



UNIVERSITI PUTRA MALAYSIA

***IN VITRO CATHARANTHUS ROSEUS (L.) G. DON CALLUS
RESPONSES ON DARK AND CHITOSAN TREATMENTS***

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AND CHITOSAN TREATMENTS***

By

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CHITOSAN TREATMENTS IN DARK***

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CERTIFICATION

This project report entitled “*In vitro Catharanthus roseus* (L.) G. Don Callus Responses on Dark and Chitosan Treatments” is prepared by Nur Amani Azwa bte Sulaiman and submitted to the Faculty of Agriculture, Universiti Putra Malaysia in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of degree of Bachelor of Horticultural Science.

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENT		ii
CERTIFICATION		iii
TABLE OF CONTENTS		iv
LIST OF TABLES		vi
LIST OF FIGURES		vii
LIST OF APPENDICES		vii
LIST OF ABBREVIATIONS		ix
ABSTRACT		x
ABSTRAK		xi
CHAPTER :		
1	INTRODUCTION	1
2	LITERATURE REVIEW	3
	2.1 <i>Catharanthus roseus</i> (L.) G. Don	3
	2.1.1 Botany and Morphology	3
	2.1.2 Importance of <i>Catharanthus roseus</i>	5
	2.2 Chitosan	6
	2.2.1 Origin, Function and general use	6
	2.2.2 General Uses of chitosan in agriculture	7
	2.3 Boron	8
	2.3.1 Origin and Function of Boron	8

	2.3.2 Application of Boron	10
	2.4 Dark Treatment	11
	2.4.1 Effect of dark treatment on callus	11
3	MATERIALS AND METHOD	12
	3.1 Plant Materials and Maintenance	12
	3.2 Experimental Procedure	13
	3.2.1 Explant material	13
	3.2.2 Culture initiation	13
	3.2.3 Culture maintenance	14
	3.2.4 Extraction for alkaloids	15
	3.2.5 GC-MS	15
	3.3 Preparation of MS stock solution	16
	3.4 Preparation of media	17
	3.5 Data analyses	18
4	RESULTS AND DISCUSSION	19
	4.1 Effect of chitosan on dry weight of <i>Catharanthus roseus</i> callus in dark treatment	19
	4.2 Effect of chitosan on boron level in <i>Catharanthus roseus</i> callus in dark treatment	22
5	CONCLUSION	25
	REFERENCES	26
	APPENDICES	32

LIST OF TABLES

TABLE		Page
1	Taxonomic Classification of <i>Catharanthus roseus</i> (L.) G. Don	4

LIST OF FIGURES

FIGURE		Page
1	<i>Catharanthus roseus</i> (L.) G. Don	12
2	The developing explant of <i>Catharanthus roseus</i>	13
3	Effect of chitosan concentrations on dry weight of <i>Catharanthus roseus</i> (L.) G. Don callus in dark treatment	20
4	Callus of <i>Catharanthus roseus</i> in dark treatment after 8 weeks of culture	21
5	Effect of chitosan concentrations on level of boron in <i>Catharanthus roseus</i> (L.) G. Don callus after 8 weeks in dark treatment	23

LIST OF APPENDICES

APPENDIX		Page
1	Murashige & Skoog (MS) stock and medium preparation	32
2	Preparation for 1 liter medium using prepared stock solutions	33
3	ANOVA table for effect of chitosan concentrations (0, 1, 2, 3, 4 and 5 mg/L) on dry weight of <i>Catharanthus roseus</i> (L.) G. Don callus in dark treatment	34
4	Mean comparison table for the effect of chitosan concentration on dry weight callus of <i>Catharanthus roseus</i> (L.) G. Don in dark treatment	35
5	ANOVA table for effect of chitosan concentrations (0, 1, 2, 3, 4 and 5 mg/L) on level of boron in <i>Catharanthus roseus</i> (L.) G. Don callus in dark treatment	36
6	Mean comparison table for effect of chitosan concentrations on level of boron in callus of <i>Catharanthus roseus</i> (L.) G. Don in dark treatment	37

