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# IMPACT OF STIMULATION THROUGH GAMMA IRRADIATION ON SEEDLINGS OF LATHYRUS (*LATHYRUS SATIVUS* L.)

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**ABSTRACT**

A study was conducted on induced mutagenesis using two varieties of Lathyrus, namely Mahateora and Prateek. The mutagen employed was Gamma rays, with experiments conducted at the Bhabha Atomic Research Centre, Mumbai, and field studies carried out under the AICRP on forage crop and utilization, Research cum Instructional Farm, Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidalaya, Raipur, (C.G.). Laboratory evaluations were conducted at the Chhattisgarh States Seed Certification Agency. Variability was observed between varieties in their tolerance to the mutagens.

Different doses of Gamma radiation were administered, including Control, 75 Gy, 100 Gy, 150 Gy, 200 Gy, 250 Gy, 300 Gy, 350 Gy, 400 Gy, 450 Gy, 500 Gy, 550 Gy, 600 Gy, and 75 Gy + EMS. The impact of doses was assessed on traits of the varieties under laboratory and field conditions. Parameters such as germination percentage, seedling height (mm), plumule length (mm), and radicle length (mm) were recorded in laboratory conditions. Field conditions were evaluated based on plant survival percentages at 30 days, 60 days, and at the time of crop harvesting.

The dose of 350 Gy was the most lethal, significantly reducing the percentage of surviving plant varieties. However, gamma irradiation exhibited a positive effect (GR 50) on the biological traits of varieties. Interestingly, under laboratory conditions, gamma rays have stimulatory effects on parameters like germination percentage, seedling height, plumule length, and radicle length. Both varieties were observed more sensitive to radiation. Furthermore, it was observed that low (100 Gy and 150 Gy) and medium doses (300 Gy and 350 Gy) had minor biological effects on Lathyrus in both laboratory and field conditions in the M1 generation, respectively.

***Keywords*:** Induced mutagenesis, Lathyrus, Gamma rays, Biological traits, Radiation dose, Varietal sensitivity, Laboratory evaluation, Field study.

## Introduction

Lathyrus (*Lathyrus sativus* Linn.) is an important crop of economic significance in India, China, Bangladesh, Pakistan, Nepal and Ethiopia. Qualities of this grain legume like sturdiness, drought and flood tolerance and adaptability to a wide range of agro-climatic conditions (Campbell, 1997) make this otherwise neglected crop popular among the farmers and attracted them to grow this crop. Despite its high protein content (21.8-40%) and stress resistance, no significant breakthrough has been achieved about genetic rectification for its neurotoxin content (β-ODAP: β-N-oxalyl-α,β-diaminopropionic acid) present in seed and other plant parts (Mondal and Puteh, 2014). Induced mutagenesis plays an important role in improvement of crops like lathyrus where predominant presence of self-pollination and inter specific incompatibility hindered its improvement through conventional breeding which results in

existence of narrow genetic variation. Spontaneous or induced mutants, with desirable character changes have been a vital material for gene discovery, mapping, functional genomics and breeding in many crops including Lathyrus. Induced mutagenesis can be used to create additional genetic variability that may be utilized by plant breeders in the development of cultivars for specific purposes or with specific adaptations (Rybinski, 2003). Improvement in the frequency and spectrum of mutations in a predictable manner and thereby achieving desired plant characteristics for their either direct or indirect exploitation in the breeding programme is an important goal of mutation research (Patil *et al.* 2017). Several researches worked in lathyrus involving induced mutagenesis (Talukdar, 2009), (Kumar *et al.,* 2011), (Tripathy *et al.,* 2012) and (Ramezani and More, 2014) to improve genetic variability in this orphan crop. A systematic and comparative study on mutagenic efficiency and effectiveness of gamma rays, ethyl methane sulphonate (EMS) and their combinations based on frequency mutations in $M_1$ generation in two genotypes of lathyrus has been undertaken in the present investigation.

## Materials and Methods

Two varieties, Mahateora and Prateek of lathyrus formed the materials for the present investigation. Dry (9-12%) moisture and healthy seeds were obtained from National seed project, Indira Gandhi Krishi Vishwavidyalaya, Raipur and exposed to (Control, 75 Gy, 100 Gy, 150 Gy, 200 Gy, 250 Gy, 300 Gy, 350 Gy, 400 Gy, 450 Gy, 500 Gy, 550 Gy 600 Gy and 75 Gy + EMS). Irradiation was done using the Cobalt 60 sources in Gamma chamber at Bhabha Atomic and Research Centre, Mumbai. In *Rabi* 2017, one hundred (100) treated seeds of two varieties of lathyrusMahateora and Prateek irradiated with twelve (12) different doses of γ-rays (75 Gy, 100 Gy, 150 Gy, 200 Gy, 250 Gy, 300 Gy, 350 Gy, 400 Gy, 450 Gy, 500 Gy, 550 Gy 600 Gy) were conducted at Seed testing laboratory under Chhattisgarh State seed certification agency, Raipur for laboratory condition and plant survival percentage studies were sown along with untreated control seeds with treated seed in the single plot design at Research cum Instructional Farm, Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidalaya, Raipur, (C.G.).

Data were recorded at laboratory condition on germination%, seedling height, plumule length and radicle length and field condition date are recorded on plant survival % in 30 days, 60 days and at the time of crop harvesting. The plant survival % (30 days after sowing and at crop harvesting) and injury percentage. Likewise variations in quantitative characters were also observed in untreated control as well as treatedplants throughout the life span of the plant.

**Table 1:** Details of Mutagenic Treatment Given to Lathyrus

| Mutagen used | Dose/conc. | Duration of presoaking (hrs) |
|---|---|---|
| Control | DDW | 12 |
| Gamma rays (GY) | 75 Gy | 12 |
| | 100 Gy | |
| | 150 Gy | |
| | 200 Gy | |
| | 250 Gy | |
| | 300 Gy | |
| | 350 Gy | |
| | 400 Gy | |
| | 450 Gy | |
| | 500 Gy | |
| | 550 Gy | |
| | 600 Gy | |
| Gamma rays (GY) + EMS | 75 Gy + EMS | 12 |

## Results and Discussion

### Laboratory condition

Detailed observation on all the $M_1$ plants of γ-rays treated seeds 75 Gy, 100 Gy, 150 Gy, 200 Gy, 250 Gy, 300 Gy, 350 Gy, 400 Gy, 450 Gy, 500 Gy, 550 and Gy 600 Gy with control of both varieties Mahateora and Prateek were recorded for lethality percent and injury percent. Observations for quantitative characters were also recorded.

**Germination percentage (%):**

Germination percentage was recorded after 5th days, 7th days and 9th days of sowing in irradiated seeds of the varieties Mahateora and Prateek in $M_1$ (Table-2, Fig.1 and Fig.2 At the 5th day, the germination rates for Mahateora and Prateek were as follows: Control (100% and 100%), 75 Gy (92% and 96%), 100 Gy (88% and 96%), 150 Gy (82% and 91%), 200 Gy (79% and 88%), 250 Gy (75% and 78%), 300 Gy (69% and 62%), 350 Gy (60% and 54%), 400 Gy (54% and 48%), 450 Gy (49% and 41%), 500 Gy (47% and 38%), 550 Gy (41% and 34%) and 600 Gy (33% and 31%).

