

Impact of gamma rays on the genetic parameters of turmeric

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ABSTRACT

In order to study the impact of gamma rays on the genetic parameters of turmeric, experiments were carried out during the year 2000-2003 in the Department of Spices and Plantation Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in Factorial Randomized Block Design with two replications. Three genotypes namely Salem local - G_1 (CL144), Alleppy finger turmeric - G_2 (CL146) and PTS 43 - G_3 (CL147) were used for the investigation. The treatment doses consisted of seven doses of gamma rays (1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0 kR) along with a control. In vM_0 and vM_1 generations, number of primary rhizomes exhibited the highest PCV and GCV. Heritability in broad sense was the highest (90.00 per cent) for essential oil content followed by curcumin content (83.00 per cent) in vM_0 generation, whereas in vM_1 generation, greater heritability (67.00 per cent) was recorded for height of the plant followed by number of primary rhizomes (60.00 per cent). GA as per cent of mean was high for number of secondary rhizomes (66.84 per cent), followed by yield per plant (41.60 per cent) in vM_0 generation, whereas greater value (53.00 per cent) was expressed by number of primary rhizomes in vM_1 generation.

Key words : Gamma rays, Genetic parameters, Turmeric.

irradiation with gamma rays.

The genus *Curcuma* consists of about 70-80 species of rhizomatous herbs distributed in Indo-Malaysian region (Purseglove *et al.*, 1981). In India, about 40 species are found. Among them, *C. longa* L.; *C. domestica* Val., *C. aromatica* Salisb., *C. amada* Roxb., *C. angustifolia* Roxb., *C. caesia* Roxb., *C. mangga* Val. and *C. zeodoria* (Beng.) Rosc. are some of the economically important ones (Purseglove *et al.*, 1981). *C. longa* L.; *C. domestica* Val. is the source of turmeric which is used as a spice, food colourant, dye and in medicine. *C. zeodoria* (Beng.) Rosc. is the wild turmeric or yellow zeodory, used as a dye, cosmetic and drug but not as a condiment. This species is found wild in India. The rhizomes have the smell of camphor (Purseglove *et al.*, 1981). Cultivated turmeric, *Curcuma longa* L. is considered to be a sterile triploid with a somatic chromosome number of sixty three ($2n=3x=63$), while, *C. aromatica* is a tetraploid ($2n=4x=84$) and set seeds. *C. longa* being a sterile triploid, flowers, however, fail to set seed. The success of variable seed set of Prabha and Prathiba which are open pollinated progenies in turmeric under Kerala conditions, by recombination breeding programme has been reported by Sasikumar *et al.*, 1994. In turmeric, systematic attempts on induction of mutations are scanty and the methodologies for induction and recovery of the mutants are yet to be standardized. An attempt was therefore made to induce variability by

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MATERIALS AND METHODS

Experiments were carried out during the year 2000 - 2003 in the Department of Spices and Plantation Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in Factorial Randomized Block Design and replicated twice. Three genotypes namely Salem local - G_1 (CL144), Alleppy finger turmeric - G_2 (CL146) and PTS 43 - G_3 (CL147) were used for the experimental purpose. Gamma ray source was cobalt - 60 in 1000 Ci, emitting 5000 rads per minute at the time of irradiation. Uniform sized finger rhizomes (approximately 10g) were selected and cut into pieces having 3 nodes per cutting. These rhizome bits subjected to seven doses of gamma rays (1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0 kR) along with a control were used as planting material. The statistical parameters such as mean, variance, standard deviation, coefficient of variation and standard error were calculated for each genotype.

RESULTS AND DISCUSSION

Effect of gamma rays on genetic parameters in vM_0 generation :

The yield per plant exhibited the highest phenotypic coefficient of variation (44.71 per cent) followed by number of primary rhizomes (44.48 per cent). Lower value for phenotypic coefficient of variation (5.06 per cent) was observed in curing per cent. The highest