

MYCORRHIZAL SPORE ABUNDANCE UNDER ACACIA
PLANTATION ON ERIS SITE OF SERI,
PERINGGANNI

IZATI BINTI

FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

2006

LP
4
FST
5
2006

MYCORRHIZAL SPORE ABUNDANCE UNDER *Acacia* PLANTATION ON
BRIS SOIL OF SETIU, TERENGGANU

By

Azalina Binti Main

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
2006

This project should be cited as:

Azalina, M. 2006. Mycorrhizal Spore Abundance under *Acacia* Plantation on BRIS Soil of Setiu, Terengganu. Undergraduate thesis, Bachelor of Applied Science (Biodiversity Conservation and Management), Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 41p.

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 the author and the supervisors of the project.

1100046078



**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: MYCORRHIZAL SPORE ABUNDANCE UNDER *Acacia* PLANTATION ON BRIS SOIL OF SETIU, TERENGGANU oleh Azalina Binti Main, no. matrik UK 8727 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 Gunaan (Pemuliharaan dan Pengurusan Biodiversiti), Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:

Penyelia Utama

Nama: **JAMILAH MOHD SALIM @ HALIM**

Cop Rasmi: Pensyarah

Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
(KUSTEM)
21030 Kuala Terengganu, Terengganu.

Tarikh: 16/05/06

Ketua Jabatan Sains Biologi

Nama: **PROF. MADYA DR. NAKISAH BT. MAT AMIN**

Cop Rasmi:

Ketua
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
(KUSTEM)
21030 Kuala Terengganu.

Tarikh: 16/05/06

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iv
LIST OF ABBREVIATIONS	v
LIST OF APPENDICES	vi
ABSTRACT	vii
ABSTRAK	vii
CHAPTER 1 INTRODUCTION	
1.1 Introduction	1
1.2 Objectives of study	4
CHAPTER 2 LITERATURE REVIEW	
2.1 Mycorrhizae	5
2.2 <i>Acacia</i> species	6
2.3 BRIS soil	8
CHAPTER 3 METHODOLOGY	
3.1 Study site	10
3.2 Mycorrhizal treatment	11
3.3 Soil sampling	11
3.4 Spore extraction	11
3.5 Data collection	12

CHAPTER 4 RESULTS

4.1 Spore description 13

4.2 Distribution of spore between seasonal 15

CHAPTER 5 DISCUSSION 21

CHAPTER 6 CONCLUSION 25

REFERENCES 26

APPENDICES 31

CURRICULUM VITAE 41

ACKNOWLEDGEMENT

First of all, I would like to extend my deepest appreciation to my supervisor Cik Jamilah Mohd Salim for her patients, thought, guidance, and knowledge in helping me to complete this project.

Special thanks to Dr. Lee Su See and Mrs. Patahayah Mansor from FRIM Kepong, and Mr. Ghazali Hassan from FRIM Setiu, Terengganu for their permission to collect soil sample and supports in this project and also to lab assistants who tried their best to fulfill my needs to conduct lab works.

My thank also goes to my close friend who have encouraged and supported me throughout my study in KUSTEM Dilla, Rinn, and Fida.

Last but not least, my deepest appreciation for my wonderful family for their support, advice and care.

LIST OF TABLES

Table		Page
3.2	Each plot has the different mycorrhizae treatment	11
4.1	Description of the spores found in each treatment on <i>Acacia</i> plantation	13
4.2	Number of spores recorded under <i>Acacia</i> plantation in rainy season on BRIS soil in FRIM, Setiu	15
4.3	Number of spores recorded under <i>Acacia</i> plantation in drier season on BRIS in FRIM, Setiu	16
4.4	Number of spores in soil sample collected from natural vegetation	17

LIST OF FIGURES

Figure		Page
3.1	Location of study site in FRIM Setiu, Terengganu	10
4.1	Mycorrhizal spore recorded from soil sample of Setiu, Terengganu	14
4.2	Spore abundance recorded from each treatment on <i>Acacia</i> plantation with two seasons	17
4.3	Spore abundance recorded according <i>Acacia</i> species with two seasons	18
4.4	Comparison of mycorrhizal extracted from soil under <i>A. mangium</i> and natural vegetation of BRIS soil	20

