

Original Research Article

Study of M₁ Generation in Coriander (*Coriandrum sativum* L.) through Induced Mutation Breeding Technique

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ABSTRACT

Coriander (*Coriandrum sativum* L.) is an annual herb, mainly cultivated for its fruits as well as for the tender green leaves. It is native of the Mediterranean region. In India, it is grown in Andhra Pradesh, Tamil Nadu, Karnataka, Rajasthan and Madhya Pradesh. Research was conducted for studying the induced mutation in Coriander two types viz., CO 3 and K Selection (Sn-K) were selected. Based on sensitivity studies, four doses of gamma rays (10, 15, 20, 25 kR), four doses of EMS (10, 15, 20, 25 mM) and four doses of combination treatments (10 kR + 10 mM, 10 kR + 15 mM, 15 kR + 10 mM, 15 kR + 15 mM) were attempted. In M₁ generation greatly influenced by combination treatment for seed yield.

Keywords

Coriander, Induced mutation, M₁ generation studies, Seed yield, Gamma rays, EMS and both combination treatments

Introduction

Coriander belongs to the family Apiaceae. It is a smooth, erect annual herb 30 to 70 cm high, lower leaves broad with crenately lobed margins, upper leaves finely cut with lineary lobes and ripe seeds are aromatic and the essential oil content, which varies from 0.1 to 1.0 % used flavouring liquors and to mask the offensive odours in pharmaceutical preparations The dried ground fruits are the major ingredients of the curry powder. The whole fruits are also used to flavour foods like pickles, sauces and confectionary. The young plants as well as the leaves are used in the preparation of chutney and are also used as seasonings in curries, soups, sauces and chutneys. It has medicinal properties too. Fruits are said to have carminative, diuretic,

tonic, stomachic and aphrodisiac properties. It is a tropical crop and can be grown throughout the year, except very hot season i.e. March-May for leaf purpose, but for higher grain yield it has to be grown in specific season. A dry and cold weather free from frost especially during flowering and fruit setting stage favours good grain production.

Cloudy weather during flowering and fruiting stage favours pest and disease incidences. Heavy rain affects the crop. As an irrigated crop, it can be cultivated on almost all types of soils provided sufficient organic matter is applied. Black cotton soils with high retentivity of moisture are best under rainfed conditions.

Materials and Methods

Two coriander (*Coriandrum sativum* L.) types viz., CO 3 and K Selection (Sn-K) were selected for the research study. (Table 1, Table 2). The mutagenic treatments are Gamma, EMS and combination. The trial was conducted in Tamil Nadu Agricultural University, Coimbatore. For the treatment gamma rays (10, 15, 20, 25 kR), four doses of EMS (10, 15, 20, 25 mM) and four doses of combination treatments (10 kR + 10 mM, 10 kR + 15 mM, 15 kR + 10 mM, 15 kR + 15 mM) were attempted (Table 3). Mutation breeding has been attempted with the following objectives:

- ❖ To determine the sensitivity of varieties to physical and chemical mutagens.
- ❖ To study the relationship between sensitivity and mutability in the M₁ generation.
- ❖ To ascertain the economic

potentialities of viable macro mutant in M₁ generation.

- ❖ To find out the heritability, genetic advance, strength and direction of association between yield and its contributing characters.
- ❖ To find out the economic mutants for the desired changes.

Results and Discussion

Among the various forms of mutagenic treatments used, gamma irradiations recorded the highest value (23.57) followed by EMS (22.80) and combination (23.23) treatment,. Among the varieties CO 3 recorded higher number of seeds (24.10) compared to Sn-K (22.37). The spectrum of increase in range was respectively, 25.85 to 130.37 and 23.21 to 45.14 per cent over control in CO 3 and Sn-K. The highest yield of 5.44 and 4.88g per plant were recorded in 25 kR in CO 3 and Sn-K (Table 3).

Table.1 Key characters of genotype

Sl.No	Genotype	Institute responsible for development	Parentage and distinguishing key characters
1.	CO 3	Horticultural College and Research Institute, Coimbatore	Germplasm selection from A.T.P. 77.
2.	Sn-K	N.D. University of Agricultural and Technology, Faizabad	Selection from Kumarganj.

Table.2 Mutagenic treatments

Sl. No	Mutagens	Doses / Concentrations
1.	Control	-
2.	Gamma	5, 10, 15, 20, 25 kR
3.	EMS	5, 10, 15, 20, 25 mM
4.	Gamma kR + EMS mM	10+10,10+15, 15+10, 15+15

Table.3 Effect of mutagen on seed yield per plant (g) in M₁ generation

Treatments		CO 3		Sn-K		Treatment mean	Percent of control
		Mean	Percent of control	Mean	Percent of control		
Gamma kR	C1	2.36	100.00	3.36	100.00	2.86	
	10	3.19	135.17	4.14	123.21	3.67	128.15
	15	5.33	225.85	4.25	126.59	4.79	167.54
	20	4.62	195.62	7.53	224.21	6.08	212.41
	25	5.44	230.37	4.88	145.14	5.16	180.30
	Mean	4.64		5.20		4.92	
EMS mM	10	5.12	216.81	9.49	282.34	7.30	255.30
	15	5.52	233.76	3.50	104.07	4.51	157.58
	20	4.21	178.39	3.94	117.26	4.08	142.48
	25	5.82	246.75	3.85	114.68	4.84	169.17
	Mean	5.17		5.19		5.18	
Gamma kR + EMS mM	10+10	4.00	169.49	5.82	173.21	4.91	171.68
	10+15	6.17	261.30	4.89	145.63	5.53	193.36
	15+10	3.69	156.22	3.66	108.83	3.67	128.38
	15+15	3.98	168.64	7.37	219.35	5.68	198.43
	Mean	4.46		5.44		4.95	
Variety	mean	4.66		5.39		5.02	
			S.ED	CD = (P = 0.05)	CD = (P = 0.01)		
Between varieties			0.160	0.321	0.428		
Between treatments			0.408	0.819	1.093		
Variety Vs treatment			0.577	1.159	1.546		

