

TIE KOK - UBAYA

INTERNATIONAL CONFERENCE PROCEEDINGS OF PSRC

International Conference on Behavioral
Sciences, Economics, Bioscience &
Environment Engineering
(ICBSEBEE'2012)

&

International Conference on Computer,
Electrical, Electronics &
Mechanical Engineering
(ICEEME'2012)

February 11-12, 2012
Penang, Malaysia

Editors:
Dr. Saji Baby
Prof. Dr. V. K. Banga

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**International Conference on Behavioral Sciences, Economics, Bioscience &
Environment Engineering (ICBSEBEE'2012)**

International Conference on Bioscience, Biochemistry and Pharmaceutical Sciences (ICBBPS'2012)

International Conference on Chemical, Environmental and Biological Sciences (ICCEBS'2012)

International Conference on Management, Behavioral Sciences and Economics Issues (ICMBSE'2012)

AND

**International Conference on Computer, Electrical, Electronics & Mechanical
Engineering (ICEEME'2012)**

International Conference on Mechanical, Automobile and Robotics Engineering (ICMAR'2012)

International Conference on Computational Techniques and Artificial Intelligence (ICCTAI'2012)

International Conference on Advances in Electrical and Electronics Engineering (ICAEE'2012)

Feb. 11-12, 2012 Penang (Malaysia)

Editors:

Dr. Saji Baby (kuwait)

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PREFACE

Dear Distinguished Delegates and Guests,

The Organizing Committee warmly welcomes our distinguished delegates and guests at Planetary Scientific Research Centre's International Conferences scheduled on Feb.11-12, 2012 at Penang (Malaysia). Currently, PSRC is organizing six conferences under two multi-conferences named as International Conference on Behavioral Sciences, Economics, Bioscience & Environment Engineering (ICBSEBEE'2012) and International Conference on Computer, Electrical, Electronics & Mechanical Engineering (ICEEME'2012).

These conferences are managed and sponsored by Planetary Scientific Research Centre and assisted by SRM University and King Mongkut's University of Technology. PSRC is striving hard to compile the research efforts of scientists, researchers and academicians across the broad spectrum of Science, Engineering, Social Sciences, Management, Environmental, Pharmaceutical and Medical Sciences. These conferences are aimed at discussing the wide range of problems encountered in present and future high technologies among the research fraternity.

The conferences are organized to bring together the members of our international community at a common platform, so that, the researchers from around the world can present their leading-edge work. This will help in expansion of our community's knowledge and provide an insight into the significant challenges currently being addressed in that research. The conference Program Committee is itself quite diverse and truly international, with membership from the America, Australia, Europe, Asia and Africa.

The main conference themes and tracks are Engineering, Science, Environment and Management. The conference has solicited and gathered technical research submissions related to all aspects of major conference themes and tracks. This proceeding records the fully refereed papers presented at the conference.

All the submitted papers in the proceeding have been peer reviewed by the reviewers drawn from the scientific committee, external reviewers and editorial board depending on the subject matter of the paper. Reviewing and initial selection were undertaken electronically. After the rigorous peer-review process, the submitted papers were selected on the basis of originality, significance, and clarity for the purpose of the conference. The main goal of these events is to provide international scientific forums for exchange of new ideas in a number of fields that interact in-depth through discussions with their peers from around the world.

The program has been structured to favor interactions among attendees coming from many diverse horizons, scientifically, geographically, from academia and from industry. We would like to thank the program chairs, organization staff, and the members of the program committee for

their work. We like to thank and show gratitude to Editors from PSRC. We are grateful to all those who have contributed to the success of PSRC Feb. 2012 Penang Conferences. We hope that all participants and other interested readers benefit scientifically from the proceedings and also find it stimulating in the Process in their quest of achieving greater heights. Finally, we would like to wish you success in your technical presentations and social networking.

We hope you have a unique, rewarding and enjoyable week at PSRC Conferences at Penang, Malaysia.

