



**The Potential Role of Triacontanol in Certain
Physiological Aspects of *Zea mays* L. Single Cross
Giza 310 Grown Under Normal and Environmental
Stress Conditions**

Thesis Submitted for the Degree of
Doctor of Philosophy of Science
in Botany (Physiology)

By
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B.Sc. (2001) - Botany
M.Sc. (2008) – Botany
(Plant Physiology)

**Ain Shams University
Faculty of Science
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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا
مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ
الْحَكِيمُ

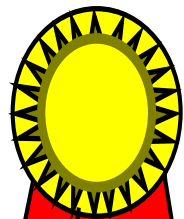
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Dedication

*To the soul of my
father*

(May mercy be upon his soul)

*To my mother
and my husband*



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Firstly and Finally Thanks to Allah

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I am also greatly indebted to my family, specially to my mother, my husband and my daughters Maya and Login.

ABSTRACT

Through investigating the physiological roles of triacontanol (TRIA) in seed germination, two different concentrations (35 and 50 ppm) were chosen based on a pilot experiment. On the basis of the results obtained, the relatively low applied concentration of TRIA enhanced *Zea mays* L. (*Z. mays*) seed germination via activating major biochemical activities and increasing hormonal content. Also, TRIA via increasing the percentage of unsaturated fatty acids, thus conferring a suitable geometry to lipid molecules, maintaining a degree of fluidity of cell membranes, had decreased the severity of imbibitional injury induced directly upon contact of dry seeds with water. A reverse trend was observed upon applying the relatively high concentration of TRIA. TRIA-treated seedlings contained three unique protein bands, one of them functions as lipoxygenase inhibitor. Soil treatment with three levels of CdCl_2 (10, 20, 200 ppm) greatly affected different growth attributes of *Z. mays* via retarding major biochemical activities, disrupting antioxidative systems, inducing hormonal imbalance and accumulation of Cd^{+2} in tissues. Interaction between Cd^{+2} and TRIA (as grain priming or foliar spray) via increasing the metabolic activities of Cd-treated plants, alleviating syndrome of oxidative stress, restoring the hormonal balance might enhanced the growth of Cd-treated plants. TRIA, via increasing leaf content of cellulose, pectins and lignin, decreased the Cd^{+2} content of *Z. mays*. TRIA treatment either alone or in combination with Cd^{+2} enhanced growth, flowering and major fruiting attributes and decreased the percentage of incidence of formation of deformed and shrivelled grains of *Z. mays*, but having small size in interaction between Cd^{+2} and TRIA compared either with control or TRIA. There was a significant and non-significant increase in starch and oil contents of grains, respectively in response to TRIA applied alone or in combination with Cd^{+2} . TRIA succeed in decreasing the percentage of *Z. mays* plants subjected to infestation of *Euprepocnemis plorans* (Charp.).

LIST of Contents

Title	Page
ABSTRACT	
INTRODUCTION	1
Literature Review	7
Physiological roles of triacontanol (TRIA)	7
TRIA, seed germination and seedling growth	7
TRIA, growth and development, flowering and fruiting responses	8
TRIA and metabolic activities	13
Triacontanol roles under hostile habitats	17
Plant uptake of Cd^{+2} and factors affecting this process	20
Effects of cadmium on seed germination, growth and different cellular activities	22
Effect of cadmium on seed germination and growth	22
Effect of cadmium on cell membranes	27
Effect of cadmium on photosynthetic process	29
Effect of cadmium on respiration	31
Effect of cadmium on mineral uptake and transpiration	32
Cadmium and oxidative stress	34
Mechanisms of cadmium detoxification and tolerance	35

List of contents

Roles of triacontanol in alleviating cadmium toxicity	38
MATERIAL and METHODS	41
A) Material	41
Preparation of triacontanol solution	41
B) Methods	41
Extraction, separation and determination of growth regulating substances using GC and HPLC	41
Extraction	42
Fractionation of plant extract	42
Methylation of plant hormones with diazomethane	43
Separation of methyl esters of plant hormones by Gas Chromatography	44
Identification and determination of auxins, gibberellins and abscisic acid contents	45
Identification and determination of cytokinin contents	45
Extraction and determination of certain metabolites	46
Extraction and estimation of photosynthetic pigments	46
Extraction and estimation of carbohydrates	47
Extraction procedure	47
Estimation of total soluble sugars	47

List of contents

Estimation of sucrose	47
Estimation of polysaccharides	48
Estimation of starch	48
Extraction and estimation of nitrogenous constituents	49
Extraction and estimation of amino acids	49
Extraction	49
Estimation of amino acids	50
Reagents	50
Procedure	51
Estimation of total soluble nitrogen	52
Procedure	52
Extraction and estimation of nucleic acids	53
Procedure	53
Estimation of ribonucleic acid (RNA)	54
Estimation of deoxyribonucleic acid (DNA)	54
Extraction and determination of cadmium	55
Procedure	55
Extraction and estimation of malondialdehyde	55
Extraction and assaying activity of certain enzymes	56

