

Mutation frequency and chlorophyll mutations by Gamma-irradiation and Ethyle Methane Sulphonate treatment in okra (*Abelmoschus esculentus* (L) Moench)

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SUMMARY

Mutagenic parameters such as mutagenic effectiveness and efficiency were determined in M_2 generation of okra. The mutant chlorina was more frequent in total spectrum than albina, xantha and viridis. The frequency was dose dependent. The mutagenic effectiveness was higher with higher doses in sole treatments followed by recurrent treatments. Mutagenic efficiency was maximum when calculated on lethality, sterility and injury basis.

Key words: Okra, Mutagen, Gamma-rays, Mutation frequency.

Mutagen are specific in producing different types of mutations. Mutagenic effectiveness and efficiency are two reliable parameters in plant breeding, which are used to evaluate a mutagen. Mutagenic effectiveness provides relationship of mutagens to different manifestation but mutagenic efficiency is the frequency of mutation by unit dose of mutagen in inducing lethality, sterility and seedling injury etc. Chlorophyll mutation frequency were used as mutagenic parameters by different workers, Ehrenberg, (1960), Konzak *et al.*, (1965), Datta and Biswas (1985). Subjecting the homozygous and heterozygous material to mutagenic treatment can further enhance mutations. The present investigation has been taken up to study the mutagenic effectiveness and efficiency of Gamma rays and EMS on okra cultivar S-51.

MATERIALS AND METHODS

Dry seeds of variety S-51 were subjected to 10 kR, 20 kR, 30kR doses of Gamma-rays at Gamma cell, Division of Genetics, IARI, New Delhi. 200 seed were taken for each treatment. The treated seeds along with untreated ones (control) were sown in field in an R B D of 3 replicates of 4 rows each with row length 3 M as spacing 45x15 cm to raise M_1 population. All the plants were bagged to insure self-pollination. Seed collected from each treatment were again (recurrent) treated with freshly prepared solution of 0.1% EMS in phosphate buffer of 7.0 pH for 4 hr. The chemical retreated seeds were washed in running tap water for 1 hrs to remove traces of chemical from seed surface. Fresh dry seeds (unirradiated) were again treated with Gamma-rays doses earlier to make a set of 11 treatments including dry and wet control. All the treatments were sown in research field and replicated three times laid out Randomised Block Design. Seeds were collected from selfed

M_1 plants were used to raise separate progeny rows in M_2 generation. The chlorophyll mutants were scored from 3rd to 15th days after germination. Mutagenic effectiveness is investigated as a measure of frequency of mutation induced by unit dose of mutagen. However, the mutagenic efficiency was also indicated by proportion of mutation in relation to undesirable effect i. e. lethality, sterility and injury. The effectiveness and efficiency were computed as the formula suggested by Konzak *et al.*, (1965).

RESULTS AND DISCUSSION

The mutation frequency was computed as percentage of segregating M_2 progenies, segregating for chlorophyll as well as other M_2 mutants. Out of 3930 seedlings in sole treatment and 3055 seedling in recurrent or retreated M_2 generation scored for chlorophyll mutations 25 and 22 plants respectively. The mutation frequency calculated as percentage of mutated M_2 progenies and plants (Table 1) showed, that the frequency of chlorophyll mutation increased with increased in doses of gamma-rays in sole treatment except 1.35, 1.79 under 20 kR and 30 kR respectively, while in recurrent population it was decreased. The number of chlorophyll mutations was higher (25) in sole treatment than (22) those in recurrent treatments on M_2 population basis. The maximum (9) progenies were mutated under 40 kR in sole treatments followed by (7) progenies under 20 kR + 0.1% EMS for recurrent progenies. Higher doses of gamma-rays in recurrent treatment showed less chlorophyll mutations while in sole treatment generally it was more.

On M_2 seedlings basis, progenies of recurrent treatments showed more mutated seedlings than sole treatment. Increased in the doses of gamma-rays, number of mutated M_2 seedlings was increased under sole treatment

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