With our warmest regards,

Organizing Committee

Feb. 11-12, 2012

Penang, Malaysia

**B. International Conference on Chemical, Environmental and Biological Sciences
(ICCEBS'2012)**

Paper ID	Title of the Paper and Authors	Page No.
212002	<i>Meta xylene removal from industrial wastewater using dielectrophoretic technique</i> Mir MasoudHosseini, MortezaHosseini, Davodmohebbi-Kalhuri	24
212051	<i>Biological study of Shadadroud River in Kerman province, Iran</i> Kamran RezaeiTavabe and GholamrezaRafiee	29
212056	<i>Phytochemical study of Helianthemum Kahircum</i> Mc. Aberkane, F. Bouzergoune, P. Mosset and F. Bitam	33
212060	<i>A Comparative Study on Low and High Density Polymer as Support Material for Immobilization of Denitrifying Bacteria in Biological Wastewater Treatment</i> Srinu Naik. S and Y. Pydi Setty	34
212068	<i>The accumulation of copper ions in biomass and its influence on the production of phytochelatine in shoot culture of Musa paradisiaca</i> Tjie Kok	38
212085	<i>Life Cycle Assessment (LCA) of Municipal Waste Management System of Karaj</i> Nematollah Khorasani, Shahram Naghibzadeh, Mohsen Ghadiryanfar, Ziaedin Badehian	41
212093	<i>Geothermal water desalination by using nanofiber</i> Saja Jaafar Sadeq	46
212114	<i>Phytochemical Study Of The Plant Launaea Arborescens</i> A. Dibi and F. Bitam	51
212120	<i>GA-Fuzzy Logic Optimization for Constructed Wetland Design</i> Ahmad Qasaimeh, Maria Elektorowicz and Marek Balazinski	55
212122	<i>Production of PHA as a means of Wastewater Treatment Plant Sludge Reduction</i> Meschi Nezami M., Ganjidoust H., Mokhtarani N. and Ayati B.	60
212131	<i>Photocatalytic Performance of Nanoporous WO3 for Carbon Monoxide Removal</i> Arnanpapha Chuensab and Apichon watcharenwong	61
212141	<i>Synthesis and characterization of new poly(ether-imide) nanocomposite containing ether group and benzophenone moieties based on 1,2- bis(4-aminophenoxy) ethane by insitu polymerization</i> Khalil Faghihi, Mahshid Bidhendi and Akram Feyzi	65
212149	<i>Design and Optimization of Citric Acid Fermentation Process by Statistical Method</i> Anand Kishore Kola and Venkat Reddy Goli	70
212157	<i>Physicochemical Analysis of Jam Preparations from Watermelon Waste</i> Souad Abati Mohamad, Olorunnisola K. saheed and Parveen Jamal	74

The accumulation of copper ions in biomass and its influence on the production of phytochelatins in shoot culture of *Musa paradisiaca*

Tjie Kok

Abstract—This study was intended to evaluate the removal of copper ions from media by shoot cultures of *Musa paradisiaca* and its influence on the production of phytochelatins. Measurement of copper ions concentration in the media and biomass after treatment indicated that the cultures were able to remove 34.41-58.32% of the ions from media containing 80-320 μM of the ions and accumulated them in their biomass. Electrophoresis of biomass acetonitrile extract using sodium dodecyl sulphate-polyacrylamide gel along with available marker followed by silver staining showed that the phytochelatins might be produced but just in small quantity that it could not be detected clearly.

Keywords—Shoot cultures, copper ions, *Musa paradisiaca*, phytochelatins.

I. INTRODUCTION

THE efforts to handle heavy metal pollution still encounter many obstacles, such as they are high cost and could not really solve the problems. Therefore, alternative cheap and efficient methods to clean the heavily contaminated soil are needed, that is by using plants having the characteristics needed.

Musa paradisiaca (banana) is a tree that is growing well on humid tropic land, especially. In the area that rain frequently take places annually, the production of banana last continually without depending on season. The height of banana (mature) is around 2-5 metres (depending on the species), with leaves length reaching 3,5 metres. The bottom part of banana is a rhizome, whose age can reach 15 years or more (Anonim, 2009).

With such characteristics, banana is considered to have an ability to remove copper ions from soil.

The compounds having such a significant role in detoxifying metals by plants are compounds forming chelates, the most well-known is phytochelatins (Cobbett & Goldsbrough, 2002).

Phytochelatins are a famili of γ -glutamylcysteine peptide riching in thiol (SH) group with glycyne or other amino acid at the end of carboxy edge, γ -Glu-Cys unit is repeated 2-11

times. This compound is synthezised from glutathione and its derivates by transeptidase enzyme, namely phytochelatin sintase with the existence of heavy metals ions (Cobbett, 2000; Rea *et al.* 2004). This polypeptides riching in cysteine use the characteristic of heavy metals to bind at thiol groups in order to detoxify them (Cobbett & Goldsbrough, 2002; Rea *et al.* 2004).

The responses observed to evaluate the ability of *Musa paradisiaca* shoot cultures in removing copper ions were the copper accumulation and phytochelatins formation in biomass.

II. MATERIALS AND METHODS

Shoot cultures of *Musa paradisiaca* var. saba (around 1,5 g) were transferred into a series of media containing Murashige Skoog Media with the addition of benzyl adenine 5 mg/L along with different concentration of copper ions [0,1; 80; 160, and 320 μM] and incubated in the same condition for four weeks. For each concentration of copper ions, 20 containers containing $\pm 1,5$ grams of fresh weight shoots were used. After incubation, the shoots were harvested. The plant materials were then weighed, dried, and powdered.

The concentration of copper ions in biomass was determined using ICP-AES (ARL ICP Fisons 3410+, Valensia-California, USA, with micro active program Plasma Vision 10, Queensland-Australia), after the destruction of powder with concentrated HNO_3 and H_2O_2 30% w/v (Chen, 1993). Quantification was conducted by measuring the emission intensity of copper ions at 324,750 nm. This method was validated based on method modified by Funk *et al.* (1992).

Phytochelatins in biomass was determined using electrophoresis with sodium dodecyl sulphate-polyacrylamide gel by mixing 5-15 milligrams of powder with 0,4 mL *monobromobimane* (mBrB) 5,8 mM in HEPPS buffer [containing 50 mM *N*-2-hydroxyethylpiperazine-*N'*-3-propane sulphonic acid (HEPPS), 5 mL *diethylenetriamine pentaacetic acid* (DTPA), and 50% *acetonitrile* at pH 8. Using appropriate marker, the molecular weight of phytochelatins yielded might be estimated.

III. RESULTS AND DISCUSSIONS

The results of growth index determination of *Musa paradisiaca* shoot cultures and sucrose concentration lowering in media before and after harvesting were demonstrated on Table 1, Figure 1 and 2.

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