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BIOCHEMICAL STUDY OF DARK GREEN LEAVES AND LUXURIANT MUTANTS IN *CORIANDRUM SATIVUM* LINN.

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ABSTRACT:
The present study was carried out for biochemical study of Dark Green leaves and luxuriant mutants in Coriandrum sativum Linn. Seeds were treated with different Concentration/Doses of Ethyl Methane Sulphonate (EMS) and Gamma rays. The treated seeds were cultivated for four generations to observe different Macro and Micro mutants in M_3 and M_4 generations. It showed two mutants like Dark Green Leaves and Luxuriant mutant. These mutants showed better yield contributing parameters and even more total essential oil, carbohydrates and protein content as compare to control.

Key words: Gamma rays, EMS, Dark Green leaves mutant, Luxuriant mutant, Essential oil.

INTRODUCTION:

Coriandrum sativum Linn. belongs to family Apiaceae. It is a fast growing pungent herb native to southern Europe and North Africa to south-western Asia, this aromatic beautiful herb is found in many parts of the world commonly known as coriander. 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 an annual soft, hairless plant growing up to 25 to 35 cm. in height. The leaves are variable in shape, broadly lobed at the base and slender and feathery top on the flowering stems. The flowers are borne in small umbels, white or very pale pink in colour, with the petals pointing away from the center of the umbel longer 5–6 mm. The fruit is a globular dry schizocarp 3–5 mm. in diameter. Fruit has delicate fragrance; seeds are pale white to light brown in colour Wallis (1985) and (Verma *et al.*, 2011).

Mutation induction is an important complementary 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). Mutation breeding is accomplished by chemical or physical treatments followed by selection for heritable changes of specific genotypes, and this method has been used successfully in the genetic improvement of crop plants (Mick *et al,*. 1985). Mutagenesis has been widely used as a potent method of enhancing variability for crop improvement (Subuthi *et al.*, 1991).

Present paper reports data on carbohydrates, protein and essential oil from dark green colour leaves and luxuriant mutants.

MATERIALS AND METHODS :

Collection of Genotype - The seed material of *Coriandrum sativum* Linn, variety CS - 287 was released by Tamil Nadu Agriculture University, Coimbatore, Tamil Nadu.

Mutagens Used - Physical mutagen gamma ray, chemical mutagen EMS were used for the treatment.

Experimental Setup - 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 M1generation.

Dark green leaves mutant and luxuriant mutants were screened in M_3 and M_4 generations for biochemical tests such as essential oil from 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 & DISCUSSION :

In Coriander the total essential oil content in fruit of the control was 0.30%. The total essential oil content in the mutants like Dark green leaves and luxuriant mutant showed increasing values as compared to control. The Dark Green Leaves mutant was the having relatively higher total essential oil percentage, which was 1.21%.

The control plant has 5.01% of carbohydrate content. The maximum amount of carbohydrate content 6.40 % was found in luxuriant mutant

The control plant has 2.50% of protein content in leaves. The maximum amount of protein content in leaves was found in luxuriant mutant, which was 3.20%.

The control plant has 2.15% of protein content in fruits and seeds. The maximum amount of protein content was found in luxuriant mutant, which was 2.60%.

The total essential oil content has shown significant enhancement in case of Dark green colour leaves mutant as compared to control. Total carbohydrate content showed significant increase in values in luxuriant mutant. Protein content in the leaf of Coriander in present investigation has revealed an enhancement in luxuriant mutant. Similarly fruit protein content showed increased values in 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.

(Chatterjee *et al.,* 2012) reported maximum variability in biochemical content like codeine, thebaine, narcotine and papaverine of Opium Poppy Gamma rays treatment and EMS treatment.

(Abdul Salam and Thoppil, 2010) also reported the similar results, where tall mutants showed high biochemical content against other mutants in *Capsicum annuum* L.

Effect of mutated genes on biochemical content was studied by (Hazra, 2012) in *Solanum lycopersicum*, revealed that mutated genes are capable of increasing biochemical content and it increased Lycopene, β carotene and Anthocyanin content. The results of biochemical investigation studied by Mullainathan and Sri Devi (2012) and reported that EMS induced synthesis of Capsanthin, oleoresin and ascorbic acid content in Chilli, which proved that chemical mutagens can be used to increase the improvement in biochemical content.

