was proved by inoculating 15 day old healthy laboratory reared larvae in three different methods. (*i*) crawling (*ii*) spraying the potted rice plants with a spore suspension containing ca. 100 spores/microscopic field of 10 × 10 and then releasing healthy larvae (*iii*) releasing the larvae on potted rice plants and then spraying the same spore suspension. Each treatment was replicated thrice. Check treatments for first method consisted of crawling of the larvae on sterilised potato dextrose agar slants while for other two methods spraying with distilled water. Pathogenicity tests were conducted at 26±1° C.

Among the three methods of incoculation, crawling method was found to be the best since the mortality started after the 2nd day onwards while with the other two methods it was delayed up to 4th day. The average mortality rate in all the cases was 80–90%. The feeding behaviour of the larvae was normal in all the three methods of inoculation upto the second day after which the larvae became sluggish and showed the symptom of loss of appetite. Black cancerous spots or mole like spots started appearing on the body segments near the legs either single or more, mostly two per segment. After development of these spots, the larvae gave up feeding, lost mobility, did not respond to external stimuli, shortened in length and finally fell down from the plants. The infected larvae were slightly hard to touch in comparison to the healthy ones. The colour of the dead larvae was green for about 48 h beyond which it turned brownish and finally dark brown. The cadavers were mumified and whitish fungal mat appeared on the body when it was kept in moist chamber (Fig. 1). Isolation yielded the same fungal pathogen. The fungus was identified as *Fusarium oxysporum* Schlecht (IMI No. 211294).

FIG. 1. Larvae of green horned caterpillar infected by *F. oxysporum*.

F. oxysporum is mainly a plant pathogenic fungus and as a rule, the form of *F. oxysporum* pathogenic on a given species is restricted in its pathogenicity to that species or to closely related ones[3]. Viswanathan (1972) recorded 100 per cent mortality of *Coccus viridis* (Green), a scale insect of coffee, within 15 days by spraying a conidial preparation of *F. oxysporum*[2]. The symptomatology described by Sinha and Prasad (1975)[1] on larvae of *Chilo zonellus* (Swinhoe) due to a pathogenic fungus *Fusarium aleyrodis* is similar to ours, except for the development of black cancerous or mole like spots on the body segments. This constitutes the first record on the occurence of *F. oxysporum* on larvae of *M. leda ismene*.

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INDUCED CHLOROPHYLL CHIMERAS AND BREEDING BEHAVIOUR IN CHILLIES*

MUTAGENS, induce, among other effects chlorophyll deficiency (Chimeras) in M_1 plants. Although the precise origin of chimeras is not perfectly understood, according to Blixt[1], they are closely associated with the mutation processess, chromosome aberrations[9], and plastid mutations[8]. Changes in the genetic material[11] are the important causes, among others, for the formation of chimeric tissues. It has been presumed that the M_1 chlorophyll chimera would show positive correlation with the M_2 chlorophyll mutations. However, the results reported by some workers are conflicting. Wetstein[10] and Natarajan and Shivasankar[5] could not obtain a positive correlation between the frequencies of M_1 chlorophyll chimeras and M_2 chlorophyll mutations while Blixt *et al.*[2], Mackey[4] and Savin *et al.*[7] reported positive correlation. However, information on the relationship between M_1 chimera and M_2 chlorophyll mutations in chilli is lacking. The

TABLE I

*Percentage of plants showing chimeras for chlorophyll deficiency in the M_1 generation***

Sl. No.	Mutagen and dose	K·1		C·156	
		Plants scored	Chimeric plants (%)	Plants scored	Chimeric plants (%)
1.	Control	291	0·0	262	0·0
2.	Gamma rays (kR)				
	10	265	0·0	245	1·22
	30	206	2·43	124	0·0
	40	148	2·70	97	0·0
	50	129	0·0	..	0·0
3.	EMS (M,M)				
	7	278	0·36	273	1·47
	15	262	3·44	206	2·91
	30	268	3·73	157	7·64
	50	249	4·42	165	10·91
	70	228	5·26	148	10·14
	100	177	7·91	..	..
	125	141	5·67	..	..
4.	MMS (mM)				
	5·0	207	1·45	215	0·0
	10·0	222	0·0	203	0·99
	12·0	234	1·71	148	1·35
5.	NEU (mM)				
	2·5	221	..	217	0·0
	5·0	188	1·06	166	0·0
	7·5	193	0·0	115	0·0
	10·0	147	0·0	143	1·40
	12·5	152	0·0	108	0·0
	15·0	97	0·0	62	1·61
6.	EI (mM)				
	1·0	197	0·0	209	..
	4·0	163	0·0	195	..
	6·0	119	1·68	138	..

