

STEM AND FOLIAR DISORDERS INCIDENCE ON URBAN
PLANTED *Hopea odorata* Roxb. IN TERENGGANU

SITI NOR KAMILAH MUSTAPA

FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2005

**STEM AND FOLIAR DISORDERS INCIDENCE ON URBAN PLANTED
Hopea odorata Roxb. IN TERENGGANU**

By

Siti Nor Kamilah Mustapa

**Research Report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Applied Science (Biodiversity Conservation and Management)**

**Department of Biological Sciences
Faculty of Science and Technology
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2005**

This project should be cited as:

Siti-Norkamilah, M. 2005. Stem and foliar disorders incidence on urban planted *Hopea odorata* Roxb. in Terengganu. Undergraduate thesis, Bachelor of Applied Science in Biodiversity Conservation and Management, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 53p.

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 a retrieval system, transmitted, or otherwise copied for public or private use, without written permission from author and the supervisor(s) of the project.



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

**PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **STEM AND FOLIAR DISORDERS INCIDENCE ON URBAN PLANTED *Hopea odorata* Roxb. IN TERENGGANU** Oleh **SITI NOR KAMILAH MUSTAPA** No. Matrik: **UK 6975** telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah Sarjana Muda Sains Gunaan (Pemuliharaan dan Pengurusan Biodiversiti), Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:


.....
JAMILAH MOHD SALIM @ HALIM
Penyelia Utama Pensyarah
 Jabatan Sains Biologi
Nama: Fakulti Sains dan Teknologi
 Kolej Universiti Sains dan Teknologi Malaysia
Cop Rasmi: (KUSTEM)
 21030 Kuala Terengganu, Terengganu.

Tarikh: 12/4/05

.....
Penyelia Kedua (jika ada)

Nama:

Cop Rasmi

Tarikh:


.....
Ketua Jabatan Sains Biologi

Nama: **PROF. MADYA DR. NAKISAH BT. MAT AMIN**
 Ketua
Cop Rasmi: Jabatan Sains Biologi
 Fakulti Sains dan Teknologi
 Kolej Universiti Sains dan Teknologi Malaysia
 (KUSTEM)
 21030 Kuala Terengganu.

Tarikh: 12/4/05

ACKNOWLEDGEMENT

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

I would like to thank my supervisor, Cik Jamilah Mohd Salim @ Halim for her sustain support, guidance, encouragement and also patience in supervising me. I am very much in debt to her. I also gratefully thank Majlis Perbandaran Kuala Terengganu, Majlis Perbandaran Kemaman and Majlis Daerah Setiu for their permission, information and assistance.

I also would like to thank staffs in Department of Biological Sciences for their assistance. Special thanks to Nur Izeanty, Roslizawati, Noraziah, Wan Fatihah, Noriatul Ismalia, Nik Nor Elyani, Amir, Firdaus, Aida, my housemates and other friends or individuals too numerous to be mentioned here. I am very much obliged to them all for their suggestions and assistance.

I especially wish to acknowledge my family: Abah and Ummy for their love and support, and for my sisters and brothers for their assistance. Jazakallahu khairan kathira.

TABLE OF CONTENTS

| | PAGE |
|--|-------------|
| APPROVAL FORM | |
| ACKNOWLEDGEMENT | ii |
| LIST OF TABLES | v |
| LIST OF FIGURES | vi |
| LIST OF APPENDICES | vii |
| ABSTRACT | viii |
| ABSTRAK | ix |
| | |
| CHAPTER 1 INTRODUCTION | 1 |
| 1.1 Objectives | 4 |
| | |
| CHAPTER 2 LITERATURE REVIEW | 5 |
| 2.1 Tree diseases and disorders | 5 |
| 2.1.1 Noninfectious injuries and disorders | 6 |
| 2.1.2 Infectious diseases | 6 |
| 2.2 The concept of disease in plants | 7 |
| 2.3 Host range of pathogens | 8 |
| 2.4 Development of tree disease | 8 |

| | | |
|--------------------------|--|----|
| 2.4.1 | Pathogen | 9 |
| 2.4.2 | Host | 9 |
| 2.4.3 | Environmental condition | 10 |
| 2.5 | Foliage diseases | 10 |
| 2.6 | Stem diseases | 11 |
| 2.7 | Diseases of <i>Hopea odorata</i> Roxb. | 12 |
| CHAPTER 3 | METHODOLOGY | 13 |
| 3.1 | Study site | 13 |
| 3.2 | Survey of stem and foliar damages and disorders | 14 |
| CHAPTER 4 | DATA ANALYSIS | 17 |
| CHAPTER 5 | RESULTS AND DISCUSSION | 18 |
| 5.1 | Type of damages and disorders on <i>H. odorata</i> | 26 |
| CHAPTER 6 | CONCLUSION | 30 |
| REFERENCES | | 31 |
| APPENDICES | | 34 |
| CURRRICULUM VITAE | | 52 |

