# بسم الله الرحمن الرحيم


MONA MAGHRABY

# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس

# التوثيق الإلكتروني والميكروفيلم

# قسم

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***MONA MAGHRABY***

# GENETIC IMPROVEMENT OF SOME ORNAMENTAL PLANTS THROUGH MUTATION INDUCTION

By

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B.Sc. Agric. Sc.(Genetics), Fac. Agric. Ain Shamus Univ.(2000)
M.Sc. Agric. Sc.(Genetics), Fac. Agric. Ain Shamus Univ.(2006)

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**Ain Shams University**

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# ABSTRACT

**Eman Ahmed Mohamed ELMenbawy: Genetic Improvement of Some Ornamental Plants through Mutation Induction. Unpublished Ph.D. Thesis, Department of Genetics, Faculty of Agriculture, Ain Shams University, 2020.**

*Calendula officinalis* and *Antirrhinum majus* are the basic plants of ornamentals. They are used for various purposes as cut flowers, pot plants and in gardens. They are rich in active compounds, thus are used as medicinal plants. The present study used mutation induction to improve the two plants. Seeds were treated with three doses of gamma ray; 25, 50, 70 Gy in *Calendula* and 40, 60, 80 Gy in *Antirrhinum*. Two chemical mutagens colchicine and EMS (Ethyl Methane Sulfonate) were applied in *Calendula* at concentrations of 1000, 3000, 10000 ppm for each one. Seeds without treatment were used as control. The yield-related traits, active compounds, SDS-PAGE profiling and DNA banding patterns with degenerative primer for gene *CYC* were detected. The data of *Calendula* plants showed that the highest plant height (50.60) in $M_2$ was obtained by 70 Gy and 10000 ppm of EMS, while the lowest dose of colchicine (1000 ppm) made the most impact on the plant height (47.0) in $M_2$. The highest number of leaves was obtained at 50 Gy (83.3) in $M_2$ compared with the control. The number of flowers/plant was not affected by the gamma radiation and colchicine but increased significantly by 10000 ppm of EMS. The flower diameter decreased at 25 Gy (3.5) and 3000 ppm of colchicine (3.0) in $M_2$ compared with the control while no effect was observed by EMS. Both Chl-a, Chl-b and carotenoids contents increased at 50 Gy, while flavonoid increased at 25 Gy. All doses of gamma ray eliminated the phenols content. While the lowest concentration of colchicine; 1000 ppm increased both of Chl-a, Chl-b, flavonoid and carotenoids, even though the 10000 ppm of colchicine increased the phenol. On the other hand, the highest concentration of

EMS 10000 ppm increased Chl-a and Chl-b (0.80, 0.97), while carotenoids, flavonoid and phenol increased at 3000 ppm of EMS compared with the control.

The data of $M_2$ *Antirrhinum* plant showed the highest plant height in $M_2$ at 60 Gy. The highest number of leaves was obtained at 80 Gy. The number of flowers per spike and spike length was not affect by gamma rays. The Chl-a, Chl-b and anthocyanin increased at 80 Gy. Flavonoids decreased with increasing gamma doses and phenol increased at 40 Gy. The SDS-protein electrophoresis showed fluctuation in the gene expression based on the type of mutagen and its dose. Due to the morphological changes in the flower shape obtained through this study, the flower symmetry *CYC* gene was investigated using degenerative primers DeCYC-1/DeCYC-2. A specific band with MS ~270 bp was detected in *Calendula* in four treated plants that gain flower change at; 50 Gy of gamma rays, 1000 and10000 ppm cochicine, 3000 ppm EMS, and in both treated and untreated plants (control) in *Antirrhinum*.

**Key words:** *Calendula officinalis*, *Antirrhinum majus*, mutation, gamma ray, EMS, colchicine, active compounds, SDS-protein electrophoresis, *CYC* gene.

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