From the above observations it is clear that there is a lot of scope for genetic improvement in Coriander through mutation breeding. 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 biochemical content in the different M_3 and M_4 mutants. The estimation of biochemical components indicated the application of mutation breeding in the development of superior genotypes carrying improved nutritional and medicinal values in Coriander.

BIBLOGRAPHY :

Abdul Salam, C. M. and Thoppil, J. E. (2010). Isolation of induced morphological mutants in Capsicum annum L. *Journal of Phytology*, 2(2): 57-63.

Chatterjee, A., Shukla, S., Mishra, K. B., Rastogi, A. and Prasad Singh, S. (2012). Induction of variability through mutagenesis in opium poppy (*Papaver somniferum* L.) *Turk J. Agric.* 36: 1-11.

Gottschalk, W. and Wolf, G. (1983) Induced mutations in plant breeding. Monographs on theoretical and applied genetics, Berlin, Springer Verlag. 7: 238.

Hazra, P., Akhtar, S. H., Biswas, P., Atanassova, B. and Balacheva, E. (2012). Efect of mutant gene on nutritive quality related compounds in Tomato (*Solanum lycopersicum*) fruits. *Acta Hort.* 960.

Hedge, J.E. and Hofreiter, B. T. (1962). In: Carbohydrate Chemistry, 17. (Eds. Whistler R.L. and Be Miller, J.N.), Academic Press, New York.

Hesham H. A. Rassem, Abdurahman H. Nour and Rosli M. Yunus (2016). Techniques For Extraction of Essential Oils From Plants: A Review. Australian Journal of Basic and Applied Sciences, 10(16):117-127.

Iwo, G.A., Amadi, C. O., Elazu, C. O. and Ukpabi, J. U. (2013). Induce mutagenesis on Ginger for improved yield components and oleoresin content. *Canadian journal of Plant Breeding*. 1(3): 90-96.

Jamali, M. M. (2012) Investigate the effect of drought stress and different amount of nitrogen and phosphorus fertilizer on oil yield and seed yield of coriander (*Coriandrum sativum* L.). *International journal of Agronomy and Plant Production* 3(12): 585-589.

Latif, H. H., Abdalla, M. A., Ahmed, F. S. (2011). Radio-stimulation of phytohormons and bioactive components of coriander seedlings. *Turkish Journal of Biochemistry–Turk J Biochem* 36 (3): 230–236.

Lowery, O. H., Rosebrough, N. J., Farr, A. L. and Randall, R. J. (1951) *J Biol chem*. 193: 265.

Mick, A., Maluszynski, M. and Donin, B. (1985) *Mutat. Breed. Rev*. 3: 1-92.

Moghaddam, S. S., Hawa, J., Rusli I., Asmah, R., Aziz, M. A. and Philip, E. (2011). Effects of Acute Gamma Irradiation on Physiological Traits and Flavonoid Accumulation of *Centella asiatica*. *Molecules* 16: 4994-5007.

Mullainathan, L. and Sri Devi, A. (2012). Effect of EMS and DES on oleoresin, capsathin and Ascorbic acid contents in chilli. *Int. J. Cur.Tr. Res* 1 (3): 110-114.

Subuthi, P. K., Mohapatra, B. K. and Sinha, S.K. (1991) *Indian J. Genet.* 5(1): 101-111.

Verma, A., Pandeya, S. N., Yadav, S. K., Singh, S. and Soni, P. (2011) A Review on *Coriandrum sativum* (Linn.): An Ayurvedic Medicinal Herb of Happines. *Journal of Advances in Pharmacy and Healthcare Research* 1(3): 28-48.

Wallis, T. E., (1985). Text book of Pharmacognosy, (Fifth edition), Published by S.K. Jain for CBS publishers and Distributors, Delhi 246 -248

TABLE NO. 1: Effect of mutagen on biochemical contents of the Dark Green leaves and Luxuriant mutant of *Coriandrum sativum* L.

Sr. No.	Morphological Mutatnts	Essential oil		Carbohydrates		Protein (Leaf)		Protein (Fruit)	
		%	±SE	%	±SE	%	±SE	%	±SE
1	Control	0.30	±0.01	5.01	±0.02	2.50	±0.02	2.15	±0.01
2	Dark Green Leaves Mutant	1.21	±0.03	6.12	±0.01	3.15	±0.03	2.52	±0.01
3	Luxuriant Mutant	0.89	±0.01	6.40	±0.02	3.20	±0.01	2.60	±0.02

±SE: Standard Error