List of contents

Enzyme extraction	56
a) Superoxide dismutase(SOD.EC.1.12.1.1) assay	56
b) Catalase (CAT, EC 1.11.106) assay	57
c) Indole Acetic Acid oxidase (IAA oxidase) assay	58
d) Glutathione Reductase (GR) assay	59
Determination of protein banding pattern	59
Total protein extraction	59
Loading on a gel	60
Gel preparation	60
Sample loading	61
Electrophoresis conditions	61
Gel staining and destaining	61
Gel analysis	62
Extraction and determination of cellulose	62
Extraction and determination of pectins	63
Extraction and determination of lignin	64
Extraction and determination of oil	64
Experimental Results	66

List of contents

A pilot experiment: Effect of soaking grains of <i>Zea mays</i> L. Giza 310 in different concentrations of triacontanol (TRIA) on germination and seedling growth..	66
Time course experiment	66
Experiment 1:Effects of soaking <i>Zea mays</i> L. grains in TRIA on germination and seedling growth.....	67
Results	68
Change in percentage of germination of <i>Z. mays</i> L. grains	68
Change in major growth attributes of <i>Z. mays</i> L. seedlings	70
Metabolic features	70
Change in the content of major carbohydrate fractions of <i>Z. mays</i> L. seedlings	70
Change in the content of amino acids and total soluble nitrogen of <i>Z. mays</i> L. seedlings	74
Change in the content of total oils and its iodine value of <i>Z. mays</i> L. seedlings	74
Change in the content of nucleic acids of <i>Z. mays</i> L. seedlings	77
Change in the protein banding patterns of <i>Z. mays</i> L. seedlings	77
Change in the activity level of certain enzymes of <i>Z. mays</i> L. seedlings	81
Change in the activity level of lipase	81

List of contents

Change in the activity level of IAA-oxidase	81
Change in the hormones content of <i>Z. mays</i> L. seedlings	83
Change in auxins content	83
Change in gibberellins content	83
Change in cytokinins content	83
Change in abscisic acid (ABA) content	85
Experiment II: Effect of grains soaking or foliage application of TRIA on growth of <i>Zea mays</i> L. plants grown under cadmium stress	85
Time course experiment	85
Experimental results	88
Effect of different concentrations of CdCl ₂ (10, 20, 200 ppm) applied alone or in combination with TRIA, 35 ppm (as spray S or grain-soaking G.S) on growth of <i>Zea mays</i> L. plants	88
Change in the content of carbohydrate fractions of <i>Z. mays</i> L. shoots	103
Change in carbohydrate fractions of <i>Z. mays</i> L. roots	106
Change in amino acids content of <i>Z. mays</i> L. shoots	106
Change in amino acids content of <i>Z. mays</i> L. roots	106
Change in nucleic acids content of <i>Z. mays</i> L. shoots	108
Change in nucleic acids content of <i>Z. mays</i> L. roots	108

List of contents

Change in malondialdehyde content of <i>Z. mays</i> L. shoots	108
Change in malondialdehyde content of <i>Z. mays</i> L. roots	111
Change in the content of cadmium in roots and shoots of <i>Z. mays</i> L	111
Change in the content of cellulose of <i>Zea mays</i> L.leaves	111
Change in the content of pectins of <i>Zea mays</i> leaves	113
Change in the content of lignin of <i>Zea mays</i> leaves	113
Change in activity level of certain enzymes	113
Change in activity level of catalase of <i>Z. mays</i> L. shoots	113
Change in activity level of catalase of <i>Z. mays</i> L. roots	116
Change in activity level of superoxide dismutase of <i>Z. mays</i> L. shoots	116
Change in activity level of superoxide dismutase of <i>Z. mays</i> L. roots	116
Change in activity level of glutathione reductase of <i>Z. mays</i> L. shoots	117
Change in activity level of glutathione reductase of <i>Z. mays</i> L. roots	117
Change in the content of the endogenous growth regulators of <i>Zea mays</i> L. plants	118
Change in the content of indole acetic acid (IAA)	118
Change in the content of gibberellins (GA ₃)	118
Change in the content of cytokinins	118

List of contents

Change in the content of abscisic acid (ABA)	120
Experiment III:Effect of TRIA applied alone or in combination with CdCl₂ on growth, flowering and fruiting of <i>Zea mays</i> L. plants grown in the field	120
Time course experiment	120
Experimental results	123
Effect of triacontanol (TRIA) at 35 ppm, either alone or in combination with different concentrations of cadmium chloride (10, 20 or 200 ppm), on growth criteria of maize plants. ...	123
Change in the content of photosynthetic pigments	136
Change in the content of cellulose of <i>Zea mays</i> leaves	142
Change in the content of pectin of <i>Zea mays</i> leaves	144
Change in the content of lignin of <i>Zea mays</i> leaves	144
Flowering and fruiting responses of <i>Z. mays</i> L.	144
Change in the content of starch of <i>Zea mays</i> grains	148
Change in the total lipids content of <i>Zea mays</i> grains	152
Effect of TRIA on susceptibility of <i>Zea mays</i> to <i>Eurepocnemis plorans</i> (Charp.) attack	152
DISCUSSION	154
SUMMARY	222