LIST OF ABBREVIATIONS

(L.) G. Don	:	Linneus, George Don
°C	:	Degree celsius
ANOVA	:	Analysis of Variance
B	:	Boron
<i>C. roseus</i>	:	Genus <i>Catharanthus roseus</i>
cm	:	Centimeter
CRD	:	Completely Randomized Design
df	:	Degree of freedom (statistic)
<i>et al</i>	:	And other
g	:	Gram
GC-MS	:	Gas-chromatography-mass spectrometry
LSD	:	Least significant difference
m	:	meter
mg/L	:	Miligram per liter
mm	:	Milimeter

ABSTRACT

Catharanthus roseus (L.) G. Don or periwinkle which originates from Madagascar belongs to the family Apocynaceae. The species has been thoroughly investigated to have alkaloids routinely used in the treatment of various cancer diseases. The present study was conducted to observe the effect of various concentrations of chitosan in the dark on callus growth and development. Callus of *C. roseus* was used as explants. The callus which was initially initiated on Murashige and Skoog medium was cultured on same medium supplemented with various levels of chitosan (0, 1, 2, 3, 4, 5 mg/L). The experiment was conducted in a Complete Randomized Design (CRD) with 3 replications. Callus growth and development under dark treatment were monitored for a duration of 8 weeks.

The main objective of the study was to observe responses on growth and development of callus of *C. roseus* on chitosan treatments. Data recorded that 3 mg/L chitosan gave the highest mean dry weight 0.28 g while the lowest was 0.17 g from 4 mg/L treatment. The control gave the highest level of boron of 0.18% while in 5 mg/L treatment gave the lowest level of 0.05%. The study concludes that callus growth decreases on medium supplemented with chitosan. Dark treatment did not give positive responses to chitosan supplementation.

ABSTRAK

Catharanthus roseus (L.) G.Don atau periwinkle berasal dari Madagascar dan tergolong dalam keluarga Apocynaceae. Spesies ini telah banyak diselidik dan dilaporkan mengandungi alkaloid yang digunakan dalam rawatan pelbagai penyakit kanser. Kajian ini dijalankan untuk meneliti kesan berbagai kepekatan kitosan dalam keadaan gelap terhadap pembentukan dan pertumbuhan kalus. Kalus *C. roseus* digunakan sebagai bahan tanaman. Kalus yang pada mulanya di atas media Murashige and Skoog telah dikultur pada media yang dilengkapi dengan pelbagai kepekatan chitosan (0, 1, 2, 3, 4, 5 mg/L). Kajian ini telah dilakukan dalam rekabentuk penuhrawak dengan 3 replikasi. Pertumbuhan dan pembentukan kalus di dalam rawatan gelap telah dipantau selama 8 minggu.

Objektif utama kajian ini adalah untuk memerhatikan tindak balas pada pertumbuhan dan pembentukan kalus *C. roseus* pada rawatan kitosan. Data direkodkan bahawa 3 mg/L kitosan memberi min berat kering tertinggi iaitu 0.28 g manakala paling rendah ialah 0.17 g dari 4 mg/L rawatan kitosan. Kawalan memberi paras boron yang tertinggi iaitu 0.18 % manakala pada rawatan 5 mg/L memberi paras boron yang terendah iaitu 0.05 %. Kajian menyimpulkan bahawa pertumbuhan kalus merosot pada media tambahan dengan kitosan. Rawatan gelap tidak memberi tindakbalas positif kepada penambahan kitosan.

CHAPTER 1

INTRODUCTION

Catharanthus roseus or periwinkle is a tropical ornamental as well as medicinal plant from the family Apocynaceae. Various types of alkaloids have been found in the roots, leaves and shoots of *C. roseus* plant. These alkaloids have been used for the treatment of various cancer diseases (Jaleel *et al.*, 2009).

The species has become one of the major plant species of interest in modern plant science and biotechnology. Because of low yield of the alkaloids and their high demand in the medical industry followed by subsequent high prices, various attempts to efficiently increase in production have been reported.

The present study observed the effect of chitosan on *in vitro* growth and development of callus of *C. roseus* in the dark. Callus was previously initiated from culture of leaf explants. Resulting callus was cultured on same Murashige and Skoog medium and supplemented with various levels of chitosan under dark environment.

Increase in chitosan concentration resulted decrease in dry weight of callus *C. roseus*. The 3 mg/L of chitosan concentration gave a highest dry weight of callus. One element recovered in the extract of *C. roseus* was boron. Increase in chitosan did not cause any increase in boron (Chang *et al.*, 2006).

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