

EFFECTS OF EXCESS WATER ON THE SPECIFIC ACTIVITIES
OF ANTIOXIDATIVE ENZYMES IN *Zea mays*

MUR ABIDA BINTI MOHAMMAD

FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI MALAYSIA TERENGGANU

2008

**EFFECTS OF EXCESS WATER ON THE SPECIFIC ACTIVITIES OF
ANTIOXIDATIVE ENZYMES IN *Zea mays***

By
NUR ABIDA BINTI MOHAMAD

A thesis submitted in partial fulfilment of
the requirements for the award of the degree of
Bachelor of Science (Biological Sciences)

**DEPARTMENT OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITI MALAYSIA TERENGGANU
2008**

1100057840

This project should be cited as:

Nur Abida, M. 2008. Effects of excess water on the specific activities of antioxidative enzymes in *Zea mays*. Undergraduate thesis, Bachelor of Science (Biological Sciences), Faculty of Science and Technology, University Malaysia Terengganu. 77pp.

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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **EFFECTS OF EXCESS WATER ON THE SPECIFIC ACTIVITIES OF ANTIOXIDATIVE ENZYMES IN *Zea mays*** oleh **NUR ABIDA BINTI MOHAMAD**, No. Matrik: **UK11289** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah **SARJANA MUDA SAINS (SAINS BIOLOGI)**., Fakulti Sains dan Teknologi,Universiti Malaysia Terengganu.

Disahkan oleh: /Verified by:

.....
Penyelia Utama/*Main Supervisor*

Nama: **PUAN NORHAYATI BINTI YUSUF**

Cop Rasmi: **NORHAYATI BINTI YUSUF**

**Pensyarah
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu.**

Tarikh: **8/5/2008**

.....
Ketua Jabatan Sains Biologi/*Head, Department of Biological Sciences*

Nama: **PROF. MADYA DR. AZIZ BIN AHMAD**

Cop Rasmi: **PROF. MADYA DR. AZIZ BIN AHMAD**

**Ketua
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu**

Tarikh: **15 JUN 2008**

DECLARATION

I hereby declare that this thesis entitled Effects of Excess Water on the Specific Activities of Atioxidative Enzymes in *Zea mays* is the result of my own research except as cited in the references.

Signature

:



Name

: Nur Abida Binti Mohamad

Matric No

: UK 11289

Date

: 7.5.2008

ACKNOWLEDGEMENTS

Alhamdulillah and thanks to Allah S.W.T for blessing and giving me strength to accomplish the experiment and report writing. There were experiences that I have gain throughout the project started till the last draft.

First of all, I want to convey my highest appreciation to my supervisor, Madam Norhayati Yusuf for her invaluable advice, comments, guidance and encouragement through this final year project. Also not forgetting, Dr. Chuah Tse Seng from FASM for his wonderful guidance and encouragement for the project was amazing. I have learned so much from them and expand my horizon through the experience that I have gain. I also wanted to appreciate lab assistants for their technical assistant.

Finally, I would like to take this opportunity to convey my special appreciation to my parent and my friends especially Hakim, Hana, Bibi, Biba and Sya for their support and encouragement in completing my project. Nevertheless, their passion to help others was the greatest thing somebody can give.

ABSTRACT

Plants can produce a number of antioxidants to protect itself against environmental stress that effect their growth and productivity. The antioxidants that have been produced include enzymatic antioxidants and non enzymatic antioxidants. The effects of different volumes of water (excess water) on the ascorbate peroxidase (APx), catalase (CAT), and guaiacol peroxidase (POD) specific activities were studied in *Zea mays*. *Zea mays* were treated with 100, 120, 140, 160, 180 and 200ml of water for 7 days. The specific activities of these antioxidative enzymes were detected every 0, 1, 2, 3, 5 and 7 days of treatment period. Water treatment significantly induced the APx and POD specific activities especially at later stages of treatment period. Increases the volume of water led to great increased of APx and POD specific activity. However, CAT specific activities were not affected at earlier stage of treatment while reduced at the later stages. These results suggest that the treatment of excess water stimulates oxidative stress in *Zea mays* by inducing the APx and POD antioxidative specific activities and reduced in CAT specific activities. As a C₄ plant or plant that uses C₄ photosynthesis, maize is a considerably more water-efficient crop than C₃ plants. The antioxidant metabolism has been shown to be important in determining the ability of *Zea mays* to survive under conditions of excess water stress and the up regulation of these enzymes would help to reduce the build up of reactive oxygen species.

KESAN LEBIHAN AIR KE ATAS AKTIVITI SPESIFIK ENZIM ANTIOKSIDA PADA DAUN JAGUNG (*Zea mays*)

ABSTRAK

Tumbuhan dapat menghasilkan pelbagai jenis antioksidan yang dapat melindunginya daripada tegasan persekitaran yang memberi kesan kepada pertumbuhan dan produktiviti tumbuhan. Antara antioksidan yang dihasilkan termasuklah jenis enzim dan bukan enzim. Kesan perbezaan isipadu air (lebih air) ke atas aktiviti spesifik enzim askorbat peroksida (APx), katalase (CAT) dan guaiacol peroksida (POD) telah dikaji pada *Zea mays*. *Zea mays* dirawat dengan 100, 120, 140, 160, 180 dan 200ml isipadu air yang berbeza selama 7 hari. Aktiviti spesifik enzim antioksidan ditentukan setiap 0, 1, 2, 3, 5 dan 7 hari rawatan. Rawatan air yang diberikan merangsang aktiviti enzim APx dan POD terutama pada tempoh akhir rawatan. Peningkatan isipadu air meningkatkan aktiviti spesifik enzim APx dan POD. Walau bagaimanapun, tegasan air tidak memberi kesan ke atas aktiviti spesifik enzim CAT pada awal rawatan dan menurun pada peringkat seterusnya. Keputusan ini mencadangkan bahawa rawatan air yang diberikan merangsang tegasan oksidatif pada *Zea mays* dengan meningkatkan aktiviti spesifik enzim APx dan POD dan menurunkan aktiviti spesifik enzim CAT. Tumbuhan yang menggunakan fotosintesis C₄ mempunyai tahap ketahanan terhadap tekanan air yang lebih cekap berbanding tumbuhan C₃. Metabolisma antioksidan menunjukkan kepentingan kebolehan *Zea mays* untuk terus hidup dalam tegasan air dan menaikkan pengaturan enzim-enzim ini yang dapat membantu mengurangkan pembentukan spesies oksigen reaktif.