sciences*.
2. Gaikwad BS (2013) Induction of Genetic variation in Cowpea [*Vigna unguiculata* (L.) Walp.] through Gamma radiations and Ethyl Methanesulphonate. Ph.D. Thesis, Fergusson College, Pune, University of Pune.
3. Goyal A, Sharma V, Upadhyay Nand Sihag M (2014) Flax and flaxseed oil: an ancient medicine & modern functional food .J Food Sci Technol*51(9):*1633–1653
4. Hakande TP (1992) Cytogenetical studies in *Psophocarpus tetragonolobus* (L.) DC. Ph.D. Thesis, BAM University, Aurangabad.
5. Jahan R, Ansari S, Malik S and Khan S (2020) Cytological aberrations in M2 morphological mutants of *Linum usitatissimum* L. induced by physical and chemical mutagens. *Vol. 20*, pp. 1343-1348 e-ISSN:2581-6063 ISSN:0972-5210.
6. Kumar A, Paul S, Thakur G (2020) Determination of Lethal Dose (LD50) and Effects of Gamma Rays and Ethyl Methane Sulphonate (EMS) Induced Mutagenesis in Linseed (*Linum usitatissimum* L.). *Int.J.Curr.Microbiol.App.Sci.9*(10): 2601-2608.
7. Laux M (2011) http://www.agmrc.org/commodities__products/grains__oilseeds/flax_profile.cfm
8. Mahla HR, Ramkrishna K and Sharma RK (1999) An assessment of induced variability in M2 progenies of Coriander. *Annals of Arid Zone*. 38(1): 81-83.
9. Rahinj AV, S. K. (2025). Effect of Gamma radiation on seed germination of Linseed. International Journal of Research Studies on Environment, Earth, and Allied Sciences (IJRSEAS), 187-189.
10. 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.

11. Sarfraz H, Ahmad IZ (2024). Antidiabetic properties of *Linum usitatissimum* L. seed: A promising medicinal plant. In: Antidiabetic Medicinal Plants. Academic Press, pp 551-563.