

EFFECTS OF AN ALKYLATING AGENT ON GERMINATION, BRANCHING AND PLANT HEIGHT OF EUPHORBACEOUS PLANT

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Effects of the alkylating agent (Ethylmethane sulfonate) on germination, branching and plant height of *Phyllanthus niruri* have been studied. Germination percentage increased with increased concentrations (from 0.015 to 0.1205%) of EMS but thereafter germination percentage decreased with increasing concentrations (from 0.241-0.482%) of EMS. Initiation time and maximum germination time was reduced with increased concentrations (from 0.0150 to 0.1205%) of EMS and then increases with increased concentrations (0.241 - 0.482%). Plant height of 4 & 8 weeks old plant and number of branching was gradually increased with increasing concentration.

Keywords : EMS; Germination percentage; Initiation time; Germination time.

Introduction

Gustaffson¹ studied chemical mutagenesis in higher plants. According to Swaminathan² mutagens are known to induce many epigenetic changes in the morphology and physiology of plants besides other mutagenic effects. Further Mahna and Singh³ had seen the effects of some alkylating agents on germination, emergence and plant height of some solanaceous crop plants. Rechaeck *et al.*⁴ obtained a mutant of *Cleviceps purpuria* by EMS and UV-radiation treatments which contained higher level of alkaloids. EMS and UV radiations constitute an important group of mutagens. Chaturvedi *et al.*⁵ had studied the effects of gamma rays, ethylmethane sulfonate and N-nitro, and N-methylurea on *Cajanus cajan*. Chaudhary and Kaul⁶ had done mutagen studies in *Papaver somniferum*. No work so far has been reported on induction of mutation by chemical mutagens in euphorbiaceous plant. Present study reports the effect of Ethylmethane sulfonate on germination, number of branching and plant height of *Phyllanthus niruri*.

Material and Methods

The seeds of *Phyllanthus niruri* or jar-amala were obtained from National Bureau of Plant Genetics Resources, New Delhi. The plants were raised in the Botanical garden of Deptt. of Botany, University of Rajasthan, Jaipur. Seeds from single plants were collected for present study. The dry seeds were soaked in glass distilled water for 24 hours. Seeds were

then transferred to the freshly prepared solution of EMS in six different concentrations (0,0.0150, 0.0301, 0.0602, 0.1205, 0.241, 0.482 percent). A control was run along using distilled water. The chemical treatment was given for a period of 4 hours, seeds were thoroughly washed in distilled water and air dried before sowing.

The germination test were carried out in pots. Experiments were set in two replicates using 750 seeds per replicate. Daily observations were made and the data on seedling emergence were collected.

Results and Discussion

Germination : The percentage, time taken for initiation and the day of maximum germination from the date of sowing of seeds are used as parameters to study the effects of chemical treatment. High concentration of EMS was found to be highly toxic and adversely affect seed germination. Effect of different concentrations vary regarding initiation and maximum germination time. (Table 1 and Fig.1). Percentage germination increases with the increasing concentration (0.0150 to 0.0602%) thereafter it decreases (0.1205 to 0.482%).

Time taken for complete germination in control was 10±2 days and time for initiation was IIIrd day. Time of initiation and maximum germination in other concentrations showed regular trend. At low concentrations (0.0301 and 0.0150 percent) time of initiation was almost same (Vth day) as the concentrations increased (0.0602-

