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Short Communication

Induced chlorophyll mutations in lentil (*Lens culinaris* Medik)

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Among the pulses, lentil (*Lens culinaris* Medik) is widely grown in the Indian subcontinent with an average yield of 733 kg/ha [1]. However, available cultivars are either small seeded, late maturing or bold seeded but rust susceptible. In an attempt to produce bold seeded, early maturing and rust resistant/tolerant mutants in lentil, the most noticeable effect of gamma-rays (ionizing radiation) observed was concomitant appearance of chlorophyll mutations in the M_2 generation. Induced chlorophyll variation serve as an indication of viable mutations in irradiated populations [2].

Dry seeds of three cultivars of lentil *viz.*, Pant L 406 (small seeded), E 258 and K 75 (bold seeded) were irradiated with two doses of gamma-rays (10 and 15 kR) using ^{60}Co as source at Bhabha Atomic Research Centre, Trombay. The dose rate was 2.368 kR per minute. Three hundred seeds were taken for each treatment as well as for the control.

After the exposure, the irradiated seeds along with the unirradiated control were sown (treatment and variety wise) in a randomized complete block design in the *rabi* season of 1994-95 with three replications in two rows-plot of 5m. length keeping plant to plant and row to row distance at 5 and 22.5 cm., respectively. Individual plants from each irradiated population were covered with muslin cloth bag and harvested separately,

Table 1. Frequency and spectrum of chlorophyll mutations in the M_2 generation of lentil.

Treatment	Total no. of M_2 progenies studied	Total no. of M_2 progenies segregating	Total no. of M_2 seedlings examined	No. of chlorophyll mutants and frequency in M_2 seedling	Spectrum and observed segregation							
					Xantha		Alboxantha		Tigrina		Chlorina	
					Mutant	Normal	Mutant	Normal	Mutant	Normal	Mutant	Normal
Pant L 406												
Control	5	-	331	0	-	-	-	-	-	-	-	-
10 kR	55	15(27.3%)	2781	22(0.8)	7*** (0.25%)	110**	5** (0.18%)	77**	6*** (0.22%)	108***	4* (0.14%)	63*
15 kR	37	7(18.9%)	1347	10(0.7)	3* (0.22%)	48*	2* (0.15%)	31*	5** (0.37%)	76**	Nil	Nil
K 75												
Control	5	-	238	0	-	-	-	-	-	-	-	-
10 kR	39	9(23.0%)	1149	15(1.3)	5** (0.43%)	88**	3* (0.26%)	46*	4* (0.35%)	83*	3* (0.26%)	55**
15 kR	23	4(17.4%)	749	8(1.1)	3 (0.40%)	50	3 (0.40%)	42	2* (0.27%)	34*	Nil	Nil
E 258												
Control	5	-	148	0	-	-	-	-	-	-	-	-
10 kR	24	6(25.0%)	297	6(2.0)	2* (0.67%)	36*	2* (0.67%)	38*	2* (0.67%)	25*	Nil	Nil
15 kR	7	1(14.3%)	38	1(2.6)	1 (2.63%)	12	Nil	Nil	Nil	Nil	Nil	Nil

*Combined segregation of 2 progenies in a treatment; **Combined segregation of 3 progenies in a treatment; ***Combined segregation of 5 progenies in a treatment; Values in the parenthesis indicate percentage of chloro-mutant seedling

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and were planted in a 'plant to progeny' wise to grow the M_2 generation in winter season of 1995-96. At seedling stage, chlorophyll deficient plants were counted for estimation of chlorophyll mutation frequency. Frequencies and spectrum of chlorophyll mutations were recorded based on per cent of segregating families as well as mutants/100 of M_2 seedlings.

Four different types of chlorophyll mutations *viz.*, xantha, albo-xantha, tigrina and chlorina were observed in the M_2 generation. Xantha was characterized by yellow to whitish yellow coloured leaves and survived only 15-20 days. The albo-xantha type was characterized by yellowish leaves with white tips and survived only a few weeks. The tigrina type was characterized by a varying degree of anthocyanin pigmentation in the seedlings and did not survive beyond 18-20 days. The chlorina type was pale dull green-yellow to yellow-green and was distinguished from xantha by the presence of green colour.

The different types of chlorophyll mutations, their frequencies, spectrum and segregation pattern in the irradiated M_2 populations of Pant L 406, K 75 and E 258 are presented in Table 1.

In the present study, differential response of genotypes to irradiations doses with respect to frequency of chlorophyll mutations was noticed. Highest frequency (2.6) was observed in E 258 at 15 kR dose and lowest one was observed in Pant L 406 at the same dose. All the four types of chlorophyll mutations were found with varying frequencies at 10 kR dose in K 75 and Pant L 406, whereas the same dose induced three types i.e., xantha, albo-xantha and tigrina in E 258. In Pant L 406 and K 75 15kR dose had induced xantha, albo-xantha and tigrina, whereas only xantha type was found at the same dose in E 258. Dixit and Dubey [3] reported xantha, tigrina, viridis, straita, albo-xantha and virido-xantha types of chlorophyll mutations in lentil. Reddy and Viswanathan [4] reported albina, Xantha, Viridis and albo-xantha types of chlorophyll mutations in lentil. Vandana *et al.*, [5] found xantha, viridis, straita and virido-xantha types, whereas only xantha and viridis types were obtained by Rajput and Sarwar [6].

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