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
Heba Metwally Hassan Hassan
B.Sc. (2001) - Botany
M.Sc. (2008) – Botany
(Plant Physiology)

Ain Shams University
Faculty of Science
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Supervisors

Prof.Dr. Azza M.Saber El-Shafey
Professor of Plant Physiology, Botany Department
Faculty of Science, Ain Shams University

Prof. Dr. Hala Fattouh Sayed
Professor of Plant Physiology, Botany Department
Faculty of Science, Ain Shams University

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Faculty of Science
Botany Department

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Ain Shams University

Approval Sheet

Title of Thesis:

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Name of Student: **Heba Metwally Hassan Hassan**

Degree: Doctor of Philosophy of Science in Botany (Physiology)

This thesis has been approved by:

1. **Prof. Dr. El Husseiny Abd El Rahman Youssef……**
   Professor of Plant Physiology, Botany Department
   Faculty of Science, Cairo University

2. **Prof. Dr. Safia Mohamed Ghazi……**
   Professor of Plant Physiology, Botany Department
   Faculty of Science, Helwan University

3. **Prof.Dr. Azza M.Saber El-Shafey……...**
   Professor of Plant Physiology, Botany Department
   Faculty of Science, Ain Shams University

4. **Prof. Dr. Hala Fattouh Sayed ……. …..**
   Professor of Plant Physiology, Botany Department
   Faculty of Science, Ain Shams University

Prof. Dr. Mohamed El-Said Tantawy

Head Department of Botany
Faculty of Science
Ain Shams University
……

بسم الله الرحمن الرحيم

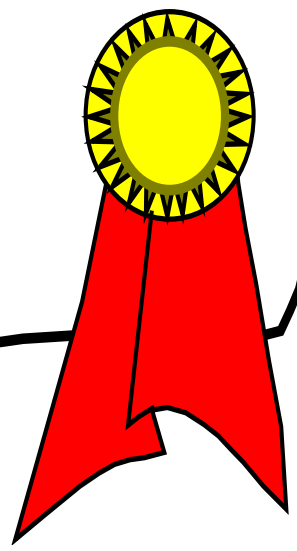
صدق الله العظيم
سورة البقرة: أية
(32)

Dedication

To the soul of my father

(May mercy be upon his soul)

To my mother and my husband



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ABSTRACT

Through investigating the physiological roles of triacontanol (TRIA) in seed germination, two different concentrations (35 and 50 ppm) were choosen 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