Gamma sensitivity of groundnut (*Arachis hypogaea* L.) Genotype: Toward the Improvement

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Abstract
Groundnut (*Arachis hypogaea* L.) is a member of family Fabaceae. It is an important monoecious annual legume in world mainly grown for oilseed, food and animal feed. Groundnut oil contains 51% of mono-saturated oil and 30% polyunsaturated and 19% saturated oil. India consumes over 10 million tons of edible oil per year. Present study was conducted to check the gamma sensitivity of groundnut and to find out suitable dose of rays. For the purpose germination %, seedling height & root length was observed after the different doses of gamma rays i.e. 10kr, 15kr, 20kr and 25kr on two varieties of groundnut viz. TAG-24 and AK-159 and it was concluded that 10 kr dose induces good genetic variability in both varieties.

Keyword: Groundnut; Gamma rays; Sensitivity

1. Introduction

Groundnut (*Arachis hypogaea* L.) is a member of family Fabaceae. It is an important monoecious annual legume in world mainly grown for oilseed, food and animal feed [1]. The plant is unusual because it flowers above ground and pods are produced underground. Seeds from the groundnut are the world's fourth largest edible oil seed crop just behind sunflower. The cultivated species was described by Linnaeus in 1753 as Arachis.

As an oilseed crop, groundnut rank fourth in world production. In India it is used as an oil seed and also consumed directly as food. Besides, it contain oil (48-52 %) and protein (22-30%) seed contain carbohydrates (10%), minerals (3%) and B complex vitamins especially thiamin [2]. Groundnut oil contains 51% of mono-saturated oil and 30% polyunsaturated and 19% saturated oil [3]. It also has neutral flavor and odour. This makes it the most preferred oil in India.

India is the third largest consumer after China and EU. Each year, India consumes over 10 million tonnes of edible oil. It was observed that the area under cultivation, production and productivity of groundnut in Maharashtra and India have revealed continuous decreasing trend [4]. However, it is self-pollinating and possesses limited variability. Thus this study investigates the improvement of groundnut by induced mutations with physical mutagen (Gamma rays).

Mutation breeding offers the possibility of inducing desired attributes that either cannot be found in nature. There are many examples where desirable mutants have been identified in groundnut [5-8].

It is very necessary to check lethal dose, relative biological effectiveness and efficiency of mutagen before starting of any sound breeding program [9]. So the present investigation deals with radio sensitivity of two varieties of Groundnut with respect of germination percentage, seedling height and root length.

2. Materials and Methods

For the present investigation two well-known verities of groundnut from Vidharbha region i.e. TAG-24 and AK-159 was selected. The Germplasm was collected form Department of Crop Research Unit (Oil Seed), Dr. Panjabrao Deshmukh Krishi Vidhyapeeth, Akola-444001 (MS). Seed having moisture content 7% were irradiated to Co_{60} at different doses viz. 10kr, 15kr, 20kr and 25kr. Electromagnetic ionizing was 24,578 rads per hour, 1000 curies) Gamma chamber facility was availed from Department of Biophysics, Government Institute of Science, Aurangabad (MS), India.

Germination percentage: To investigate the Germination percentage 50 seeds per dose including control (In triplicate), per genotype were taken and kept on moist blotting paper mounted in petriplate to record germination percentage. Germination percentage was recorded as a mean of three reading and mentioned in percentage.