Fig.1 Effect of mutagen on seed yield per plant (g) in M₁ generation for CO₃

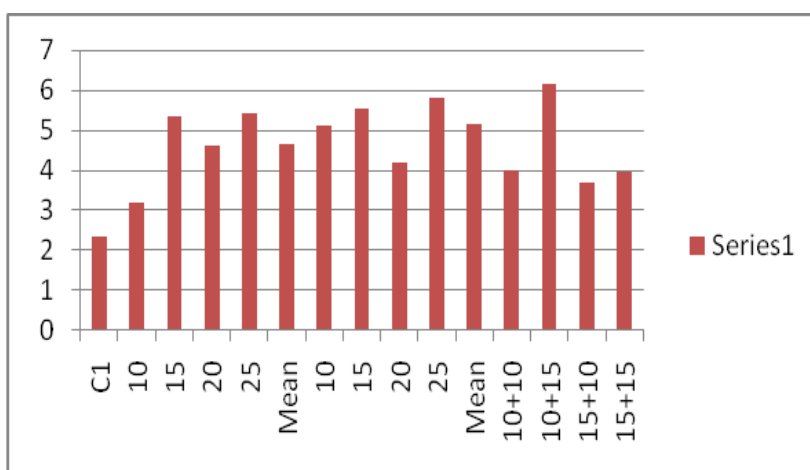


Fig.2 Effect of mutagen on seed yield per plant (g) in M₁ generation for Sn-K

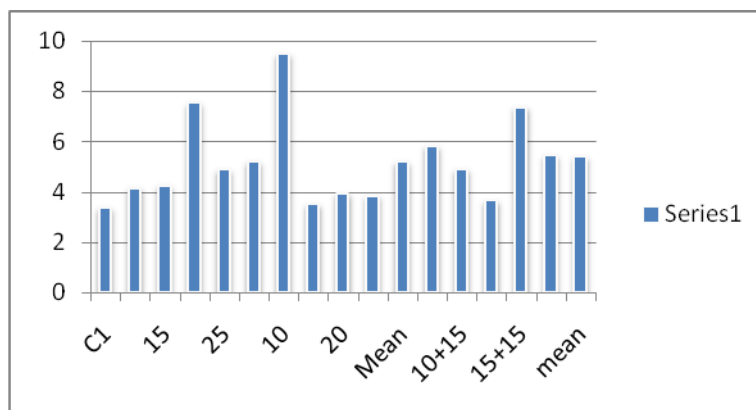
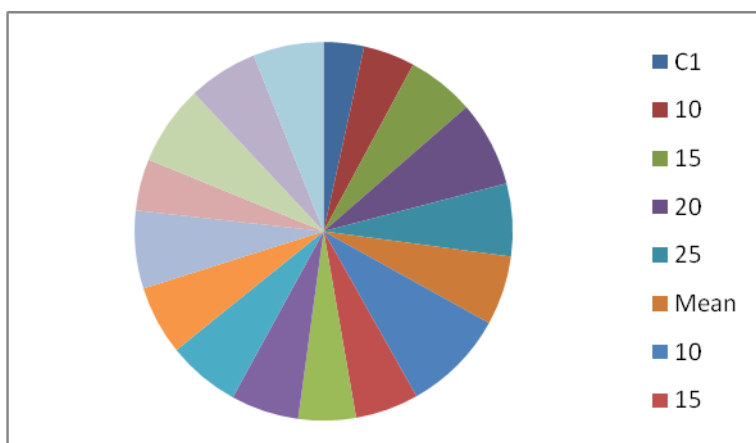


Fig.3 Treatment effect of Gamma (kR) + EMS (mM) mutagen on seed yield per plant (g) in M₁ generation



In EMS treatments the seed yield showed an overall positive shift. The greatest reduction (4.03) was recorded by 10 kR treatment. Fig 1, 2, 3 in EMS treatments also had the same effect as that of gamma treatments in CO 3 at 20 and 25 mM concentrations which recorded an increased per cent of umbels, the mutagenic treatments (Rathnasamy *et al.*, 1975). This increase or decrease was reflected in the yield contributing factors like number of umbels, number of umbellets per umbel, seeds per umbel and 100 seed weight. The influence of combination was greater in both the varieties and the increase was between 30 and 49 per cent. The 100 seed weight, one of the yield contributing character was greatly influenced by

combination treatment, Reduction in plant height due to mutagenic treatments in the early part of their growth phase had been recorded in many crops like lablab, green gram (Suresh, 1975), fenugreek (Raguvanashi and Singh, 1977).

References

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