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Induced mutagenesis in okra [*Abelmoschus esculentus* (L.) Moench] by gamma rays and ethyl methane sulphonate

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The special use of induced mutations are basically to improve polygenic traits in crop plants by introducing desirable mutants directly into commercial cultivars or to use them indirectly through cross breeding. Considerable progress has been made to study the effect of induced mutations in okra *[Abelmoschus esculentus* (L.) Moench), but comprehensive information on different aspects of genetic mutants in segregating generation in okra are limited. In the present investigation an attempt has been made to study the morphological and economical mutants.

The five hundred seeds of okra variety Parbhani Kranti were irradiated with gamma rays at 15, 30, 45 and 60 kR (^{60}Co source). For ethyl methane sulphonate (EMS) treatments, five hundred seeds of Parbhani Kranti were soaked in distilled water for 12h followed by soaking of seeds in freshly prepared EMS solution in phosphate buffer pH 7.0 (0.2, 0.4, 0.6, 0.8 and 1.00%) for 6h, thereafter washed thoroughly in running tap water for an hour before sowing to terminate the reaction of the chemical. The treated seed along with their respective controls were sown to raise the M_1 generation during summer season 2010 at Experimental Farm of Department of Agricultural Botany, MKV, Parbhani. Self seed of healthy, disease free individual plants of M_1 generation were harvested and individual plant progenies were raised in M_2 generation with two replications in RBD during *Kharif* season of 2010. The observations were recorded for germination, mortality, pollen sterility, days to flowering, number of fruit per plant, number of primary branches, seeds per fruits and yield per plant. A number of stable mutants selected in M_2 generation were grown in RBD with two replications at 45 x 30 cm spacing along with their respective controls during summer season of 2011 to observed the breeding behaviour of mutants in M_3 generation.

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Significant differences between the treatments were observed for all the characters in M_2 generation. The lower doses of mutagens i.e. 15 kR and 30kR gamma rays and 0.2 and 0.4 per cent EMS produced increased in germination, plant height, number of fruits per plant, fruit length, number of seeds per fruit and yield per plant. Significant decrease was recorded for yield per plant at 45 kR and 60 kR gamma rays and 0.8% and 1.00% EMS in M_2 generation. However the range of most of the characters studied was higher as compared to control. The more altered range of characters resulted due to occurrence of polygenic mutations with equal frequencies towards positive and negative directions as reported by Singh *et al.,* (1998).

In M_2 generation number of morphological and economical mutants like chlorophyll, tall plant, dwarf plant, fruit size, early and late maturity were isolated and their breeding behavior was observed in M_3 generation.

Selection could be made in M_2 generation as wide variability occurs for various traits which decreases when the population is advance to M_3 generation. It is appeared that mutagenic treatments were very effective in inducing

Table 1 : Induced mutants of Parbhani Kranti and their characters.

Mutant	Dose	Character
Parbhani Kranti		
PK – 1	30 kR	Dwarf with short internoded
PK – 2	30 kR	Tall, more branches and long fruited
PK – 3	45 kR	Long fruited and more branches
PK – 4	60 kR	Dwarf with short internoded
PK – 5	60 kR	More branches with anthocynin pigmented
PK – 6	60 kR	Short fruited and dwarf
PK – 7	0.4% EMS	Tall and long internoded
PK – 8	0.6% EMS	Early maturing and dwarf
PK – 9	1.0% EMS	Short fruited, dwarf and short internoded

Table 2 : Mean values for various characters in induced mutants of Parbhani Kranti

Mutant	Plant height (cm)	Days to 50% flowering	Fruit length (cm)	Yield per plant (g)	Seeds per dry fruit
Control PK	86.40	44.00	13.40	108.50	59.50
PK – 1	60.93*	49.27	11.02	122.03	55
PK – 2	117.13**	48.03	16.03**	138.02	50
PK – 3	87.23	42.10**	18.07**	162.04	63*
PK – 4	62.30**	49.13	10.93	109.03	52
PK – 5	71.90	51.00	10.87	114.34	46*
PK – 6	70.45*	48.20	9.10**	101.80	40**
PK – 7	122.30**	47.50	14.50	117.20	56
PK – 8	76.60*	39.70**	10.70	113.90	48
PK – 9	85.20	46.20	8.30**	104.50	41**

*, ** - significant at P= 0.005 and P = 0.01 respectively.

macromutations for various desirable traits which is a consonance of the earlier finding in okra by Sharma and Arora (1991), Kulkarni and Nerkar (1992). These desirable mutants may be useful and valuable in okra improvement programme.

References

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