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Studies on heritability and genetic advance in mutant populations of sesame (*Sesamum indicum* L.)

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ABSTRACT

An investigation was undertaken to elucidate information on induced variability for yield and yield components in sesame (*Sesamum indicum* L.). The study consisted of two genotypes treated with physical (gamma rays) and chemical (EMS) mutagens. Two sesame varieties were treated with gamma rays ^{60}Co source with doses of 10,20,30,40 and 50 krad followed by Ethyl methane sulphonate with concentrations of 0.8, 1.0, 1.2, 1.4 and 1.6 per cent. The LD_{50} values based on germination reduction in the M_1 generation were fixed at 30krad and 1.2 per cent for gamma rays and EMS, respectively. High GCV for the traits plant height and number of capsules per plant in both the varieties was observed. Induced genetic variability was more in Cardeboriga than SVPR 1.The high heritability and genetic advance combined with increased genetic variability was realized for the characters *viz*., number of seeds per capsule and number of capsules per plant. The enhanced genetic variability observed for seed yield and its components in M_2 generation of the present study indicated the scope for effective selection.

Key words : Sesame, Gamma rays, EMS, Mutant population and variability studies

INTRODUCTION

Mutational genetic manipulation of crop plants has been used very successfully to reconstruct crop ideotypes and improve a number of productive characteristics, in effect increasing the yield potential. This has been amply demonstrated in many crop species as exemplified by Xue Bai *et al.* (2000) in soybean, Shadakshari *et al.* (2001) in rice, Sharma (2001) in pea, Singh *et al.* (2001) in blackgram, Muthusamy and Jayabalan (2002) in cotton, Samiullah (2004) in blackgram, Singh (2006) in cowpea and Janila *et al.* (2007) in groundnut. More than 1500 mutant cultivars of crop plants with significantly improved attributes have been released worldwide in the last 30 years through induced mutation.

Sesame is probably the most ancient oilseed known and used by man. Success in any breeding programme depends on the amount of genetic variability present for the different characters in population. The genetic variability offered by mutagenic agents is of extreme importance in plant breeding. The variability in quantitative characters increases considerably by treating the biological materials with different mutagenic agents. An estimation of the extent of variability induced in M_2 generation will be of great value to provide useful information for carrying out further selection.

MATERIALS AND METHODS

Two promising sesame genotypes namely, SVPR 1 (ruling popular white seeded type) and Cardeboriga (monostem African type) were treated with the two mutagens *viz*., gamma rays and EMS. Two hundred well filled dry seeds were sealed in butter paper covers and exposed to 10 to 50 krad doses of gamma rays from ^{60}Co source at Indira Gandhi Centre for Research, Kalpakkam, Tamil Nadu. Another variety of two hundred seeds of each variety, for each treatment were presoaked in distilled water for four hours then treated with different concentrations of EMS ranging from 0.8 to 1.6 per cent for three hours. After the treatment, the seeds were thoroughly washed with tap water ten times. The normal good looking plants based on base population randomly selected in each treatment in the M_1 generation were advanced to M_2 generation. They were sown in family rows in a Randomized Block Design replicating four times with a spacing of 30 cm between rows and 30 cm between plants. Five normal looking plants chosen randomly from each family in a replication were subjected to record biometrical traits such as (i) Plant height (ii) Number of branches per plant (iii) Number of capsules per plant (iv) Capsule length (v) Number of seeds per capsule (vi) 1000 seed weight and (vii) Single plant yield.

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