Annals of Arid Zone 31 (2) 111-113 1992

Diethyl Sulphate Induced Micromutations in Fenugreek

V L Mathur and G S Sharma
Department of Genetics and Plant Breeding, Rajasthan Agricultural University, Udaipur-313 001 India

Abstract Fenugreek (*Trigonella foenum graecum* L.) seeds were treated with diethyl sulphate (dES) and M1 generation was raised. Twenty normal M1 plants were selected from each treatment to raise M2 generation. In M2 generation it was observed that the efficiency of dES and dES-R treatments at highest concentrations almost same in inducing genetic variability for yield contributing traits. dES treatments produced more number of superior progenies at different concentrations than dES-R treatments.

Key words Induced micromutations, Fenugreek, dES, Genetic variability.

Diethyl sulphate has been extensively used for inducing micromutations in various crops such as, soybean (Raut et al. 1982), and chickpea (Nadrajan et al. 1983). Periodical replacement of dES solution was reported to increase its mutagenic efficiency (Konzak et al. 1964). Fenugreek is a crop of multifarious importance and has limited amount of variability for many traits. Though mutation breeding employing EMS and γ -rays has been used for increasing the genetic variability in fenugreek (Wanzari 1982, Laxmi & Dutta 1986), no report is available about the efficiency of diethyl sulphate in this crop. Therefore, this study was conducted using two methods of dES treatment.

Materials and Methods

Seeds of fenugreek var. UM 75 were soaked in distilled water for 4h and then treated with three concentrations of dES for 6 h . In the second method the dES solution was replaced after every hour. Both these treatments were designated as dES and dES-R respectively. Control seeds were kept in distilled water for the entire period. The M_1 generation was raised.

Twenty normal M_1 plants from all the treatments including control were advanced to M_2 generation using compact family block design with three replications. Four meter long single row of each progeny was taken in each replication. Row to row and plant to plant distance was maintained as 40 and 10 cm respectively. Observations were recorded on ten randomly selected plants of each progeny in each replication. Analysis of variance was done following the standard procedure (Panse & Sukhatme 1978). Variability parameters were computed in all those families which revealed significant progeny differences. Progenies significantly superior than the best progeny of control were identified for different traits using '*t*' test.

Results and Discussion

The efficiency of 0.08% concentration of dES and dES-R was almost same with respect to the amount of genetic variability generated for yield per plant. But the estimates of heritability and genetic gain were comparatively of lower order in dES-R. This treatment, however, proved most effective for number of pods per plant, where the variability generated and expected genetic gain were maximum. The heritability was of course moderate. These two treatments were equally effective for pod length except that the heritability and genetic gain were comparatively high under dES-R treatment. However, for number of grains per pod, the efficiency of these two treatments was in a vice-versa order.Thus for most of the characters the highest concentration of dES or dES-R proved best. For some characters like grains per pod and test weight the lowest concentration of dES and dES-R respectively was most effective (Table 1). Thus, it is clear that though the dose variations were there but in general dES treatments induced potential genetic variability which can be exploited by exercising selection, as the heritability

Table 1 *Coefficient of genotypic and phenotypic variation, heritability and genetic gain as percentage of mean for yield contributing traits in M2 generation of fenugreek*

Families	Coefficient of variation		Heritability (%)	Genetic gain (%)
	Genotypic	Phenotypic		
		Pod Length		
dES 0.04	8.61	10.26	70.39	14.95
dES 0.06	5.85	8.06	52.62	9.20
dES 0.08	8.29	11.04	56.41	12.95
dES 0.08(R)	8.45	9.64	76.75	15.21
		Number of pods plant^{-1}		
dES 0.04	17.99	26.96	44.52	24.73
dES 0.08 (R)	35.67	42.75	69.61	61.37
		Number of grains pod^{-1}		
dES 0.04	18.99	21.36	79.00	34.75
dES 0.06	6.19	9.38	44.48	8.49
dES 0.08	13.73	18.16	57.17	21.35
dES 0.08(R)	8.39	12.51	44.94	11.56
		Test weight		
dES 0.04	5.41	7.82	47.83	7.62
dES 0.08	4.33	8.22	27.81	4.85
dES 0.04(R)	8.81	12.01	53.79	14. 43
		Seed yield plant^{-1}		
dES 0.04	19.63	31.58	38.62	25.22
dES 0.06	18.78	24.22	60.12	30.27
dES 0.08	25.58	29.79	73.74	45.20
dES 0.04 (R)	18.42	25.37	52.70	27.66
DES 0.08(R)	25.63	40.61	39.84	33.33

and genetic gain estimates were also moderate or of higher order. Further the replacement of treatment solution did show marginal advantage in some of the characters.

dES 0.08-R was the only treatment which showed superior progenies for number of pods per plant, pod length and number of grains per pod (Table 2). Likewise dES 0.06 induced superior progenies for yield per plant, pod length and number of grains per pod. There is an indication that replacement of treatment solution even at higher concentrations may increase the mutagenic efficiency of dES. Thus the results established that dES was effective in generating variability in fenugreek and progenies identified provide a preliminary base to further investigate the nature of this variability.

References

Konzak CF, Nilan RA, Wagner J & Foster RJ 1964 Efficient chemical mutagenesis. The use of induced mutation plant breeding. *Radiation Botany* **5** 49-70

Laxmi V, Dutta SK 1986 Gamma rays induced small seeded mutant of fenugreek. *Journal of Nuclear Agricultural and Biology* **15** 183-184

Table 2 *Progenies superior over the best progeny of control for various characters*

Treatment	Progeny number	% increase over control
	Pod length	
dES 0.08(R)	4	32.3
	3	31.3
	Number of grain pod^{-1}	
dES 0.06	4	23.3
dES 0.04	1	43.2
	6	41.9
dES 0.06	5	41.3
	12	35.9
	6	35.4
	19	32.5
	1	31.3
	8	32.2
	9	32.0
	18	31.4
dES 0.08	20	32.9
	11	30.4
	4	24.2
dES O.08(R)	11	33.1
	4	28.6
	9	28.1
	2	26.5
	Number of pods plant^{-1}	
dES 0.08(R)		
	7	57.4
	8	52.0
	Seed yield plant^{-1}	
dES 0.06	18	83.5
	19	55.3
	12	43.6
	15	37.7
	7	21.3
	10	17.0
	5	13.9
	11	13.8

Nadrajan TR, Sathupathi R & Shivasamy N 1983 Induced variation in quantitative characters in redgram, *Madras Agricultural Journal* **70** 219-222

Raut VM, Halvankar GB & Patil VP 1982 Induced variation in black seeded soyabean variety Kalitur. Indian Journal of Genetics **42** 250-255

Wanzari KB 1982 Mutagenesis in Trigonella foenum greaecum L. The Punjabrao Krishi Vidhyapith Research Journal **6** 1-3

(Received October 1991 Accepted April 1992)