Ain Shams University
Faculty of Science
Botany Department

Cytological and Molecular Studies on The Effect of Some Chemical and Biological Pesticides on The Plant Cell

A Thesis
Submitted for Partial Fulfillment of Master
Degree of Science in Botany
(Cytology and genetics)

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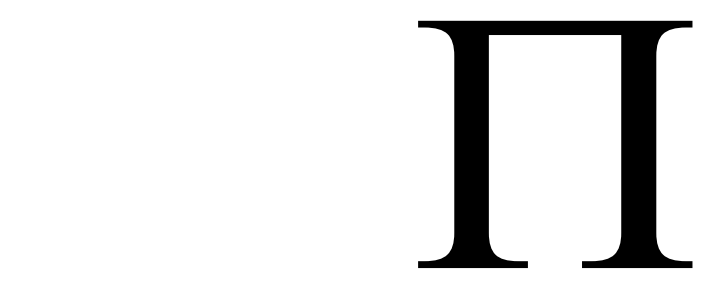

(قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ)

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Student's name : Maher Abd Elfattah Mohammed

Title of Thesis : " Cytological and molecular studies on the effect of some chemical and biological pesticides on the plant cell"

Degree of Thesis : Master of Science in Botany

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To

My Parents,

My Wife,

My Great Kids

Maher Abd Elfattah Mohammed

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Abstract

The chemical pesticides are used, nowadays, on a large scale to protect crops against pests. Pests cause annually a drastic loss of the economical crops allover the world. The wide production and uses of chemical pesticides causes a serious pollution to the surrounding environment.

Man today is concerned very much with the pollution of his environment. Biological control agents for plant disease are currently being examined as alternative to synthetic pesticides due to their perceived increased level of safety and minimal environmental impacts.

The present investigation was planned to compare the mutagenic effects of two chemical fungicides (mancozeb and nimrode) with the two biological fungicides (plant guard and rhizo-N). In addition, effect of these pesticides on polyacrylamide gel electrophoresis profiles of *Allium cepa* seed proteins, and the different parameter of the cell cycle were investigated.

At the cytological level, the four fungicides used in this study induced a decrease in the mitotic index accompanied with considerable percentage of chromosomal abnormalities. These abnormalities include stickiness, C-metaphase, disturbed chromosomes at metaphase and anaphase, bridges, laggards and

trimultipolar cells. True clastogenic abnormalities including chromosome bridges and micronuclei were observed after treatment with the fungicide mancozeb and plant guard.

Image cytometric measurements of mitotic cell cycle showed accumulation of cells in the G_2 phase in roots treated with the fungicide mancozeb, while the cells accumulated at G_1 phase in roots treated with the biofungicide plant guard. On the other hand, the four fungicides caused changes in the protein-banding pattern. These changes include the absence of some bands and the appearance of few novel bands as well as overexpression of the others. The results showed that the chemical fungicides mancozeb and nimrod have more mutagenic potentialities than the biological fungicides.

Acknowledgment

First and foremost, I am indebted to Allah forever, the most beneficent and merciful.

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Maher Abd ElFattah Mohamed

This thesis has not been previously submitted for any degree at this or any other university.

Maher Abd Elfattah Mohammed

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Introduction

Pesticides constitute a heterogeneous category of chemical specifically designed for the control of plant diseases. Chemical pesticides are widely used in Egypt in order to minimize the loss in economic crops due to pest invading. These chemicals, apart from affecting the target pest, also affect economical plants, animals, and human. Evidences accumulated in the past two decades have indicated that a large number of pesticides have mutagenic effects and are capable of inducing chromosomal aberration or DNA damage in cells of different organisms. The mutagenic potentiality of pesticides have been studies by many investigators using different living system **(Amer, 1965; Wuu and Grant, 1966; Mann, 1977; Njagi and Gopalan, 1981; Badr, 1988; Sobhi and Haliem, 1990; Saeed and Robina, 1992; Salam *et al.*, 1993; Datta *et al.*, 1995; Abdelsalam *et al.*, 1997; a & b; Ghareeb, 1998; De Marco *et al.*, 2000; Bolognesi, 2003; Bolle *et al.*, 2004; Dane and Dalgic, 2005; Singh, ~~Kaymak and Muranli, 2005; Chauhan and Gupta, 2005 and Bouilly *et al.*,~~ 2007 and Renata-Kontek *et al.*, 2007).**

Some of these pesticides may persist in the environment for many years. Most of them were found to be a major source of soil and water pollution in rural areas of Egypt. The danger of these pesticides doesn't necessary be due to direct contact, since it was found that some of these pesticides may accumulate

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