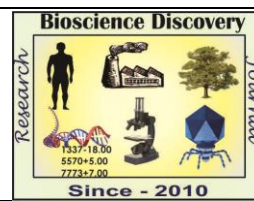


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**Research Article**



## Effect of mutagens on seed germination, seedling height and survival of plants in Hyacinth bean (*Lablab purpureus* L.) sweet

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### Abstract

Seeds of M1 generation of Hyacinth bean (*Lablab purpureus* L.) sweet was raised by treated the varieties Konkan Bhushan and Konkan Wal-2 with varied concentration of chemical mutagens (EMS- 0.05%, 0.10%, 0.15% and SA- 0.010%, 0.015%, 0.020%) and physical (Gamma rays- 5KR, 10 KR, 15 KR) mutagen. The seed germination percentage, seedling height in cm and survival of plant percentage in M1 generation was noticed. Highest germination percentage was 83.07 at 0.05% EMS and least germination percentage noticed at 0.020% SA treatment 68.88 in Konkan Bhushan and 85.77 at 0.05% EMS and least germination percentage at 0.020% SA treatment 70.58 in Konkan Wal-2. Highest seedling height was 9.11 was noticed at 0.05% EMS and lowest seedling height was noticed at 0.020% SA treatment 6.60 in Konkan Bhushan and 9.77 at 0.05% EMS and lowest seedling height was noticed in 0.020% SA treatment 6.77 in Konkan Wal-2. An increase in concentration of EMS, SA and Gamma rays reduced the percentage of survival of plants at maturity.

### INTRODUCTION

The Hyacinth bean are commonly known as, dolichos bean, seim bean, lablab bean and Indian bean. Hyacinth bean is legume crop widely grown throughout the world for its vegetable or pulse for human consumption or as animal forage or feed. In Maharashtra it is commonly known as Pawta, Wal pardi as well as Wal in vernacular name. *Lablab purpureus* (L.) Sweet has two distinct botanical forms namely *Lablab purpureus* (L.) Sweet var. Lignosus and *Lablab purpureus* (L.) Sweet var. Typicus.

The pod and beans are edible by boiling. It is the staple food of the people and a major source of protein. It is multipurpose crop since it is used for food, forage, soil improvement and soil protection (Maass, 2006). Induced mutations are highly effective in enhancing natural genetic

resources and used in developing improved cultivars of fruits, crops and cereals (Lee *et al.*, 2002). The present experiment was conducted to study the effect of three mutagens viz., EMS, SA and gamma rays on germination, seedling height and survival of plants in *Lablab purpureus* (L.) Sweet.

### MATERIAL AND METHODS

The seed material of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2 procured from the Dr. Balasaheb Savant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.) India were used in present study and treated by various doses of EMS, SA and Gamma rays (Co 60 1000 curie), irradiated at the department of Biophysics, Government Institute of Science, Aurangabad (M.S.) India.

Healthy and uniform seeds were immerse in distilled water for 6 hrs; such seeds were treated in chemical mutagens for 6 hrs. Seeds soaked in distilled water served as control. After 6 hrs. Such pre-soaked seeds were treated with the different concentration of 0.05%, 0.10% and 0.15% for EMS; 0.010%, 0.015% and 0.020% for SA, respectively while for the physical mutagen the doses Gama rays treated were 5KR, 10KR and 15KR.

The seeds treated with mutagenic treatment were sown immediately in the field, following randomized block design with three replication along with control to grow the M1 generation. The seeds were sown at a distance of 45X30 cm spacing. The various mutagenic effects on germination, seedling height and survival of plants were noted mutagen wise and variety wise separately.

