

INDUCED CHLOROPHYLL MUTATIONS AND SPECTRUM IN COWPEA**REENA NAIR^{*}, ANOOP KUMAR MEHTA¹ AND SUDHAKAR PRASAD MISHRA²***College of Agriculture, Murjhad Farm, Waraseoni, Balaghat-481 551 (M.P.)**Key words:* Chlorophyll mutations, Gamma rays, Ethylmethane sulphonate, Cowpea**Abstract**

Induced chlorophyll mutations and spectrum in cowpea var. Pusa Komal and Arka Garima treated with gamma rays and EMS was studied. Broad spectrum of chlorophyll mutations (*albino*, *xantha*, *chlorina*, *viridis* and *xantha-viridis*) were obtained in treatment 500 Gy gamma rays and 0.35% (6 hrs) EMS. Chemical mutagens appeared to be more effective in inducing maximum frequencies than physical mutagen in both the varieties.

Cowpea (*Vigna unguiculata* (L.) Walp) is an important food legume. Chlorophyll mutations are used as markers in genetic, physiological and biochemical investigations and are used in evaluating the mutagenic action of different mutagens in several crops. The objectives of the present study were to investigate the effect of gamma rays and EMS on induction of frequency and spectrum of chlorophyll mutants in Pusa Komal and Arka Garima varieties of cowpea.

The present research was carried out at Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur, Madhya Pradesh, India during 2009-2011. Seeds of Pusa Komal and Arka Garima were treated with 100, 200, 300, 400, 500 Gy of gamma rays and EMS 0.25, 0.30, 0.35, 0.40 and 0.45% for 6 hrs. Untreated seeds served as control. Chlorophyll mutations were observed from emergence until six weeks after germination and were classified in accordance with Gustafsson (1940) based on the intensity of pigmentation in M_1 in both the varieties and grouped as lethal and non-lethal.

Significant variations in spectrum and frequency of different chlorophyll mutations were recorded among different treatments and in both varieties. Spectrum of chlorophyll mutations includes *albina*, *xantha*, *chlorina*, *viridis* and *xantha-viridis* (Fig. 1). Tambe *et al.* (2010) also observed *albina*, *xantha* and *chlorina* chlorophyll mutations in gamma rays treated soybean. Wide spectrum of mutants irrespective of the varieties were obtained in treatment 500 Gy gamma rays and 0.35% (6 hrs) EMS. In Pusa Komal, maximum frequency was observed at 0.45% (6.92 %) of EMS and 500 Gy (5.26%). The overall spectrum of induced chlorophyll mutations was in the order of *chlorina* > *viridis* > *xantha* > *albina* > *xantha-viridis* (Table 1). Frequency of *chlorina* in 0.45% of EMS was 2.52 and 1.97% in 500 Gy. *Xantha* and *viridis* were 1.89% in 0.45% EMS and 1.23% in 400 Gy. *Albina* was highest in 500 Gy (1.32%) followed by 0.35% EMS (0.59%) (Table 1). Mahla *et al.* (2010) in cluster bean reported that mutation frequency of *albino* type induced by gamma rays was higher than EMS. In Arka Garima maximum frequency of *viridis* 2.55% were obtained in 0.45% of EMS and 1.32% in 500 Gy (Table 1). *Chlorina* was highest in 500 Gy (1.99%) and 0.45% EMS (1.27%). *Xantha* was maximum in 0.45% (1.91%) followed by 500 Gy (0.66%). Maximum induction of *xantha* suggested that genes for xanthophylls are readily available for mutagenic action. *Albina* was maximum in 500 Gy (0.63%). Pusa Komal appeared to be more receptive towards the physical and chemical mutagens than Arka Garima.

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The frequency of chlorophyll mutation increased with the increase in dose/concentration irrespective of variety. Similar findings were reported by Dhulgande *et al.* (2010) in pea. EMS proved superior over gamma rays producing a higher frequency and spectrum of chlorophyll mutations. Swaminathan *et al.* (1962) proposed that high frequency is due to the preferential action of EMS on chlorophyll development genes located near centromere. *Xantha-viridis* was least and only observed in 500 Gy (0.66) and 0.35% of EMS (0.59) in both the genotypes.

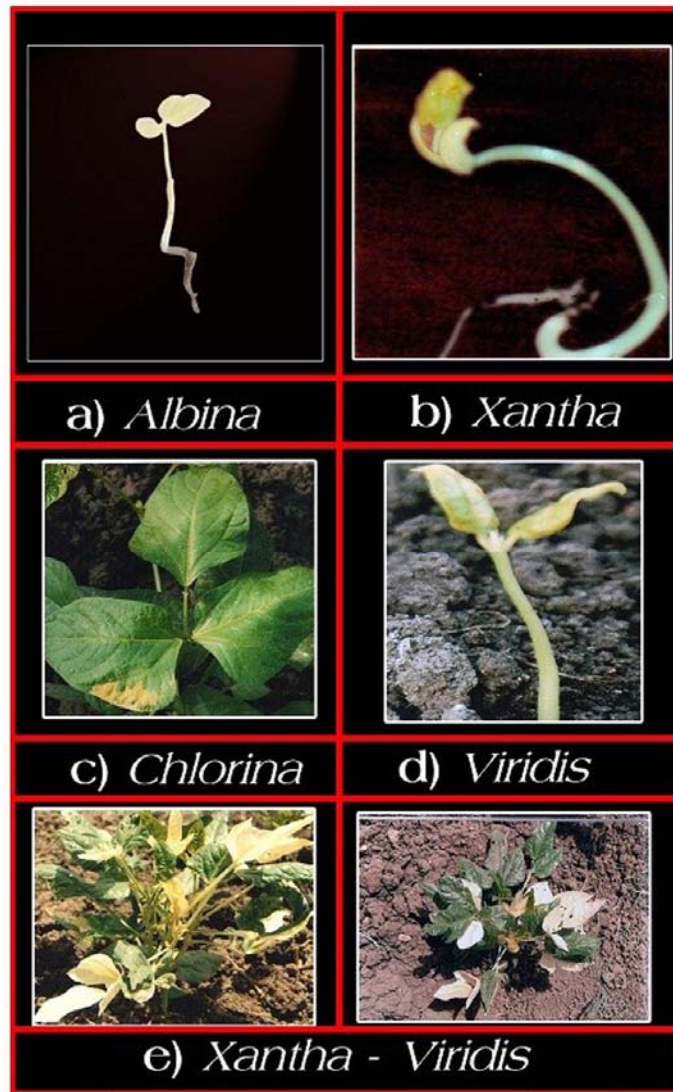


Fig. 1. Chlorophyll mutations.

It is concluded that EMS is more effective in inducing maximum frequencies of chlorophyll mutants than gamma rays in cowpea. Such mutants in M_1 is a proof that hot spots are in the population treated and variability could be induced.

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