



***IN VITRO ROOTING OF CLINACANTHUS NUTANS AS AFFECTED BY  
COMBINATION OF DIFFERENT MURASHIGE & SKOOG SALT AND IBA  
CONCENTRATIONS***

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**UNIVERSITI PUTRA MALAYSIA**

**SERDANG SELANGOR DARUL EHSAN**

**2017/2018**

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COMBINATION OF DIFFERENT MURASHIGE & SKOOG SALT AND IBA  
CONCENTRATIONS**

**By**

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**Department of Agriculture Technology**

**Faculty of Agriculture**

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**2017/2018**

## APPROVAL SHEET

I certify that this research project report entitled “*In vitro* rooting of *Clinacanthus nutans* as affected by combination of different Murashige & Skoog salt and IBA concentrations” has been examined and approved as a partial fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Horticultural Science in the Faculty of Agriculture, Universiti Putra Malaysia, Serdang Selangor Campus.

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## LIST OF ABBREVIATIONS

Indole acetic acid	IAA
Indole butyric acid	IBA
2,4-Dichlorophenoxyacetic acid	2,4-D
6-Benzylaminopurine	BAP
Naphthalene acetic acid	NAA
Murashige and Skoog medium	MS
Gamborg B5 medium	B5
Linsmaier and Skoog medium	LS
Nitsch and Nitsch medium	NN
Sodium hydroxide	NaOH
Hydrochloric acid	HCl
Quarter strength Murashige and Skoog medium	¼ MS
Half strength Murashige and Skoog medium	½ MS
Milligram per Litre	mg/L
Pound per square inch	psi
Plus-minus sign	±
Metre squared per second	m <sup>-2</sup> s <sup>-1</sup>
Micromole	µmol
Statistical Analysis Software	SAS

## ABSTRACT

*Clinacanthus nutans* is a medicinal plant widely grown in tropical Asia and locally known “Belalai Gajah” or Sabah Snake Grass. Low reproductive capacity and non-uniform plant materials of *Clinacanthus nutans* propagated by stem cutting had brought to a study on the best combination of MS salt and IBA concentrations for rooting of *Clinacanthus nutans* explant under *in vitro* condition. This experiment was carried out at *In Vitro* Laboratory, Department of Agriculture, Universiti Putra Malaysia and conducted using Completely Randomized Design (CRD). Medium with full strength and half strength of Murashige and Skoog (1962) medium formulation were supplemented with indole butyric acid (IBA) at 0, 0.1, 1.0, 2.5 and 5.0 mg/L respectively. Shoot of axenic cultures of *Clinacanthus nutans* with a size of 2.5 cm was cultured in these treatments with ten replicates each. It has been observed that medium with half strength MS salt supplemented with 0.1 mg/L IBA gave good rooting of *Clinacanthus nutans* as it produced 90% of explant rooted with two roots formed per explant and a reasonable root length of 1.38 cm. This treatment gives an economical benefit by reducing the cost of planting material production.

## ABSTRAK

*Clinacanthus nutans* adalah tumbuhan ubatan yang tumbuh secara meluas di Asia tropika dan nama tempatannya dikenali sebagai Belalai Gajah atau 'Sabah Snake Grass'. Kajian mengenai kombinasi terbaik MS media dan kepekatan IBA untuk pengakaran dalam keadaan *in vitro* dilakukan kerana *Clinacanthus nutans* mempunyai kapasiti pembiakan yang rendah dan anak pokok tidak seragam apabila dibiak menggunakan kaedah keratan batang. Eksperimen ini dijalankan di Makmal *In Vitro*, Jabatan Pertanian, Universiti Putra Malaysia dan dilakukan dengan menggunakan Rekabentuk Rawak penuh (CRD). Formulasi kekuatan penuh dan kekuatan separuh media Murashige dan Skoog (1962) ditambah dengan asid indole butyric (IBA) pada 0, 0.1, 1.0, 2.5 dan 5.0 mg/L. Pucuk 'axenic' hasil sub-kultur daripada *Clinacanthus nutans* dengan saiz 2.5 cm dibiakkan dalam rawatan ini dengan menggunakan sepuluh replika. Pemerhatian menunjukkan bahawa medium dengan separuh kekuatan garam MS ditambah dengan 0.1 mg/L IBA memberikan pengakaran yang baik pada *Clinacanthus nutans* kerana ia menghasilkan 90% akar yang terbentuk dengan dua akar terbentuk bagi setiap eksplan dan panjang akar yang munasabah iaitu 1.38 cm. rawatan ini memberikan manfaat ekonomi dengan mengurangkan kos pengeluaran bahan tanaman.

## 1.0 INTRODUCTION

Currently, the studies conducted on herbs in Malaysia are still under developing level and more research should be established for improving its production. One of the medicinal plants which can give benefits in the medicine line through proven research is *Clinacanthus nutans*. This medicinal plant has become well identified and research on it has been widened by several discoveries. This plant is a perennial herb widely grown in tropical Asia, especially in Malaysia, Vietnam, Indonesia, and Thailand. It is locally known as 'Belalai Gajah' or Sabah Snake Grass and it belongs to the Acanthaceae family.

Statistically, there are about 80% of the populations of some Asian and African countries still vastly use herbal medicine for some aspects of basic health care (Edgar et al., 2002). Malaysia is regarded as a country with a very rich biological diversity in the world. The tropical rainforests are rich for the growth of various types of herbs (Yusof, 2002).

*Clinacanthus nutans* is the most important species from the Acanthaceae family and it has been used as vital herbal medicine in tropical Asia and considered as one of the largest sources of medicinal plants used in traditional herbal medicine (Fazil et al., 2016). *Clinacanthus nutans* has diverse and potential medicinal uses in treating skin rashes, insects and snake bites, skin lesion caused by virus and diabetes (Lau et al., 2014).

There is a research claim that, *Clinacanthus nutans* can treat several diseases including cancer. Arullappan et al. (2014) observed that the leaf extracts of *Clinacanthus nutans* are effective as antioxidant with antiproliferative effect on human cancer cell lines. Their study has been proven as an efficient alternative side treatment for cancer.

*Clinacanthus nutans* is usually propagated by stem cuttings and seeds. However, a limited number of plant materials can be produced using cuttings while non-uniform plant materials can be produced using seeds. In addition, it will cause low reproductive capacity due to slow growth and germination.

In order to fulfil high demand towards this plant, tissue culture technique is applied in order to regenerate the explant for conservation and rapid multiplication of a plant species (Bouhouche & Ksiksi, 2007). Therefore, *in vitro* propagation is another alternative for mass production of uniform planting materials. It does not require much labour and is also less time consuming.

Recently, there is a study on *Clinacanthus nutans* which was carried out by Nur Syazwani (2017) for her Final Year Project. Her study was focused on shoot multiplication using node cultures which were supplemented with various kinetin concentration. However, there is no study about *in vitro* rooting of *Clinacanthus nutans* treated with different MS salt formulation and IBA concentration have been done.



Besides that, the objective in defining two different MS medium formulation of full and half MS would help in maximizing the root initiation under *in vitro* condition and lead to an idea on minimizing the cost of medium preparation.

Therefore, this study was aimed to determine the best combination of MS salt and IBA concentrations for rooting of *Clinacanthus nutans* explant under *in vitro* condition.



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