** The doses wherein chimeric plants have been observed are presented.

incidence of chimera in the M_1 generation after mutagenic treatments and their breeding behaviour in the M_2 generation in chillies are presented in this communication. *Capsicum annuum* L (K·1) and *C. frutescens*. L (C·156) were selected in the present study. Dry and well filled seeds of uniform size with a moisture content of 12% were used for the treatment. For each dose 300 seeds were treated. The mutagens employed consisted of Gamma rays, X-rays ethyl methanesulphonate (EMS), methyl methanesulphonate (MMS), N–Nitroso N–ethyl urea (NEU), N–methyl–N–nitro–N Nitrosoguanidine (MNNG) and Ethylene imine (EI). Gamma irradiation was done using 2000 curie, 60 Co in a gamma cell. X-irradiation was done from Philips C. T. apparatus operated at 50 kV without filter. The seeds presoaked in distilled water for ten hours were treated with the respective chemical mutagens (freshly prepared) for eight hours at pH 7, keeping the volume of solution at a proportion of ten times that of seeds at a constant temperature of 24 ± 2° C. To facilitate uniform absorption, continuous shaking was given. After the chemical treatment, the seeds were washed in running water for half an hour and sown in three replications.

The M_1 plants were examined for the chlorophyll deficient sectors. The branches in the chimeric plants were remarked and the fruits obtained from them were harvested separately and labelled as chimeric fruits

TABLE II

Interrelationship between M_1 chlorophyll chimeras and M_2 chlorophyll mutations in varieties K.1 and C.156

Sl. No.	Particulars	Varieties K.1	Varieties C.156
1.	Progenies from normal branches of chimeric plants :		
	(*a*) Number of fruits secored	135	145
	(*b*) Number of fruit progenies segiegating	5	16
	(*c*) Segregation percentage	3·7	11·0
2.	Progenies of normal fruits on chimeric branches from chimeric plants :		
	(*a*) Number of fruits scored	84	105
	(*b*) Number of fruits segregating	9	34
	(*c*) Percentage of segregation	10·7	32·4
3.	Progenies of striped fruits on chimeric branches :		
	(*a*) Number of fruits scored	8	12
	(*b*) Number of fruits segregating	6	10
	(*c*) Percentage of segregation	75·0	83·3

from chimerid branches, normal fruits from chimeric branches and normal fruits from normal branches. The M_2 gentration was raised on M_1 fruit progeny basis and the chlorophyll mutation frequency was computed.

In M_1, variants exhibiting chlorophyll deficient sectors with *albina, xantha* or *chlorina* stripes valrying in size were noticed. Chimeras to maximum extent of 10·91 and 7·91% were observed, respectively in C·156 and K·1 treated with 50 and 100 mM of EMS, respectively (Table I). No association was observed between the doses of mutagens and the frequency of chimera among the varieties.

It is interesting to note that in both the varieties K·1 and C·156, X-rays and MNNG, and in cv 156, EI treatments did not produde chimeras in M_1 but, in M_2, all these treatments induced chlorophyll mutations[8]. Therefore, it could be inferred that the frequency of chlorophyll chimeras may not serve as a criterion for estimating the relative mutagenic effects of radiations and chemical mutagens employed. In M_2, the frequency of occurrence of chlorophyll mutations was significantly more in the progenies raised from striped fruits obtained from the chimeric branches than those from normal fruits obtained either from chimeric or normal branches (Table II).

Fruits selected from chimeric branches yielded more chlorophyll mutations than those from normal branches of the chimeric plant (Table II). Thus, the sectors on the fruits gave more reliable indication of mutations in the progeny than the presence of sectors on the leaves. Sahib and Abraham[6] obtained 39·8% of chlorophyll mutants in the M_2 progenies of chimeric branches, while the progenies from the non-chimeric branches did not segregate for chlorophyll mutants. It could, therefore, be concluded that the chimerism obesrved on the fruits can be regarded as an effective indication of the likely occurrence of high frequency of chlorophyll mutations in M_2 generation from individual fruit progenies of chillies.

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