On the 7th day, the germination rates for Mahateora and Prateek were: Control (100% and 100%), 75 Gy (93% and 96%), 100 Gy (89% and 97%), 150 Gy (84% and 93%), 200 Gy (80% and 88%), 250 Gy (75% and 88%), 300 Gy (70% and 63%), 350 Gy (62% and 55%), 400 Gy (54% and 48%), 450 Gy (49% and 42%), 500 Gy (48% and 38%), 550 Gy (42% and 33%) and 600 Gy (33% and 33%).

By the 9th day, the germination rates for Mahateora and Prateek were: Control (100% and 100%), 75 Gy (93% and 96%), 100 Gy (89% and 97%), 150 Gy (85% and 93%), 200 Gy (80% and 89%), 250 Gy (75% and 79%), 300 Gy (70% and 63%), 350 Gy (62% and 55%), 400 Gy (54% and 47%), 450 Gy (49% and 42%), 500 Gy (48% and 38%), 550 Gy (42% and 35%) and 600 Gy (33% and 30%).

**Table 2 :** Germination percentage in difference doses of gamma rays treated seed in Lathyrus at laboratory condition.

| **Germination %** | | | | | | |
|---|---|---|---|---|---|---|
| **Doses** | **5th Day** | | **7th Day** | | **9th Day** | |
| | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** |
| **Control** | **100** | **100** | **100** | **100** | **100** | **100** |
| 75 Gy | 92 | 96 | 93 | 96 | 93 | 96 |
| 100 Gy | 88 | 96 | 89 | 97 | 89 | 97 |
| 150 Gy | 82 | 91 | 84 | 93 | 85 | 93 |
| 200 Gy | 79 | 88 | 80 | 88 | 80 | 89 |
| 250 Gy | 75 | 78 | 75 | 79 | 75 | 79 |
| 300 Gy | 69 | 62 | 70 | 63 | 70 | 63 |
| 350 Gy | 60 | 54 | 62 | 55 | 62 | 55 |
| 400 Gy | 54 | 48 | 54 | 46 | 54 | 47 |
| 450 Gy | 49 | 41 | 49 | 42 | 49 | 42 |
| 500 Gy | 47 | 38 | 48 | 38 | 48 | 38 |
| 550 Gy | 41 | 34 | 42 | 33 | 42 | 35 |
| 600 Gy | 33 | 31 | 33 | 32 | 34 | 30 |

Result observed in both the varieties Mahateora and Prateek indicated that seed germination percent decreased with an increasing dose of gamma rays clearly indicating that gamma rays as mutagen have induced an inhibitory effect on seed germination. (Chaudhary and Singh, 1980), (Satpute and Fultambkar, 2012) reported similar results in Soybean. A similar result of dose dependent germination percent reduction in other crops was reported by different workers *viz.,* (Kumar *et al*., 2009) in Cowpea, (Sagade and Apparao, 2011) and (Bhosale *et al*., 2013) in Urdbean. The reduction in germination may be either due to genetic cause or inhibition of physiological process in cell by mutagen. In present investigation the variety Mahateora was found more sensitive to gamma rays as compared to variety the Prateek. Similar mutagenic sensitivity has been reported by (Kothekar and Kothekar, 1992) in Mothbean.

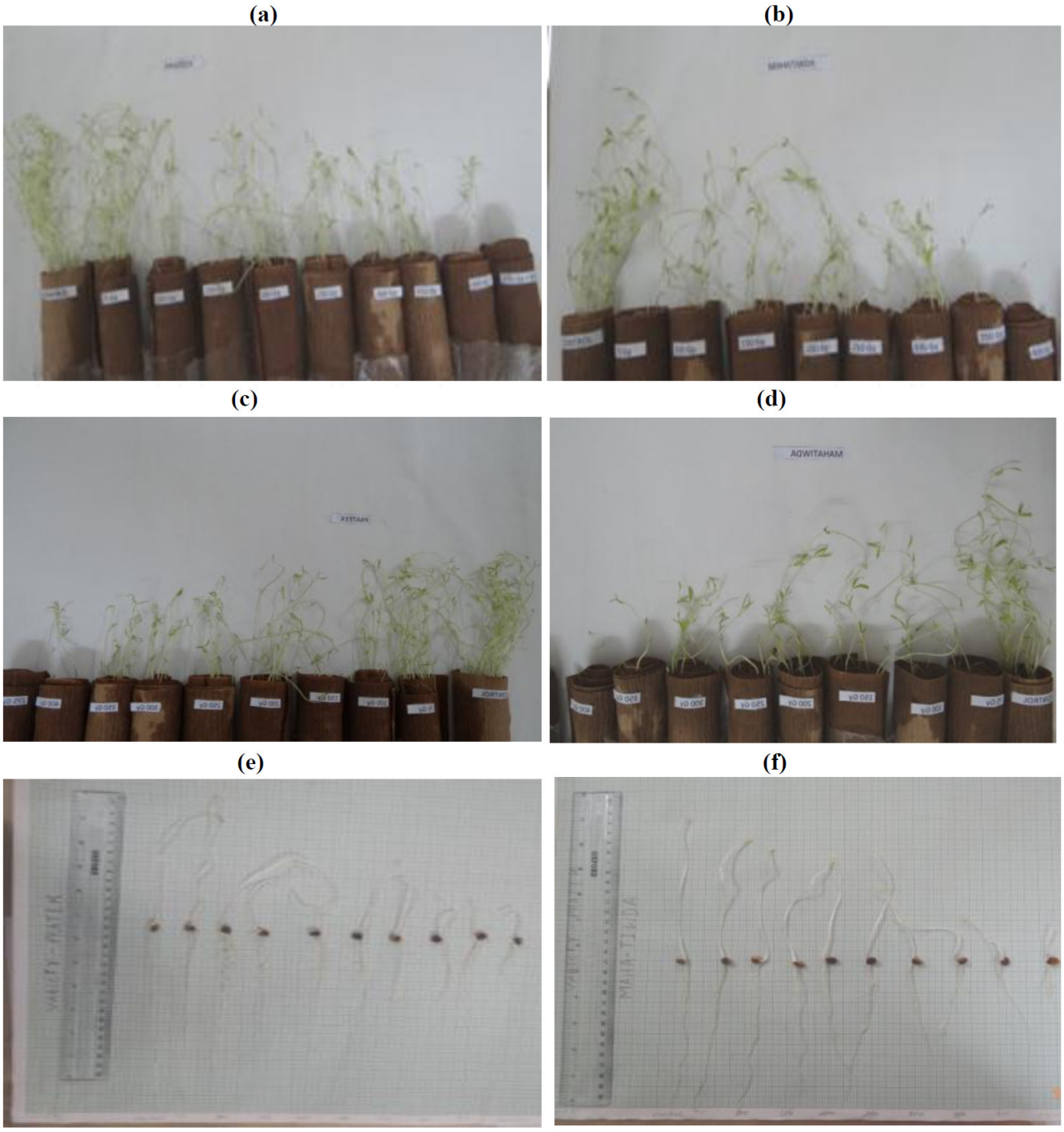


**Fig. 1:** (a, b, c, d, e and f) Germination of $M_1$ generation gamma rays treated seed in Lathyrus of laboratory condition.

