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Several chromosomal abnormalities at Anaphase-I of meiosis in control and treated plants of "Navoday" cultivar of *Lycopersicon esculentum*

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Abstract :

The present investigation deals with frequency of abnormalities at Anaphase I of meiosis in control and gamma rays treated plant of "Navoday" cultivar of *Lycopersicon esculentum* (Tomato).

Lycopersicon esculentum is one of the most important vegetable plants. It originated in western South America. Because of its importance as food, tomato has been bred to improve productivity. *Lycopersicon esculentum* has been widely used not only for food, but also as research material for increase production and isolate desirable changes *Lycopersicon esculentum* is very important member of family Solanaceae.

The present paper deals with different doses of Gamma rays treatment such as 10Kr, 15 Kr, 20 Kr, 25 Kr and 30 Kr on "Navoday" cultivar of *Lycopersicon esculentum* which is commonly cultivated in Gaya, Bihar.

Introduction :

This paper deals with frequency of abnormalities at Anaphase-I of meiosis in control and gamma rays treated plants of "Navoday" cultivar of *Lycopersicon esculentum* (tomato).*Lycopersicon esculentum* is one of the most important vegetable plants. It originated in western South America. Because of its importance as food tomato has been bred to improve productivity. *Lycopersicon esculentum* has been widely used not only for food but also as research material for increase productivity and isolate desirable changes. *Lycopersicon esculentum* is very important member of family Sonanaceae.

The present investigation deals with different doses of gamma rays such as 10KR, 15KR, 20KR, 25KR and 30KR on "Navoday" cultivar of tomato, which is commonly cultivated in Gaya, Bihar. Gamma rays are penetrating electromagnetic radiation arising from the radioactive decay of the nuclei. It consist of short wave-length electromagnetic wave. Various researchers have the opinion that gamma ray among the physical mutagen is the most effective and powerful agent (Dhumal and Bolbhat, 2002; Chauhan and

Rivindron, 1979; Kumari and Kumar, 1995; Kumar and Singh, 2005). In the present investigation, therefore the gamma rays has been used as the physical mutagen on *Lycopersicon esculentum* (Allegra Margi and Zannon, 1965; Blackeslee and Avery, 1937). The dividing root cells of control plants showed 2n=24 chromosome and the meiotic studies in control plant showed gametic number as n=12. In gamma rays treated plants showed very much abnormalities at Anaphase I of meiosis. Simple chromosomal bridges, chromosomal laggards, persistent chromosomes and unequal separation of chromosome were recorded in a considerable number. Similar report have been observed by many researchers (Gordon, 1957; Pushpalatha et al, 1992; Rao and Laxmi, 1980).

Material and Method :

Material for the present investigation on the cultivar of *Lycopersicon esculentum* namely "Navoday" available in Gaya town showed in Table-1.

Table-1

Name of Species	Name of Cultivar	Seed taking for gamma ray treatment
Lycopersicon esculentum	Navoday	100

Different doses of gamma rays has been given to Navoday cultivar of *Lycopersicon esculentum*showed in table-2

Table-2

Name of cultivar	Doses of gamma rays
Navoday	10 KR 15 KR 20 KR 25 KR 30 KR

Finally, the seed were dried for sowing. In this way treated seed were grown in the area of Dept. of Botany, Gaya College, Gaya recording morphological, ecological and cytological characters.

Mitotic and Meiotic Studies:

Fixation of root tip and flower buds were made in 1:3 aceto alcohol. All the stages of mitosis and meiosis were obtained by squash preparation, and the best time for somatic metaphase was found to between 10:00 am to 11:00 am. And for the meiotic squash preparation, the suitable time is 10:00 am to 11:45 am.

