

SEMULAJAYA KEMERIAHAN ELEUSINE INDICA  
(A) BERTAMBAH DENGAN CAHAYA  
CANTUM DAN BERSEKUTU.

SEMULAJAYA KEMERIAHAN

SEMULAJAYA KEMERIAHAN  
SEMULAJAYA KEMERIAHAN  
2003



GERMINATION RESPONSE OF *Eleusine indica* (L.) Gaertn. SEED TO DIFFERENT  
LIGHT QUALITIES AND INTENSITIES.

By

Suganthi Krishnan

Research Report submitted in partial fulfillment of  
the requirements for the degree of  
Bachelor of Science (Biological Sciences)

Department of Biological Sciences  
Faculty of Science and Technology  
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA  
2006

This project should be cited as:

Suganthi, K. 2006. Germination response of *Eleusine indica* (L.) Gaertn. seed to different light qualities and intensities. Undergraduate thesis, Bachelor of Science in Biological Sciences, 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 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 supervisor(s) of the project.



## ACKNOWLEDGEMENTS

Om Sivaya Namaha.

First and foremost, I would like to extend my sincere appreciation and gratitude to my supervisors, Dr. Chuah Tse Seng and Dr. Cha Thye San for their guidance, comments, support, hospitality and patience throughout the project. This project has polished my skills and rendered valuable experiences.

I am very grateful to my close friends who are also my project members, Franci Julop, Shirley Maclaine Simoli, Anne Marie Kaben and Nor Asmah Jalil for their encouragement and their kindness in completing my thesis. I would also like to thank Encik Hasan and the laboratory staffs for their helping hand during the project. Special thanks to my senior Karthik and my good friends, Suriya and Tevan for being there and understanding the difficulties I had been through.

Finally, my utmost gratitude to my beloved parents especially my father Mr. Krishnan and my mother Mrs. Letchumy, and my siblings for their unconditional support and love. My deepest gratitude also goes to my biological sciences batch mates for their endless support, concern and friendship and my heartfelt thanks to all of my housemates, Sivagamy, Liza, Mages, Nithya and friends who have contributed in this project one way or another.

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	ii
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	viii
<b>LIST OF APPENDICES</b>	ix
<b>ABSTRACT</b>	x
<b>ABSTRAK</b>	xi
<b>CHAPTER 1 INTRODUCTION</b>	1
1.1 Introduction	1
1.2 Importance of Study	3
1.3 Objectives	4
<b>CHAPTER 2 LITERATURE REVIEW</b>	5
2.1 <i>Eleusine indica</i> (L.) Gaertn. (goosegrass)	5
2.1.1 Distribution	5
2.1.2 Morphology	5
2.1.3 Habitat	8
2.2 Seed germination	9
2.3 Seed responses to light	10
2.4 Photocontrol	13
2.5 Weed control	13

<b>CHAPTER 3 METHODOLOGY</b>	15
3.1 Seed source	15
3.2 General procedures	15
3.3 Dormancy and viability of biotypes (Experiment 1)	16
3.4 Effect of light quality (Experiment 2)	16
3.5 Effect of light intensity (Experiment 3)	18
3.6 Influence of dark imbibition period (Experiment 4)	20
3.7 Experimental design and analysis	20
<b>CHAPTER 4 RESULTS</b>	21
4.1 Dormancy and viability of biotypes	21
4.2 Effect of light quality	23
4.3 Effect of light intensity	25
4.4 Influence of dark imbibition period	28
<b>CHAPTER 5 DISCUSSION</b>	30
<b>CHAPTER 6 CONCLUSION</b>	35
<b>REFERENCES</b>	36
<b>APPENDICES</b>	43



**CURICULUM VITAE**

53

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
3.1	The red/far red (R:FR) ratio and the duration of light/dark used in the germination studies	17
3.2	The photon irradiance (quanta in the 400-800 nm range) and duration of light/dark used in the germination studies.	19
4.1	Germination of two glyphosate-resistant biotypes and one glyphosate-susceptible biotype of goosegrass after treated with potassium nitrate (KNO <sub>3</sub> ) or distilled water for 14 days with 12hour photoperiod.	22
4.2	Germination of three biotypes and one glyphosate-susceptible biotype of goosegrass after treated with green light and red light for 21 days for seeds with seed coat and 14 days for seeds without seed coat with 12 hour photoperiod.	24
4.3	Germination of three biotypes of goosegrass after treated with dim white light, moderate white light and bright white light for 21 days for seeds with seed coat and 14 days for seeds without seed coat with 12 hour photoperiod. Seeds in darkness treatment were for 24 hours.	27
4.4	Germination of three biotypes of goosegrass after treated with dark imbibition for 14 days with 24 hour of darkness followed by 14 days with red light with 12 hour photoperiod.	29