**Fig.:2a**

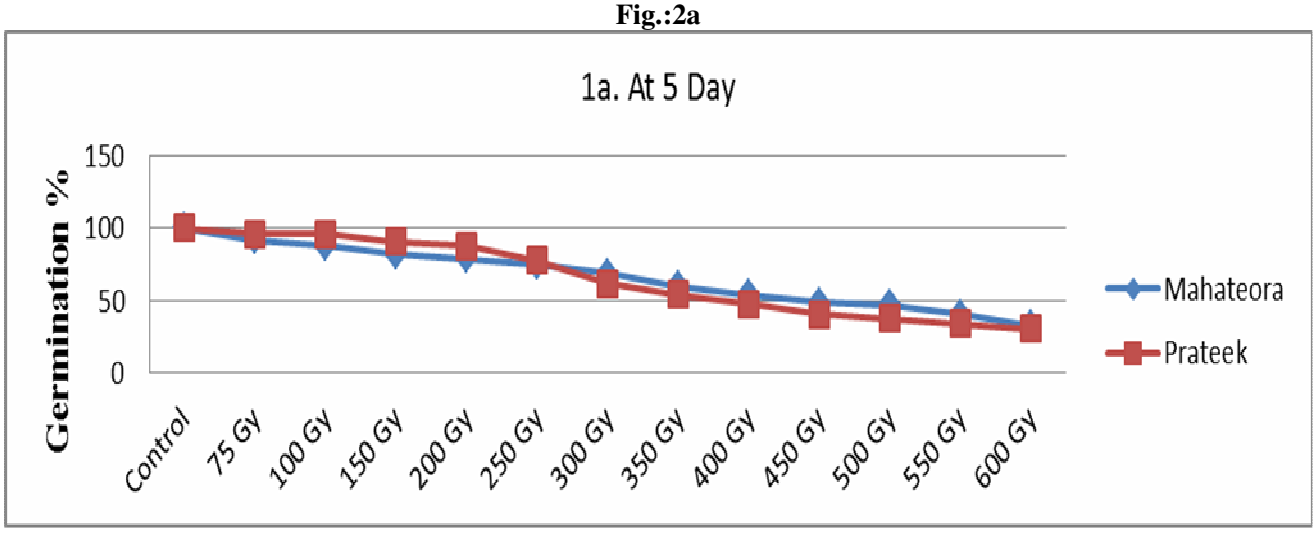


**Fig.:2b**

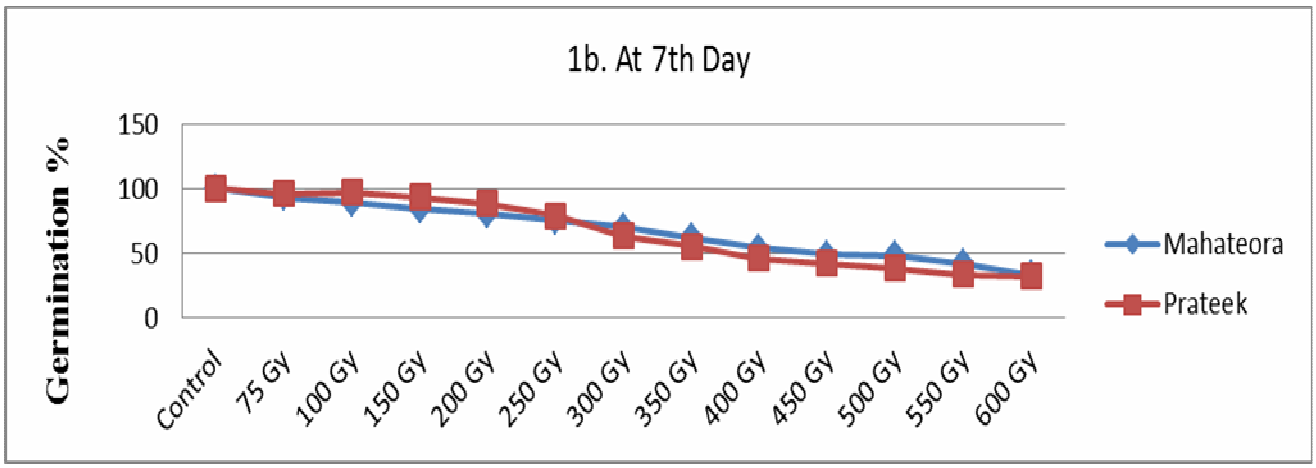


**Fig.:2c**

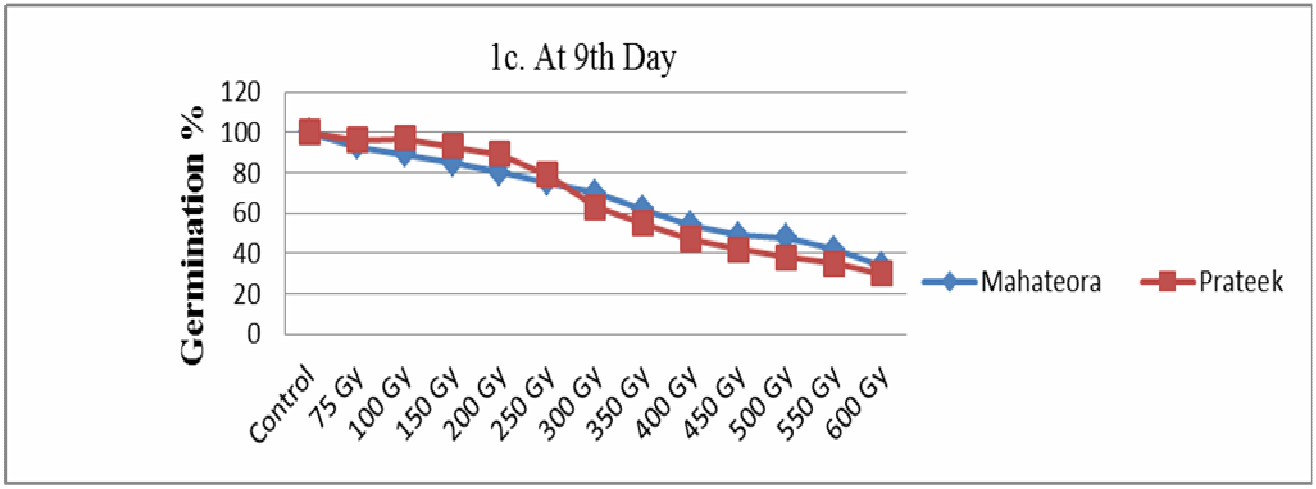


**Fig. 2 (a, b, c):** Germination percentage of $M_1$ generation for difference doses of gamma rays treated seed in Lathyrus of laboratory condition.

