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RESEARCH PAPER

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Comparative Effect of EMS on Vegetative and Fertility Traits in Different Varities of Advanced Autetraploid (C_{12}) *Trigonella*

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ABSTRACT

Dry and pre-soaked seeds of four diploid selections varieties of advanced autotetraploid (C_{12}) Trigonella foenum-graecum L. were treated with 0.125, 0.25 and 0.50 per cent EMS (ethyl methane sulphonate) for 12 hours at 7 pH and 30± 1ºC. Data on different parameters such as germination, survival and other vegetative and reproductive agronomic characters were recorded in both dry and presoaked sets. The effect of mutagen on various parameters increased with the increase in dose except in sel. 4 for certain parameters. Stimulation in seed germination and survival due to EMS treatment could be observed in sels 3 and 4. The differences to mutagen response among these selections may be assigned to the differential genotypic reactions of the various genotypes (selections) to EMS. Pre-soaking enhanced the effectiveness of the mutagen.

Key words: Trigonella, Autotetraploid, Genotypes and EMS.

INTRODUCTION

Response of many cropy plants of varying ploidy levels to EMS (Ethyl Methane Sulphonate) a well known mutagen, has been studied by a number of workers (Swaminathan et.al., 1972, Zutshi and Kaul, 1995, Raghuvanshi and Singh, 1980, Khalatkar *et al.,* 1971). But there appear no reports whatsoever, dealing with the response of different varieties (sels.) of

the same species to EMS. Also, the presoaking has been used as an important factor to enhance the mutagencity of the various agents (Reddy and Reddy). Therefore, we undertook this work to study the effect of presoaking on EMS action and the response of four varieties (selection) of autotetrapbid *Trigonella foenum graecum* to different EMS concentrations to find out the importance of genotype in relation to the mutagenic response.

MATERIAL AND METHODS

Dry and pre-soaked seeds of four selections of advanced autotetaploid (C_{12}) *Trigonella foenum graecum* L. were treated with three concentrations of EMS viz. 0.125 per cent, 0.25 percent and 0.5 percent for 12 hours at 7 pH and 30± 1ºC. Pre-soaking of seeds was done for 12 hours and 100 seeds were used in each case. After treatments, the seeds were thoroughly washed in running tap water and then sown in field in a replicated trial along with controls. Different parameters of M_1 generation viz. germination survival, plant height, number of branches/ plants, pollen fertility, number of pods/ plant, pod length and seeds/ pod were studied and the data recorded for quantitative parameters was based on ten plant per replicate. Histograms were plotted on the basis of per cent of control values to study the response of the four selections towards various EMS concentrations and the impact of presoaking on the effectiveness of the mutagen.

