

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF DIFFERENT
CONCENTRATIONS OF COCONUT
WATER ON CALLUS GROWTH OF
ENDOSPERM EXPLANTS OF
Barringtonia racemosa (L.)**

**NUR DAYANA ATHIRAH BINTI
KAMARUZZAMAN**

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ABSTRACT

Barringtonia racemosa is a woody plant that possesses many medicinal properties in maintaining human health. The fruits are used to relieve pain and inflammation, the leaf is proven in lowering high blood pressure while the root and bark are effective to treat chickenpox. Scientific study should be done by using this species as it can give benefits towards human health. However, there is no previous study had been done using this species with coconut water. A comparative study of different types of media and concentrations of coconut water was performed to determine its effect on callus growth and morphology of endosperm explants from *B. racemosa*. The observation of callus growth and morphology were done a weekly basis for 4 weeks incubation periods. The types of basal media studied were MS, WPM and B5. The endosperm explants of *B. racemosa* was cultured on MS, WPM and B5 media supplemented with 1.0 mg/L 2,4-D and 1.5 mg/L kinetin. The most suitable medium for callus growth of *B. racemosa* endosperm explants were obtained from MS medium supplemented with 1.0 mg/L 2,4-D and 1.5 mg/L kinetin with the highest fresh weight (0.357 ± 0.029 g) and dry weight (0.028 ± 0.002 g). The analysis from One-way ANOVA also revealed the p-value 0.00 which was less than 0.05 ($p < 0.05$) which means, there was a significant difference between the means of callus fresh weight and dry weight with the types of basal media. The callus produced in MS medium were nodular in shape with creamy yellow colors. The effect of different concentrations of coconut water on callus growth and morphology of endosperm explants of *B. racemosa* were assessed using the MS medium supplemented with different concentrations of coconut water (0, 25, 50, 75 and 100 ml/L), 1.0 mg/L 2,4-D and 1.5 mg/L kinetin. The findings showed that the optimum concentration of coconut water for the callus growth of endosperm explants from *B. racemosa* was 100 ml/L. The highest fresh weight (0.622 ± 0.085 g) and dry weight (0.072 ± 0.01 g) were recorded for this concentration. The callus generated from this concentration were compact and creamy yellow. In conclusion, MS media supplemented with 100 ml/L coconut water, 1.0 mg/L 2,4-D and 1.5 mg/L kinetin are recommended in order to successfully induced the vigorous callus growth of *B. racemosa* endosperm explants.

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TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	xi
LIST OF SYMBOLS	xii
LIST OF ABBREVIATIONS	xiii
CHAPTER ONE: INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statement	2
1.3 Significant of Study	3
1.4 Research Objectives	4
1.5 Scope and Limitations	4
CHAPTER TWO: LITERATURE REVIEW	5
2.1 Botanical Description of <i>B. racemosa</i>	5
2.2 Medicinal Uses of <i>B. racemosa</i>	7
2.3 Pharmacological Activities of <i>B. racemosa</i>	7
2.3.1 Anti-bacterial Activity	7
2.3.2 Anti- tumor Activity	8
2.3.3 Anti-oxidant Activity	8
2.3.4 Anti-inflammatory Activity	9
2.4 Plant Tissue Culture	9
2.5 Plant Growth Regulator	10

CHAPTER ONE

INTRODUCTION

1.1 Research Background

People have been using various materials from nature as beneficial sources to cure their ailment and maintain good health. One of the most usable sources from nature are plants, and as a result, large amounts of modern drugs had been isolated and processed from various types of plant. Plants that contribute to medicinal properties are known as a medicinal plant. These medicinal plants have the abilities to help in curing certain diseases due to their pharmaceutically significant contents of bioactive compounds. The compounds are isolated from the plant's secondary metabolites. It is estimated about 50,000 plant species from Asian medicines are used as traditional medicines (Wangchuk, 2004). Besides providing advantages in curing diseases, these medicinal plants were also contributing in production of foods, perfumes and flavonoids which help them grow in popularity across the globe.

One of the important medicinal plants that can be found in Malaysia is, *Barringtonia racemosa* (L.). *B. racemosa* is a type of woody plant that possesses many benefits for maintaining human health such as lowering the high blood pressure and to treat chickenpox (Ong and Nordiana, 1999). Besides that, this plant also contains high phenolic content with the presence of diterpines, triterpenoids, steroids and saponins thus can enhance the antioxidant activities (Deraniyagala *et al.*, 2003). Furthermore, this species also was proven to act as anti-gouty arthritis remedy because of its anti-inflammatory activities (Osman *et al.*, 2016). Pharmacological activities of this species including antibacterial, anti-tumor, anti-nociceptive, antioxidant, anti-inflammatory, an alpha-glucosidase inhibitor, anti-fungal, anti-tuberculosis, anti-arthritic and anti-diarrhea in different parts of *B. racemosa* were proven based on the previous study (Osman *et al.*, (2015).

Thus, the sustainability of this species needs to be maintained through several techniques in plant biotechnologies. One of the suitable techniques that can be used is the induction of callus through plant tissue culture. This technique have been introduced to sustain the distributions and productions of this species. This technique is useful as it enables the whole plant body to be generated through the massive growth of cells