LIST OF TABLES

| Table | | Page |
|-------|--|------|
| 3.1 | Scoring system applied for foliar and stem disorder survey to <i>H. odorata</i> planted along the main roadside of Terengganu | 14 |
| 5.1 | Overall incidence of wound, scar and foliar disorders recorded on <i>H. odorata</i> in urban plantation in five sites in Terengganu | 19 |
| 5.2 | Results of Kruskal Wallis test for site differences in incidence of damage on planted <i>H. odorata</i> in five selected sites in Terengganu | 19 |
| 5.3 | Number of wound incidence cases and its position relative to the stem of host trees | 23 |
| 5.4 | Number of scar incidence cases and its position relative to the stem of host trees | 24 |
| 5.5 | Number of foliar disorder incidence and its position relative to the stem of host trees | 24 |

LIST OF FIGURES

| Figure | | Page |
|--------|--|------|
| 2.1 | The disease triangle | 9 |
| 3.1 | Illustration of location of scored damages and disorders on <i>H. odorata</i> trees planted along the main roadside of Terengganu | 15 |
| 5.1 | Overall comparison of stem and foliar disorders incidence on planted <i>H. odorata</i> recorded from five sites in Terengganu | 20 |
| 5.2 | Incidence of stem and foliar disorders scored on planted <i>H. odorata</i> in five selected sites in Terengganu | 22 |
| 5.3 | Type of stem disorders recorded on urban planted <i>H. odorata</i> along the main roadside of Terengganu | 26 |
| 5.4 | Disorders recorded on <i>H. odorata</i> from urban planting along the main road side of Terengganu | 27 |
| 5.5 | Foliar disorders recorded on <i>H. odorata</i> from urban planting along the main road side of Terengganu | 28 |
| 5.6 | Examples of human and animal activity impacts and pruning on the urban planted <i>H. odorata</i> recorded along the main road side of Terengganu | 29 |

LIST OF APPENDICES

| Appendix | | Page |
|----------|---|------|
| A | Incidence of foliar and stem disorders | 34 |
| B | Result of Kruskal Wallis test for site differences in incidence of damage on planted <i>H. odorata</i> in five selected sites in Terengganu | 51 |

ABSTRACT

The incidence of stem damages and foliar disorders was visually estimated on 250 trees of *Hopea odorata* Roxb. from the urban planting in five selected sites in Terengganu. Incidence of stem damages was more frequent compared to foliar disorders, with scar being the most frequent incidence recorded relative to other types of damages or disorders incidence. Overall incidence of stem damages could be related to the developmental status of the district with the highest incidence recorded in Gong Badak site while the lowest incidence recorded in Batu Rakit. Stem canker and severe insect leaf mining activities were noted as a possible threat to *H. odorata* plantation and deserved a further study. Proper management guidelines for urban planting of this species is recommended, for example in pruning and maintenance, which could contribute to healthier urban planted *H. odorata*.

**PENELITIAN KEROSAKAN BATANG DAN DAUN TANAMAN BANDARAN
Hopea odorata Roxb. DI TERENGGANU**

ABSTRAK

Kajian kecederaan mekanikal pada bahagian batang dan kerosakan daun *Hopea odorata* Roxb. dijalankan ke atas 250 pokok di lima daerah terpilih di Terengganu secara anggaran visual. Pokok-pokok tersebut merupakan spesies tanaman bandaran di bawah penyeliaan majlis daerah berkenaan. Kecederaan bahagian batang pokok *H. odorata* menunjukkan kekerapan yang lebih tinggi berbanding kerosakan daun, dengan parut kulit (luka yang pulih) sebagai faktor kecederaan tertinggi diceraap berbanding faktor kerosakan yang lain. Kadar kecederaan yang tinggi pada bahagian batang dapat dikaitkan dengan tahap pembangunan kawasan kajian, dengan kekerapan kecederaan bahagian batang dan kerosakan daun tertinggi di kawasan Gong Badak berbanding paling rendah di kawasan Batu Rakit. Penyakit canker batang dan kerosakan daun akibat aktiviti serangga dijangkakan menjadi ancaman utama kepada *H. odorata* dan aspek ini memerlukan perhatian dan kajian terperinci. Garis panduan pengurusan tanaman bandaran dicadangkan, contohnya bagi pemangkasan dan jarak penanaman untuk memastikan tanaman *H. odorata* yang sihat.