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Response of Different Species of *Vernonia* to Gamma Radiations

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Two species of Vernonia viz *V. galamensis* (Cass.) Less and *lasiopus* (O) Hoffm. procured from USA were recently introduced at Regional Research Laboratory, Jammu and evaluated alongwith indigenous *V. anthelmintica* (L) Willd. for ecological suitability, adaptability and yield potential (Singh *et al.* 1990, Ram *et al.* 1990). With a view to enhance crop potential of the species, a comprehensive programme of induced mutation and breeding has been initiated for development of plant types with higher yield of seed and oil ha^{-1}. The present study compares response of three species to different levels of Gamma radiations and records their LD_{50} (Dose causing 50% reduction in growth) for selection of suitable dosage for inducing mutations.

Viable seeds of the species were separately exposed to different levels of Gamma radiations and planted over moist filter paper in triplicate of 100 seeds each and kept in BOD incubator with two tube lights maintained at 25 ±1°C. From another batch of similarly treated seeds grown under indentical conditions, root tips fixed in 1:3 acetic alcohol were used in squash preparation with Feulgen for scoring chromosomal aberrations at anaphase.

Nuclear volume of the species was determined according to method of Sparrow *et al.* (1965). Data on seed lethality and seedling root growth injury were recorded in Petri plates after 20 days of sowing.

Presowing exposure to Gamma radiations caused a dose dependent increase in seed lethality and seedlings growth injury (Table 1). Significant increases in these parameters were observed at higher doses of radiations (45-75 kR). For identical treatments, the extent of damage (shoot and root growth injury) was higher in *V. galamensis* followed by *V. anthelmintica* and *V. lasiopus*. Seed of *V. galamensis* exposed to 60 & 75 kR Gamma radiations recorded a very high frequency of chromo-

Table 1 *Effect of Gamma rays on growth of three species of Vernonia.*

	Nuclear volume U^3±SD	Dose (kR)	Germination (%)±SD	Chromosomal aberration 100^{-1} cells ±SD	Seedling growth (cm)±SD	Root growth (cm) ±SD
V. anthelmintica	139.6±5.1	0	90.3±2.6	0	5.43±0.19	3.60±0.13
		30	86.3±3.4	14.3±3.6	3.91±0.21	1.94±0.20*
		45	83.6±4.1	27.0±5.1	3.13±0.34*	1.52±0.18*
		60	78.0±3.8*	41.3±6.0	2.92±0.18**	0.90±0.09**
		75	72.6±3.6**	54.0±4.3	2.72±0.17**	0.83±0.03**
V. galamensis	396.3±9.7	0	92.6±3.4	0	6.13±0.16	5.27±0.18
		30	83.3±2.6	40.1±6.2	3.54±0.19*	2.34±0.16*
		45	80.6±3.9*	65.3±4.5	3.21±0.16**	1.91±0.13*
		60	73.2±4.1*	73.5±7.2	3.05±0.23**	1.39±0.16*
		75	68.3±3.3**	86.4±6.4	2.80±0.18**	1.05±0.21**
V. lasiopus	120.3±3.6	0	96.6±3.8	0	3.16±0.02	2.60±0.03
		30	90.3±4.3	20.5±4.2	2.12±0.17	1.63±0.08
		45	86.3±4.1	36.4±5.6	1.90±0.05*	1.04±0.02*
		60	73.6±4.3*	48.3±3.8	1.54±0.07**	0.87±0.08**
		75	70.2±4.1**	63.3±5.7	1.73±0.04**	0.56±0.02**

* Significant at P = .05%   ** Significant at P = 01%

somal aberrations (73.5% & 86.4%) against 48.3 & 63.5% and 41.3 & 50.0% in *V. lasiopus* and *V. anthelmintica* respectively. In all the three species radiated seeds recorded a comparatively higher range of root growth injury than that of shoot growth damage. The LD_{50} in *V. anthelmintica* & *V. lasiopus* is around 75 and 50 kR for *V. galamensis*; thus, out of the three, *V. galamensis* appeared to be most sensitive. Species differ in the radio-sensitivity and show varied response (Sparrow *et al.* 1975, Ehrenberg *et al.* 1974). The relationship between nuclear volume and radiosensitivity of species has been extensively studied (Sparrow *et al.* 1965) with the inference that radio-sensitivity increased with increase in nuclear volume. This contention is supported by the present finding that *V. galamensis* recorded highest nuclear volume with enhanced sensitivity to Gamma radiations. The metaphase chromosome length, total number of recessive genes, qualitative differences in the DNA and heterochromatin etc. are among other important factors affecting sensitivity of species (Sparrow & Christensen 1953).

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