**Seedling height (mm)**

Seedling height was recorded after 5th days, 7th days and 9th days of sowing in irradiated seeds of the varieties Mahateora and Prateek in $M_1$ (Table-3) and Figure-3 (a, b, c). At 5th days of Control (170mm and 250mm), 75 Gy (210mm and 220mm), 100 Gy (190mm and 190mm), 150 Gy ( 170mm and 190mm), 200 Gy (200mm and 150mm), 250 Gy (130mm and 130mm), 300 Gy (120mm and 110mm), 350 Gy (100mm and 100mm), 400 Gy (80mm and 80mm), 450 Gy (60mm and 75mm), 500 Gy (45mm and 65mm), 550 Gy (20mm and 60mm) and 600 Gy (10mm and 45mm).

At 7th days of Control (290mm and 350mm), 75 Gy (270mm and 340mm), 100 Gy (260mm and 260mm), 150 Gy (240mm and 240mm), 200 Gy (215mm and 230mm), 250 Gy (145mm and 200mm), 300 Gy (180mm and 150mm), 350 Gy (140mm and 125mm), 400 Gy (120mm and 110mm), 450 Gy (100mm and 80mm), 500 Gy (85mm and 75mm), 550 Gy (70mm and 65mm) and 600 Gy (55mm and 50mm).

At 9th days of Control (430mm and 510mm), 75 Gy (430mm and 430mm), 100 Gy (360mm and 460mm), 150 Gy (400mm and 380mm), 200 Gy (390mm and 470mm), 250 Gy (280mm and 500mm), 300 Gy (260mm and 190mm), 350 Gy (230mm and 270mm), 400 Gy (180mm and 240mm), 450 Gy (140mm and 90mm), 500 Gy (115mm and 80mm), 550 Gy (90mm and 70mm) and 600 Gy (65mm and 55mm).

**Table 3:** Seedling height (mm) for difference doses of gamma rays treated seed in Lathyrus at Laboratory condition

| Seedling height (mm) | | | | | | |
|---|---|---|---|---|---|---|
| **Doses** | **5th Day** | | **7th Day** | | **9th Day** | |
| | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** |
| Control | 170 | 250 | 290 | 350 | 430 | 510 |
| 75 Gy | 210 | 220 | 270 | 340 | 430 | 430 |
| 100 Gy | 190 | 190 | 260 | 260 | 360 | 460 |
| 150 Gy | 170 | 190 | 240 | 240 | 400 | 380 |
| 200 Gy | 200 | 150 | 215 | 230 | 390 | 470 |
| 250 Gy | 130 | 130 | 245 | 200 | 280 | 500 |
| 300 Gy | 120 | 110 | 180 | 150 | 260 | 190 |
| 350 Gy | 100 | 100 | 140 | 125 | 230 | 270 |
| 400 Gy | 80 | 80 | 120 | 110 | 180 | 240 |
| 450 Gy | 60 | 75 | 100 | 80 | 140 | 90 |
| 500 Gy | 45 | 65 | 85 | 75 | 115 | 80 |
| 550 Gy | 20 | 60 | 70 | 65 | 90 | 70 |
| 600 Gy | 10 | 45 | 55 | 50 | 65 | 55 |

The result of this study demonstrated that increasing doses from Control–600 Gy had effect on seedling height even though there were slight decrease in heights with increase in dosage but the decrease was not proportional to the increase in dosage for both lathyrus varieties. This indicated that the varieties did not differ in radio sensitivity with respect to seedling height as the dose of 350 Gy causing 50% seedling height reductions was in both varieties. However, at 550 Gy and 600 Gy above the effected seedling height. Similar studies on rice have been documented by (Cheema and Atta, 2003) and (Smith, 1972). However, a linear dependency of seedling height of rice on the dosage of physicaland chemical mutagens have been reported by (Katoch *et al.*, 1992), (Wang *et al.,* 1995) and (Goyal *et al.,* 2009) on Mungbean and on Pigeon pea by (Biradar *et al*., 2004).

