



EVALUATION OF PLANT INJURY DUE TO RADIATION IN M1 GENERATION OF SESAME (*SESAMUM INDICUM* L)

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ABSTRACT

Physiological damage during M1 generation is one of the important considerations for the selection of mutagen and its dose. In present study plant injury due to gamma radiation in sesame (*Sesamum indicum* L.) was analyzed. Air dried seeds of two cultivars of sesame i.e. Krishna and RT 54 were treated by gamma rays in single dose of 60 kr., split dose of (30+30) kr. and (20+20+20) kr. . Plant injury was observed in all radiated population of both cultivars in M1 generation, indicating the role of gamma ray in bringing small or large physiological damage. Plant injury due to split doses was found higher than that of single dose in both cultivars.

Key words: Sesame, Gamma ray, Plant injury, Mutagen.

INTRODUCTION

In any mutation breeding program, the choice of mutagen and its dose or concentration is very important consideration for achieving the desired results. The effectiveness of mutagenic dose and other pre-conditioning of the treatment set a limit on the dose of mutagens, duration and environment of treatments. Physiological damage during M1 generation is one of the important considerations for the selection of mutagen and its dose. Usually such mutagens which results in low plant injury but in high genetic effects are desirable. Therefore, a quantitative determination of M1 injury should be a routine procedure in mutation breeding experiments. M1 injury can be measured quantitatively with the monitoring of certain characters such as germination percentage of seeds, emergence percentage of seedlings, periodic growth of radical and plumule and Pollen sterility.

MATERIAL AND METHOD

Air dried seeds of two cultivar of Sesame i.e. Krishna and RT-54 were irradiated with gamma ray in single dose of 60kr. split dose of (30+30) kr. and (20+20+20) kr. in Bhabha Atomic Research Centre (BARC) Trombay , Mumbai. After treatment, the seeds were clustered into two sets one was meant for study under laboratory condition (viz. germination%, Periodic growth of seedlings and pollen sterility) and other for seeding in experimental plot to study emergence%. Germination test was done by conventional Petri-dish method by using germination chamber. Germination was counted on 5 consecutive days from first day of germination onward and germination % was calculated. For determination of periodic root length “growing – rack” method developed by Mikaelson (1966) was used. Radical length was measured from the days of germination up to 6 consecutive days. Plumule height was measured by using Petri-dish method

from the day of emergence to 6 consecutive days. Emergence of seedling was measured in field condition and observation was recorded from 4th day onward up to floral initiation. Pollen sterility was measured at flowering stage by using acetocarmine technique for analysis for analysis of fertile and sterile pollen.

RESULT AND DISCUSSION

S. no.	Treatment	Germination of seeds (%)	Emergence of seedlings (%)	Periodic root growth(mm/day)	Periodic shoot growth(mm/day)	Pollen sterility
1	Krishna (C1)	95.00	80.00	09.53	05.17	02.19
2	Krishna (60) kr.	80.00	50.00	02.56	03.00	03.13
3	Krishna (30+30)kr.	80.00	40.00	03.86	03.08	07.63
4	Krishna (20+20+20)kr.	80.00	20.00	05.29	02.75	14.07
5	RT-54 (C2)	100.00	85.00	07.96	04.38	02.12
6	RT-54 (60)kr.	80.00	50.00	04.42	02.80	07.77
7	RT54 (30+30)kr.	70.00	10.00	04.40	02.66	09.25
8	RT54 (20+20+20)kr.	70.00	10.00	04.38	02.50	15.82

C1=Control 1, C2= control 2

Table: Effect of mutagen on germination, emergence, seedling growth and pollen sterility
Germination % in all mutagenic treatments were decreased in compare to control in both cultivars .In Krishna there is not any variation in germination between single dose of 60kr. and split dose of (30+30) kr. or (20+20+20) kr., But in RT-54 germination in split dose was reduced in compare to single dose .Emergence in all mutagenic treatments were decreased in compare to control. In both cultivars emergence in split dose is reduced in compare to single dose. Almost similar result was seen in periodic growth of root and shoot except in one case where periodic root growth in (60) kr. of Krishna was reduced in compare to split dose. Pollen sterility of all mutagenic treatment was increased in compare to control. In both cultivars sterility was higher in split dose in compare to single dose. Overall split dose was found to cause plant injury more than that of single dose.

Dose dependent reduction in germination% was also seen in sesame cultivar TTVS 51 and TTVS 19 by Ramadoss et. al.(2014). Ravichandran and Jayakumar (2014) have shown inversely proportional relation between germination % and dose concentration in sesame cultivar VRI-1. Depressive effects with increasing radiation and 50% reduction in germination and seedling size were observed at 50 kr. gamma ray in TMV3 by Anbarasan et. al. (2013). Dose dependent increase in pollen sterility has been observed by other workers in different crops like Ramaya

and Nallathambi (2014), Chaturvedi et. al. (1983) in blackgram, Dixit and Dube (1988) in Lentil, Sangle et. al. (2011) in okra.

CONCLUSION

It can be concluded from all the above findings that in both the cultivars split dose causes more plant injury than that of single dose.

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