

CELEBRATING  
COMMERCIALISATION  
YEAR 2014

# iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention  
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& design  
exposition 2014

INNOVATEUR  
wannabe!  
2014

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UNIVERSITI TEKNOLOGI MARA  
MALAYSIA

*Bridging  
the valley of death :  
advancing the  
commercialisation  
of research*

RESEARCH BOOK

# iiindex2014

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innovation  
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## FOREWORD

The Honourable Minister of Science, Technology and Innovation (MOSTI) has launched 2014 as Malaysia Commercialisation Year 2014 (MCY2014) with the theme Science Technology and Innovation (STI) for Wealth Creation. In line with this theme, Invention, Innovation, Design & Exposition 2014 (iidex2014) is an annual exposition organized by UiTM and is the ultimate platform to highlight and commercialise new inventions and innovations. Researchers and inventors will exhibit their products which cater to the needs and wants of the community and the country.

The iidex2014 creates a new dimension by fusing two competitive concepts, a competition among innovative products and a competition to invite Innovateur Wannabes to perform live pitching of their products to the audience. The iidex2014 focuses on comprehensive commercialization and creating opportunities for entrepreneurs to carry out R&D as well as to provide avenue to commercialise their products. Through expositions such as iidex2014, MOSTI hopes to inculcate the culture of commercialisation of new technology designed and created by Malaysians.

I wish to congratulate all the participants of the iidex2014 and this is the opportunity for all researchers to show their ideas and exhibits their products and creativity. Apart from showcasing their products, innovators will have the opportunity to provide a window to the industry for business matching during the exposition.

**Tan Sri Dato' Sri Sallehuddin Mohamed**  
Pro-Chancellor, Universiti Teknologi MARA

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## BIOACTIVE METABOLITES FROM ENDOPHYTES ASSOCIATED WITH RUBIACEOUS PLANTS FROM UiTM PUNCAK ALAM BIOLOGICAL RESERVE

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Plant endophytes are an important and novel resource of natural bioactive compounds. In the past two decades, many valuable bioactive compounds with antimicrobial, cytotoxic and anticancer activities have been successfully discovered from the endophytic microorganisms. In this research, 54 endophytic fungi and 6 endophytic bacteria were isolated from leaves, stems, flowers and roots of the three plants species of Rubiaceae family collected in the biological reserve, UiTM Puncak Alam, Malaysia. The objective of this study is to isolate bioactive metabolites of endophytic microorganisms from Rubiaceae plants. The microorganisms were inoculated and fermented according to a standardized procedure. The fungal cultures were fermented for 14 days, and we assumed that most secondary metabolites were produced in the media. For bacterial cultures, we assume the length of incubation could be of only 3 days. Each culture was extracted using ethyl acetate based on our standard operation procedure. The crude extracts were evaluated for preliminary screening of antimicrobial activity against *Staphylococcus aureus* ATCC 25923, *Enterococcus faecium* ATCC 51585, *Pseudomonas aeruginosa* ATCC 27853, *Escherichia coli* ATCC 25922 and *Candida albicans* ATCC 44831, using MTT method. The principle of MTT assays is to measure the colour of the MTT reagent that is converted from yellow tetrazole to purple formazon in living cells. The purple colouring of the wells in the microtiter plate was interpreted as visible growth of the microorganisms and therefore as a lack of activity of the extracted. Conversely, crude extracts for which no purple formazon could be detected were considered as active. Pleasingly, the antimicrobial effects of these crude extracts were slightly lower than standard antibiotics. The minimum inhibitory concentration (MIC) of the crude ethyl acetate extracts ranged from 0.1875 mg/ml to 1.5 mg.ml. Six extracts were considered as interesting, as they show significant activities on fungal and bacterial strains and compare the metabolomes of a large number of fungi, it is necessary to rely upon an HPLC procedure that would produce consistent results. The analysis of samples according a standard operating procedure (SOP) requires specifications such as sharp and symmetrical peaks, baseline resolution, and quality chromatogram within a short time. The chromatographic conditions were selected so that the majority of the chromatograms would meet the above specifications. The crude extracts were analyzed by high performance liquid chromatography (HPLC) using diode-array detected (DAD) and evaporative light scattering detector (ELSD). DAD was useful to detect UV active analyses and ELSD to detect non-volatile and non-UV active analyses. HPLC fractionation followed by retesting of the fraction led to correlate chromatographic peaks with biological activity. Pure compound was subjected to standard spectrometry analyzes by mass spectrometry (MS), nuclear magnetic resonance (NMR). ultra violet (UV). infra- red (IR) and comparison with available literature. The combination of UV, MS, and NMR data will quickly determine the structure of known compounds and allow dereplication by referring to a specific database. Data of compounds will be presented. The structure of novel compounds will be elucidated by applying a standard combination of 1D and 2D NMR analysis. The impact of microbial biodiversity, the influence of growth conditions on the production of secondary metabolites, the choice of the best approach at the screening step and the challenges faced during the isolation and identification of the active compounds are examined as the critical factors contributing to success in the effort of antibiotic discovery from microbial natural products (Pelaez, 2006). Therefore, endophytic microorganisms from Rubiaceae plants from biological reserve of UiTM at Puncak Alam could become a source of new lead compounds in view of drug discovery. Antimicrobial, antibacterial, antifungal.