### RESULTS AND DISCUSSION

**Seed germination-** In Hyacinth bean maximum number of seeds germinated on four to five days after sowing in the variety Konkan Bhushan and Konkan Wal-2. In control the germination percentage was found in Konkan Bhushan was 92.11 and 93.77 in Konkan Wal-2. An inhibitory effect on seed germination seen, after the mutagenic treatments in Hyacinth bean. Mutagenic treatment showed a gradual decreasing trend in germination from lower doses to higher doses. Highest germination percentage was 83.07 at 0.05% EMS in Konkan Bhushan and 85.77 at 0.05% EMS in Konkan Wal-2. The lowest germination percentage noticed at 0.020% in SA treatment 68.88 in Konkan

Bhushan and 70.58 at 0.020% SA in Konkan Wal-2. (Table 1)

**Seedling height-** Decreasing trend was observed in regard to seedling height as the concentration and dose increased. After 25 days height of seedling was noted. In control seedling height was found to be 10.15 cm in Konkan Bhushan and 10.73 cm in Konkan Wal-2. The seedling height ranged from 9.11 to 7.69 after EMS treatment, 8.22 to 6.60 after SA treatment and 8.19 to 7.23 after Gamma ray treatment in Konkan Bhushan. In Konkan Wal-2 it ranged from 9.77 to 7.61 after EMS treatment, 7.95 to 6.77 after SA treatment and 8.02 to 6.91 after Gamma ray treatment. (Table 2)

**Survival of plants at maturity-** Survival of plants at maturity expressed as percent of control showed gradual decrease with an increase in concentration and dose of the mutagenic treatment. In control 91.18 % survival of plants was observed in Konkan Bhushan and 92.18% in Konkan Wal-2. Survival ranged of Konkan Bhushan 85.00 to 78.51 in EMS, 80.03 to 73.44 in SA and 82.69 to 76.62 in Gamma ray and Konkan Wal-2 it showed 87.55 to 77.62 in EMS, 85.51 to 75.73 in SA and 84.51 to 76.06 in Gamma ray dose. (Table 3). Mutagenesis has been widely used as method of enhancing variability for crop improvement (Singh and Singh, 2001). The occurrence of mutagens on germination, seedling height and survival of plants had reported earlier by several researchers, in Hyacinth bean (Monica and Seetharaman 2015, Jagtap and More 2015, Monica and Seetharaman 2015), in Blackgram (Usharani and Ananda Kumar 2015, Ramya and Nallathambi 2014), in Pigeonpea (Sangle *et al.*,

**Table 1.** Effect of mutagens on seed germination percentage in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2

Variety		Konkan Bhushan		Konkan Wal-2	
Treatment	Concentration (%) /Dose (KR)	Seed germination %	±SE	Seed germination %	±SE
Control	--	92.11	0.67	93.77	0.88
EMS	0.05	83.07	0.20	85.77	1.17
	0.10	82.59	0.25	82.88	0.23
	0.15	80.66	0.38	79.55	1.93
SA	0.010	75.21	0.29	78.66	1.53
	0.015	71.02	0.42	73.62	0.34
	0.020	68.88	1.93	70.58	0.31
Gamma rays	5KR	81.62	0.34	82.62	0.34
	10KR	80.40	0.40	79.99	1.53
	15KR	78.69	0.28	79.59	0.32

**Table 2.** Effect of mutagen on seedling height in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2.

Variety		Konkan Bhushan		Konkan Wal-2	
Treatment	Concentration (%) /Dose (KR)	Seedling height in cm	±SE	Seedling height in cm	±SE
Control	--	10.15	0.12	10.73	0.21
EMS	0.05	9.11	0.15	9.77	0.14
	0.10	8.10	0.16	8.68	0.13
	0.15	7.69	0.15	7.61	0.12
SA	0.010	8.22	0.19	7.95	0.22
	0.015	7.65	0.16	6.79	0.15
	0.020	6.60	0.15	6.77	0.09
Gamma rays	5KR	8.19	0.19	8.02	0.20
	10KR	7.57	0.10	7.61	0.10
	15KR	7.23	0.14	6.91	0.12

**Table 3.** Effect of mutagens on survival of plants at maturity in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2.

