RESEARCH ARTICLE

Effect of Chemical and Physical mutagens on pollen sterility in *Lablab purpureus* (L.) Sweet

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ABSTRACT

Lablab purpureus (L.) belongs to family Fabaceae. It is known as a Dolichos bean and have economically important as grain legume, vegetable, animal fodder and green manure. In the present study seeds of *Lablab purpureus* (L.) variety *Phule Suruchi* were treated with Ethyl methanesulphonate (EMS) at different concentrations like 10mM, 20mM, 30mM, 40mM and Gamma rays doses with 100Gy, 200Gy, 300Gy, 400Gy, and Combination of EMS and Gamma rays Concentration/doses at 100Gy+40mM, 200Gy+30mM, 300Gy+20mM, 400Gy+10mM.The effect of Physical and chemical mutagens on pollen sterility was studied in selected plants from the population of M_1 generation.

Keywords: *Lablab purpureus (L.), EMS, Gamma rays, Pollen sterility.*

INTRODUCTION

Lablab purpureus(L.) used as legumecrops. It is one of the major crop in Tamilnadu, Karnataka and Andhra Pradesh. It is a member of family Fabaceae. It is perennial, twinning or creeping herb generally cultivated as an annual crop. Most of varieties are with twining habit and few are bushy, prostrate or semi-erect in habit. Leaves are trifoliate and flowers are white, reddish or purple and borne on axillary racemes. Pods are flat or inflated, linear or broad, 1-5 inch long with persistent style. Seeds are globose, ovate or flat. It is cultivated as a single crop or it is mixed with some other crops like corn, groundnut, castor, bajra etc.

MATERIAL AND METHODS

Collection of seed material: The seeds of *Lablab purpureus* (L.) variety *Phule Suruchi* were collected from Mahatma Phule Agriculture College, Shivajinagar, Pune (India).

Mutagens used: Physical mutagen like Gamma rays, chemical mutagen like EMS were used for the present treatment**.**

1. Chemical mutagen- The seed material were treated with different concentration of EMS like 10mM, 20mM, 30mM, 40mM in the Laboratory, Department of Botany, Fergusson College, Pune.

2. Physical mutagen- The seed material was irradiated with Gamma rays obtained from source CO^{60}at Nuclear Chemistry division, Department of Chemistry, Savitribai Phule Pune University.

3. Combination treatment- The combination of EMS and Gamma rays mutagenic concentrations/doses at 100Gy+40mM, 200Gy+30mM, 300Gy+20mM, 400Gy+10mM used for the treatment.

Experimental setup: The *Lablab purpureus* (L.) seeds treated with three mutagenic treatments with four treatments, treated seeds were sown in Field by Complete Randomized Block Design along with the control.

Test for Pollen Sterility: Pollen sterility was determined in 25 randomly selected plants of each treatment along with control by staining the pollen grains stained with 2% acetocarmine. The stained pollen grains were considered as a fertile and partially stained or shriveled stained was considered as sterile.The pollen sterility expressed in percentage.

RESULTS AND DISCUSSION

The pollen sterility in control was observed to be 2.1%. It was observed that the pollen sterility was increased with the increases in concentration of EMS and Gamma rays. The Pollen sterility range was observed 3.30% to 10.49%. The Pollen sterility range in EMS treatment was 3.3% to 8.8%, in Gamma radiation the pollen sterility range was 6.26% to 10.49%, while in Combination treatment the Pollen sterility range was 6.33% to 9.69%. The highest inducing mutagen was Gamma rays with 10.49% Pollen sterility at 400Gy radiation. In Combination treatment the Pollen sterility was highest 9.69% at 400Gy+10mM treatment followed by EMS treatment 8.8% at 40mM concentration. The Pollen sterility was highest 10.49%.at 400Gy Gamma radiation while lowest 3.30% at 10mM EMS concentration.

Amongst three mutagenic treatments gamma rays was better to induce the maximum pollen sterility in *Lablab purpureus* (L) Sweet. In the present research work on *Lablab purpureus* (L) the pollen sterility was increased with increases of concentration/dose of EMS, Gamma rays, and Combination of both mutagenic treatments. Sinha and Godward (1972) reported that induction of pollen sterility through Gamma rays in *Lens*. Chemical mutagen have induced pollen sterility was reported by (Gohal *et al*., 1972) in Guar (Hakande, 1990) in winged bean and (More, 1992) in Alfalfa.

Different researches have recorded a progressive increase in pollen sterility with increases in dose/concentration of mutagens, (Hakande, 1990) in winged bean and (More, 1992) in Alfalfa. (Gaikwad, 2013) in cowpea.

Satpute and Fultambekar, (2012) studied the pollen sterility in soyabean. The percentage of sterility increased as dose/concentration increases in both the mutagens due to chromosomal interchange, chromosomal aberrations and gene mutation.

Table 1: Effect of mutagens on pollen sterility in M_1generation of Lablab purpureus (L.)

Mutagens	Dose/ Conc.	Pollen Sterility (%)	± S.E.
Control	Control	2.1	0.1
EMS	10mM	3.30	0.5
	20mM	4.84	0.7
	30mM	6.65	0.6
	40mM	8.8	0.8
Gamma rays	100Gy	6.26	0.6
	200Gy	7.93	0.5
	300Gy	8.65	0.4
	400Gy	10.49	0.6
Gamma rays+ EMS	100Gy+40mM	6.33	0.7
	200Gy+30mM	7.35	0.8
	300Gy+20mM	8.14	0.3
	400Gy+10mM	9.69	0.6

Many research workers like (Gautam *et al*., 1992) reported the same result. (Dixit and Dube, 1981) reported the pollen sterility in *Lentil*, which gradually increased with increase in dose/concentration. (Sangle *et al*., 2011) in Pigeon pea and (Shinde and More, 2010) in Cluster bean reported that the pollen sterility was increased with increase in concentration/dose after EMS, Gamma rays and combination of both mutagens. The pollen sterility in *Lablab purpureus* (L). after the EMS, Gamma rays, and Combination of both revealed quite lower values within the individual treatments. This character of pollen sterility clearly demonstrated that system has resistance to the different employed mutagens. This mutagen can bring about change in genetic structure and alter many physiological activities like pollination reported by (Bhosale and More, 2013b) in Withania and Aney, (2014) in pea. Similarly it is reported for other physiological activities like germination and growth parameters for seedlings by (Bhosale and More, 2013a, 2014) in Withania, (Mishra and Khan, 2014) in isabgol and (Salve and More, 2014) in Coriander.

CONCLUSION

It is conclude that the pollen sterility was increased in *Lablab purpureus* (L) with the increased in the concentrations of EMS and Gamma radiation treatment. The percentage of pollen sterility was increased in Gamma radiation treatment than EMS treatment. The High mutagenesis effect was observed at the doses of 400Gy radiation where the pollen sterility was 10.49% which was more lethal as compared to the other mutagens .Amongst 3 mutagenic treatments gamma rays was better to induced the maximum pollen sterility in *Lablab purpureus* (L) Sweet.

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