**Fig.-3a**

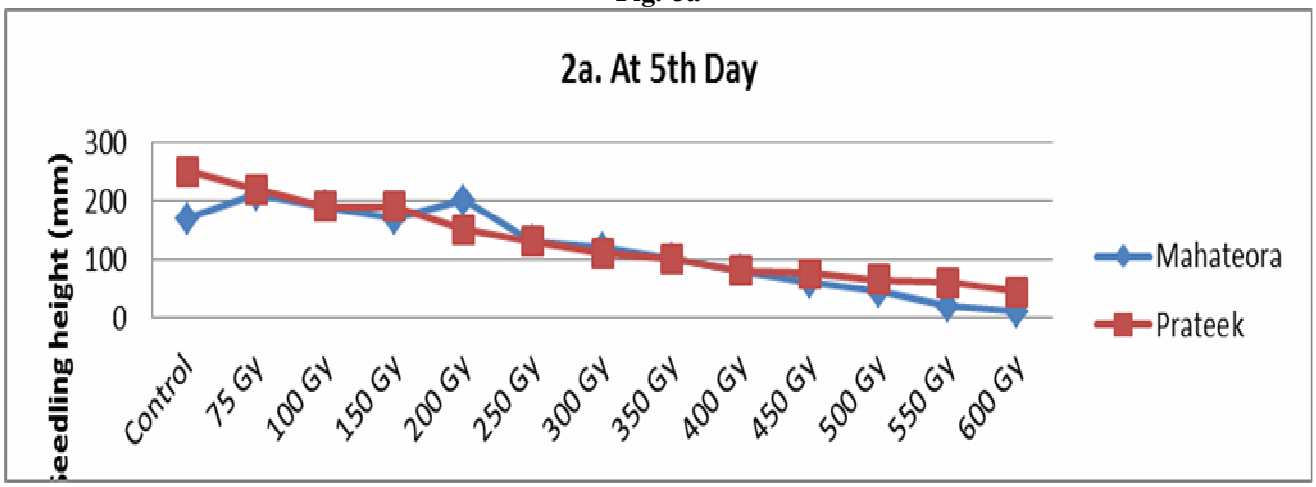


**Fig.-3b**

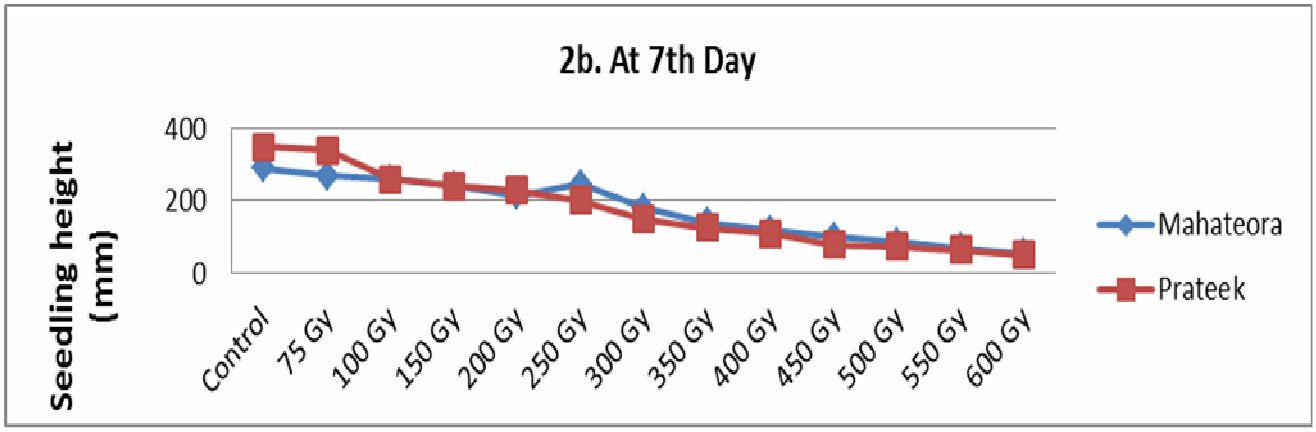


**Fig.-3c**

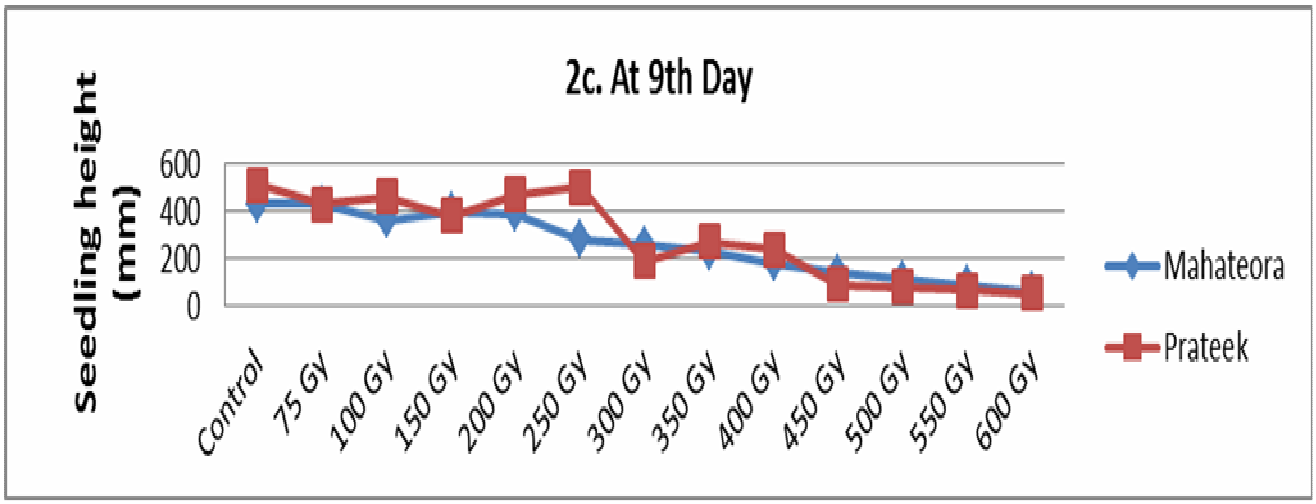


**Fig. 3 (a, b, c):** Seedling height of $M_1$ generation for difference doses of gamma rays treated seed in lathyrus of Laboratory condition

**Plumule length (mm)**

Plumule length was recorded after 5th days, 7th days and 9th days after sowing in irradiated seeds of the varieties Mahateora and Prateekas in $M_1$ Population (Table-4) and Figure-4(a, b, c). At 5th days of Control (70mm and 100mm), 75 Gy (115mm and 95mm), 100 Gy (80mm and 65mm), 150 Gy (65mm and 75mm), 200 Gy (90mm and 65mm), 250 Gy (45mm and 40mm), 300 Gy (50mm and 45mm), 350 Gy (50mm and 30mm), 400 Gy (20mm and 25mm), 450 Gy (35mm and 20mm), 500 Gy (20mm and 15mm), 550 Gy (15mm and 10mm) and 600 Gy (10mm and 5mm).

At 7th days of Control (140mm and 150mm), 75 Gy (120mm and 100mm), 100 Gy (110mm and 115mm), 150 Gy (110mm and 120mm), 200 Gy (105mm and 80mm), 250 Gy (115mm and 85mm), 300 Gy (75mm and 70mm), 350 Gy (650mm and 45mm), 400 Gy (50mm and 40mm), 450 Gy (60mm and 30mm), 500 Gy (45mm and 25mm), 550 Gy (25mm and 15mm) and 600 Gy (15mm and 10mm).

At 9th days of Control (230mm and 290mm), 75 Gy (220mm and 280mm), 100 Gy (200mm and 210mm), 150 Gy (220mm and 180mm), 200 Gy (220mm and 200mm), 250 Gy (150mm and 260mm), 300 Gy (160mm and 120mm), 350 Gy (140mm and 110mm), 400 Gy (110mm and 100mm), 450 Gy (120mm and 50mm), 500 Gy (90mm and 35mm), 550 Gy (75mm and 25mm) and 600 Gy (50mm and 15mm).

**Table 4:** Plumule length for difference doses of gamma rays treated seed in Lathyrus at laboratory condition

| Plumule length (mm) | | | | | | |
|---|---|---|---|---|---|---|
| **Doses** | **5th Day** | | **7th Day** | | **9th Day** | |
| | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** | **Mahateora** | **Prateek** |
| Control | 70 | 100 | 140 | 150 | 230 | 290 |
| 75 Gy | 115 | 95 | 120 | 100 | 220 | 280 |
| 100 Gy | 80 | 65 | 110 | 150 | 200 | 210 |
| 150 Gy | 65 | 75 | 110 | 120 | 220 | 180 |
| 200 Gy | 90 | 65 | 105 | 80 | 220 | 200 |
| 250 Gy | 45 | 40 | 115 | 85 | 150 | 260 |
| 300 Gy | 50 | 45 | 75 | 70 | 160 | 120 |
| 350 Gy | 50 | 30 | 65 | 45 | 140 | 110 |
| 400 Gy | 20 | 25 | 50 | 40 | 110 | 100 |
| 450 Gy | 35 | 20 | 60 | 30 | 120 | 50 |
| 500 Gy | 20 | 15 | 45 | 25 | 90 | 35 |
| 550 Gy | 15 | 10 | 25 | 15 | 75 | 25 |
| 600 Gy | 10 | 5 | 15 | 10 | 50 | 15 |

The result of Plumule length demonstrated that increasing doses from Control–600 Gy had effect on Plumule length even though there were slight decrease in heights with increase in doses but the decrease was not proportional to the increase in dosage for both lathyrus varieties. Plumule length of both varieties had not growth at all doses compare to control. The increase Plumule length so seedling height increasing and Plumule length small so seedling height reduced. This indicated that the varieties are differ in radio sensitivity with respect to seedling height and Plumule length as the dose of Gy 75 (115 mm), Gy 200 (90 mm) and Gy (80 mm) Plumule length increasing was in Mahateora varieties. Similar observation had been reported in Pigeonpea (Toker *et al.,* 2004), *Cicer*seeds (Toker *et al.,* 2005) and Lathyrus (Mahadavi *et al.,* 2007).

