EFFECT OF GAMMA RAYS ON EGYPTIAN COTTON CHARACTERISTICS

BY

EMAN MOHAMED RABIE MOHAMED SALIH
B.Sc. (Agronomy), Ain Shams Univ., 1994

A thesis submitted in partial fulfillment of the requirements for the degree

Of

MASTER OF SCIENCE

in
Agriculture
(Agronomy)

Department of Agronomy
Faculty of Agriculture
Ain Shams University

2000

APPROVAL SHEET

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ABSRACT

Eman mohammed Rabih Mohammed. Effect of Gamma-Rays on Egyptian Cotton Characteristics. Master of Science thesis Agronomy Department, Fac. of Agric., Ain Shams Univ., 2000.

Dried seeds of the two Egyptian long - staple cultivars; Giza 85 and Giza 75 were irradiated with different gamma rays of 1, 3, 5, 10, 15, 20, 30, 40, 50 and 60 kr. doses emitted from a Co^{60} source aiming to study their effect on germinability, seedling growth characters, earliness, plant height, yield and yield components in M_1, M_2 and M_3 generations.

The results of the M_1 indicated that γ-rays doses of 1 and 3 kr slightly affected seed germination in Giza 75 cv. but the doses from 5 up to 60 kr caused marked inhibition. Seedling length progressively declined as the γ-dose increased. The 1 kr dose caused stimulation effect on seedling fresh and dry weights, whereas higher doses showed stunting effect on both traits. However, seedling exposed to so and 60 kr doses falied to survive and died after thinning. Slight earliness estimated as days to first flower appearance was recorded at 1,3 and 5 kr doses while the dose 10 kr above delayed the first flower appearance as well as retardation of the appearance of first sympodium to higher nodes as compared to the unirradiated control. For plant height, small differences existed between the lower doses and the control whereas a clear stunting effect was noticed atnumber at higher doses. The 1 and 3 kr doses tended to increase number of bolls per plant, while higher doses caused gradual reduction, Boll weight tended to decrease as the γ-dose increased and the reduction was pronounced in higher doses. The 1 kr dose in Giza 85 and the 3 kr dose in Giza 75 caused increments in seed-

cotton yield per plant while higher doses caused appreciable reduction in this trait. Marked stimulation effect was recorded for 1, 3, 5 and 10 doses on lint percentage, while dose 20 kr and above depressed lint %. for seed index, no significant differences existed between the control and lower doses; 1, 3 and 5 kr while higher doses inhibited seed size of both cultivars.

In M_2 generation, the ranges of frequency distribution for total plants of irradiation doses were wider than the ranges of their unirradiated controls for all traits. Also, phenotypic variation and coefficients of variation were higher for total doses than their controls, indicating effectiveness of γ-ray in inducing variability. Many desirable forms were better than their mother culivars were obtained in all traits, indicating the possibility of selection. Morphological mutations due to γ-rays were observed, e.g; albino, cleistogamous flowers, floral aberrations, 4, 5, or 6 locks/boll, two bolls with one calyx, cluster flowers, dwarf, sterile and others. Selected M_2 plants were tested in M_3 for yielding ability and some progenies were promising and deserve to be screened in subsequent generations.

KEY WORDS

Cotton, gamma ray, irradiation, phenotypic and genotypic variation, mutation, germination, growth, yield and its attributes.

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