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INDUCED HIGH YIELDING MUTANTS IN *Arachis-hypogaea* L.

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Single treatments of gamma irradiation at 30 krad and EMS at 40 m*M* in TMV-9 and combination (20 krad+40m*M*) treatment in Ah. 7911 have resulted in the isolation of 40 mutant plants in M_2 showing superior yield and morphological similarity to parents. When they were tested in M_3 generation, five out of 40 lines gave significant higher yield than their respective parents. Number of mature pods contributed to higher yield. Hundred kernel weight remained unaltered due to mutagenic treatments which resulted in increased number of pods and superior yield in mutant lines.

Induced mutation has been used as a tool in crop improvement. There are several examples of successful utilisation of this technique in cereal and horticultural crops (Sigurbjournsson and Micke, 1969).

During the course of investigation in which two groundnut cultivars, namely, TMV-9 and Ah. 7911 were subjected to gamma irradiation, 20krad 30krad, and 40krad and EMS at 40m*M* 60m*M* and 80m*M* concentrations and combination treatment of 20 krad+ 40m*M* high yielding mutant selections were isolated and the details are presented here.

MATERIAL AND METHODS

In M_1 generation observations were recorded on morphological characters to isolate gross morphological deviants which were classified under macromutants. Forty normal looking plants were selected in the population derived from induced mutation for critical assessment of pod yield, number of mature pods, number of kernels and kernel yield per plant and hundred kernel weight in their progenies.

RESULTS AND DISCUSSION

The yield performance of forty mutant lines studied in M_3 generation is presented in Table. 1. Of these, five lines, namely, 10 and 20 (TMV 9 EMS 40m*M*), 24 and 27 (TMV 9 30 krad) and 39 (Ah. 7911, 20 krad + 40m*M*) were found to be superior with yield increase ranging from 9.0 to 43.5 percent over TMV 9 and 14.5 to 50.7 percent over Ah. 7911. The possibility of isolating such high yielding mutants has been demonstrated by earlier peanut workers. The mutant variety NC-4x released in USA in 1959 has out yielded the mother strain (NC-2) besides having thicker hull and good quality with resistance to pod cracks (Gregory, 1960). In India, three mutants TG.1, TG.3 and TG.6 with a potential of over 19 percent increased pod yield over the parent variety were developed and released for cultivation. (Patil and Thakare, 1969).

Data on observations relating to number of mature pods, number of kernels and kernel yield per plant and hundred kernel weight are presented in Table. 2. There was increase in

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the number of pods from 2.6 to 32.3 per cent over TMV 9 and 27.5 to 68.6 per cent over Ah. 7911. Mutant line 24 was outstanding with 32.3 per cent and 68.6 per cent increased number of per plant over TMV 9 and Ah. 7911 respectively. Increase in the number of kernels per plant ranged from 52.8 to 67.4 per cent over Ah. 7911. There was significant increase in kernel yield ranging from 35.3 to 67.3 per cent over Ah. 7911. When compared to TMV 9, mutant line 24 alone gave 36.7 per cent increased kernal yield. Hundred kernal weight has not been increased by mutagenic treatments.

Lack of increase in hundred kernel weight in the promising mutant lines have indicated that the yield increase in these lines was due to increased number of mature pods per plant. Higher reproductive efficiency in mutant lines has resulted in increased number of mature pods compared to control. Genitic parameters, namely genotypic variance, genotypic coefficient of variability, heritability and genetic advance were worked out and presented in Table. 3. High values of heritability and genetic advance were observed for kernel yield per plant. Genotypic variance and coefficient of variability were the lowest for hundred kernel weight.

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TABLE-1. Pod yield per plant of mutant lines in M_3 generation

Mean pod yield g/plant	Percentage on TMV-9	Percentage on Ah-7911	Mean pod yield g/plant	Percentage on TMV-9	Percentage on Ah-7911
13.2	91.0	95.7	20.8	143.5	150.7
11.6	80.0	84.1	11.3	77.9	81.9
9.7	66.9	70.3	14.5	100.0	105.1
13.3	91.7	96.4	16.9	116.6	122.5
14.5	100.0	105.1	11.5	79.3	83.3
14.5	100.0	105 1	14.9	102.8	108.0
13.4	92.4	97.1	11.0	75.9	79.7
11.5	79.3	83.3	11.0	75.9	79.7
10.5	72.4	76.1	14.0	99.3	104.4
12.9	89.0	93.5	13.2	91.0	95.7
13.7	92.6	99.3	13.0	89.7	94.2
14.2	97.9	102.9	12.2	84.1	88.4
13.6	93.8	98.6	13.1	90.3	94.9
8.8	60.7	63.8	14.1	97.2	102.2
14.2	98.1	102.9	14.0	96.6	101.5
11.0	75.9	79.7	16.0	110.3	115.9
13.2	91.2	95.7	13.0	89.7	94.2
11.0	75.9	79.7	14.5	100.0	105.1
15.8	109.0	114.5	13.8	95.2	100.0
16.7	115.2	121.0	13.2	91.0	95.7
13.6	94.0	98.6	1.6	11.0	11.5
12.5	86.2	90 6	4.5	30.7	32.3
9.2	63.5	66.7	—	—	—

TABLE : 2 Mean values of economic traits of promising mutant lines in M_3 generation

Mutant line number	Mean	Percentage on TMV-9	Percentage on Ah. 7911	Mutant line number	Mean	Percentage on TMV-9	Percentage on Ah. 7911
1. *Number of mature pods/plant*				3. *Kernel yield (g)/Plant*			
19	20.0	102.6	130.7	19	11.6	110.5	135.3
20	23.0	118.0	150.3	20	11 9	113.6	139.1
24	25.8	132.3	168.6	24	14.4	136.7	167.3
27	21.0	107.7	137.3	27	12.1	115.5	141 4
39	19.5	100.0	127.5	39	11.9	113.6	139.1
TMV-9	19.5	100 0	12.75	TMV-9	10.5	100.0	122.5
Ah. 7911	15.3	78.5	100.0	Ah. 7911/	8 6	81.7	100.0
S. E.	1.8	—	—	S E.	1.1	—	—
C. D. (at 5%)	5.2	—	—	C. D. (at 5%)	3.1	—	—
2. *Number of kernels/plant*				4. *Hundred kernel weight (g)*			
19	36.0	109.1	161.8	19	31.4	98.7	82 4
20	34.8	105.3	156.2	20	34.3	107.7	89.9
24	37 3	112.9	167.4	24	38.7	121.9	101.7
27	34.0	103.0	152.8	27	35.9	112.9	94.2
39	36 8	111.4	165.2	39	31.9	100 3	83.7
TMV-9	33.0	100.0	148.3	TMV-9	31.8	100.0	83.4
Ah. 7911	22.3	67.4	100.0	Ah. 7911	38.1	119.8	100.0
S. E	3.2	—	—	S E	1.8	—	—
C. D (at 5%)	9.0	—	—	C. D (at 5%)	4.9	—	—

TABLE-3 Genetic Parameters for economic characters of murant lines in M_3 generation

Characters	Genotype variance (GV)	Genotypic Coefficient of variability (GCV)	Heritability percent (h^2)	Genetic advance advance GA as % of mean)
Pod yield (g)/plant	2.37	11.63	48.33	16.66
Number of mature pods/plant	3.26	10.25	49.08	14.79
Number of kernels/plant	12.71	12.67	55.03	19.37
Kernel yield (g)/plant	1.77	14.55	59.80	23.00
100-Kernel weight (g)	2.35	3.56	30.28	4.03