Variety		Konkan Bhushan		Konkan Wal-2	
Treatment	Concentration (%) /Dose (KR)	Plant survival %	±SE	Plant survival %	±SE
Control	--	91.18	0.24	92.18	0.24
EMS	0.05	85.00	0.19	87.55	0.29
	0.10	82.10	0.11	81.18	0.24
	0.15	78.51	0.36	77.62	0.52
SA	0.010	80.03	0.09	85.51	0.36
	0.015	77.59	0.25	81.70	0.41
	0.020	73.44	0.38	75.73	0.32
Gamma rays	5KR	82.69	0.24	84.51	0.36
	10KR	77.58	0.34	77.59	0.53
	15KR	76.62	0.34	76.06	0.48

**Figure 1.** Effect of mutagens on seed germination percentage in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2

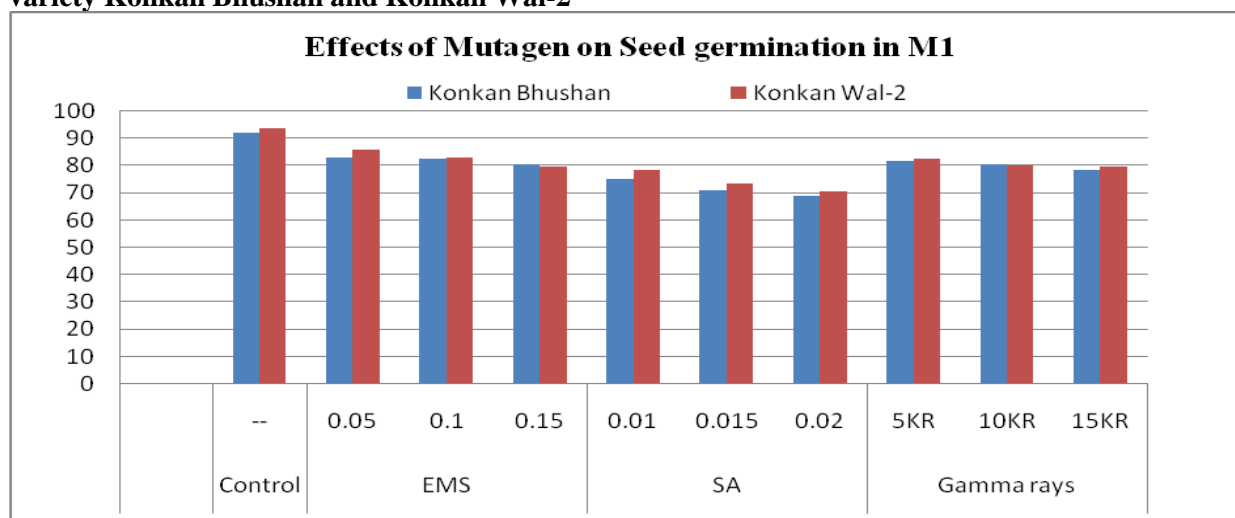


Figure 2. Effect of mutagen on seedling height in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2.

