

Frequency and spectrum of chlorophyll mutation in chilli (*Capsicum annuum* L.)

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SUMMARY

A comparison of the effect of gamma-rays ethyl methane sulfonate (EMS) and their combination for induced mutagenesis in two chilli varieties Kashi Anmol (KA-2) and VR-338 (Kashi Gaurav). 1000 chilli seeds each were irradiated with 10, 15, 20, and 25 kR doses of gamma-rays treated, with 0.02, 0.03, 0.04 and 0.05 M concentration of ethyl methane sulfonate and another 1000 seeds used for combination treatments were treated with all doses of gamma-rays followed by 0.03M EMS. The M_1 generation was raised in protected nursery at Horticulture Research Farm, BHU, Varanasi during July 2011. Chlorophyll mutations were used to evaluate the mutagenic efficiency of various mutagens. The spectrum of chlorophyll mutants Albino, Chlorina, Viridis Xantha and Dark Xantha were most frequently observed in M_2 generation. Gamma rays induced higher proportions of chlorophyll mutants than EMS and their combination. However, frequencies of viable chlorophyll mutants were observed in higher EMS and gamma-rays treatments than with their combination. Treatment with 15 kR gamma-rays was more effective in inducing chlorophyll mutations with highest frequency. Mutagenic effect generally increased with increasing dose of and gamma-rays EMS and their combination.

Key Words : *Capsicum annuum*, Induced mutation, EMS, Gamma-rays, Chlorophyll

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Chilli peppers have been a part of the human diet in the Americas since at least 7500 BC. It originated in the Americas (Guatemala). Chilli (*Capsicum annuum* L.) is one of the most cultivated vegetable spice crops in tropical and subtropical climates. India is the largest consumer and exporter of chilli in the international markets and exports dry chilli, chilli powder and oleoresins (biological colouring agent) to over 90 countries. The production of chilli in India is dominated by Andhra Pradesh which bestows 53 per cent to the total area production. It is grown in several parts of India has a larger area; its productivity is low when compared to other countries. Hence, there is an urgent need

to produced and identify new varieties combining high level of disease resistance, besides increased yield and capsaicin content in chilli. Mutagenesis is one of the most critical steps for genetic studies as well as selective breeding. Mutations are the tools and being used to study the nature and basis of plant growth and development, thereby producing raw materials for genetic improvement of crops. Induced mutations can rapidly create variability in quantitatively and qualitatively inherited traits in crops. Various mutagenic agents are used to induce favourable mutations at high frequency that include ionizing radiation and chemical mutagens. Successful mutant isolation largely relies on the use of efficient mutagens. In plant research, a chemical mutagen, ethyl methane sulfonate (EMS) produces single base substitutions with different mutation spectra. Chemo-mutagens induce a broad variation of morphological and yield structure parameters in comparison to normal plants. The present study was undertaken to gather information on the response of chilli genotype to varying doses of gamma-rays irradiation, chemical mutagens (EMS) and their

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