

## Mutagenic effectiveness and efficiency of gamma rays in blackgram (*Vigna mungo* L.) Hepper) in M<sub>2</sub> generation

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The mutagenic effectiveness and efficiency of gamma rays *viz.*, 40, 50, 60, 70 and 80 kR in three varieties of urd bean cultivars namely ADT 3, ADT 5 and APK 1 were studied. The effectiveness of gamma ray shows a consistent relationship of lower doses of gamma ray was found more effective in M<sub>1</sub> plant and M<sub>2</sub> seedling basis. The high effectiveness was recorded in ADT 5 at 40 kR followed by 50 kR in ADT 3 and APK 1 at 50 kR on M<sub>1</sub> plant basis. In M<sub>2</sub> seedling basis the high effectiveness was recorded in ADT 3 at 50 kR followed by ADT 5 at 40 kR and APK 1 at 60 kR. The mutagenic efficiency directly proportional with the increase in the dose among all the varieties studied.

Key words: Gamma ray, ADT 3, ADT 5, APK 1, Effectiveness, Efficiency, Blackgram.

### INTRODUCTION

**B**lackgram is an important pulse crop, occupying unique position in Indian agriculture. Among the pulses, it stands fourth in production and acreage. For any successful mutation breeding programme, selection of efficient and effective mutagenesis is very essential to recover high frequency of desirable mutations. Mutagenic effectiveness is a measure of the frequency of mutations induced by a unit dose of mutagen while mutagenic efficiency gives an idea of the proportion of mutations in relation to other associated undesirable biological effects such as lethality and sterility induced by the mutagen. (Konaz *et al.*, 1965). The present study reveals on effectiveness, efficiency and synergistic effect of gamma rays in blackgram varieties *viz.*, ADT 3, ADT5 and APK1.

### MATERIALS AND METHODS

Three varieties of *Vigna mungo viz.*, ADT 3, ADT 5 and APK 1 were treated with gamma rays. Well filled, undamaged and uniform sized seeds were hand picked from the seed lot and equilibrated to the moisture content of 12 per cent. For each dose of physical mutagen, a random sample of 370 seeds were treated in each variety. The dry seeds of blackgram varieties (ADT 3, ADT 5 and APK 1) were treated in <sup>60</sup>CO gamma ray chamber available at Indira Gandhi Atomic research Center, Kalpakkam. The seeds were irradiated at ten different

doses starting from 10 to 100 kR with an interval of 10 kR.

The irradiated seeds were sown in *Kharif* 2000 in the field immediately after the treatment. The total of 270 seeds in each treatment were sown in the field under randomized block design in three replications with a spacing of 30 cm between rows and 15 cm between plants. The recommended agronomic practices and plant protection measures were followed uniformly for all treatments. Survival of plants at the maturity was recorded and expressed as percentage over control. The seed sterility was worked out as number of seeds produced per plant and was expressed as reduction in the seed number in relation to control. Pollen sterility was determined by acetocarmine stainability. The effectiveness and efficiency was calculated as per the formulae suggested by Konazk *et al.* (1965).

### RESULTS AND DISCUSSION

The results are presented in Table 1 and 2. Mutagenic effectiveness is measured by the percentage of mutated families divided by a unit mutagen dose. (Konazk *et al.*, 1965). In the present study, the effectiveness of different varieties by gamma ray was assessed by their mutagen dose and the efficiency was assessed on four different biological parameters *viz.*, plant height, and seed sterility and plant survival. The results indicated that, the mutagenic effectiveness of gamma rays ranged from 25.00 to 80.00, 1.33 to 4.26 on M<sub>1</sub> plant and M<sub>2</sub> seedling basis,

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