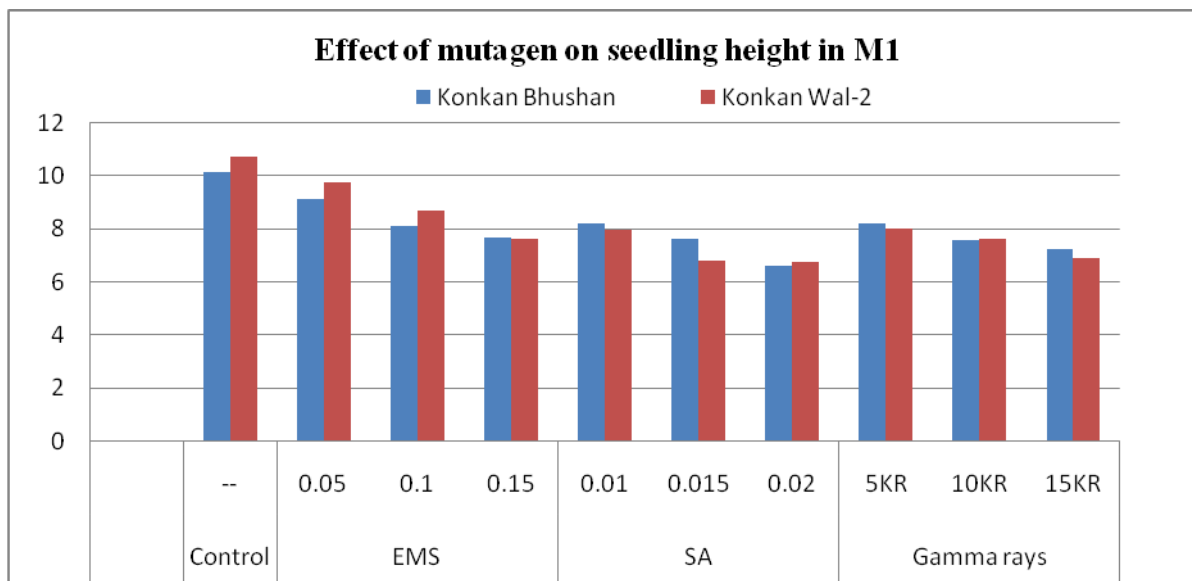
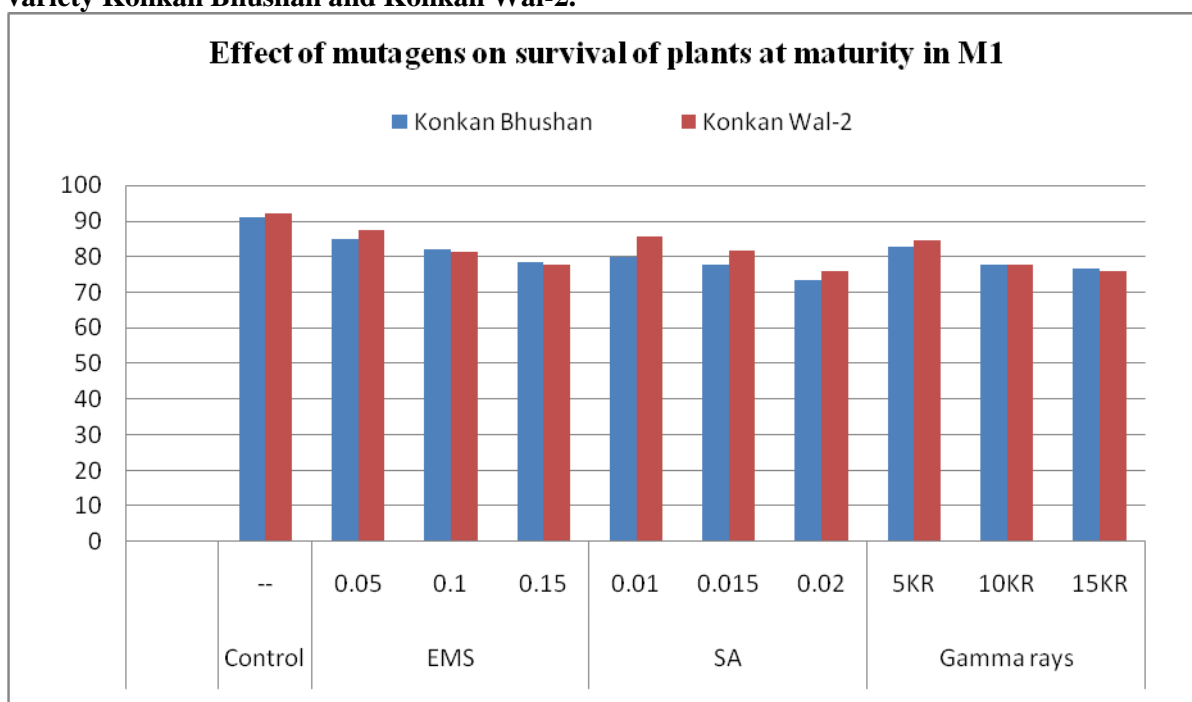


Figure 3. Effect of mutagens on survival of plants at maturity in M1 generation of Hyacinth bean variety Konkan Bhushan and Konkan Wal-2.



2011, Giri 2014), in Chickpea (Umavathi and Mullainathan 2014), in French bean (Mahamune and Kothekar 2012), in Horse gram (Kulkarni and Mogle 2013), in Isabgol (Mishra and Khan 2014), in Pea (Dhulgande *et al.*, 2015), in Soybean (Fultambkar 2013), in grass pea (Singh and Sadhukhan, 2019) and in daisy (Kapoor *et al.*, 2017)

From the experiment it can be concluded that all the mutagens showed an inhibitory effect on germination, seedling height and survival of plants at maturity, as compare to control plants. The concentration and doses used in present study will be effective in induction of broad range of mutagenic characters for further investigation.

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