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VARIATION IN ALKALOID CONTENT OF EMS TREATED *LYCOPERSICON ESCULENTUM* CV PUSA EARLY DWARF

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Mutagens have remarkable possibilities of modifying physiology of plants with regards to their metabolite production. Ethyl methanesulphonate (EMS) is highly effective mutagen for variety of plants in modifying morphology and physiology. In the present investigation, effect of six different concentrations (0.0150%, 0.0301%, 0.0602%,0.01205%, 0.0241%, 0.482%) of EMS on *Lycopersicon esculentum* cv pusa early dwarf has been studied. Treated seeds of *L. esculentum* were sown along with untreated seeds (control) in triplicates. Different parts of plants (leaf, stem, root) were harvested and subjected to alkaloid extraction. Maximum amount of alkaloid was observed in stem of plants treated with 0.0301% EMS (0.799 mg/gdw) followed by leaf (0.672 mg/gdw) and roots (0.664 mg/gdw), which was more than that of roots of control plants (0.504 mg/gdw). Other concentrations were not that effective in increasing the concentration of alkaloid when compared with control. The most effective concentration was 0.0301%, which has been found to increase the alkaloid content in all parts (stem, leaf, root) of the plant.

Key words : Alkaloid, EMS, *Lycopersicon esculentum*

Mutagens are known to induce many epigenetic changes (Chaturvedi *et al.*, 1982). Jain and Agarwal (1987) have seen the effect of chemical mutagens on level of ascorbic acid in *Trigonella* species. Farrant *et al.* (1993) had described the role of plant growth regulators in development and germination of seeds of *Avicennia mariana*. A study on ethyl methanesulphonate induced seed mutagenesis of *Capsicum annum* have been reported by Alcantara *et al.* (1995). EMS was used to induce variability in *Artemisia pallens* (Rekha *et al.*, 2000).

So far effect of mutagen on alkaloid content of *Lycopersicon esculentum* cv pusa early dwarf has not been studied. In the present study efforts have been made to see the effect of ethyl methanesulphonate on alkaloid content in different parts of *L. esculentum* cv pusa early dwarf

MATERIALS AND METHODS

Seeds of *Lycopersicon esculentum* cv pusa early dwarf obtained from 'National Seed Corporation' were selected for the study. Seeds were soaked in glass-distilled water for 24 hours. They were then transferred to freshly prepared solution of EMS of different concentrations viz 0.0150, 0.0301, 0.0602, 0.1205 and 0.241 percent. Seeds used as control were treated with glass-distilled water (Jain and Agarwal, 1988). EMS treatment was given for a period of 4 hours at room temperature (23±1°C), thereafter seeds were washed in distilled water and kept on blotting paper till superfluous water was soaked. Experiments were set in triplicate sowing 300 seeds per replicate along with control (Zodape, 1991). After 120 days (when fruits were riped) plants were harvested and subjected to alkaloid extraction.

Table 1: Alkaloid content in plants raised from normal and EMS treated seeds

Parts of plant and alkaloid content / Control and concentrations of EMS	Leaf (mg/gdw)	Stem (mg/gdw)	Root (mg/gdw)
Control	0.426	0.326	0.504
0.0150%	0.331	0.443	0.140
0.0301%	0.673	0.799	0.664
0.0602%	0.556	0.662	0.468
0.1205%	0.448	0.462	0.351
0.241%	0.366	0.455	0.223

Extraction of alkaloids was carried out from ten grams of plant material (root, stem, leaf) collected from different (treated and control) replicates of

plants of *L. esculentum*. Dried and powdered material of each replicate was macerated with 5% acetic acid and filtered. Filtrates, thus obtained were heated separately at 70°C temperature and ammonium hydroxide was added till ph was 10. The precipitates, thus formed were separated by centrifugation at 3000 rpm. The process was repeated thrice and precipitates thus obtained were washed with 1% NH_4OH and were dissolved in boiling methanol, filtered through Whatman No. 1 filter paper and evaporated. Extract obtained after evaporation was weighed and subjected to thin layer chromatography. Solvent system used was methanol and ammonium hydroxide in the ratio of 200:3. Dragendorff (spraying reagent) positive spot (Rf 0.52) was eluted from about 200 unsprayed plates, filtered, crystallized and was subjected to melting point (283°-285°C) and IR-Spectral studies for identification (Kolankiewicz, 1954). Values obtained for eluted compound, were comparable to that of standard solanine.

RESULTS AND DISCUSSION

Alkaloid content in plant parts (leaf, stem, root) of control and treated *Lycopersicon esculentum* has been estimated. Maximum content of crude alkaloid (0.799 mg/gdw) was observed in stem of plants treated with 0.0301% of EMS, followed by plants treated with 0.0602%, 0.1205% and 0.241%. (Table and Figure). However plants treated with 0.015% (lowest concentration) of EMS, showed more amount i.e. 0.443 mg/gdw to that of control (0.326 mg/gdw). Alkaloid content in leaves of plants treated with 0.301% showed the maximum (0.672 mg/gdw) amount. In roots maximum alkaloid concentration was (0.504 mg/gdw) was observed in plants treated with 0.0301% EMS (Table 1 and Figure 1). The mutagenic effects of EMS in *L. esculentum* are in conformity with the results obtained in large number of different plants under similar treatments (Jain and Agrawal, 1994; Mary and Jayabalan, 1995; Kumar and Mani, 1997; Singh *et al.*, 2000; Kumar and Tripathi, 2004).

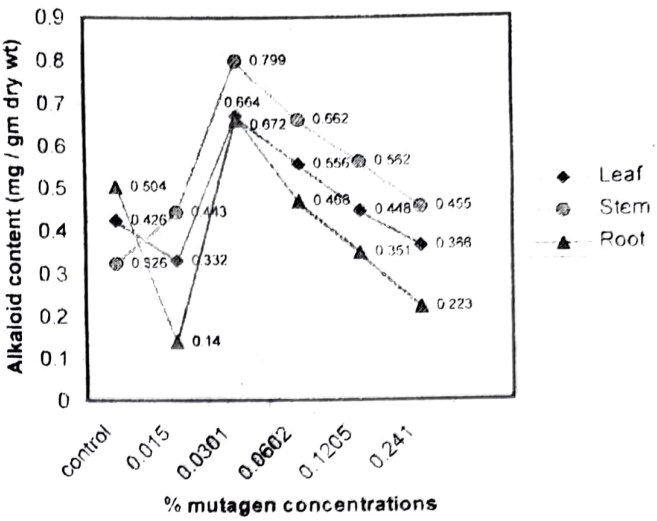

Figure 1. Alkaloid content of control and EMS treated plants of L. esculentum cv pusa early dwarf

CONCLUSION

The present investigation shows that a wide range of variability could be generated through the induced chemical mutagenesis in *L. esculentum*. Sensitivity of the plant to EMS is evident from the data tabulated with regards to alkaloid production. Results obtained reveal that percentage of alkaloid varies with concentrations of EMS used for seeds treatment. Further 0.0301% of EMS is found to be the best concentration for increasing the alkaloid content in *L. esculentum* cv pusa early dwarf in the present investigation.

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