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Nutritional Analysis of Late Flowering mutant of *Coriandrum sativum* Linn.

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Abstract

Mutation breeding is the one of the traditional method of crop improvement. Induction of mutation has become a proven way of creating variation within a crop variety. *Coriandrum sativum* L. belongs to family Apiaceae commonly called Coriander. It is a very common green spice used in every part of India. In Maharashtra it is known as Kothembiri. In present investigation mutation breeding was carried out for morphological and nutritional analysis. Ethyl Methane Sulphonate (EMS) and Gamma rays are potential mutating agents which induced mutations in coriander leading to various mutants. From reported mutants nutritional content of Late Flowering mutant were analyzed, which showed variable result as compared to control.

Keywords: Gamma rays, EMS, Nutritional analysis, Late Flowering mutant.

1. Introduction

Coriandrum sativum Linn. It belongs to the Apiaceae family and is often known as coriander. The entire plant, particularly the immature fruit, has a strong unpleasant odor, which is why it is called coriander after the Greek word for bedbug, koris. Coriander, also known as Dhania, is a famous green spice used throughout India. In Maharashtra, it is pronounced Kothembiri. Coriander seeds and leaves are used as a green spice. It has a significant economic and nutritional importance in Indian agriculture. Aside from its many applications, it is a well-known remedy in ancient medical systems such as Ayurveda. Because of its usefulness and economic worth, this plant has been the subject of mutational research. Mutation induction is a valuable strategy for developing crop species. Gottschalk and Wolf [1] found that using induced mutations to enhance agricultural plants resulted in numerous mutants that were employed directly as new cultivars.

The current research presents data on the Late Flowering mutant generated by various concentrations/ doses of EMS and Gamma radiation.

2. Methodology

The Tamil Nadu Agriculture University in Coimbatore, Tamil Nadu, issued the *Coriandrum sativum* Linn, variety CS - 287 seed material. The therapy involved the use of chemical mutagen EMS and physical mutagen gamma rays. In order to produce the M1 generation for the current investigation, three replications of the Complete Randomized Block Design (CRBD) were used to sow the seeds of each treatment together with the control (untreated seeds) in the research area. For nutritional analyses, such as essential oil from fruits and seeds by hydrodistillation method [2], carbohydrates by anthrone method [3], and protein from leaves and fruits and seeds [4], late flowering mutants were screened in M3 and M4 generations. The data was quantified.

Results and Discussion

The maximum amount of carbohydrate content was found to be a significant increase in the Late Flowering mutant as compared to the control. A similar trend in result was observed for the protein content of fruit and leaves. The total amount of essential oil content in mutants has shown enhancement as compared to control. Total carbohydrate content showed significant increase in mutants. A similar result was reported by Salve and More [5] in Coriander and stated that there were increases in the amount of carbohydrates, protein leaf and fruit, and essential oil content in the tall mutant and a decrease in the dwarf mutant. Salve and More [6] in *Coriandrum sativum* L. and stated there was an enhancement in the amount of carbohydrates, protein leaf, fruit, and essential oil in the Dark Green mutant and Luxuriant mutant. Iwo et al. [7] reported that gamma-ray-induced mutants of ginger were found to be more promising in rhizome yield and biochemical constituents like oleoresin content. The effect of Gamma rays on *Centella asiatica* was studied by Moghaddam et al. [8]. They reported that the irradiated plants of *Centella* displayed higher total flavonoid content than the non-irradiated (control) plants. As the growth of the plant increased, there was an increase in biochemical content. Latif et al. [9] studied the effect of gamma rays on bioactive components of coriander. They reported that low doses of Gamma rays showed increased plant growth, phytohormones, oil production, and amino acid content.

The Apiaceae family contains the widely cultivated coriander (*Coriandrum sativum* L.), which has a range of culinary and medicinal use. Coriander essential oil has been shown to have several pharmacological properties, including antibacterial, anthelmintic, insecticidal, allelopathic, antioxidant, antidiabetic, anticonvulsive, antidepressant, and hepatoprotective properties [10]. Because of the crop's economic importance and the need for genetic development, scientists have investigated the use of several mutagenesis agents to confer advantageous characteristics on coriander.

Chemical and physical mutagens, such as gamma rays and ethyl methanesulfonate, can be used to genetically improve coriander plants.

Table 1: **Effect of mutagen on carbohydrates, leaf protein, Fruit and seed protein and Essential oil content of the morphological mutant of *Coriandrum sativum* L.**

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	Late Flowering Mutant	5.60	±0.03	2.96	±0.02	2.44	±0.02	0.75	±0.03

±SE: Standard Error

It has been established that utilizing these mutagenic agents produces a wide range of genetic variations, which may subsequently be selected for improved features. In a research on the genetic modification of saffron, another member of the Apiaceae family, ethyl methanesulfonate-based in vitro mutagenesis was found to be a beneficial strategy for creating genetic variation and identifying desirable traits [11].

In a similar line, gamma radiation has been examined as a method of inducing mutations in cilantro. Gamma radiation has been shown to influence the accumulation of phytochemicals, secondary metabolites, and chlorophyll in coriander plants, perhaps leading to improved antioxidant properties and other beneficial features [12].

Several research have looked at the impact of gamma radiation on coriander [13-14]. According to one study, gamma-irradiation of coriander seeds enhanced mitotic and meiotic abnormalities while decreasing seed germination rate and seedling growth. Further research discovered that different combinations of light quality and intensity, which can be altered by gamma radiation, may influence the accumulation of chlorophyll and phytochemical contents in coriander leaves, modifying the leaves' antioxidant properties [12].

Conclusion

The preceding analysis shows that there is a lot of room for genetic improvement in *Coriandrum sativum* Linn. Through a mutation breeding scheme. Important characteristics such as high carbohydrate, protein, and vital essential oil content can be enhanced by mutant breeding. The mutagens cause relatively minimal changes in nutritional content in the various M3 and M4 mutants. The analysis of nutritive components revealed the use of mutation breeding to generate superior genotypes with higher nutritional and medicinal properties in Coriander.

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