Annals of Arid Zone 34(4) : 297-299, 1995

Mutagenic Effectiveness of EMS, MMS and Gamma Rays in Niger (*Guizotia abyssinica* Cass.)

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Abstract : Seeds of niger cv., UN-4 were treated with two doses of EMS, MMS and gamma rays. In M_1 generation variable response of metagens was observed for different characters. Plants appearing normal were selected from each treatment and advanced to M_2 generation. The estimates of GCV, heritability and genetic gain were high in the mutagenic lines of EMS (0.25% followed by 0.50%) and gamma rays (20 k^R). EMS was the most effective at lower doses in both the generations.

Key words : Chemical and physical mutagens, niger, M_1 and M_2 generations.

Niger (*Guizotia abyssinica* Cass.) is largely grown as rainfed crop in hilly and unproductive poor soils of southern Rajasthan. Niger seed oil is yellow with little odour and pleasant nutty taste. Niger oil is not only edible but also has many uses in soap and paint industries. In spite of great importance, traditional methods of plant breeding have not yielded desired results in improving the genetic potential of this crop. Mutagenesis has been used for genetic improvement of oilseed crops like groundnut, sesame and rapeseed - mustard (Ramnathan, 1983; Kamla, 1990; Mehta *et al.*, 1991) but little work on this aspect has been done in niger. An attempt was therefore made to study mutagenic effects of alkylalting agents (EMS and MMS) and physical mutagen (gamma rays) in M_1 and M_2 generations.

Materials and Methods

Seeds of niger variety UN-4 were soaked in distilled water for two hours and then treated with freshly prepared solutions of EMS (0.25 and 0.50%) and MMS (0.025 and 0.05%) with intermittent stirring for six hours at room temperature, and washed thoroughly in running tap water. The seeds of UN-4 were irradiated with two doses of gamma rays (10 kR and 20 kR) at Indian Agricultural Research Institute, New Delhi. M_1 generation was raised in randomized block design with three replications. Observations for eight quantitative characters (Table 1) were recorded on 20 randomly selected plants. For

Table 1. Mean values under various treatments for different quantitative characters in M_1 generation of niger

Treatment	Days to maturity	Plant height (cm)	Primary branches/ plant	Capitulum/ plant	Seed/ capitu-lum	100-seed weight (g)	Grain yield (g/plant)	Oil content (%)
Control	117.3	121.1	9.4	37.2	20.1	0.3	1.7	31.5
EMS 0.25%	110.0	130.8	14.1	86.9	21.0	0.3	5.2	31.4
EMS 0.50%	103.6	98.9	11.9	38.0	16.4	0.3	1.2	32.5
MMS 0.025%	109.0	117.2	12.3	42.8	19.2	0.3	2.0	31.1
MMS 0.050%	115.0	115.7	10.4	58.8	20.9	0.4	3.2	34.7
Gamma rays 10 kR	106.6	91.1	7.9	38.8	20.4	0.3	2.1	32.8
Gamma rays 20 kR	108.3	70.6	7.6	19.0	14.9	0.2	0.7	27.6
CD 5%	7.1	1.2	1.5	13.4	3.1	0.0	0.8	0.3