

## VARIATION IN GROWTH CHARACTERISTICS OF PEA UNDER THE INFLUENCE OF GAMMA IRRADIATION

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Dry seeds of 'Green Feast' pea variety were exposed to 0, 5, 10 and 15 kR doses of gamma rays ( $\text{Co}^{60}$ ) and variability for growth characteristics was studied in  $M_1$ . Higher radiation doses (10 and 15 kR) resulted in increased plant height, number of branches, dry weight of plants and extended vegetative period compared to lower doses (0 and 5 kR).

### INTRODUCTION

Any change in growth pattern will ultimately affect maturity and yield. Gamma irradiation of seed has been found to exert pronounced effects on plant growth. Increase in plant height has been observed in pea and French bean (Rubaihayo, 1978) in response to gamma irradiation while decrease in plant height has also been noticed in pea (Frank and Tolnay, 1974; Vasiloveva, 1981; Shamsi and Bajwa, 1979) and leaf number  $\text{plant}^{-1}$  (Khangyldin, 1967). Extended vegetative period has been reported in soybean (Akilov, 1970) and in French bean (Bajaj *et al.*, 1970) as a result of higher doses of irradiation. Variation in dry weight  $\text{plant}^{-1}$  has also been recorded in peas (Magandda and Donini, 1971). It has been observed to increase the dry weight  $\text{plant}^{-1}$  in pea (Shamsi and Bajwa, 1979).

### MATERIALS AND METHODS

Pea variety 'Green Feast' grown in the Department of Horticulture, University of Agriculture, Faisalabad during 1987-88. Dry seeds were irradiated with gamma rays using  $\text{Co}^{60}$  at Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad. Radiation doses consisted of 5, 10 and 15 kR. Irradi-

ated seeds alongwith a control (0 kR) were sown in field on both sides of raised beds keeping 10 cm and 105 cm plant to plant and bed to bed distance, respectively following a Randomised Complete Block Design with three replications. For collecting the data, ten plants were randomly selected from each plot. The data recorded on plant height (cm), number of branches  $\text{plant}^{-1}$ , number of leaves  $\text{plant}^{-1}$ , juvenility period (days) and dry weight  $\text{plant}^{-1}$  (g) were subjected to analysis of variance technique coupled with DMR test at 5% probability to compare the differences among treatment means (Steel and Torrie, 1980).

### RESULTS AND DISCUSSION

Maximum plant height (56.67 cm) was recorded for 15 kR treatment while it stood minimum (51.20 cm) for 5 kR (Table 1). In general, higher doses of seed irradiation resulted in greater plant height than lower doses. These findings are similar to those of Akilov (1970) and Rubaihyo (1978) who observed increased plant height with gamma irradiation of seeds. Gibberellin like substances may be stimulated by gamma rays resulting in an increase in plant height. It is possible that the production of this growth regulating substance might had been

triggered by irradiation of the apical meristematic region in the embryonic stage of the seed and this response persisted during the further growth stages of plants.

ity period and delayed flowering due to gamma irradiation for soybean.

Maximum dry weight plant<sup>-1</sup> (11.4 g) was produced with 15 kR and 10 kR treat-

**Table 1.** Effect of gamma irradiation on growth characteristics of pea

Radiation dose (kR)	Plant height (cm)	Number of branches plant <sup>-1</sup>	Number of leaves plant <sup>-1</sup>	Juvenility period (days)	Dry weight g plant <sup>-1</sup>
0	52.30 bc	4.05 b	52.50 b	69.66 c	9.93 ab
5	51.20 c	4.37 b	59.83 b	71.33 bc	9.03 b
10	56.30 ab	4.93 b	75.37 a	75.66 b	11.40 a
15	57.67 a	6.17 a	77.87 a	83.33 a	11.40 a

Maximum number of branches plant<sup>-1</sup> (6.17) were recorded in plants resulting from seed treated with 15 kR dose of gamma rays followed by 10 kR (4.93), 5 kR (4.37) and 0 kR (4.05). These results corroborate with those of Vasileva (1981) and Shamsi and Bajwa (1979) who observed increased number of branches as a result of seed<sup>-1</sup> irradiation. Maximum number of leaves (77.87) were recorded in treatment 15 kR followed by 10 kR (75.37) but control (0 kR) produced minimum number of leaves (52.50) and was statistically similar to 5 kR (59.83). Increase in leaf number has also been observed by Khangyldin (1967) who suggested that an increase in kinetin to auxin increased buds and leaf shoots. The same hormonal balance may also be formed by gamma irradiation by kinetin. The production of growth hormone, kinetin have been stimulated which resulted in increased number of branches and leaves.

Higher dose of 15 kR extended juvenility period and took 83 days for flowering followed by 10 kR (76 days), 5 kR (71 days) and 0 kR (70 days). These results are in accordance with Akilov (1970) and Bajaj *et al.* (1970). They observed extended juvenil-

ments followed by 0 kR (9.37 g) while 5 kR produced minimum dry weight (9.033 g). These results are in accordance with the findings of Shamsi and Bajwa (1979). The increase in plant dry weight could be attributed to increased plant height, branches and leaf number. Furthermore, plants in 10 kR and 15 kR treatments also enjoyed extended vegetative period for their development which resulted in increased plant dry weight.

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