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FRACTIONATED GAMMA RAYS INDUCED CHANGES IN SURVIVAL PATTERN AND MORPHOLOGY OF *EUTETRAMORUS PLANCTONICUS* (CHLOROPHYCEAE)

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Eutetramorus planctonicus was irrdiated with fractionated doses of gamma rays (10 kR, 20 kR--------90 kR). Effects of radiation were recorded with regards to growth, chloroplast deformities and morphological variations. The alga could tolerate the highiest dose administered in the present study. Various type of morphological variations were observed and chloroplast was very much disrupted by irradiation.

Keywords : Gamma rays; Survival pattern; Morphology; *Eutetramorus planctonicus*.

Introduction

Fractionated or spaced irradiation is extensively employed in the field of medicine. In algae, most of the studies with gamma radiations were concerned with the chromosomal aberrations. Information pertaining to the effect of fractionated doses of gamma rays on growth and morphology of algae as a whole and green algae in particular is scanty (Nizam, 1960; Srivastava and Nizam, 1974; Vidyavati and Nizam, 1974; Bajaj, 1987). Therefore, present study was carried out to observe the varied effects of spaced doses of gamma rays on *Eutetramorus planctonicus* (chlorococclean alga).

Material and Methods

Freshly growing pure cultures of *Eutetramorus plactonicus* (Korch) Bourr (Dadheech and Srivastava, 1986) were subjected to spaced doses of gamma rays for 10 kR at a time. Cultures were exposed to nine fractions of rediation to get an accumulative dose of 90 kR (Dadheech and Srivastava, 1989). Observations were carried out at weekly intervals following the method described earlier (Dadheech and Srivastava, 1988).

Results and Discussion

E. planctonicus could resist ever highest number of exposure which was 90 kR. Data obtained from optical density measurements showed that there was no evident affect of spaced doses of gamma rays on the growth of the alga (Data not given). This finding was also supported by coenobial counts (Table 1). A good number of healthy coenobia were enrolled even after fifth exposure. A significant influence was recorded after seventh exposure. On final observation of ninth exposure, 72.72% healthy, 21.33% damaged and 5.94% dead coenobia were present which were

TABLE 1

PERCENTAGE OF COENOBIAL COUNTS AND MEASUREMENTS OF CELLS AND COENOBIA OF *E. PLANCTONICUS* AFTER GAMMA IRRADIATION*

	Control		Irradiated
	H 100.00	Coenobial Counts	H 99.12
Initial D -	D 0.00		D 0.77
	Dd 0.00		Dd 0.10
	H 97.15		H 72.72
10 X 9 kR	D 1.89		D 21.33
	Dd 0.95		Dd 5.94
		Average measurements (l/b µm)-	
	Ce 10.92/10.92		Ce 10.80/10.80
Initial	Co 18.88/18.20		Co 18.72/18.08
	Ce 12.92/12.92		Ce 18.80/17.92
10 X 9 kR	Co 20.88/19.58		Co 26.98/25.72

* Only final data are given in the table: H-Healthy; D-Damaged; Dd-Dead; Ce-Cells; Co-Coenobia; l-Length; b-Breadth.

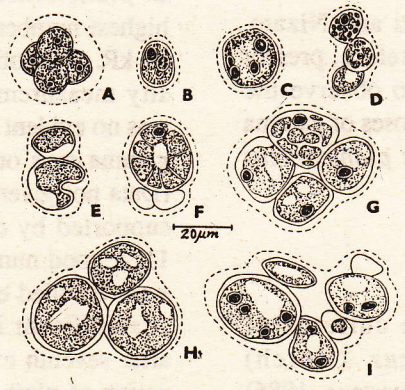

Figure 1. *E. planctonicus:* Chloroplast and morpholgical deformities after fractionated gamma irradiation. A - An unirradiated coenobium; B-I, after irradiation

found to increase in later observations. Fractionated doses of irradiation could produce only temporary supression of growth by damaging cells and coenobia. In case of spaced doses, dose per fraction or interval between the fractions was more important than the dose rate in determining the leathal effects as has been shown with X- rays (Paterson and Thompson, 1948).

Cells and coenobia increased in dimensions with subsequent exposure of gamma rays (Table 1). Enlargement of cells and coenobia may be due to chemical changes induced by radiation either by alteration or inhibition of DNA molecules in nucleus (Hollaender, 1954). Average length and breadth of coenobia were found to be more 6.1 µm and 5.24 µm respectively when compared with unirradiated sample. Length and breadth of irradiated cells after last exposure were increased by 5.16 µm and 5.20 µm correspondingly.

Significant changes in chloroplast and morphology of the alga were observed after six exposures. In damaged cells, chloroplast was broken and fragmented (Figs. 1 D, F & G). After 8th exposure, in damaged cells chloroplast was pale-green, and shrunken to large extent (Fig. 1E). These observations get its support from finding of Zill and Tolbert (1958); Gailey and Tolbert (1958); Srivastava and Nizam (1974) and Vidyavati and Nizam (1974). A unique observation was recorded that cells were possessing varied number of pyrenoids ranging between 2-4(Figs. 1B, C & I). Interestingly, vacoulization in cells was frequenly observed (Figs. 1G, H & I).

Morphological varients with disorientation of cells in a coenobium were obsereved and the coenobium with bulged cells were abundantly encountered after irradiation (Figs. 1D & I). Resting cells were also present. Higher doses were instrumental in producing monstrous forms (Fig. 1I). Giant cells die within 2-3 weeks due to chromosomal damage which produces mechanical difficulties during mitosis as observed by Pratibha Devi (1981) in *Spirogyra*.

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