Frequency of abnormalities at anaphase I of meiosis in control and gamma rays treated plants of "S-22" cultivar of *Lycopersicon esculentum*.

Leena and Jitendra Kumar,
Department of Botany,
Magadh University, Bodh Gaya, Bihar, India
E-mail: ramleena19@gmail.com, jitendra4343@gmail.com

Abstract:

The present paper deals with frequency of abnormalities at anaphase I of meiosis in control and gamma ray treated plant of "S-22" cultivator of *Lycopersicon esculentum*(Tomato). Tomatoes are rich source of various vitamins and have good amount of Lycopene. The fruits are used in salad, cooked vegetable and ketchup. *Lycopersicon esculentum* belongs to family Solanaceae. Tomatoes plants are cultivated for its edible fruits. The plants of tomatoes are generally 90 cm tall and much branched. Leave are hairy and pinnately compound and 10-25 cm long. Leaves are strong odorous. The five petaled flowers are yellow and fruit are berries. In present investigation different doses of Gamma rays treatment such as 10 Kr, 15 Kr, 20 Kr, 25 Kr and 30 Kr given to "S-22" Cultivars of *Lycopersicon esculentum*, which is commonly cultivated in Gaya, Bihar. Some interesting abnormalities at anaphase I of meiosis in R1 and R2 generation were found out. Frequency of abnormalities at anaphase I in control and gamma ray treated were noted out. However the frequencies of abnormalities work less in R2 than R1 generation.

Key Words: *Lycopersicon esculentum*, S-22 cultivar, Solanaceae, Gamma radiation, frequency, abnormalities at anaphase I, R1 and R2 generation.

Introduction:

This paper deals with frequency of abnormalities at anaphase I of meiosis in control and gamma ray treated plants of 'S-22" cultivar of *Lycopersicon esculentum*(Tomato).*Lycopersicon esculentum* belongs to nightshade family(Solanaceae), cultivated for its edible fruits. Tomatoes are a good source of a vitamins and lycopene. The fruits are commonly eaten as salad, in cooked vegetable for

flavor, and in pickle. A large percentage of tomato used as juice, ketchup and "Sun-dried" form. There are various uses of tomato in our present day meal. Tomato plants are generally much branched, spreading upto 90 cm tall, leaves are hairy, strong odorous, pinnatley compound and upto 10-25 cm long. The five- petaled flowers are yellow. Fruit are berries that have various diameter.

The present investigation deals with treatment of different doses of gamma rays such as 10 Kr, 15 Kr, 20 Kr, 25 Kr and 30 Kr given to "S-22" Cultivar of *Lycopersicon esculentum*, which is commonly cultivated in Gaya, Bihar. Gamma rays are penetrating electromagnetic radiation arising from the radioactive decay of the nuclei. It consists of short wave-length electromagnetic wave. Different workers have the opinion that gamma ray among the physical mutagen is the most effective mutagenic agent (Sparrow, 1961; wada&Izuta 1961). In the present investigation, therefore the gamma rays has been used as the physical mutagen on *Lycopersicon esculentum* (Kumar Devanand, 1995; Chandra and Choudhary 1991). The dividing root cells of control plant showed 2n=24 chromosome and the meiotic studies showed gametic number as n=12. The gamma rays treated plants showed very much abnormalities at anaphase I of meiosis. Chromosomal laggards, simple chromosomal bridges, unequal separation of chromosomes were recorded in a considerable number in pollen mother cells. In some cells clumped group of chromosomes at four places were observed by many workers (Koo,1972, Adamu and Aliya, 2007, Tarar and Dnyansagar,1980, Verma et al 2011)

Material and Methods:

Material for the present investigation on the cultivars of tomato namely "S-22" available in Gaya town showed in table-1

Table-1

Name of species	**Name of cultivar**	**Seed for taking for gamma ray treatment**
Lycopersicon esculentum	S-22	100

Different doses of gamma radiation given to "S-22" cultivar of *Lycopersicon esculentum*, showed in table-2

Table-2

Name of Cultivar	Doses of gamma radiation
S-22	10 Kr 15 Kr 20 Kr 25 Kr 30 Kr

The Gamma ray treatment was made on the plant at NBRI, Lucknow. Treated seed were grown in the area of Department of Botany, Gaya College, Gaya for recording cytological characters.

