

**CALLUS INDUCTION FROM THE LEAVES OF  
*Ipomoea batatas* (SWEET POTATO)**

**NOR ATIKAH BINTI ISMAIL**

**Final Year Project Report Submitted in  
Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Science (Hons.) Biology  
In the Faculty of Applied Sciences  
Universiti Teknologi MARA**

**JANUARY 2019**

This Final Year Project Report entitled “**Callus Induction from the Leaves of Sweet Potato (*Ipomoea batatas*)**” was submitted by Nor Atikah binti Ismail, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty of Applied Sciences, and was approved by

---

Dr. Rosli bin Noormi  
Supervisor  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
Cawangan Negeri Sembilan  
Kampus Kuala Pilah  
72000 Kuala Pilah Negeri Sembilan

---

Siti Norazura binti Jamal  
Project Coordinator  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
Cawangan Negeri Sembilan  
Kampus Kuala Pilah  
72000 Kuala Pilah Negeri Sembilan

---

Dr. Aslizah binti Mohd Aris  
Head of School of Biology  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
Cawangan Negeri Sembilan  
Kampus Kuala Pilah  
72000 Kuala Pilah Negeri Sembilan

Date: \_\_\_\_\_

## TABLE OF CONTENTS

	<b>PAGE</b>
<b>ACKNOWLEDGEMENTS</b>	<b>iii</b>
<b>TABLE OF CONTENTS</b>	<b>iv</b>
<b>LIST OF TABLES</b>	<b>vi</b>
<b>LIST OF PLATES</b>	<b>vii</b>
<b>LIST OF FIGURES</b>	<b>viii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>ix</b>
<b>ABSTRACT</b>	<b>x</b>
<b>ABSTRAK</b>	<b>xi</b>
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Background Study	1
1.2 Problem Statement	2
1.3 Significance of Study	3
1.4 Objectives of the study	4
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 Family Convolvulacea	5
2.2 <i>Ipomoea batatas</i>	6
2.2.1 <i>Ipomoea batatas</i> leaves	6
2.2.2 <i>Ipomoea batatas</i> tuber	7
2.2.3 Previous study on <i>Ipomoea batatas</i>	8
2.3 Plant Tissue Culture Technology	9
2.3.1 Tissue Culture	9
2.3.2 Advantages of Tissue Culture	10
2.4 Plant Tissue Culture Technique	11
2.4.1 Callus Induction	11
2.4.2 Culture media for Callus Induction	12
2.4.3 Callus Quality	13
<b>CHAPTER 3: METHODOLOGY</b>	
3.1 Materials	14
3.1.1 Raw materials	14
3.1.2 Chemicals	14
3.1.3 Apparatus	15
3.2 Methods	15

3.2.1	Preparation of stocks hormone	15
3.2.2	Preparation of the media	16
3.2.3	Surface sterilization of the explants	17
3.2.4	Inoculation of the explants	18
3.2.5	Maintenance	19
3.3	Parameter	19
3.3.1	Percentage of contamination	19
3.3.2	Percentage of callus induction	19

#### **CHAPTER 4: RESULTS AND DISCUSSION**

4.1	Effect of types of hormone and concentration on the percentage of contamination	21
4.2	Callus induction of the leaves of <i>Ipomoea batatas</i> with concentration 1.0 mg/L to 5.0 mg/L	24
4.3	Callus induction of the leaves of <i>Ipomoea batatas</i> with concentration 1.2 mg/L to 2.4 mg/L of 2,4-D	27
4.4	Statistical analysis	30
4.5	Effects of types of hormone and concentration on percentage of callus induction	32
4.6	Effect of types of hormone and concentration on period to form callus	35
4.7	Effect of types of hormone and concentration on nature of response	36

#### **CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS** 37

#### **CITED REFERENCES** 39

#### **APPENDICES** 44

#### **CURRICULUM VITAE** 58

## ABSTRACT

### CALLUS INDUCTION FROM THE LEAVES OF SWEET POTATO (*Ipomoea batatas*)

Sweet potato (*Ipomoea batatas*) is vital crops that are consumed in several countries such as China and Africa. However, only the tubers of sweet potato are use up by many people but the other parts such as leaves and stems are usually discarded. Based on previous study, the leaves of sweet potato plant actually contain secondary metabolite. It is proved through a research conducted by Muhamad Ridzuan (2017). The results from his study had revealed the presented of unknown alkaloid in leaves of sweet potato consumed from the wild type plant sample. As published, alkaloid may be used in treatment of disease such as an ovarian cancer. Therefore, the comparison of alkaloid that presented within the callus induced from this study and the wild type plant will be done. Thus, the purpose of this research is to induce the callus from leaves of sweet potato by using different types of hormones such as 2,4-dichlorophenoxyacetic acid (2,4-D), naphthaleneacetic acid (NAA) and indole-3-acetic acid (IAA) at different concentrations. Besides from that, the aim of this study is to compare the callus induction from leaves of sweet potato with different types of phytohormone such as, 2,4-dichlorophenoxyacetic acid (2,4-D), naphthaleneacetic acid (NAA) and indole-3-acetic acid (IAA) at different concentrations (1.0, 2.0, 3.0, 4.0 and 5.0 mg/L). The explants were cultured in media that contain phytohormone and were observed in 30 days. At the end of research, there can be seen that the best hormone induced callus was IAA, followed by 2,4-D. Unfortunately, there was no callus induced through NAA. Based on concentration, the highest percentage of callus was induced by IAA at 3.0 (13.33%). Meanwhile, the percentage of callus induced by 2,4-D was at 1.0 and 4.0 mg/L concentration (6.67%). For the narrowed down concentration of 2,4-D, the highest percentage of callus was induced at concentration 2.0 mg/L of 2,4-D (20.00%). From the physical appearance, after 4 days it can be seen that the entire callus induced are in white callus. Based on the result, the present of secondary metabolites such as alkaloid can be detected through Thin Layer Chromatography (TLC) from the callus induced. Therefore, the optimization of callus growth by using different media and formulation of concentration phytohormone can be done. In addition, the concentration of the alkaloid can be obtained through High Performance Liquid Chromatography (HPLC).