LIST OF ABBREVIATIONS

°C	-	degree Celsius
cm	-	centimeter
dbh	-	diameter breast height
E	-	East
g	-	gram
ha	-	hectare
km	-	kilometer
m	-	meter
mm	-	millimeter
N	-	North
P	-	Phosphorus
RPM	-	rotation per minute
µm	-	micrometers
%	-	percentages

LIST OF APPENDICES

Appendix	Page
1. Block <i>Acacia</i> plantation at FRIM Setiu, Terengganu	31
2. Wet Sieving and Decanting Method (Gerdermann and Nicolson, 1963)	32
3. 2-Way ANOVA analysis for spore abundance in each treatment for both seasons under <i>Acacia</i> plantation on BRIS soil of Setiu, Terengganu	33
4. Spore abundance under <i>Acacia</i> plantation on both seasons	34

ABSTRACT

This study has been conducted to screen mycorrhizal spore abundance *Acacia* plantation on BRIS soil of Setiu, Terengganu. Soil samples were collected under plantations of three *Acacia* species of *Acacia mangium*, *A. hybrid* and *A. auriculiformis* that were subjected to four mycorrhizae treatments; vesicular arbuscular mycorrhizae (VAM), ectomycorrhizae (ECM), ectoendomycorrhizae (ECM-VAM) and control sample without mycorrhizae addition. Soil samples were collected at two relatively differ rainfall, rainy season (November, 2005) and drier season (February, 2006). Spore from Glomales familiy were represented by four species with *Glomus* sp. being the most abundant followed by *Acaulospora* sp., *Gigaspora* sp. and *Scutellospora* sp. In ECM treatment, both periods recorded the highest number of spores with 115 on rainy season compare to 142 in drier season. The lowest number of spores has been recorded in soil subjected to VAM treatment in both seasons. Under *A. mangium*, rainy season showed the highest number of spores and the number of spores was similar between seasons under *A. hybrid*. In contrast, *A. auriculiformis* showed the highest number of spores in drier season. The differences in spore numbers mycorrhizal fungus species and mycorrhizal treatments indicate the possibility of mycorrhizal application to improve BRIS soil fertility.

KELIMPAHAN SPORA MIKORIZA DI BAWAH TANAMAN *Acacia* DI ATAS TANAH BRIS SETIU, TERENGGANU

ABSTRAK

Kajian ini dilakukan untuk meneliti kelimpahan spora mikoriza di bawah tanaman *Acacia* di atas tanah BRIS di Setiu, Terengganu. Sampel tanah diambil di bawah tiga tanaman spesies *Acacia* iaitu *Acacia mangium*, *A. hybrid*, dan *A. auriculiformis* yang telah diletakkan dengan empat jenis rawatan mikoriza iaitu mikoriza-vesikular arbuskular (VAM), ektomikoriza (ECM), ektoendomikoriza (ECM-VAM) dan sampel kawalan tanpa rawatan mikoriza. Sampel tanah diambil pada dua perbezaan taburan hujan; musim hujan (November, 2005) dan musim kering (Februari, 2006). Kehadiran spora dari famili Glomales dengan empat jenis berjaya dicerap iaitu *Glomus* sp. mencatatkan bilangan yang paling banyak diikuti *Acaulospora* sp., *Gigaspora* sp. dan *Scutellospora* sp. Di dalam rawatan ECM, kedua-dua musim merekodkan bilangan spora yang paling tinggi dengan 115 pada musim hujan dan 142 pada musim kering. Bilangan spora yang paling rendah dicatatkan pada rawatan VAM di kedua-dua musim. Di bawah *A. mangium*, musim hujan menunjukkan bilangan spora yang paling tinggi, manakala bilangan spora bagi *A. hybrid* mempunyai bilangan spora yang hampir sama di antara dua musim. Berbeza pula bagi *A. auriculiformis* menunjukkan bilangan spora yang paling tinggi pada musim kering. Perbezaan bilangan spesies spora dan rawatan mikoriza menunjukkan penggunaan mikoriza dapat memperbaiki kesuburan tanah di atas tanah BRIS.