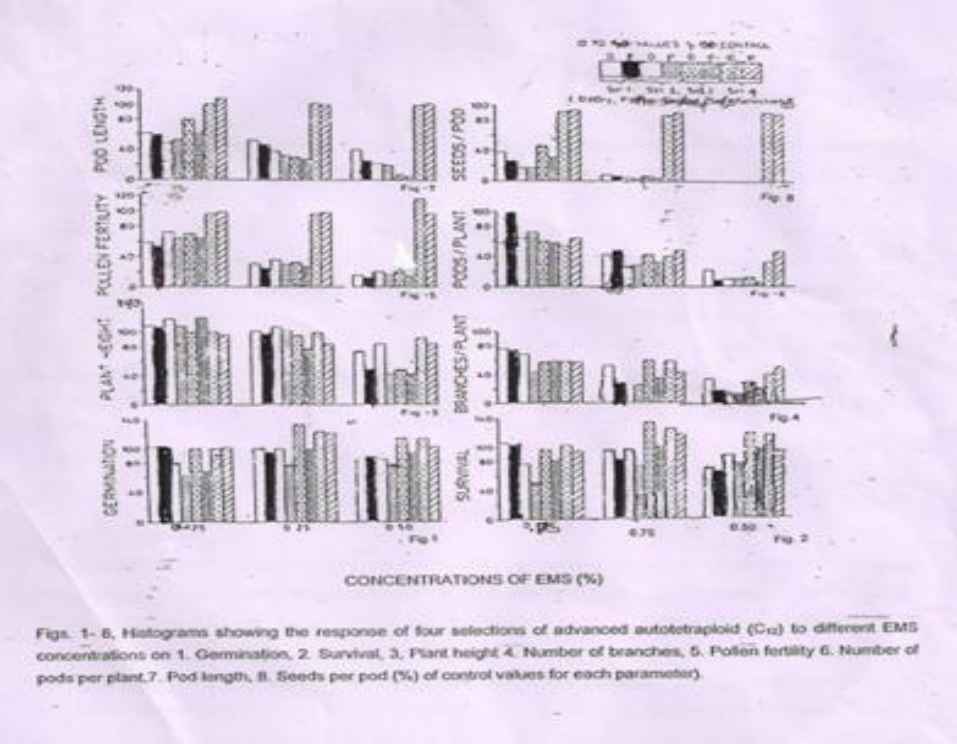
RESULTS

Germination was decreased at higher concentration in sels 1 and 2 Pre-soaked sets, particularly sels 2 and 3 were affected more. Enhanced germination was observed in sels. 3 and 4 at higher concentrations of treatment (Fig. 1). Survival exhibited almost the similar trend to that of germination, i.e. survival in sels. 1 and 2 was less at higher concentrations. Pre-soaked sets showed decreased survival almost throughout. Sels 3 and 4 showed stimulation in survival also at higher doses (Fig.2)

Plant height was affect in all the four genotypes at higher EMS concentration and the sel. 3 was affected most. Pre-soaked sets of different selections were affected more (Fig. 3). Branches per plant sharply decreased with the increase in does and the effect was drastic at higher doses. Pre-soaked sets in general, exhibited more effect of mutagen. sel. 2 had low branching throughout (Fig. 4). The effect of mutagen on the pollen fertility of both dry and presoaked set was evidently marked in proportion to concentration and the presoaked ones having been affected more. The mutagenic effect on the pollen fertility of sel. 4 was comparatively negligible throughout (Fig. 5). Pods per plant in different selections also got reduced in number with the increase in FMS concentration. The pre-soaked sets except for sel. 3 were affected less in comparisons to the dry ones for this parameter (Fig. 6).

While pod length in sel. 4 was found to be unaffected with increasing EMS concentration, the rest of the selections showed remarkable decrease in pod length with increase in EMS concentrations. Sel.3 exhibited more effect of this parameter. Pre-soaked sets had almost obviously more effect (Fig. 7)

Except for sel. 4 which showed the slight reduction in number of seeds per pod throughout, other selections were highly affected in proportion to EMS concentration with regard to the number of seeds per pod, to the extent that there was no seed setting in them at .50 per cent. Pre-soaked sets showed more effect on this parameter also (Fig. 8).



Figs. 1- 8, Histograms showing the response of four selections of advanced autotetraploid (C_{T2}) to different EMS concentrations on 1. Germination, 2. Survival, 3, Plant height 4. Number of branches, 5. Pollen fertility 6. Number of pods per plant,7. Pod length, 8. Seeds per pod (%) of control values for each parameter).

DISCUSSION

This study makes it clear that the effect of mutagen becomes more pronounced in almost all the selections as the concentration is increased. Pre-soaked sets, in general, are affected more in all the selections for most of the parameters. This indicated that pre-soaking increased the vulnerability of various selections to EMS. The reproductive phase gets drastically affected so much so that first three selections do not set any seed at higher dose. This may be due to the altered action of gene (s) or gene complexes, whose activity is necessary during reproductive phase of plants.

There appear genotypic differences for mutagen response as the effect on different selections was variable for any parameter. But in sel. 4 mutagenic sensitivity at various doses in both dry and pre-soaked sets was less pronounced as indicated by vigour as well as fertility plateau. This may be due to the fact that during the speciation or formation of these genotypes in a single species complex of *T. foenum graecum,* nature has played an important role in aggregating certain more resistant genes in this genotype (sel.4).

Thus the genotypic differences for mutagenic response were well evident from the above study. In an irradiation experiment with gamma-rays on both diploid and autotetraploid genotypes of this species of *Trigonella,* Raghuvanshi and Singh reported that radiosensitivity at autoploid level is more or less variety dependent. Zutshi and Kaul while working with EMS on Solanums have reported considerable differences in sensitivity between different species of same ploidy level. But our study will substantiate the earlier findings because we have in this experiment recorded that the differences in response exist even at varietal level, which may have differences with regard to only few genes in their nature or may be in positions, thus the mutagenic response appears to be genetically conditioned.

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