## LIST OF FIGURES

Figure	Page
2.1 Leaf blades of <i>Eleusine indica</i>	6
2.2 Seedheap up close of <i>Eleusine indica</i>	7
2.3 Spikelets of <i>Eleusine indica</i>	7
2.4 <i>Eleusine indica</i> seed with seed coat and without seed coat	8
4.1 Dormancy and viability of <i>E.indica</i> seeds with seed coat (sc) and without seed coat (wsc) in distilled water (d) and potassium nitrate (p) for three biotypes namely glyphosate-resistant (BR) and glyphosate-susceptible (BS) biotypes from Bidor and glyphosate-resistant biotype (CR) from Chaah.	22
4.2 The effect of different light qualities on <i>E.indica</i> seeds with seed coat (sc) and without seed coat (wsc) in alternating green light plus dark treatment (g) and alternating red light plus dark (r) for three biotypes namely glyphosate-resistant (BR) and glyphosate-susceptible (BS) biotypes from Bidor and glyphosate-resistant biotype (CR) from Chaah.	24
4.3 The effect of different light intensities on <i>E.indica</i> seeds with seed coat (sc) and without seed coat (wsc) in darkness (dk), dim white light (di), moderate white light (m) and bright white light (b) for three biotypes namely glyphosate-resistant (BR) and glyphosate-susceptible (BS) biotypes from Bidor and glyphosate-resistant biotype (CR) from Chaah.	26
4.4 The influence of dark imbibition period on <i>E.indica</i> seeds with seed coat (sc) and without seed coat (wsc) for three biotypes namely glyphosate-resistant (BR) and glyphosate-susceptible (BS) biotypes from Bidor and glyphosate-resistant biotype (CR) from Chaah.	29

## LIST OF ABBREVIATIONS

p<0.05	-	not significant
SD	-	standard deviation
ANOVA	-	analysis of variance
HSD	-	Tukey's Honestly Significant Difference
BR	-	glyphosate-resistant biotype of Bidor
CR	-	glyphosate-resistant biotype of Chaah
BS	-	glyphosate-susceptible biotype of Bidor
Pr	-	phytochrome in red light
Pfr	-	phytochrome in far red light
R:FR	-	ratio of red light to far red light
EPSPS	-	Enzyme 5-enolpyruvylshikimate-3-phosphate synthase

## LIST OF APPENDICES

Appendix		Page
A.1	Univariate Analysis of Variance on dormancy and viability of <i>E.indica</i> seeds (mean $\pm$ SD)	43
A.2	Univariate Analysis of Variance on effect of light qualities of <i>E.indica</i> seeds (mean $\pm$ SD)	45
A.3	Univariate Analysis of Variance on effect of light intensities of <i>E.indica</i> seeds (mean $\pm$ SD)	47
A.4	Univariate Analysis of Variance on dark imbibition period of <i>E.indica</i> seeds (mean $\pm$ SD)	49
A.5	CR and BS biotypes of <i>Eleusine indica</i> without seed coat in red light treatment of light quality experiment.	51
A.6	<i>Eleusine indica</i> biotypes with seed coat in green light treatment of light quality experiment.	52

# GERMINATION RESPONSE OF *Eleusine indica* (L.) Gaertn. SEED TO DIFFERENT LIGHT QUALITIES AND INTENSITIES.

## ABSTRACT

A study was conducted on the germination response of *Eleusine indica* (L.) Gaertn. seed to different light qualities and intensities in the laboratory. The seeds were from three different biotypes namely glyphosate-resistant and glyphosate-susceptible biotypes from Bidor and glyphosate-resistant biotype from Chaah. The seeds were germinated in Petri dishes involving seeds with and without seed coat. The results indicate that the seeds without seed coat recorded higher germination rate. Based on the result of the study, it can be concluded that *Eleusine indica* seed was found to be light insensitive. Therefore, light quality and light intensity does not play a vital role in controlling the weed dormancy. However, the seeds were found to germinate in darkness. The seed with seed coat which plays an important role in preventing water, gases penetration into the seed poses the greatest barrier to the seed itself.

# **GERAKBALAS PERCAMBAHAN BIJI BENIH *Eleusine indica* (L.) Gaertn TERHADAP KUALITI DAN KEAMATAN CAHAYA YANG BERBEZA.**

## **ABSTRAK**

Satu kajian tentang gerakbalas percambahan biji benih *Eleusine indica* (L.) Gaertn terhadap kualiti cahaya dan keamatan cahaya yang berbeza telah dilaksanakan di makmal. Biji benih yang digunakan untuk eksperimen ini terdiri daripada biotip rintang dan rentang terhadap glifosat dari Bidor serta biotip yang rintang terhadap glifosat dari Chaah. Biji benih bersalut dan tanpa bersalut dari biotip masing-masing dicambahkan dalam piring Petri. Keputusan kajian menunjukkan biji benih tanpa salut mencatatkan kadar percambahan biji benih yang tinggi. Daripada kajian ini, dapat disimpulkan bahawa biji benih *Eleusine indica* tidak peka terhadap cahaya. Maka, kualiti cahaya dan keamatan cahaya tidak mempengaruhi kedormanan biji benih. Namun demikian, biji benih ini didapati bercambah dalam kegelapan. Biji benih bersalut yang memainkan peranan penting dalam menghalang kemasukan air dan gas merupakan halangan terbesar untuk biji benih ini.