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Establishment of tissue culture of *Aquilaria malaccensis*
(Gaharu) / by Zailikha Zulkifli.

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ESTABLISHMENT OF TISSUE CULTURE OF *Aquilaria malaccensis* (GAHARU)

By
ZAILIKHA BINTI ZULKIFLI

A research report submitted in partial fulfilment of
the requirements for the award of the degree of
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DEPARTMENT OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
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**JABATAN SAINS BIOLOGI
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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **ESTABLISHMENT OF TISSUE CULTURE OF *Aquilaria malaccensis* (GAHARU)** oleh **ZAILIKHA BINTI ZULKIFLI**, no. matrik: **UK 15878** telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh ijazah **SARJANA MUDA SAINS (SAINS BIOLOGI)**, Fakulti Sains dan Teknologi, Universiti Malaysia Terengganu.

Disahkan oleh:

Penyelia Utama

Nama:

Cop Rasmi:

DR. AZIZ BIN AHMAD
Pensyarah / Pembimbing Siswa
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh:

20/5/2020

Penyelia Kedua (jika ada)

Nama:

Cop Rasmi

Tarikh:

Ketua Jabatan Sains Biologi

Nama:

Cop Rasmi:


DR. MARIAM BINTI TAIB
Ketua
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh:

22/7/10

DECLARATION

I hereby declare that this research report entitled **Establishment of tissue culture of *Aquilaria malaccensis* (Gaharu)** is the result of my own research except as cited in the references.

Signature	:	
Name	:	Zailikha binti Zulkifli
Matrix No.	:	UK 15878
Date	:	19 May 2010

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ESTABLISHMENT OF TISSUE CULTURE OF *Aquilaria malaccensis* (GAHARU)

ABSTRACT

Aquilaria malaccensis whose resinous portion is called agarwood is very useful in medicine and incense. Worldwide trading of agarwood is facing a serious shortage of resources because of its chaotic collection in forests and the decrease in the tropical rain forest area. The effects of plant growth regulators on callus and shoot induction on *A. malaccensis* were evaluated. Leaf of *A. malaccensis* were used as explants to determine effects of various auxins (Picloram, 2,4-D, IBA, NAA) with the concentrations of 1-3mg/L and a combination of auxin with cytokinin (IBA with BAP and NAA with BAP) in various concentrations on MS medium. Shoot were used as explants to determine the effects of BAP (0.03-1.2 mg/L) for shoot induction. The results showed that medium supplemented with 3mg/L IBA produce the higher frequency of calli (80%). The four auxin with cytokinin combination of 0.5mg/L NAA with 1mg/L BAP, 1mg/L NAA with 2mg/L BAP, 2mg/L IBA with 2mg/L BAP, and 3mg/L IBA with 2mg/L BAP showed the higher callus induction (100%) and yielded bigger calli compared to other combinations. The calli of four combination of auxin with cytokinin with high callus percentage was subcultured after 2 weeks on the same medium to measure the callus weight (fresh weight) for 27 days to observe the callus growth. *A. malaccensis* callus growth on MS medium supplemented with 1mg/L NAA with 2mg/L BAP was superior (4.438g) to other media examined. Shoot induction was higher on MS medium supplemented with 0.3mg/L BAP (83%). The induction and growth of calli and shoot induction for *A. malaccensis* is dependent on type and combination of hormone used.

PENETAPAN KULTUR TISU BAGI *Aquilaria malaccensis* (GAHARU)

ABSTRAK

Aquilaria malaccensis menghasilkan resin yang dinamakan gaharu yang sangat berguna bagi tujuan perubatan dan wangian. Pasaran dunia bagi gaharu, menghadapi masalah kekurangan sumber yang serius kerana pengumpulannya yang tidak terkawal dan pengurangan kawasan hutan hujan tropika. Kesan hormon terhadap pengaruh kalus dan pucuk ke atas pokok *A. malaccensis* telah dikaji. Daun digunakan sebagai eksplan untuk menentukan kesan pelbagai jenis auksin (Pikloram, 2,4-D, IBA, NAA) pada kepekatan 1-3mg/L dan kesan gabungan antara auksin dan cytokinin (IBA dengan BAP, NAA dengan BAP) dengan kepekatan yang pelbagai di atas media MS. Pucuk digunakan sebagai eksplan untuk menentukan kesan BAP (0.03-1.2mg/L) terhadap pengaruh pucuk. Keputusan menunjukkan bahawa media yang dibekalkan dengan 3mg/L IBA menghasilkan frekuensi kalus yang tertinggi (80%). Empat kepekatan gabungan hormon auksin dan cytokinin iaitu 0.5mg/L NAA dengan 1mg/L BAP, 1mg/L NAA dengan 2mg/L BAP, 2mg/L IBA dengan 2mg/L BAP, dan 3mg/L IBA dengan 2mg/L BAP menunjukkan pengaruh kalus yang tertinggi (100%) dan memperolehi saiz kalus yang lebih besar berbanding dengan gabungan yang lain. Kalus daripada empat gabungan kepekatan hormon auksin dan cytokinin dengan pengaruh kalus yang tertinggi telah disubkultur di atas media yang sama selepas 2 minggu untuk mengukur berat kalus (berat basah) selama 27 hari untuk melihat kadar pertumbuhan kalus. Kalus *A. malaccensis* yang tumbuh di atas media yang dibekalkan dengan 1mg/L NAA dengan 2mg/L BAP adalah yang terbaik (4.438g) berbanding dengan media lain. Pengaruh pucuk pula adalah tinggi di atas media MS yang dibekalkan dengan 0.3mg/L BAP (83%). Pengaruh dan pertumbuhan kalus serta pengaruh pucuk bagi *A. malaccensis* bergantung kepada jenis dan gabungan hormon yang digunakan.