Short Communication

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EFFECTS OF GAMMA IRRADIATION ON MUTANT GENOTYPES : *CHRYSANTHEMUM* CULTIVAR 'D-5' AND ITS MUTANTS

S.K. DATTA
Mutation Breeding Laboratory, National Botanical Research Institute, Lucknow-226 001, India.
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Effects of gamma radiation on different cultivars of garden chrysanthemum have been studied by a number of workers (Broertjes & Van harten, 1978; Datta, 1988, 1989a, 1989b, 1992a, 1992b). Literature on effects of gamma radiation on mutant genotypes is very scanty. The present paper reports the radiosensitivity of three mutant genotypes of chrysanthemum.

Rooted cuttings of 'D-5' (original cultivar) and its three gamma ray induced somatic mutants viz. 'Alankar', 'Shabnam' and 'Agnisikha' were treated with 0, 1.5, 2.0 and 2.5 Krad gamma rays for testing radiosensitivity.

Survival, plant height, branch, leaf and flower-head number were reduced in all the exposures of gamma rays in 'D-5' and its three mutants. Different types of morphological abnormalities in leaves and flower-heads were recorded after irradiation in all the cultivars and the percentage of abnormalities increased with increase in doses in all the cases (Fig. 1). There were no significant differences in Interphase Nuclear Volume (INV), Interphase Chromosome Volume (ICV) and total DNA content per nucleus between the original and three mutants. The INV and ICV (um^3) in 'D-5', 'Alankar', 'Shabnam' and 'Agnisikha' were 2169.29±71.14 and 40.70±1.32; 2149.89±57.28 and 39.81±1.40; 1978.35±49.84 and 37.62±2.12; and 2014.89±57.28 and 39.81±1.40; 1978.35±49.84 and 37.62±2.12; and 2014.37±58.35 and 38.21±1.74 respectively. Similarly the 2 c DNA content (pg) was 19.90±0.12, 19.82±0.17, 13.70±0.15 and 12.70±0.22 in 'D-5', 'Alankar', 'Shabnam' and 'Agnishika' respectively. Chromosomal abnormalities such as clumping, bridges (single, double and triple) with or without fragment, laggards early separation and micronuclei were recorded after irradiation in all the cases. The percentage of cells with chromosomal abeerations increased with increase in exposure in all the cases. Induced flower colour mutations were detected on all the cultivars after irradiation except in 'Agnisikha' which was found to be very stable. The frequency of mutations varied with the cultivar and exposure of gamma rays.

In the present experiment the response of original cv. 'D-5' and its three mutants to gamma rays was almost same. There was no significant difference in radiation sensitivity between the original and the mutant genotypes as assessed presently on the basis of different cytomorphological parameters. Regarding mutations both the mutant genotypes ('Alankar' & 'Shabnam') mutated further to produce new flower colour. But no mutation could be

