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PHYTONUTRIENTS ANALYSIS OF EARLY FLOWERING MUTANT OF CORIANDER

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ABSTRACT:
Induced mutation is one of the sources of producing variations in plants. Naturally occurring mutation rate is very low. Hence, physical and chemical mutagens have proven the useful for increasing the variation within a crop variety. *Coriandrum sativum* L. belongs to the family Apiaceae and commonly called coriander. It is common green spice used as a flavoring agent in every part of India. In Maharashtra, it also known as Kothembiri. In the present study, mutation breeding carried out for morphological and phytonutrients analysis. Ethyl Methane Sulphonate (EMS) and Gamma rays are potential mutating agents that induce mutations in coriander leading to various mutants. From mutants phytonutrients of Early Flowering mutant was analyzed, which showed the great enhancement in phytonutrients as carbohydrates protein from leaf and fruit and essential oil as compared to control.

Keywords:- *Early Flower mutant, EMS, Gamma rays, Phytonutrients analysis, Coriander.*

INTRODUCTION:

Coriandrum sativum Linn. is belongs to family Apiaceae and called as coriander. 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. Coriander is a very common green spice used in every part of India popular as Dhania. Coriander seeds and leaves are used as green spice. It has great economic and nutritional value in Indian agriculture. Apart from all uses it is well known medicine in traditional medicinal stem like Ayurveda. This plant due to its uses and economic value has been undertaken in mutational study. Mutation induction is an important method of breeding crop species. The utilization of induced mutations for the improvement of crop plants has yields several mutants which have been used directly as new cultivars Gottschalk and Wolf (1983). Present paper reports data on Early Flower mutant induced by different concentrations/doses of EMS and Gamma rays.

MATERIAL & METHODS:

The seed material of *Coriandrum sativum* Linn, variety CS - 287 was released by Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu. Physical mutagen gamma ray and chemical mutagen EMS were used for the treatment. For present study, the seeds of each treatment along with control (untreated seeds) were sown in research field by Complete Randomized Block Design (CRBD) with three replications in order to raise the M1 generation. Early Flower mutant were screened in M3 and M4 generations for nutritional analysis such as essential oil from

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fruits and seeds by hydrodistillation method (Hesham H. A. Rassem et al 2016), carbohydrates by anthrone method (Hedge and Hofreiter, 1962) and protein from leaves and fruits and seeds (Lowery et al., 1951) and data was quantified.

RESULT AND DISCUSSION:

The maximum amount of carbohydrate content was found significant increase in Early Flowering mutant as compared to control. Similar trend in result was observed for protein content of fruit and leaves. The total amount of essential oil content in mutants has shown slight enhancement as compared to control. Total carbohydrate content showed significant increase in mutants. Similar result was reported by Salve and More, 2019 in Coriander and stated that there was increases in amount of carbohydrates, protein leaf and fruit and essential oil content in tall mutant and decrease in dwarf mutant. Salve and More, 2018 in *Coriandrum sativum* L. and stated there was enhancement in amount of Carbohydrates, protein leaf and fruit and essential oil in Dark green mutant and Luxuriant mutant. (Iwo et al., 2013) reported that Gamma rays induced mutants of ginger were found to be more promising in rhizome yield and biochemical constituents like oleoresin content. Effect of Gamma rays on *Centella asiatica* was studied by (Moghaddam et al., 2011). They reported that the irradiated plants of *Centella* displayed higher total flavonoid content than the non-irradiated (control) plants. As the growth of plant increased there was increase in biochemical content. (Latif et al., 2011) studied effect Gamma rays on bioactive components of Coriander. They reported that low doses of Gamma rays showed increased plant growth, phyto hormones, oil production and amino acid content.

The Apiaceae family includes the widely grown coriander (*Coriandrum sativum* L.), which has a variety of culinary and medicinal uses. Numerous pharmacological characteristics, such as antibacterial, anthelmintic, insecticidal, allelopathic, antioxidant, antidiabetic, anticonvulsive, antidepressant, and hepatoprotective actions, have been reported for the coriander essential oil (Al-Khayri et al., 2023). Owing to the crop's economic significance and the requirement for genetic advancement, scientists have looked into using a variety of mutagenic agents to give coriander beneficial features.

Using chemical and physical mutagens, such as gamma rays and ethyl methanesulfonate, is one method of improving coriander genetically. It has been demonstrated that using these mutagenic chemicals results in a broad spectrum of genetic variants, which may then be chosen for better traits. For example, ethyl methanesulfonate-based in vitro mutagenesis proved to be a useful technique for producing genetic variety and pinpointing desired features in a study on the genetic enhancement of saffron, another member of the Apiaceae family (Kashtwari et al., 2018).

In a similar vein, gamma radiation has been investigated as a means of causing mutations in coriander. It has been demonstrated that gamma radiation affects the build-up of phytochemicals, secondary metabolites, and chlorophyll in coriander plants, which can lead to enhanced antioxidant qualities and other advantageous traits (Lin et al., 2022).

Numerous studies have examined the effects of gamma radiation on coriander (Jan et al., 2013; Elmenbawy et al., 2020). According to one study, gamma irradiating coriander seeds increased mitotic and meiotic aberrations and decreased seed germination rate and seedling growth. A further research found that different

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combinations of light quality and intensity, which may be changed by gamma radiation, may have an impact on the build-up of chlorophyll and phytochemical contents in coriander leaves, which in turn may modify the leaves' antioxidant properties (Pramanik et al., 2018).(Lin and others, 2022).

CONCLUSION:

From the above study it is clear that there is a lot of scope for genetic improvement in Coriander through mutation breeding program. Important features like high Carbohydrate, Protein and essential oil content can be improved through mutation breeding. Relatively very fewer fluctuations are induced by the mutagens in the case of nutritional content in the different M3 and M4 mutants. The investigation of nutritive components indicated the application of mutation breeding in the development of superior genotypes carrying improved nutritional and medicinal values in Coriander.

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TABLE NO.: 1- Effect of mutagen on carbohydrates, leaf protein, Fruit and seed protein and Essential oil content of the morphological mutant of Coriander.

Sr. No	Morphological Mutants	Carbohydrates		Protein - Leaf		Protein - fruit		Essential oil	
		%	±SE	%	±SE	%	±SE	%	±SE
1	Control	5.01	±0.01	2.50	±0.02	2.15	±0.02	0.30	±0.01
2	Early Flowering Mutant	5.75	±0.02	2.84	±0.03	2.38	±0.01	0.32	±0.02

±SE: Standard Error

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