ICECS 2010

2010 3rd International Conference on Environmental and Computer Science

October 17-19, 2010, Kunming, China

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Environmental and Computer Science

17-19, October, 2010

Kunming, China

PROCEEDINGS

2010 3rd International Conference on

Environmental and Computer Science (ICECS)

IEEE Catalog Number: CFP1075I-PRT
ISBN: 978-1-4244-7630-5

IEEE Catalog Number: CFP1075I-ART
ISBN: 978-1-4244-7632-9

IEEE Catalog Number: CFP1075I-CDR
ISBN: 978-1-4244-7631-2

Publisher: Institute of Electrical and Electronics Engineers, Inc.
Printed in Chengdu, China

PREFACE

Dear Distinguished Delegates and Guests,

The Organizing Committee warmly welcomes our distinguished delegates and guests to the 2010 3rd International Conference on Environmental and Computer Science (ICECS 2010) held on October 17-19, 2010 in Kunming, China.

ICECS 2010 is sponsored by Asia-Pacific Chemical, Biological & Environmental Engineering Society (APCBEES) and International Association of Computer Science and Information Technology (IACSIT), and supported by APCBEES, IACSIT Members and scholars from universities all round the world. If you have attended a conference sponsored by APCBEES and IACSIT before, you are aware that the conferences together report the results of research efforts in a broad range of chemical, biological and environmental engineering society. These conferences are aimed at discussing with all of you the wide range of problems encountered in present and future high technologies. ICECS 2010 is organized to gather members of our international community scientists so that researchers from around the world can present their leading-edge work, expanding our community's knowledge and 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 Americas, Europe, Asia, Africa and Oceania.

This proceeding records the fully refereed papers presented at the conference. The main conference themes and tracks are Environmental and Computer Engineering. 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. Both inward research; core areas of Environmental and Computer Engineering and outward research; multi-disciplinary, inter-disciplinary, and applications will be covered during these events.

The conference has solicited and gathered technical research submissions related to all aspects of major conference themes and tracks. 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 selected papers and additional late-breaking contributions to be presented as lectures will make an exiting technical program. The conference program is extremely rich, featuring high-impact presentations.

The high quality of the program – guaranteed by the presence of an unparalleled number of internationally recognized top experts – can be assessed when reading the contents of the program. The conference will therefore be a unique event, where attendees will be able to appreciate the latest results in their field of expertise, and to acquire additional knowledge in other fields. The program has been structured to favor interactions among attendees coming from many diverse horizons, scientifically, geographically, from academia and from industry. Included in this will to favor interactions are social events at prestigious sites.

We would like to thank the program chairs, organization staff, and the members of the program committees for their work. Thanks also go to Editor Ms. Feng Ying, International Association of Computer Science and Information Technology, for her wonderful editorial service to this proceeding.

We are grateful to all those who have contributed to the success of ICECS 2010. We hope that all participants and other interested readers benefit scientifically from the proceedings and also find it stimulating in the process. 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 ICECS 2010 in Kunming, China.

With our warmest regards,

The Organizing Committees
October 17-19, 2010
Kunming, China.

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Contents

The Remediation of Copper Ions by Shoot Cultures of Solanum Melongena and Its Influence on The Production of Phytosterols and Phytosteroids

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Abstract— **This study aimed to observe the remediation of copper ions by shoot cultures of Solanum melongena and its influence on the production of phytosterol(s) and phytosteroid(s). The cultures were able to remove 46.6-66.5% of the ions from media containing 80-320 µM of the ions and accumulated them in their biomass. Application of copper ions concentration higher than that of control Murashige and Skoog media modified with the addition of benzyladenine 4 µg/L caused a decrease in total free sterols content of the cultures. The higher the copper ions concentration, the higher the decrease in total free sterols content was. Spotting the hydrolysate extracts of the cultures on tin layer chromatography (TLC) plate, developing using a mixture of $CHCl_3$:CH_3OH (10:1), and spraying the spots by Dragendorff's reagent–followed by heating for 5 minutes at 1000C, there was a blue spot with Rf (retardation factor) value similar to that of standard (solasodine). The chromatograms of gas chromatograph (GC) showed that the retention time (Rt) of certain substance contained in the extracts is similar to that of solasodine. Verification using mass spectrometer (MS) showed that the ionic fragments of the substance are similar to those of standard solasodine (dilute). It could then be predicted that the shoot cultures of Solanum melongena were be able to produce solasodine. Further verification is needed to ensure whether it was solasodine or not; it can be conducted by using nuclear magnetic resonance (NMR).**

Keywords-Solanum melongena, copper ion, phytosterols, phytosteroids, shoot culture.

I. INTRODUCTION

Plant cell cultures, as well as its intact plant can give certain responses on the presence of certain metal ions in the medium. Cultures of *Chlorella vulgaris* could remove 75% of 0.5 ppm copper ions from the medium [1]. Hairy root cultures of *Armoracia rusticana* were able to remove 62.4% of the copper ions from initial value of 20.5 ppm copper ions [2]. Copper tolerant callus cultures of *Nicotiana tabacum* regenerated plants that were able to grow in the presence of 6.0 ppm copper ions [3].

Free sterols content of shoot cultures of *Costus speciosus* increased in media containing up to 20 ppm copper ions, the highest was at 5 ppm of the ions (120%), compared to the control (0.006 ppm). In media containing 1-5 ppm copper ions, the content of bound sterols increased up to 119-213%, whilst at concentration 20 ppm the ions caused a decrease in that content (85%). Adding up to 20 ppm copper ions into the media caused an increase of total (sum of free and bound) sterols content of that cultures, the highest was at 5 ppm of that ions (134%). The cultures remediated 26-38% copper ions from media containing 1-20 ppm of the ions [4].

Callus cultures of *Agave amaniensis* produced squalene, sterols and some sapogenin steroids, where hecogenin is the major constituent [5]. Copper ions at concentration of 0.6 ppm in the media caused an increase of total sapogenin steroids content in callus cultures of *Agave amaniensis* [5]. Using a relatively high concentration of calcium (2.7-4.5 mM), magnesium (4.3-5.3 mM), cobalt (0.4-1.0 µM) and copper (7.2-12.3 µM) ions simultaneously in media, inhibition of the sapogenin steroids production in callus cultures of *Agave amaniensis* was observed [6].

Application of 2.5 ppm copper ions to callus cultures of *Costus speciosus* was able to increase the content of free and bound sterols; addition of 1 ppm and 20 ppm copper ions into media decreased the free
sterols content; at concentration 5, 10 and 20 ppm copper ions caused a decrease in the content of bound sterols [7].

Callus cultures of *Solanum mammosum* produced some sterols (cholesterol, sitosterol, stigmasterol, campesterol), but solasodine was not produced by that cultures [8].

Coppers ions are one of the essential micronutrients for normal plant growth. Excess of copper ions, however, causes a range of deleterious influences including inhibition of photosynthesis, pigment synthesis and damage to the plasma membrane permeability and other metabolic disturbances [3].

II. EXPERIMENTAL

A. Materials

The shoot cultures of *Solanum melongena* were cultivated on modified Murashige and Skoog media with the addition of 4 µg/L benzyladenine. Cultures were maintained in the light using Philips TL40W at 25^0C. Subculturing of the stock-shoots was performed every 4 weeks [5].

In order to study the accumulation of copper ions and its influence on the production of phytosterols and phytosteroids, the cultures were transferred to a series of 20 ml media containing different concentration of copper ions and cultivated for 4 weeks under the same conditions before

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