



EFFECT OF PHYSICAL CHEMICAL AND COMBINATION OF MUTAGENS ON GROWTH PARAMETERS OF BHENDI (*Abelmoschus esculentus* (L.) Moench.)

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Abstract

An experiment was conducted with the view to find out the level of variability with respect to physical, chemical and combination of both the mutagens in bhendi. A considerable reduction was observed in plant height among the combination doses (Gamma 40 kR + 0.5% MES) than single dose of mutagens. Among the single treatment DES 0.8 per cent showed an increase in nodal number, whereas all the combination doses induced stimulatory effect on nodal formation. In general, all the mutagens exerted reduction in intermodal length than control in M_1 generation, whereas the maximum intermodal length was observed among combination doses (50 kR + 0.8 % DES). Regarding the stem girth, all the mutagenic treatments exerted increase than control. It was observed that gamma irradiation combined with DES showed marked increase in stem girth and it was maximum with 50 kR gamma + 0.8 per cent DES treatment. The number of branches was more with 0.8 per cent DES treatment and all the mutagens exerted increases in number of branches than control. In general, all the mutagenic treatments showed significant variations.

Keywords : Mutagens, bhendi, growth parameters

Introduction

Okra or bhendi (*Abelmoschus esculentus* (L.) Moench.) is a self pollinated crop with limited variability. An attempt was made to enlarge its variability by induced mutation. The special use of induced mutations are basically to improve polygenic traits in crop plants by introducing desirable mutants directly into commercial cultivar or to use them indirectly through cross breeding. Three methods of treatments viz., physical, chemical and combination of both physical and chemical mutagens were followed and their efficiency was compared. Though most of the workers have attempted to create variability in quantitative characters through physical and chemical mutagens, the investigations involving combination of mutagens are meager in bhendi. This paper deals with the objective of studying the variability in growth of bhendi in M_2 generation.

Materials and Methods

Well filled 200 seeds packed in polythene bags were selected and treated in the gamma chamber at 30 kR, 40 kR and 50 kR doses. Similarly, the seeds were treated with 0.3, 0.4 and 0.5 per cent concentration of EMS and 0.7, 0.8, 0.9 per cent of DES treatments. Regarding the combination treatments, the seeds subjected to gamma rays irradiation had been subsequently treated with chemical mutagens for the study. The seeds subject to treatment were sown in the field along with a control in a randomized block design with three replications. All the treatments including the

control were raised adopting the recommended cultural operations during the period of crop growth. To assess the mutagenic effect in M_1 generation, 10 random plants were selected in each treatment under each replication and observation were recorded for all growth parameters viz., plant height, number of nodes, intermodal length, stem girth and number of branches.

Results and Discussion

The data on growth parameters in M_1 generation are furnished in Table 1, which showed statistically significant variations due to different mutagenic treatments. Among the treatments, 0.3 per cent EMS dose recorded maximum plant height (78.60 cm) in M_1 generation (Singh and Singh, 2002). The maximum reduction in plant height was observed at the combination dose of gamma 40 kR + 0.5 per cent EMS (61.0 cm) as against 81.50 cm in the control. Regarding the number of nodes per plant, 0.8 per cent DES caused increased nodal number (26.80) than control (20.30), whereas the combination does induced stimulatory effect on nodal formation. Similar results were obtained by Paliwal *et al.* (1983). The mutagenic treatments showed a marked reduction in intermodal length in the combination dose of gamma 50 kR + 0.8 per cent DES treatment (2.53 cm) as compared to control with 9.96 cm. In general, all the mutagens indicate marked reduction in intermodal length in M_1 generation (Suryakumari, 1984). The stem girth showed significant variation among the mutagenic treatments. Among the combination treatments, gamma irradiation combined with various doses of DES recorded maximum stem

girth. The treatment 50 kR gamma + 0.8 per cent DES exerted a beneficial effect on this trait with a mean of 7.50 cm whereas the lowest stem girth (3.50 cm) was recorded in control. Regarding the number of branches in M₁ generation, the treatment significantly showed variation among various mutagenic treatments. Among the treatments, DES 0.8 per cent recorded maximum number of branches (5.01) as compared to control with 1.17. This is in line with the findings reported by Jambhale and Nerkar (1982) in bhendi.

Table 1 : Effect of physical and chemical mutagens and their combination on growth parameters in M₁ generation in okra.

Tr. No.	Dose	Plant height (cm)	Number of nodes	Internodal length (cm)	Stem girth (cm)	Number of branches
T ₁	Control	81.50	20.30	9.96	3.50	1.17
T ₂	Gamma 30 kR	74.50	15.50	4.80	3.65	4.09
T ₃	40 kR	71.30	19.70	5.93	3.78	3.78
T ₄	50 kR	70.70	13.60	5.30	4.10	2.73
T ₅	EMS 0.3%	78.60	12.90	6.23	4.26	3.87
T ₆	0.4%	78.40	16.00	6.10	4.00	3.11
T ₇	0.5%	77.10	18.20	4.23	3.95	3.95
T ₈	DES 0.7%	73.97	15.90	6.46	4.20	2.14
T ₉	0.8%	72.90	26.80	4.50	4.70	5.01
T ₁₀	0.9%	65.70	23.20	5.43	4.90	2.01
T ₁₁	40 kR + 0.3% EMS	68.10	16.20	4.23	5.80	3.22
T ₁₂	40 kR + 0.4% EMS	67.20	24.50	3.76	6.20	4.46
T ₁₃	40 kR + 0.5% EMS	61.00	23.10	3.04	6.50	3.21
T ₁₄	50 kR + 0.7% EMS	67.00	25.10	2.66	7.20	3.63
T ₁₅	50 kR + 0.8% EMS	66.30	26.20	2.53	7.50	2.40
T ₁₆	50 kR + 0.9% EMS	65.70	25.00	2.60	7.00	4.50
	SED	1.69	0.78	0.71	0.74	0.32
	CD (p = 0.05)	3.35	1.55	1.41	1.46	0.62

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