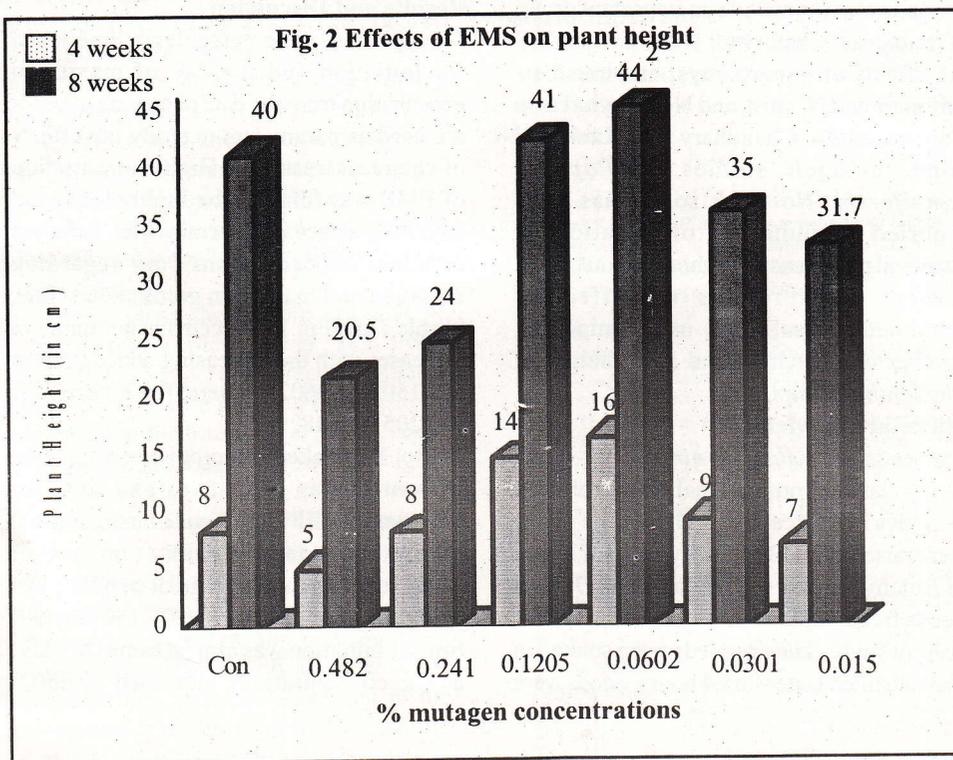
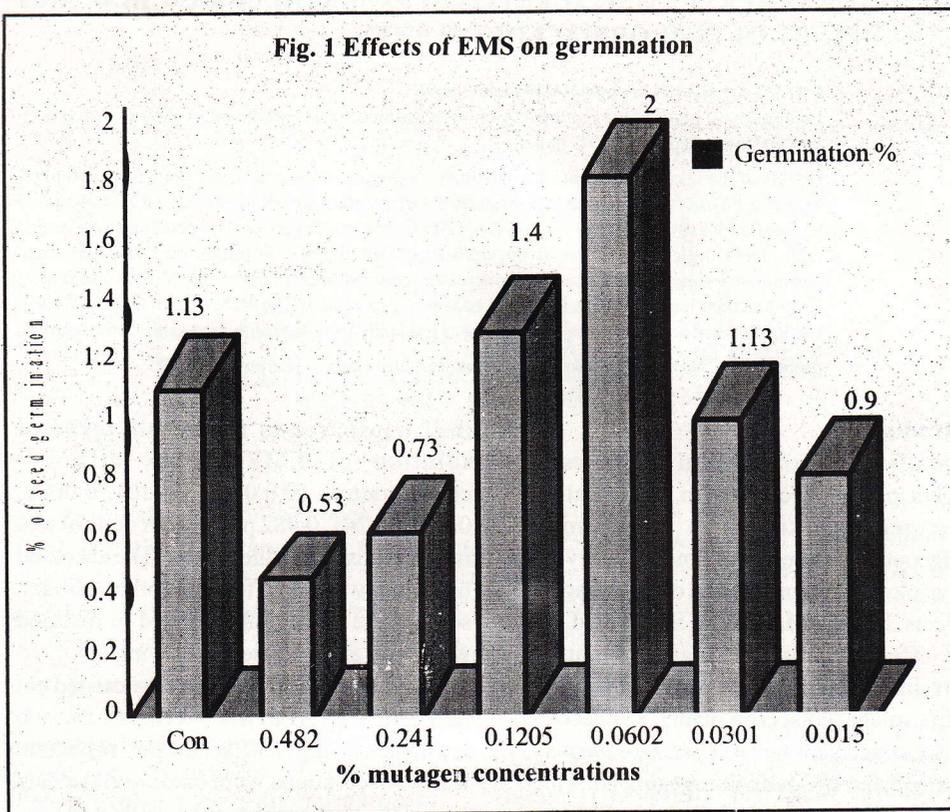


Table 1. Data on germination, height and number of branching of *Phyllanthus niruri*.

Concentration	Germination (%) EMS	Time for		Plant height (cms) (EMS) (4 weeks) (8 weeks)		Number of branching
		(i) Initiation (days)	(ii) Max. Germination (days) (EMS)	4 weeks	8 weeks	
		(i)	(ii)			
Control	1.13	III	X	8	40	9
0.482%	0.53	IV	XI	5	20.5	20
0.241%	0.73	IV	XI	8	24	26
0.1205%	1.4	II	VII	14	41	27
0.0602%	2.0	II	VII	16	44	22
0.0301%	1.13	V	X	9	35	19
0.0150%	0.9	V	X	7	31.5	15

0.1205%) and thereafter again started increasing.

Similar trend is seen in maximum germination time. Maximum germination time was almost similar (10±2 day) to that of control except in concentrations 0.1205 and 0.0602% where the maximum germination time was preponed (VIIth day). **Plant height** : It is clear from the table that range of variation in plant height as compared to control was very less except the height of the plants treated with 0.1205 percent and 0.0602 percent where the increase in height was considerable. High concentrations of EMS decreased plant height. A single plant of *Phyllanthus niruri* which survived in 0.482 percent EMS concentration was almost three and half time shorter than those of concentration of 0.0602 percent and two times shorter than those of control (Fig. 2). In this case the maximum increase in plant height is recorded in 0.0602 percent concentration in 4 weeks and 8 weeks old plant.

Branching : Variation in number of branching was observed in control as well as in treated plants. Lower concentrations of EMS (0.0150 and 0.0301 percent) showed decrease in number of branching. Number of branches were same in control and in plants treated with 0.0301 percent. Number of branching was maximum in the plants treated with 0.1205 percent EMS.

Conclusion : The study indicates that alkylating agent EMS influence germination, plant height and number of branching of

Phyllanthus niruri to a considerable extent.

The manifestations of its effects take place in various ways and the sensitivity of this plant to this chemical is clear from the data. Higher concentration of EMS has toxic effects as compared to lower concentration. Preliminary observations on the treated plants reveal that it is fairly effective. Its positive effect is seen in concentration 0.0602 percent, where time of initiation and maximum germination decreased as compared to control and to same extent 0.1205 percent where number of branching was found to be maximum.

Ethyl methane sulphonate is easy to handle and its effective concentration is not very high. Therefore it is cheaper to use for the plant under investigation i.e. *Phyllanthus niruri*, which is a well established medicinal plant.

Acknowledgement

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