**Fig.-4a**

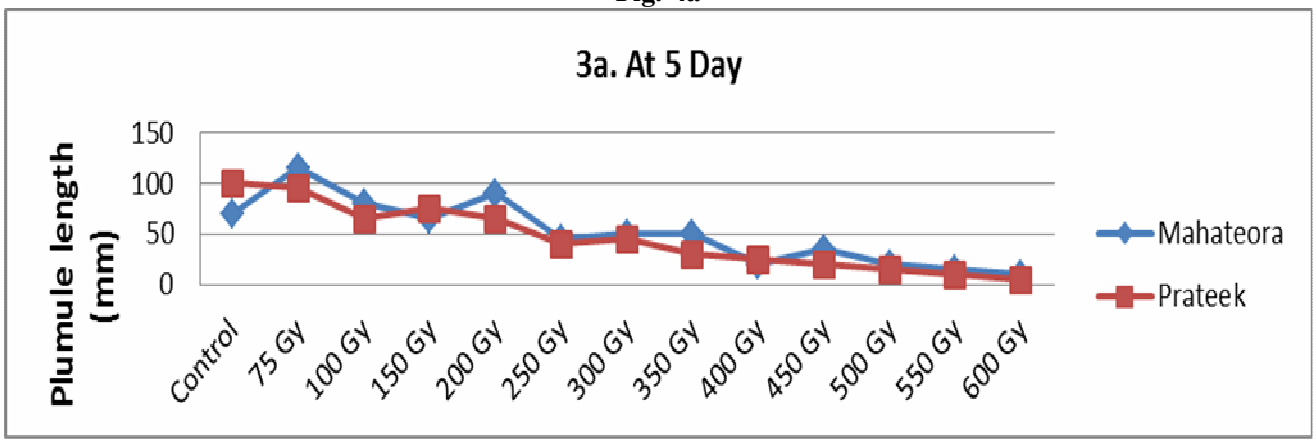


**Fig.-4b**

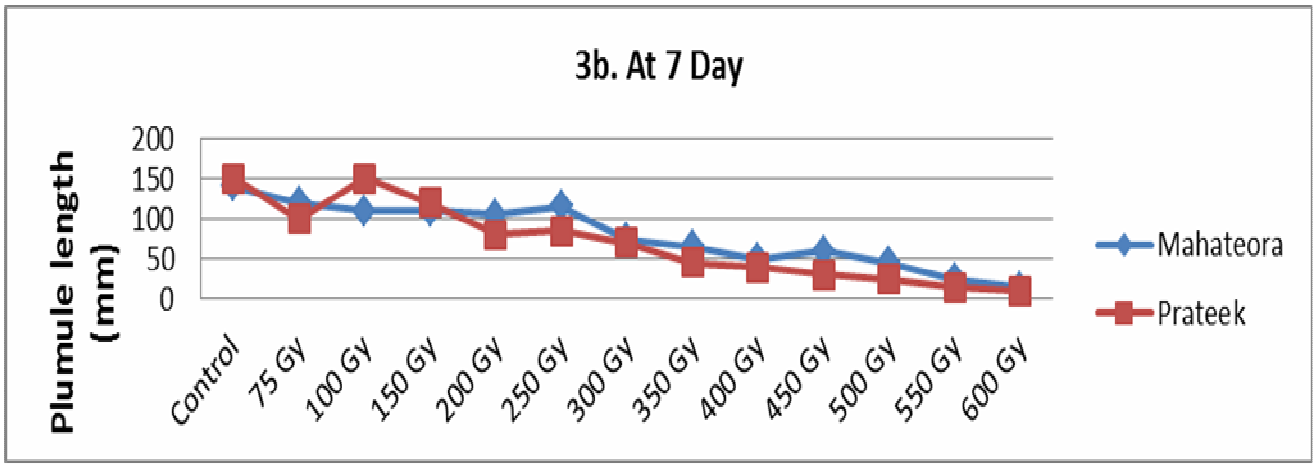


**Fig.-4c**

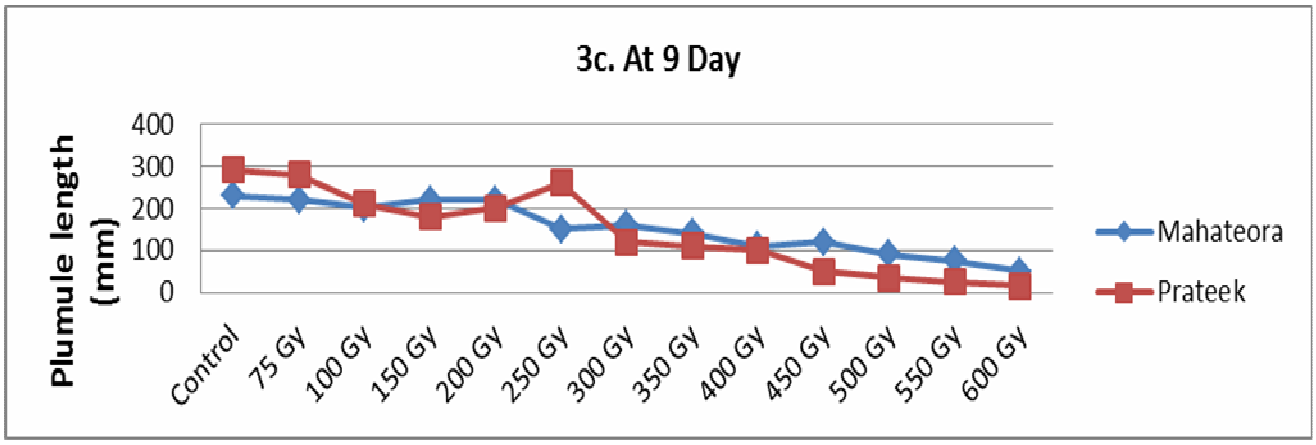


**Fig. 4(a, b, c):** Plumule length of $M_1$ generation for difference doses of gamma rays treated seed in lathyrus of laboratory condition.

**Radicle length (mm)**

Radicle length was recorded after 5th days, 7th days and 9th days of sowing in irradiated seeds of the varieties Mahateora and Prateek in $M_1$ (Table-5) and Figure-5 (a,b,c). At 5th days of Control (100mm and 150mm), 75 Gy (105mm and 135mm), 100 Gy (110mm and 125mm), 150 Gy (105mm and 115mm), 200 Gy (110mm and 85mm), 250 Gy (105mm and 90mm), 300 Gy (70mm and 65mm), 350 Gy (50mm and 70mm), 400 Gy (60mm and 55mm), 450 Gy (50mm and 50mm), 500 Gy (40mm and 40mm), 550 Gy (25mm and 35mm) and 600 Gy (15mm and 30mm).