Mitotic and Meiotic Study:

Fixation of root tip and flowers 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 anaphase was found to be between 10:00 am to 11:00 am, and meiotic squash preparation, the suitable time for 10:00 am to 11:45 am.

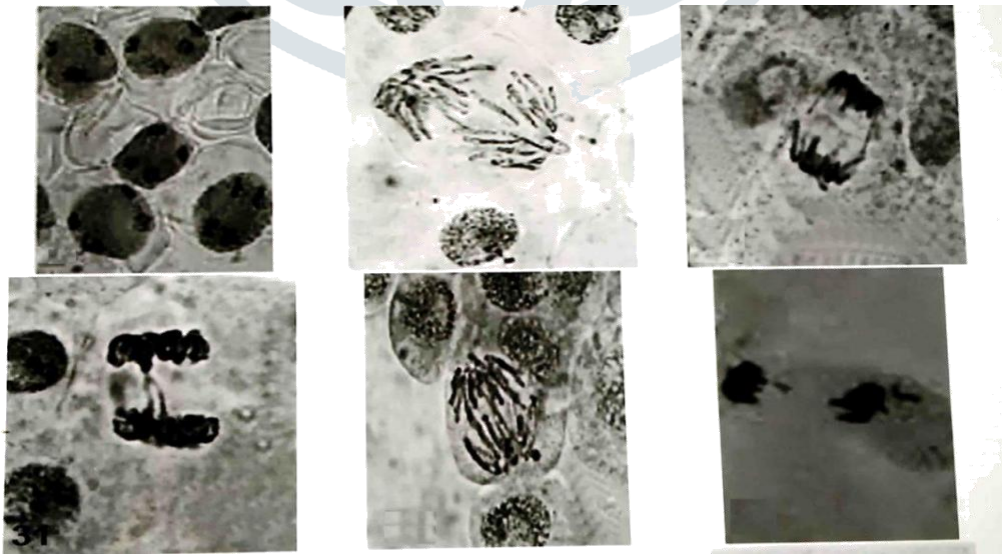
Result and Discussion:

The somatic chromosome number in "S-22" cultivar has been confirmed as 2n=24 in control as well as treated plants. Meiotic studies in S-22 cultivar showed gametic number as n=12. Abnormalities at anaphase I in meiosis were quite common. In control plant percentage of affected cells at anaphase I of meiosis was 10.57 percentage but in treated plants number of affected cell was very much pronounced. It was found to vary from 15 percent to 34.14 percent. Among abnormalities fragment, unequal separation, chromosomal laggards, lagging bivalent, chromosomal bridges were reported.

Table-3

Frequency of abnormalities at anaphase I of meiosis in control and gamma ray treated (R1 & R2) plants of "S-22" cultivar

Control and Treated Plants	Total No. of cells studied	No. of affected cells				
		Fragments	Unequal Separation	Chromosomal Laggards + lagging bivalent	Chromosomal bridges	Percentage of affected cells
Control	700		4	40	30	10.57
Gamma ray doses in Kr				R1 Generation		
10Kr	700	20	10	40	35	15.0%
15Kr	700	50	12	45	36	20.43%
20Kr	700	80	60	30	18	26.86%
25Kr	700	120	70	24	25	34.14%
30Kr	700	150	40	26	19	33.57%
				R2 Generation		
10Kr	700	12	5	19	18	7.71%
15Kr	700	37	6	24	19	12.28%
20Kr	700	54	46	18	12	18.57%
25Kr	700	88	5	20	16	25.57%
30Kr	700	100	25	17	10	21.714%



Besides, Chromosomal laggards, Chromosomal bridges and unequal separation of chromosome, chromosomal fragments were also observed in good number in pollen mother cells. However in R2 generation, the percentage of abnormalities decreased (Jana, 1963, Katiyar, 1978,Lesley and Lesley, 1956).

Conclusion:

With the help of different mutagen in cytological studies we can understand about chromosomal behavior of control and treated plants. Because of its relative simplicity mutagenic treatment of seed remains a useful tool for isolating the desired variants and developing resistance to biotic and abiotic stress in various crops. In this regards, induced mutagenesis is gaining importance in plant molecular biology as a tool to observe and identify different changes after treatment with different doses of gamma radiation.

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