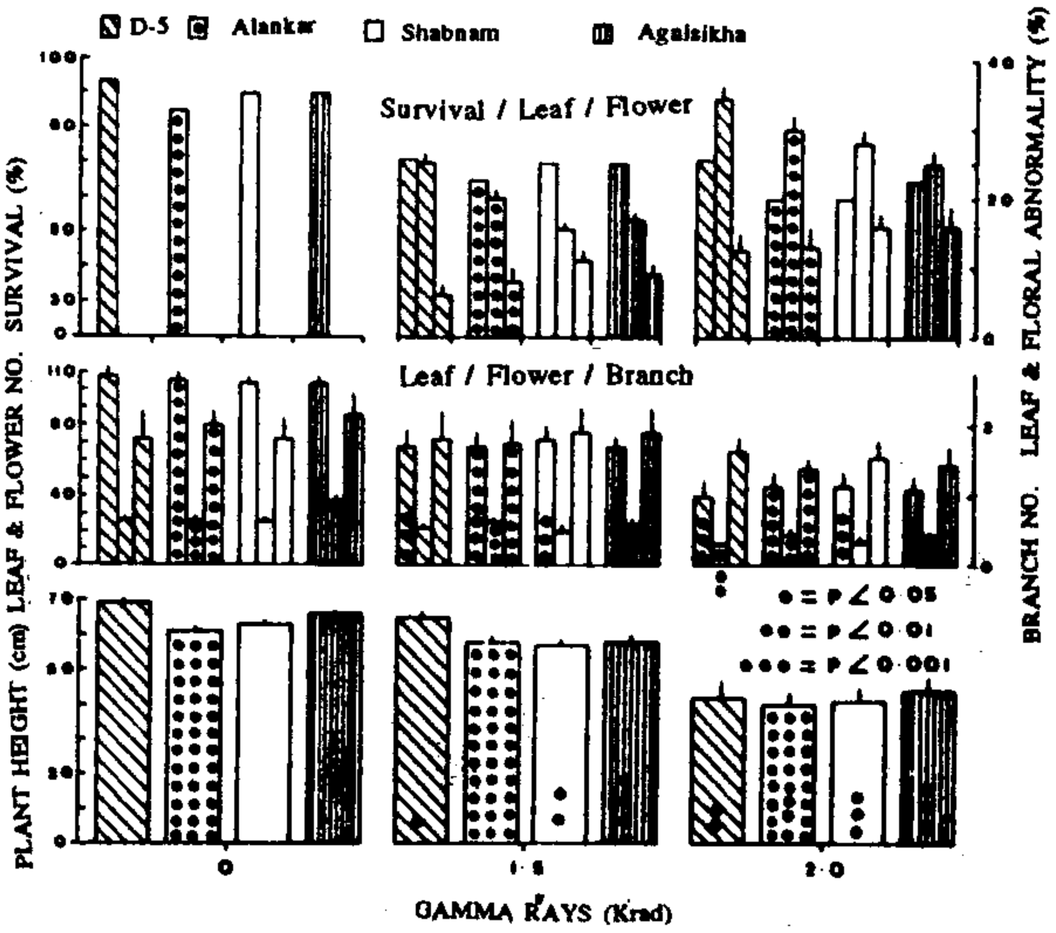

Figure 1. Graph showing effects of Gamma rays on different characters of criginal chrysanthemum cv. 'D-5' and three of its Gamma ray induced mutants.

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Table 1. Per cent cells with chromosomal aberrations during root tip mitosis in original chrysanthemum cv. 'D-5' and three of its gamma ray induced mutants 'Alankar', 'Agnisikha' & 'Shabnam'

Aberrations (%)	Cultivar	Gamma rays (Krad) 0 (Control)	1.5	2.0	2.5
Clumping	D-5	2.24	3.43	3.69	4.93
	Alankar 2.90	2.13	2.00	8.37	
	Agnisikha	0.16	1.16	1.17	2.20
	Shabnam	0.13	2.23	1.46	2.01
Bridges	D-5	0.72	4.29	7.41	19.83
	Alankar	-	4.42	13.21	11.73
	Agnisikha	0.16	1.42	2.35	3.62
	Shabnam	0.13	2.09	3.20	3.59
Laggards	D-5	-	-	0.37	-
	Alankar	-	-	0.34	-
	Agnisikha	-	-	0.15	-
	Shabnam	-	-	0.29	0.29
Early separation	D-5	-	-	-	-
	Alankar	0.21	-	0.34	-
	Agnisikha	-	0.39	0.29	0.63
	Shabnam	-	-	-	0.14
Microunclei	D-5	0.16	-	0.15	-
	Alankar	0.08	-	0.15	-
	Agnisikha	-	-	0.15	0.31
	Shabnam	-	0.13	0.58	0.57
Total±S.E.	D-5	1.73±0.40	3.69±0.68	5.20***±0.82	9.53±1.24
	Alankar	2.35±0.38	3.00±0.59	5.83±0.76	9.65±1.13
	Agnisikha	0.33±0.23	2.97***±0.61	4.10±0.76	6.77***±1.00
	Shabnam	0.26±0.18	4.46***±0.76	5.53***±0.87	6.61±0.94

No. of cells examined : 'D-5' - 556-1040; 'Alankar' - 684-1040; 'Agnisikha' = 611-774; 'Shabnam = 687-782.
+ = P/0.002; *** = P/0.001

induced in 'Agnisikha' indicating that flower colour (pigment composition) of starting material is responsible for new flower colour mutation. Role of flower colour (pigment composition) of starting material for development of mutation has been reported earlier by the author (Datta, 1989b, 1990a,b).

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