At 7th days of Control (100mm and 200mm), 75 Gy (105mm and 145mm), 100 Gy (150mm and 160mm), 150 Gy (130mm and 140mm), 200 Gy (115mm and 150mm), 250 Gy (135mm and 115mm), 300 Gy (105mm and 80mm), 350 Gy (85mm and 80mm), 400 Gy (70mm and 70mm), 450 Gy (65mm and 65mm), 500 Gy (50mm and 50mm), 550 Gy (40mm and 40mm) and 600 Gy (30mm and 20mm).

At 9th days of Control (200mm and 220mm), 75 Gy (210mm and 150mm), 100 Gy (160mm and 250mm), 150 Gy (180mm and 200mm), 200 Gy (170mm and 270mm), 250 Gy (140mm and 240mm), 300 Gy (110mm and 70mm), 350 Gy (90mm and 160mm), 400 Gy (70mm and 140mm), 450 Gy (60mm and 120mm), 500 Gy (55mm and 100mm), 550 Gy (40mm and 80mm) and 600 Gy (30mm and 40mm).

**Table 5 :** Radicle length for difference doses of gamma rays treated seed in Lathyrus at laboratory condition

| Radicle length (mm) | | | | | | |
|---|---|---|---|---|---|---|
| Doses | 5th Day | | 7th Day | | 9th Day | |
| | Mahateora | Prateek | Mahateora | Prateek | Mahateora | Prateek |
| Control | 100 | 150 | 100 | 200 | 200 | 220 |
| 75 Gy | 105 | 135 | 150 | 145 | 210 | 150 |
| 100 Gy | 110 | 125 | 150 | 160 | 160 | 250 |
| 150 Gy | 105 | 115 | 130 | 140 | 180 | 200 |
| 200 Gy | 110 | 85 | 115 | 150 | 170 | 270 |
| 250 Gy | 105 | 90 | 135 | 115 | 140 | 240 |
| 300 Gy | 70 | 65 | 105 | 80 | 110 | 70 |
| 350 Gy | 50 | 70 | 85 | 80 | 90 | 160 |
| 400 Gy | 60 | 55 | 70 | 70 | 70 | 140 |
| 450 Gy | 50 | 50 | 65 | 65 | 60 | 120 |
| 500 Gy | 40 | 40 | 50 | 50 | 55 | 100 |
| 550 Gy | 25 | 35 | 40 | 40 | 40 | 80 |
| 600 Gy | 15 | 30 | 30 | 20 | 30 | 40 |

In this investigation, reduction in radicle lengthof seedling occurred with each corresponding increase in gamma radiation doses not in a linear fashion. Higher doses of gamma irradiation such as 550 Gy and 600 Gy showed drastic suppressing effect on radicle length in both lathyrus varieties. Radiation doses of 350 Gy and 400 Gy for Mahateora and Prateek varieties of lathyrus which showed less than 50% growth reduction (GR50) in radicle length of seedlings at 5th day, 7th day and 9th day . Such aconclusion gets supported by (Shah *et al.,* 2008) mentioned that higher doses gamma irradiation causing35-50% reduction in radicle length of seedlingsunder the laboratory conditions.

