



UNIVERSITI PUTRA MALAYSIA

**THE EFFECT OF DIFFERENT 6-BENZYLAMINOPURINE (BAP)
CONCENTRATIONS ON AXILLARY BRANCHING OF
*Clinacanthus nutans***

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CONCENTRATIONS ON AXILLARY BRANCHING OF *Clinacanthus nutans*

BY

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ENDORSEMENT/CERTIFICATION

This project report entitled The effect of different 6-Benzylaminopurine (BAP) concentrations on axillary branching of *Clinacanthus nutans* is prepared by Fatin Haziqah binti Mohamad and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Horticultural Science.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	i
TABLE OF CONTENTS	ii
APPENDICES	v
LIST OF ABBREVIATIONS	vi
LIST OF PLATES	viii
LIST OF FIGURES	ix
LIST OF TABLES	x
ABSTRACT	xi
ABSTRAK	xii
CHAPTER 1	
INTRODUCTION	1
CHAPTER 2	
LITERATURE REVIEW	
2.1 <i>Clinacanthus nutans</i>	4
2.2 Medicinal uses	6
2.3 Axillary Branching	8
2.3.1 Importance of Axillary Branching	9

2.4 Cytokinins	9
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2.4.1 BAP (6-Benzylaminopurine)	10
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CHAPTER 3 MATERIALS AND METHOD

3.1 Research Location	11
-----------------------	----

3.2 Experimental Materials	11
----------------------------	----

3.3 Equipments and Facilities	12
-------------------------------	----

3.4 Potting media preparation	12
-------------------------------	----

3.5 Cultural Practices	14
------------------------	----

3.5.1 Watering	14
----------------	----

3.5.2 Weeding	15
---------------	----

3.5.3 Fertilizer application	15
------------------------------	----

3.6 BAP Preparation	15
---------------------	----

3.7 Treatments	16
----------------	----

3.8 Experimental Design and Statistical Analysis	18
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3.9 Parameters	19
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CHAPTER 4	RESULTS AND DISCUSSIONS	
	4.1 Effect of different BAP concentration on number of days taken for axillary buds to protrud from the axils of the leaf, mean number of shoots proliferated and length of axillary branching	20
CHAPTER 5	CONCLUSION	27
REFERENCES		28
APPENDICES		32

APPENDICES

		Page
Appendix A	ANOVA for number of axillary buds proliferated	32
Appendix B	ANOVA for length of axillary branching	32



LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BA	Benzyladenine
BAP	6-Benzylaminopurine
<i>C. nutans</i>	<i>Clinacanthus nutans</i>
cm	Centimeter
CK	Cytokinin
DMRT	Duncan's multiple range test
HSV	Herpes simplex virus
IARC	International Agency for Research on Cancer
mg/L	Milligram Per Liter
MS	Murashige and Skoog
NaOH	Sodium hydroxide
NCSM	National Cancer Society of Malaysia
PGR	Plant Growth Regulators
RCBD	Randomized complete block design

SSG	Sabah Snake Grass
SAS	Statistical analysis system
TDZ	Thidiazuron
VZV	Varicella-zoster virus
WHO	World Health Organisation



LIST OF PLATES

Plate	Title	Page
1	The root and stem of <i>Clinacanthus nutans</i>	4
2	The leaves of <i>Clinacanthus nutans</i>	5
3	Inflorescent of <i>Clinacanthus nutans</i>	5
4	The <i>Clinacanthus nutans</i> plant	6
5	Sand and perlite mixture with 1:1 ratio	13
6	Sand and perlite mixture as planting media	13
7	Stem cutting in pot	14
8	Spraying BAP on plant	17
9	Randomized complete block design (RCBD) was used in the study	18
10	Terminal buds were decapitated and leaves removed before the nodes were sprayed with BAP at different concentrations	20
11	Proliferation of buds	23
12	Length of axillary branching	25

LIST OF FIGURES

Figure	Title	Page
1	Number of days taken for axillary bud proliferated from the axils of the leaf	21
2	Number of buds proliferated as affected by different BAP concentrations at 30 th day	23
3	Length of axillary branching as affected by different BAP concentrations at 30 th day	24

LIST OF TABLES

Table No.		Page
1	Concentration of BAP for each treatment	17



ABSTRACT

Sabah Snake Grass with the scientific name, *Clinacanthus nutans* belongs to the Acanthaceae family. It has several important uses such as treatment for eye diseases, treat injuries from fall, remove blood clots, and others. This plant originates from Malaysia, Indonesia, Thailand, Vietnam, and China and can be propagated by using seed or stem-cutting. But, propagation by stem cutting produces limited plant production. Therefore, the objective of this study is to trigger axillary branching on *C. nutans* plants by using different concentrations of 6-Benzylaminopurine (BAP). The study was conducted using randomized complete block design (RCBD). The experimental materials for this study were the semi-hardwood stem cuttings with four nodes. The stem cuttings were planted in pots containing a mixture of sand and perlite at 1:1 ratio. They were allowed to root and grow to a height of 15-20 cm before the terminal buds were decapitated. The nodes of the plants were sprayed with different BAP concentrations (0, 25, 50, 75, 100 mg/L) and the plants were watered twice daily. Most BAP treatment triggered axillary branching except for 50 mg/L BAP. The highest number of buds proliferated was obtained at 100 mg/L BAP concentration, but the highest length of axillary branching was obtained at 0 mg/L BAP which is the control treatment.

