

ADAPTIVE RESPONSES OF *Piper batle*, L.  
(DURY SPICE) UNDER DROUGHT STRESS

MUHAMMAD HAZWAN BIN HAFIZ

FAKULTI SAINS DAN TEKNOLOGI  
UNIVERSITI MALAYSIA TERENGGANU

2008

LP  
31  
FST  
1  
2008



**ANTIOXIDATIVE RESPONSES OF *Piper betle*, L. (DAUN SIRIH) UNDER  
PARAQUAT STRESS**

By  
Muhamad Hazwan bin Mat Tar

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

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

This project should be cited as:

Hazwan, M.T. 2008. Antioxidative Responses of Piper betle (Daun Sirih) Under Paraquat Stress. Undergraduate thesis, Bachelor of Science (Biological Sciences), Faculty of Sciences and Technology, Universiti Malaysia Terengganu. 33pp.

No part of this project report may be produced by any mechanical, photographic or electronic process, or in the form of phonographic recording, nor may it be stored in retrievals system, transmitted or otherwise copied for public or private use without written permission from the author and the supervisor of the project.



**JABATAN SAINS BIOLOGI  
FAKULTI SAINS DAN TEKNOLOGI  
UNIVERSITI MALAYSIA TERENGGANU**

**PENGAKUAN DAN PENGESAHAN LAPORAN  
PROJEK PENYELIDIKAN I DAN II  
RESEARCH REPORT VERIFICATION**

Adalah ini diakui dan disahkan bahawa laporan peyelidikan bertajuk: **ANTIOXIDATIVE RESPONSES OF *Piper Betle* , L (DAUN SIRIH)** oleh **MUHAMAD HAZWAN BIN MAT TAR**, No Matrik: **UK12022** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperolehi 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: **13/5/2008**

~~Ketua~~ Jabatan Sains Biologi / *Head Department of Biological Sciences*

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

Cop Rasmi:

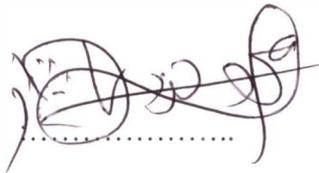
**PROF. MADYA DR. AZIZ BIN AHMAD**  
Ketua  
Jabatan Sains Biologi  
Fakulti Sains dan Teknologi  
Universiti Malaysia Terengganu  
21030 Kuala Terengganu

**13 MAY 2008**  
Tarikh:.....

## DECLARATION

I hereby declare that this thesis entitled Antioxidative Responses of *Piper betle*, L. (daun sireh) Under Paraquat Stress is the result of my own research except as cited in the references.

Signature



Name : Muhamad Hazwan bin Mat Tar

Matric No : UK 12022

Date : 11.5.2008

## ACKNOWLEDGEMENTS

In the name of Allah, The Most Gracious and The Most Merciful

First of all, I am grateful to Allah S.W.T for the blessing and giving me strength for being able to complete this thesis. I would like to express my sincere appreciation and deepest gratitude to my supervisor, Puan Norhayati Binti Yusuf, who amazingly generous for her supervision, assistance, comments and guidance so that this project can be completed nicely.

These appreciations extended to lab assistant, Puan Fatimah, Puan Ku Naiza and Encik Mazrul for their superb assist making the project carried out smoothly. Nevertheless, their passion to help others was the greatest thing somebody can give.

Last but not least, to my family, mother and father, and my other sibling, thanks for supporting.

Once again, I wish my greatest thank to all who had give their hand directly or indirectly in order to finish this project. Thank You.

## ABSTRACT

Antioxidants include enzymatic and non-enzymatic antioxidant as well as bioactive plant phenols. The health benefits of this *Piper betle* are largely due to antioxidant vitamin supported by large number of phytochemicals, some with greater antioxidant properties. The objective of this study is to determine the effects of oxidative stress induced by paraquat (PQ) on the level of antioxidative constituents (carotenoid, ascorbic acid, and  $\alpha$ -tocopherol) in *Piper betle*. Leaf disc of *Piper betle* were treated with different concentrations of PQ (0, 15, 30, 60  $\mu$ M) for 7 days. At the earlier stages of PQ treatment, increasing of PQ concentrations enhanced the level of non-enzymatic antioxidants compared to control. Excess PQ application (60 $\mu$ M) lowered the ascorbic acid, carotenoid, and  $\alpha$ -tocopherol concentration. Results revealed that PQ induced the oxidative stress in *Piper betle*.

## ABSTRAK

Antioksidan termasuk antioksidan berenzim dan bukan enzim dan juga bioktif fenol pada tumbuhan. *Piper betle* mempunyai kelebihan dari segi kesihatan kerana mengandungi vitamin antioksidan dan kandungan fitokimia yang tinggi. Objektif kajian ini adalah untuk mengkaji kesan tegasan oksidatif oleh parakuat ke atas kandungan antioksidan (karotenoid, asid askorbik, dan  $\alpha$ -tokoferol) dalam *Piper betle*. Disk daun *Piper betle* dirawat dengan PQ pada kepekatan yang berbeza (0, 15, 30, 60  $\mu$ M) selama 7 hari. Pada peringkat awal kajian, peningkatan kepekatan PQ meningkatkan kandungan antioksidan bukan enzim berbanding dengan kawalan. Kepekatan PQ yang tinggi (60 $\mu$ M) menurunkan kandungan asid askorbik, karotenoid, dan  $\alpha$ -tokoferol. Kajian ini menunjukkan bahawa PQ merangsang tegasan oksidatif di dalam *Piper betle*.