**Fig.-5a**

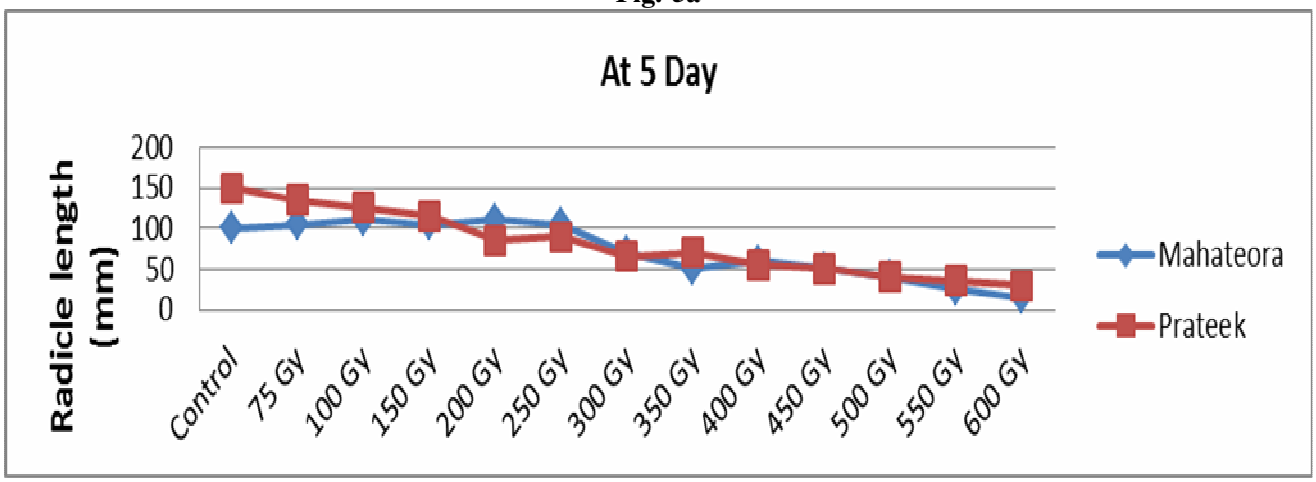


**Fig.-5b**

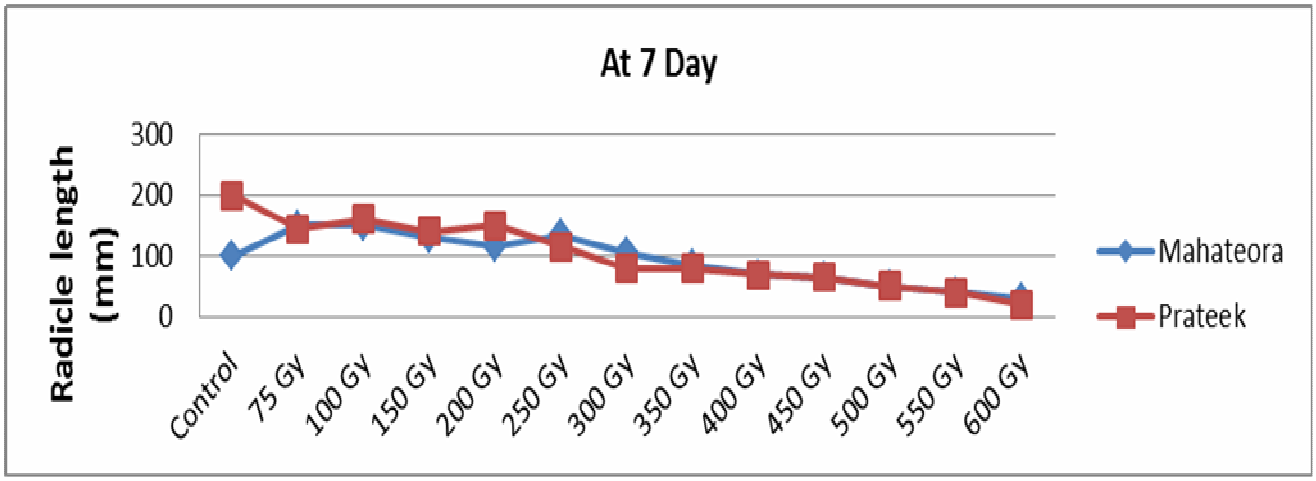


**Fig.-5c**

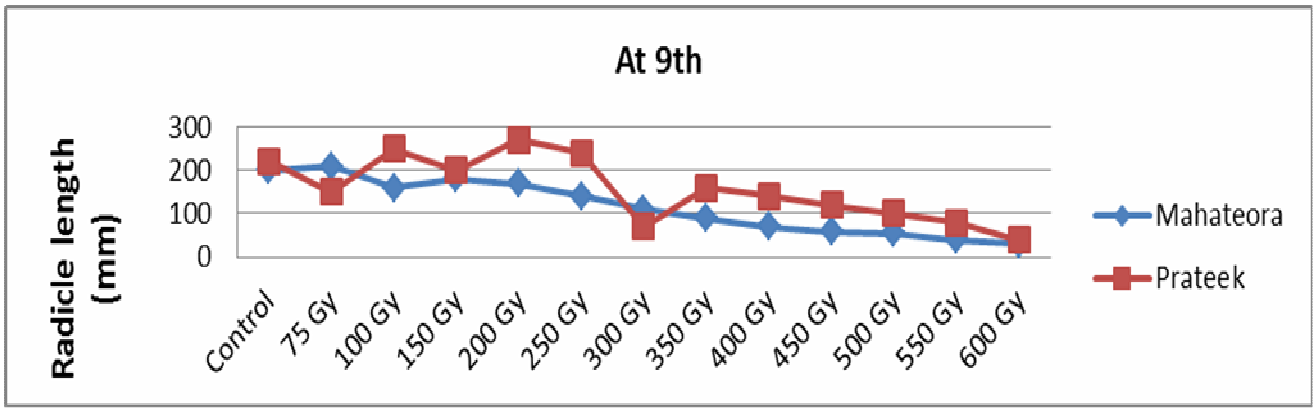


**Figure-5 (a,b,c):** Radicle length of $M_1$ generation for difference doses of gamma rays treated seed in lathyrus of laboratory condition.

**Field condition:**

**Plant survival percentage:**

Plant survival percentage recorded at 30 days, 60 days and crop maturity of sowing in irradiation seed of both varieties Mahateora and Prateek in $M_1$ are presented in Fig.-6. At 30 of control (98.00% and 100%), 300 Gy (49.49% and 52.51%), 350 Gy (51.20% and 45.29%), 400 Gy (29.51% and 29.51%) and 75Gy + EMS (04.08% and 04.12%), At 60 daysof control (97.00% and 96%), 300 Gy (41.09% and 45.46%), 350 Gy (44.60% and 44.60%), 400 Gy (28.49% and 26.77%) and 75Gy + EMS (02.88% and 02.72%) and At crop harvesting of control (92.00% and 95%), 300 Gy (39.23% and 40.44%), 350 Gy (24.34% and 37.00%), 400 Gy (22.26% and 20.31%) and 75Gy + EMS (00.92% and 00.76%) days Maximum plant survival percentage was found at 300 Gy in all most three stages are both varieties. There was significant difference in plant survival percentage at 350 Gy in radiation doses within each variety of GR 50. Both varieties all most similarly responded with increasing doses of irradiation. Similar results have been reported in *Vigna sesquipedalis* (Kon *et al*., 2007) and chickpea (Khan and Wani, 2005) and (Toker *et al*., 2005). The number of surviving plants decreased with increase radiation doses in an approximately linear fashion (Grif-2) inboth varieties. Radiation dose with EMS proved most lethal dose are reduced the percentage of survived plants in lathyrus varieties Mahateora and Prateekin. Reduction in plant survival due to mutagenic treatments is a common phenomenon in induced mutation experiments (Toker and Cagigran, 2004), (Khan and Wani, 2005) and (Toker *et al*., 2005).

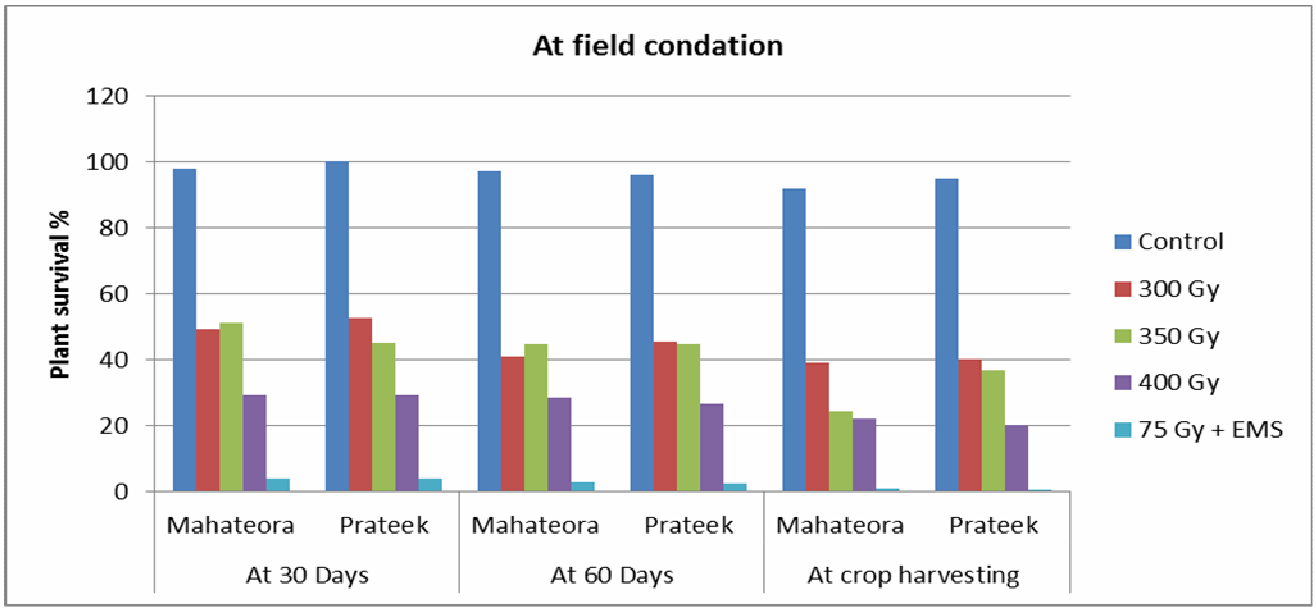


**Fig. 6**: Plant survival percentage of $M_1$ generation for difference doses of gamma rays and EMS treated seed in Lathyrus of field condition

## Conclusion

From this investigation we concluded that gamma irradiation has a GR50 are positive effect on biological traits of lathyrus varieties. In contrast, gamma rays had some stimulatory effects at laboratory condition on germination%, seedling height, Plumule length and Radicle length and Field condition date are recorded on plant survival % in 30 days, 60 days and at the time of crop harvesting. The variety Mahateora and Prateekin have to be found more sensitive to gamma radiation. The results indicated that low radiation (100 Gy and 150 Gy) and medium radiation (300 Gy and 350 Gy) doses have small biological effects on Lathyrus in both condition.

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