

BRIEF COMMUNICATION

GAMMA IRRADIATION INDUCED VARIABILITIES IN *CANAVALIA VIROSA*

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Dry seeds of *Canavalia virosa* were treated with seven different doses viz., 4, 8, 12, 16, 24, 32 and 36 Krad of gamma irradiation. Percent germination increased in 4 and 8 Krad treatment, while, a gradual decrease was observed from 12 to 32 Krad treatments. Seedling measurements taken at the end of 15 days showed increase in 4 and 8 Krad over control, while 12 to 32 Krad treatments showed gradual decrease. Plants treated with 4 Krad showed maximum survival percentage at maturity, while a gradual decrease was observed in 12 to 32 Krad treated plants. The treatment of 36 Krad was lethal.

Key words : Gamma irradiation, *Canavalia virosa*

Gamma irradiation is being widely used for inducing mutations in crop plants. It is found that usually higher doses produce very drastic effects which may be lethal, while relatively lower doses usually result in altered growth characteristics (Flower & Mac Queen 1972). However, there are differences in radiation tolerance among species and even among varieties of the same species (Sparrow 1966). In the present investigation, an attempt was made to study some variabilities induced by gamma rays on dry seeds of *Canavalia virosa*.

Matured seeds of *C. virosa* were irradiated with gamma rays from Co⁶⁰ source at doses ranging between 4 and 36 Krad. The irradiated seeds along with unirradiated ones, serving as control were soaked in water and allowed to germinate in petridishes at 28-30°C. Seed germination was recorded on 100 seeds. Survival percentage was recorded at maturity. The seeds were planted in pots (26 cm diameter) (one seed/pot) and labelled accordingly. Seedling height was recorded on the 15th day after sowing. Various morphological abnormalities were recorded till maturity.

Gamma irradiation affected germination in *C. virosa*. Lower doses of gamma irradiation (4 Krad & 8 Krad) increased germination, while higher doses (12 Krad - 32 Krad) showed gradual decline in percent germination (Table 1). The dosage of 36 Krad was lethal. Retardation in germination at higher doses may be due to the mutagen interference in the metabolic pathways. The mutagen may cause disturbance in genetic and physiological processes leading to death of cells (Gunckel 1957). Except for the lower doses (4 Krad & 8 Krad) seedling height showed a gradual decrease with increasing amount of gamma irradiation (Table 1). The increase in the seedling height at lower doses might be due to stimulating effect of radiation (Kumar & Sinha 1989). The decrease in the seedling growth could be attributed to the destruction of auxins caused by ionising radiation (Gunckel 1957). The decrease in seedling growth may also be due to chromosomal injury, genic changes or both (Evens & Sparrow 1961). Gordon (1957) has opined the irradiation which induced physiological changes may involve a number of interrelated non-specific factors, such as inhibition of DNA synthesis and variation in the auxins level.

Various morphological abnormalities in the plant organs of gamma irradiated plants have been recorded (Table 2). Similar observations have been made earlier (Gunckel 1957). Results indicate

Table 1 Effect of gamma irradiation on growth characteristics of *C.virosa*

| Dose rate in Krad | germination (%) | survival (%) | seedling height* (cm) |
|-------------------|-----------------|--------------|-----------------------|
| 0 | 58.8 | 41.2 | 20.2 ± 2.13 |
| 4 | 66.7 | 41.7 | 24.5 ± 1.57 |
| 8 | 64.7 | 41.2 | 22.1 ± 2.39 |
| 12 | 52.9 | 24.0 | 20.2 ± 1.16 |
| 16 | 43.8 | 18.8 | 19. ± 1.16 |
| 24 | 42.8 | 17.7 | 14.8 ± 0.90 |
| 32 | 41.2 | 11.8 | 10.6 ± 0.16 |

Reading taken on the 15th day after sowing. Values mean ± SD ; * mean of five replicates.

Table 2 Effect of gamma irradiation on plant organs in *C.virosa*.

| Dose rate in Krad | Plant part | Irradiation effect* |
|-------------------|------------|--|
| 0 | stem | - |
| | leaf | - |
| | flower | - |
| 4 | stem | - |
| | Leaf | Much elongated, tapering at the apex |
| | flower | - |
| 8 | Stem | - |
| | leaf | Showed mosaic-like colour changes; Much elongated, tapering at the apex; Often one or two leaflets missing |
| | flower | - |
| 12 | stem | Alternating cotyledons. |
| | leaf | First pair of simple leaves were thick and slightly, crumpled ; Distorted venation; Puckering between the veins. |
| | flower | - |
| 16 | stem | Showed extensive bruchking. |
| | leaf | First pair of simple leaves were thick and slightly crumpled ; often with one or two leaflets missing ; fission. |
| | flower | - |
| 24 | stem | - |
| | stem | - |

| | | |
|----|--------|---|
| | leaf | Showed mosaic-like colour changes ; reduced lamina with one or two leaflets missing ; fusion |
| | Flower | In few cases, flowers did not develop anthers. |
| 32 | Stem | Dwarfing and excessive branching ; woody, brownish in colour; cotyledons persisted till the 50th day; abnormal swelling at the root region. |
| | Leaf | Showed mosaic-like colour changes; fusion. leaflets larger in size as compared to the control; |
| | Flower | In few cases, flowers did not develop anthers |

* These abnormalities were observed in the survived plants

that the leaves and stem were the most affected plant organs due to gamma irradiation. Only a few flowers from plants treated with 24 Krad and 32 Krad did not develop anthers. Otherwise no significant effect on flower morphology was observed.

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