



EFFECTS OF INDUCED MUTAGENIC TREATMENT IN M_1 GENERATION ON GREEN GRAM (*VIGNARADIATA* (L) R WILCZEK

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Abstract

The possibility of improving yield related traits through mutation breeding have wide applications in recent years. In the present study, the seeds of green gram variety Vamban 3 were treated with different concentration of chemical mutagens like EMS, DES and SA. The LD_{50} for EMS, DES and SA were observed at 20 mM, 30mM and 20mM respectively. The yield contributing traits such as days to first flowering, days to 50% flowering, number of pod cluster per plant, number of pods per cluster, number of seeds per pod and 100 seed weight were studied in each concentration. The results revealed that, all the parameters except days to first flowering and days to 50% flowering were decreased with increasing concentration of chemical mutagen, it might be due to the stress carried by the mutagenic application.

Key words: Green gram, Chemical mutagen, M_1 generation.

Introduction

Pulses are referred to as the “poor man’s meal” and “rich man’s vegetable”. Among them, Green gram is considered as one of the important pulse crop grown in India, because here most of the population follow vegetarian diet. It is a self pollinating grain legume, belongs to the family Leguminosae. With its high protein content and lysine content, it becomes a major source of human food and animal feed; it also plays an important role in sustaining soil fertility by improving soil physical properties and fixing atmospheric nitrogen. In India, the area of green gram cultivation is around 3.8 million hectare with a production of 1.0 million tonnes. Even though, in this decade also most of the population were affected by malnutrition. It might be due to the low productivity and increasing population size, to meet these two parameters it is urgent to adopt effective crop improvement techniques.

Mutation breeding is the purposeful application of mutations in plant breeding. An indication about the possibility of induction of mutation, through the use of chemical mutagens helps plant breeders to develop improved cultivars. It offers good prospects of the domestication of promising underutilized wild species for

agricultural or horticultural uses as well as for improving adaptations of recently introduced crops to unsuitable environments (Anonymous, 1986). So the present work aims to find out the effect of chemical mutagenic treatments on green gram in M_1 generation.

Materials and Methods

Plant Material: The seeds of green gram variety were used for the present study

Mutagenic treatments: The seeds were treated with different concentrations of Ethyl Methane Sulphonate (10, 20, 30, 40 and 50M), Diethyl acetate (10, 20, 30, 40 and 50M) and Sodium Azide ((10, 20, 30, 40 and 50M).

The treated seeds of EMS, DES and SA and control seeds were immediately sown in the field in a randomized block design with three replications. All the cultural practices were carried out during the cultivation. Data were recorded for all the quantitative parameters and further statistically analysed.

Result and Discussion

All the parameters studied such as Days to first flowering, days to 50% flowering, number of cluster per plant, number of pods per cluster, number of seeds per pod and 100 seed weight showed a negative improvement towards the growth in M_1 generation (table. 1).

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Table 1: Effects of EMS, DES and SA on quantitative characters of Green gram in M₁ generation.

Mutagens (mM)	Treatments	Days to first flowering	Days to 50% flowering	No. of cluster /plant	No. of pods /cluster	No. Seeds /pod	100 seed weight(g)
Control	-	34	45	9.9	3.23	15	4.23
EMS	10mM	36	47	6.5	1.67	14	3.49
	20mM	38	49	9.3	2.66	13	3.14
	30mM	40	52	7.7	2.13	12	3.06
	40mM	42	54	6.0	1.74	12	2.92
	50mM	48	60	5.5	1.15	10	2.54
DES	10mM	37	49	4.3	1.22	11	3.34
	20mM	39	41	4.8	1.51	11	3.23
	30mM	41	52	5.3	2.45	10	3.10
	40mM	43	55	4.2	2.05	09	3.01
	50mM	47	59	3.6	1.33	09	2.97
SA	10mM	38	50	4.3	9.50	13	3.35
	20mM	39	53	7.1	1.67	12	3.27
	30mM	40	55	7.0	1.19	10	3.02
	40mM	42	58	4.0	1.10	09	2.86
	50mM	45	59	3.3	1.07	07	2.15

The control plants were flowered at 34th day after seed sowing and the days to first flowering was increased with increasing concentrations of EMS, DES and SA. Mean while the days to 50% flowering also showed the similar trend after mutagenic treatment. The highest reading on numbers of days to first flowering and number of days to 50% flowering were observed at highest concentration of all the mutagenic treatments employed.

The number of pod cluster per plant was also significantly affected by mutagenic treatments employed and the least mean value was reported at highest concentration. The number of pods per cluster and number of seeds per pod reduced with increasing concentration of both mutagens applied. Similar report in the quantitative parameters were reported in Chick pea (Umavathi and Mullainathan, 2014). The hundred seed weight and the yield also show a negative trend towards crop improvement.

The relative sensitivity of green gram to various mutagenic treatments was assessed by studying the biological damages caused in M₁ generation, in terms of quantitative traits which directly influence the economic value of the crop. Promoting effects of low doses of

chemical mutagens on biological parameters have been reported earlier in Chick pea by Mohanty (2004) and in *Vicia* by Vandana and Dubey, (1988).

In this study, M₁ generation indicated highly significant reduction for all the parameters studied. In this generation, the reduction of these parameters was prominent in higher concentrations of all the mutagens induced. Because, in the first generation the treated seeds were suffer from growth inhibition due to stress caused by the mutagenic agents. Such inhibitory effects of various mutagens were reported in several other crops by Reddy *et al.*, (1992) in Lentil and Arulbalachandran (2006) in Black gram. Rizwana Banu (2004) observed in cowpea the quantitative characters decreased with increasing concentration of mutagenic treatment.

References

- Anonymous (1986). Plant domestication by Induced mutations. Proceedings of an Advisory Group meeting, Vienna, 17 – 21 Nov. 1986.
- Mohanty, B.K. (2004). Genetic variability and path analysis. *Indian J. Agric. Res.*, **38**: 65-68.
- Vandana, T.A. and D.K. Dubey (1988). Effect of ethylmethane sulphonate and diethylsulphate in faba bean. *FABIS Newsl.*, **32**: 18-22.
- Reddy, V.R.K, M. Indra, K.N. Pushbalatha and R. Revathi (1992). Biological effects of physical and chemical mutagens and their combinations in lentil. *Act Bot Ind*, **20**: 93-98.
- Rizwana, Banu, M. (2004). Effect of mutagenic treatments on quantitative caharcters in Vigna. *Adv. Plant Sci.*, **20**: 55 – 60.
- Arulbalachandran, D. (2006). Effect of physical and chemical mutagenesis in black gram. Ph.D. thesis, Department of Botany, Annamalai University.
- Umavathi, S. and L. Mullainathan (2015). Physical and Chemical induced mutagenesis study for identifying lethality dose in chick pea (*Cicer arietinum* L.) Var. CO⁻⁴. *International Letters of Natural Sciences*, **35**: 1-5.