ABSTRAK

Belalai Gajah atau nama saintifiknya, *Clinacanthus nutans* tergolong dalam keluarga Acanthaceae. Ia mempunyai beberapa kegunaan penting seperti penawar bagi penyakit mata, merawat kecederaan akibat terjatuh, mengeluarkan darah beku, dan lain-lain. Tumbuhan ini berasal dari Malaysia, Indonesia, Thailand, Vietnam dan China dan boleh dibiakkan dengan menggunakan biji benih atau keratan batang. Tetapi, pembiakan melalui keratan batang menghasilkan pengeluaran pokok yang terhad. Oleh itu, objektif kajian ini adalah untuk merangsang percabangan ranting aksil pada pokok *C. nutans* dengan menggunakan kepekatan 6-Benzylaminopurine (BAP) yang berbeza. Kajian ini telah dijalankan dengan menggunakan rekabentuk blok penuh terawak(RCBD). Bahan eksperimen yang digunakan untuk kajian ini adalah batang separa keras dengan empat nod. Keratan batang tersebut ditanam di dalam pasu yang mengandungi campuran pasir dan perlite pada nisbah 1:1. Ia digalakkan untuk berakar dan menumbuh sehingga ketinggian 15-20 cm sebelum tunas hujung dipotong. Node pada anak pokok tersebut disemur dengan kepekatan BAP yang berbeza (0, 25, 50, 75, 100 mg/L) untuk menentukan kepekatan yang terbaik bagi merangsang percabangan ranting aksil. Kebanyakan rawatan BAP dapat menggalakkan percabangan ranting aksil kecuali rawatan BAP pada kepekatan 50 mg/L. Bilangan tunas tertinggi telah diperolehi daripada rawatan 100 mg/L BAP, tetapi panjang dahan aksil tertinggi telah diperolehi pada 0 mg/L BAP yang merupakan rawatan kawalan.

CHAPTER 1

INTRODUCTION

The occurrence of cancer in Malaysia has increased from 32 000 new cases in 2008 to 37 400 in 2012 and this number is expected to rise to 56 932 by 2025 if no action is taken. According to the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO), the mortality caused by cancer has stood at 20 100 deaths in 2008 and keep increasing to 21 700 deaths in 2012. Not only in Malaysia, cancer also affects all the people in the whole world regardless of race and skin colour.

There are various approaches to control the widespread of this disease which is either by consuming medicines or through public awareness. One of the means to aware the public is by having the World Cancer Day which focuses on reducing the stigma and dispelling myths about cancer. As far as medicine is concerned it can either be taken in the form of medicinal tablet or as natural ingredients. To ensure it is safe, some prefer to consume the natural ingredients like herbal or medicinal plants as an alternative from having chemical medicines. One of the herbal plant species that has been used in treating cancer is *Clinacanthus nutans* (*C. nutans*). This herb has also started gaining popularity in Malaysia where it is more commonly known as Sabah snake grass (SSG) or Belalai Gajah (Yong *et al.*, 2013).

This herbal plant is an annual shrub which can also be used to treat other diseases such as reducing swelling and relieve pain. It can also help to regulate menstrual function, remove blood clots, and as a treatment of eye diseases. In traditional medicine the fresh leaves of *C. nutans* have long been used as an anti-inflammatory drug to treat insect and snake bite, skin rashes, allergic responses, herpes simplex virus (HSV) and varicella-zoster virus (VZV) lesions (Sakdarat *et al.*, 2008).

In conjunction to its wide usages, many Asian people have started planting *C. nutans* and consumed it to prevent the attack from cancer. Farmers also anticipated in producing a large number of *C. nutans* by propagating them using seeds or stem cuttings. Propagation of this plant using seeds is not recommended because the progeny produced are not true to type. Propagation by stem cutting is limited by the number of propagules produced. As an alternative, the farmers can initially propagate this plant using stem cutting and then allow the plants to grow in the potting media. As they grow taller, the terminal bud is decapitated and axillary branching triggered using plant growth regulators (PGR). The axillary buds are allowed to grow to form branches and new cuttings are taken from them to be rooted to form new plants. The most suitable PGR is cytokinin which can help to break apical dominance and then allowing axillary branching. There are many different types of cytokinin but the most popular and easily available ones are 6-Benzylaminopurine (BAP) and kinetin (Kefford *et al.*, 1966).

In this experiment, BAP is preferred to trigger axillary branching and promote the growth of dormant buds of *C. nutans*. Therefore, this experiment is carried out with the objective:

1. To determine which concentration of BAP triggers high shoot formation and axillary branching on *C. nutans* plants.



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