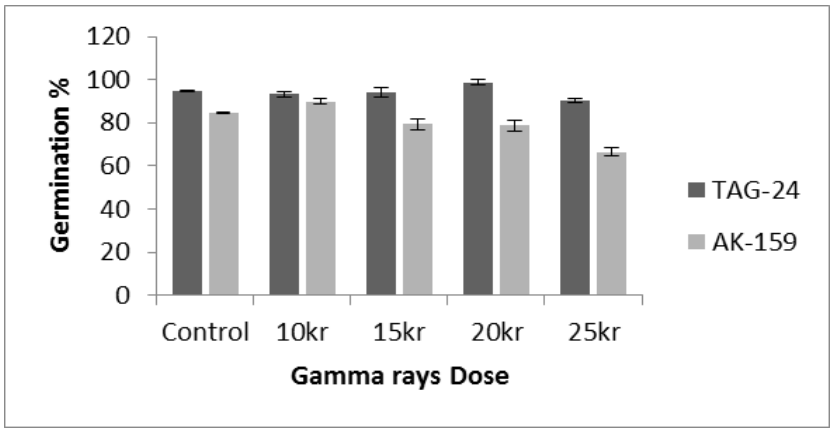
Root Length: To investigate the root length, germinated seed in moisture chamber were forewords soaked in water and placed in controlled environment (temp 25± 2 °C humidity 50% ± 3%). The controlled photoperiod is of 16 hrs per day. And the root length was measured in Centimeters after 8 day [10].

Seedling Height: The seedling height was recorded on 10th day after the germination of seeds which were earlier sown in pots, by randomly measuring the height of 10 seedlings. The reduction in mean seedling length of treated seedlings as compared to control was regarded as seedling injury and expressed as percentage.

Data of Germination percentage, Root length & Seedling height were recorded in triplicate and data was subjected to analyze S.E. (Standard error), mean and coefficient of variation by using the standard formulae [11].

3. Result and Discussion

Epigeal type of germination is occurs in Groundnut, the cotyledons become green soon after emergence. Generally it takes about 3-5 days for germination and emergence from the soil at 30 °C. In varieties, AK-159 and TAG-24 maximum number of seeds germinated on 8th day after sowing. In present investigation fixed pattern was not observed any. The germination percentage for control is 94.67 (SE ±0.5243) and 84.67 (SE ±0.4985) for TAG-24 and AK-159 respectively. In variety TAG-24 germination percentage goes increasing up to dose 20kr and suddenly drops down at higher dose. It was recorded in variety AK-159 the germination percentage shows decreasing pattern as dose increases. Same results were recorded by L. Tshilenge-Lukanda [12].



Graph 1: Showing effect of gamma rays on seed germination in *Arachis hypogaea* (L.) variety TAG-24 & AK-159

Table 1: Showing the effect of Gamma rays on Root length and Seedling height of *Arachis hypogaea* L. Variety TAG-24 & AK-159.

Sr. No.	Variety	Dose	Root length		Seedling height	
			Mean	*SE	Mean	*SE
1	TAG-24	Control	2.62	±0.09234	5.84	±0.085049
		10kr	3.01	±0.14587	6.15	±0.236291
		15kr	2.85	±0.31452	5.97	±0.060093
		20kr	2.16	±0.14785	5.50	±0.284312
		25kr	2.02	±0.16487	5.24	±0.248963
2	AK-159	Control	4.01	±0.01289	6.93	±0.145258
		10kr	3.93	±0.04562	6.45	±0.144338
		15kr	3.74	±0.09875	5.77	±0.185592
		20kr	3.71	±0.09875	6.27	±0.332081
		25kr	3.43	±0.19852	5.19	±0.20145

***SE=** Standard error

Variations in phenotypic expression due to irradiation were studied with root length and seedling height. For variety Tag-24 root length and seedling height sowed decreasing pattern but at 10kr dose seedling height and root length showed more value than control. While in variety AK-159 it shows zig-zag pattern, it was observed in both the varieties, that highest dose i.e. 25kr significantly affect the seedling height and root length.

4. Conclusion

The present work significantly helps to select the dose of gamma rays for the mutation breeding of Groundnut. It was concluded that 10kr is the most suitable dose for both the varieties and 25kr dose is most damaging dose for variety TAG-24 and AK-159. Gamma rays can induce a genetic variability towards positive direction. Molecular analysis using ISSR markers has proved that gamma ray irradiation at dose 10 kr increased level of genetic variability [13].

5. References

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