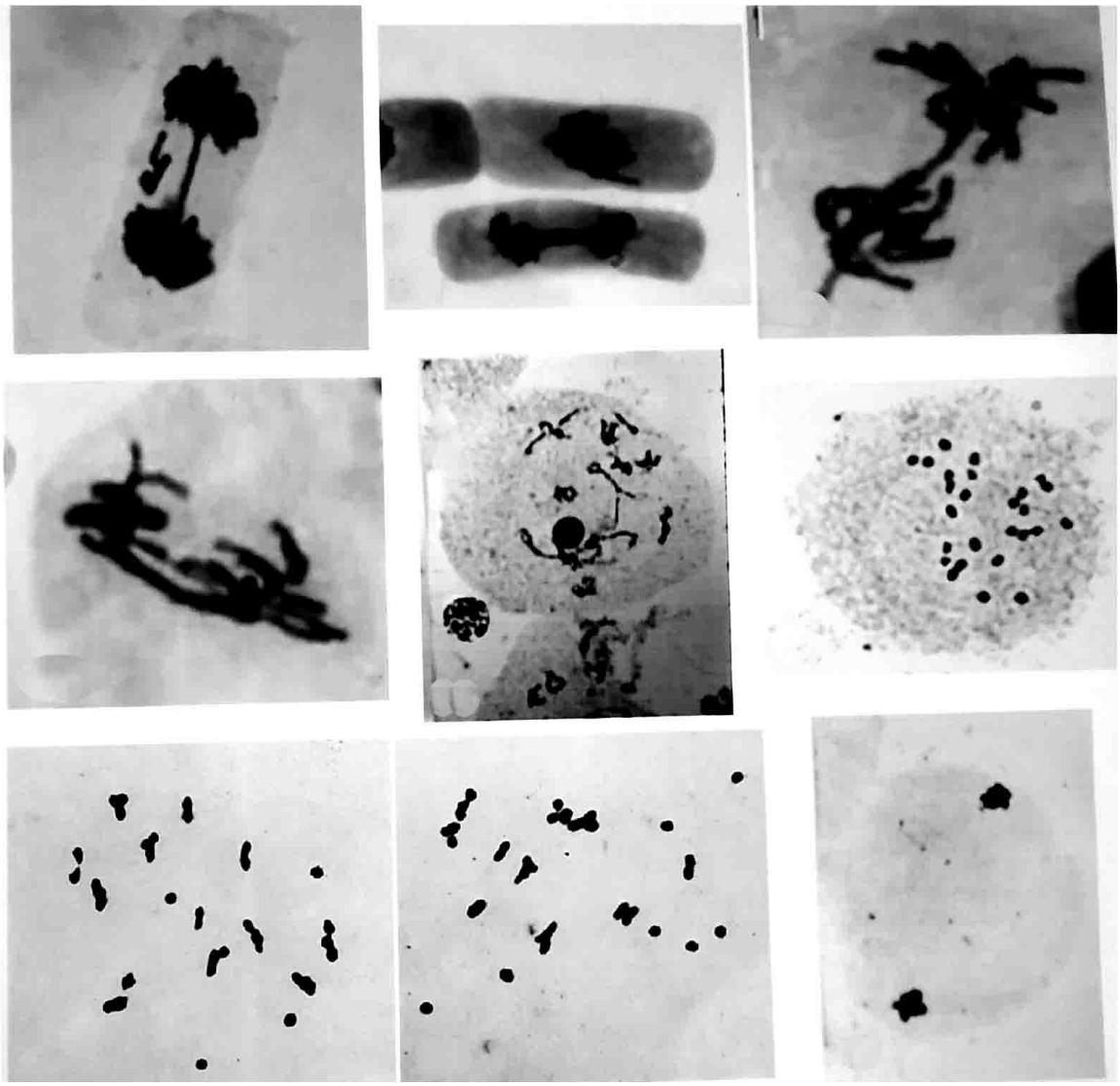
Result and Discussion:

The somatic chromosome number "Navoday" cultivar has been confirmed as 2n=24 in control as well as treated plants. In control plant percentage of affected cells at Anaphase I of meiosis was 5.42 percentage but in treated plants number of affected cells was very much pronounced. It was found to vary from 11 percent to 39 percent. Among abnormalities fragments, unequal separation, chromosomal laggards, lagging bivalent, chromosomal bridges were reported.

Table-3
Frequency of abnormalities at anaphase I in control and gamma ray treated (R_1& R_2) plants "Navoday" cultivar

Control and treated plants	Total No. of cells studied	No. of affected cells showing				
		Fragments	Unequal Separation	chromosomal Laggards + lagging bivalent	chromosomal bridges	Percentage of affected cells
Control	700	-	-	20	18	5.42%
Gamma rays in KR			R_1 Generation			
10KR	700	15	10	27	25	11%
15KR	700	25	4	35	28	13.14%
20KR	700	105	65	43	10	13.85%
25KR	700	128	73	10	14	32.14%
30KR	700	212	28	12	22	39.14%
			R_2 Generation			
10KR	700	8	6	15	13	6%
15KR	700	15	18	17	15	9.3%
20KR	700	70	-	21	7	14%
25KR	700	98	22	4	9	19%
30KR	700	165	5	7	10	26.71%

Meiotic studies in "Navoday" cultivar showed gametic number as n=12. Abnormalities at Anaphase I in meiosis were quite common.



Besides, chromosomal laggards, chromosomal bridges and unequal separation of Chromosome and chromosomal fragment were also observed in good number (Nilon, 1965; Newcombe, 1971).

Conclusion :

Variability, the base of crop improvement can be quickly brought about through various mutagen. In this paper gamma rays as a physical agent for creating chromosomal changes and showed various abnormalities at Anaphase I of meiosis in "Navoday" cultivar of *Lycopersicon esculentum*. The study made to find out more about the effect of gamma rays to understand chromosomal aberration and behaviour.

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