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Short Communication

INDUCED MORPHOLOGICAL VARIANTS IN KABULI CHICKPEA

S.M. Bhatnagar, S.N. Sharma, D.Singh and V.K. Bhatnagar

Department of Genetics and Plant Breeding,
Rajasthan Agricultural University, Agricultural Research Station,
Durgapura, Jaipur 302 018 (Rajasthan)

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The mutation breeding technique has been used as an important supplement to other conventional methods of plant breeding for improvement of crops by developing new plant type with superior biochemical composition and better adaptation. Unlike other crops, such as wheat, barley, rice and peas, where much work as been done to understand the mutation process *per se* and the use of mutation breeding for yield improvement, very limited work has been carried out in Kabuli chickpea, which is of recent introduction in India and its cultivation has been increasing day by day in the irrigated areas due to good economic return per ha. as compared to *desi* type gram cultivation. However, this crop has limited to desi type gram cultivation. However, this crop has limited range of variability, which was not sufficient to ensure high potential and adaptible variety for wide range of cultivation. The present study therefore, aimed to know the quantum and direction of mutational variability (1) for most of morphological characters of economic importance, which could be useful to accelerate the pace of its genetic improvement.

Air dried seeds of kabuli chickpea cultivars, namely L-550 and Baroda Dhakeri local (BDL) were treated with 3 doses each of gamma rays, neutron, EMS and 2 doses of MMS individually and in combinations. In all, 11 individual and 30 combination treatments alongwith control were grown to raise M_1 at ARS Durgapura Station. M_2 generation was raised from individual M_1 plant. In M_2, morphological variants showing wide range of variation for various characters were isolated from each cultivar (2-7). Finally fertile plants from M_2 were grown in M_3 generation in RBD with two replications in 45 × 15 cm spacing. The data on morphological characters were recorded on 5 randomly

selected plants from each replication in only lines which bred true to the type. The extreme type of variations in morphological characters were catagorised in terms of frequency in the present communication.

The present study showed that the frequency of mutations was the highest in EMS among individual treatment and gamma rays + EMS is combined treatments. Neutrons and MMS combinations resulted in higher number of morphological mutants in both the cultivars and are in accordance with the earlier reports (Chaudhary and Singh, 1980; Bhatnagar *et al.*, 1982 and Bhatnagar, 1984). The results of morphological mutants isolated in M_2 generation (Table 1) revealed that in all, 532 mutants were isolated, of which 230 (153 in L-550 and 77 in BDL) were fertile and could be carried to M_3 generation. Of the 153 and 77 fertile mutants, 99 and 59 in L-550 and BDL, respectively bred true to their major characters whereas the remaining mutants showd segregation which continued to next generation. The number and frequency of stable mutants for fourteen morphological characters (Table 2) indicated that the frequency of mutants for economically important characters like early flowering and maturity (8.28 and 7.01%), more primary and secondary branches (7.64 and 12.10%) and high number of pods (11.46%) was fairly high among induced mutants. The behaviour of the cultivars was almost similar in producing stable mutants for different morphological characters. A close parallelism was recorded in the frequency of mutants for majority of the characters studied except the pod length and width in both the cultivars. Among morphological mutants, tall, dwarf and normal looking types were isolated which differed in habit, branching pattern, leaf type, leaflets, flower, pod and seed characters. The frequency of stable mutants for extreme range of characters was similar in both the cultivars. New mutant types isolated in kabuli type were extra early flowering and maturity, reduced number of leaflet per leaf type, twisted leaf, fasciated secondary branches and floral mutants with long style and exposed style type.

Table 1. Morphological mutants isolated in M_2 generation

Mutant type	Cultivars		Total
	L-550	BDL	
Total mutants/variant	355	177	532
Viable mutant/variant	153	77	230
Non viable mutant/variant	202	100	302
Stable mutant	99	58	157
Unstable mutant/variant	54	19	73

Table 2. Number and percentage of stable extreme type mutants in M_3 generation for various morphological characters

Character	Range	L-550 Total		BDL Total		L-550+BDL Total	
Flowering	- Early	9	0.09	4	6.90	13	8.80
	- Late	5	5.05	3	5.17	8	5.10
Maturity	- Early	9	9.09	2	3.45	11	7.01
	- Late	3	3.03	2	3.45	5	3.18
Plant hight	- Tall	7	7.07	5	8.62	12	7.64
	- Dwarf	8	8.08	6	10.34	14	8.92
Primary branches	- Many	9	9.09	3	5.17	12	7.64
	- Few	4	4.04	1	1.72	5	3.18
Secondary branches	- Many	11	1.11	8	13.79	19	12.10
	- Few	4	4.04	2	3.45	6	3.82
Pods/plant	- High	11	11.11	7	12.07	18	11.46
	- Low	3	3.03	4	6.90	7	4.46
Seess/pod	- High	2	2.02	3	5.17	5	3.18
	- Low	20	20.20	9	15.52	29	18.47
Seed Size	- Bold	4	4.04	2	3.45	6	3.82
	- Small	16	16.16	3	5.17	19	12.10
Internodal length	- Long	8	8.08	4	6.91	12	7.64
	- Short	2	2.02	2	3.45	4	2.55
Leaflet length	- Long.	8	8.08	4	6.0	12	7.64
	- Short	2	2.02	2	3.45	4	2.55
Leaflet length	- Long	4	4.04	1	1.72	5	3.18
	- SHort	4	4.04	2	3.45	6	3.82
Leaflet width	- Narrow	7	7.07	6	10.34	13	8.28
	- Broad	5	5.05	4	6.90	9	5.73
Pod length	- Long	3	3.03	4	6.90	7	4.46
	- Short	8	8.08	4	6.90	12	7.64
Pod width	- Narrow	5	5.05	4	6.90	9	5.73
	- Broad	5	5.05	1	1.72	6	3.82

It is, therefore apparent that considerable amount of genetic variability was induced in both the cultivars by mutagenic treatments. A large number of mutants isolated were economically important. However, a mutant having

positive variation in all the yield components could not be isolated. It is likely as the characters deviated in both plus as well as in minus directions in one or other character. However, desired mutant having increase in a particular component can easily be selected and used successfully in crop improvement.

Various micro-mutants isolated, can directly be used after careful testing for yield potential for general cultivation which will result in positive shift in present yield levels of kabuli gram.

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