THE 6TH INTERNATIONAL CONFERENCE ON MATHEMATICS AND NATURAL SCIENCES

ICMNS 2016

ON THE ROAD TOWARDS SUSTAINABLE DEVELOPMENT

2-3 NOVEMBER 2016

INSTITUT TEKNOLOGI BANDUNG
BANDUNG, INDONESIA

ORGANIZED BY:

FACULTY OF MATHEMATICS AND NATURAL SCIENCES
SCHOOL OF LIFE SCIENCES AND TECHNOLOGY
SCHOOL OF PHARMACY

100
YEARS (1920-2020)
ITB AND HIGHER EDUCATION
IN INDONESIA

INVITED SPEAKER

Wednesday, 2 November 2016

Code	Place	Time	Invited Speakers
INV-01	WH	15:15-15:45	Veinardi Suendo Institut Teknologi Bandung, Indonesia "Local Structure Investigation of tetraphenylporphyrin: Ab initio calculations of its dimer and spectroscopic approaches"
INV-02	EH1	15:15-15:45	Lucky Puspitarini Institut Teknologi Bandung, Indonesia "Extracting Diffuse Interstellar Bands from Cool Star Spectra"
INV-03	EH2	15:15-15:45	Marlia Singgih Institut Teknologi Bandung, Indonesia "Role of Monascus and Neurosporain Pharmacy: Their Metabolites as Active Ingredients and Excipients"
INV-04	EH2	15:15-15:45	I Made Agus Gelgel Wirasuta Universitas Udayana, Indonesia "Herbal Fingerprint for authentication and quantification: an Increasing Indonesian Herbal Medicine tandardization"
INV-05	EH3	15:15-15:45	Guntur Fibriansyah Duke-NUS Medical School, Singapore "The Development of Therapeutic Antibodies against Dengue"
INV-06	EH4	15:15-15:45	Tirto Prakoso Brodjonegoro Institut Teknologi Bandung, Indonesia "Hydrothermal Carbonization of Seaweed for Biochar Production"
INV-07	EH5	15:15-15:45	Yogi Ahmad Erlangga Nazarbayev University, Kazakhstan "Multilevel Krylov Methods: Analysis and Applications"
INV-08	CC	15:15-15:45	Nandang Mufti Universitas Negeri Malang, Indonesia "Functionalization of Magnetite Photocatalyst Nanocomposite as Wastewater Treatment and Renewable Energy Materials"
INV-09	RFMIPA	15:15-15:45	Acep Purqon Institut Teknologi Bandung, Indonesia "Urban Physics and Its Implementation in Predicting Economic Growth Related to High Speed Train Development"
INV-10	BSCA1	15:15-15:45	Alexander A. Iskandar Institut Teknologi Bandung, Indonesia "Nano Plasmonics for Optical Sensing"

[INV-04]
Herbal Fingerprint for Authentication and Quantification: an Increasing Indonesian Herbal Medicine Standardization

I Made Agus Gelgel Wirasuta

Universitas Udayana, Indonesia

Abstract

The global market of herbal medicines has increased 7% annually. Their total market in 2008 was 200 million USD and it will increase to 50 billion USD in 2050. The WHO recommend an implementation the phytochemicals fingerprint to ensure and standardize the herbal remedies. The chemical content of herbal medicine is influenced by several factors, such as: species-varieties, cultivation, geography and climate of a place to grow, harvest, post-harvest processing methods, and production processing. The Good Agriculture and Collection Practices (GACP) guide to control the cultivation factors of medicinal plants. The current Good Manufacture Practices (cGMP) and good laboratory practices (GLP) govern to ensure the repeatability of the efficacy of the herbal medicine product. The spectrophotometric instrument, such as raman, FTIR; the chromatographic method implements to provide the phytochemical fingerprint. This method identifies and measure the bio- or chemical –marker. The biomarker is the chemical constituents, which were detected and identified while the pre and clinical trial. The biomarker represents the claimed substance, which responsible to their pharmacological effect. Many traditional herbal medicine based on the empirical experiment, so there is no scientific information of their biomarker. In this case the phytochemical chromatographic fingerprint could be used as a tool to control the substances. Providing the fingerprint of the JAMU herbal medicine will increase their quality and potency to compete in the global herbal medicine market.

CERTIFICATE

FACULTY OF MATHEMATICS AND NATURAL SCIENCES
SCHOOL OF LIFE SCIENCES AND TECHNOLOGY
SCHOOL OF PHARMACY

Bandung, 2-3 November 2016

ICMNS 2016

THE 6TH INTERNATIONAL CONFERENCE ON MATHEMATICS AND NATURAL SCIENCES

ON THE ROAD TOWARDS SUSTAINABLE DEVELOPMENT

This is to certify that

Dr.rer.nat. I Made Agus Gelgel W., M.Si. Apt.

has participated in the 6th International Conference On Mathematics and Natural Sciences
as

Invited Speaker

Dr. Dessy Natalia	Prof. Edy Tri Baskoro, M.Sc., Ph.D.	Dr. I Nyoman Pugeg Aryantha	Prof. Dr. Daryono H. Tjahjono Apt.
Chairperson ICMNS 2016	Dean Faculty of Mathematics and Natural Sciences Institut Teknologi Bandung	Dean School of Life Sciences and Technology Institut Teknologi Bandung	Dean School of Pharmacy Institut Teknologi Bandung

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Nr. : 4861/I1.C01/LL/2016

7 October 2016

Ref. : Invitation of the 6th International Conference on Mathematics and Natural Sciences (ICMNS)

Prof. Dr. I Made Agus Gelgel Wirasuta
Universitas Udayana
Bali
Indonesia

Dear Prof. Dr. I Made Agus Gelgel Wirasuta,

We would kindly like to invite you to the 6th ICMNS which will be held on Nov 2-3 2016 at Institut Teknologi Bandung, Bandung, Indonesia. This conference aims to disseminate recent research results in the field of sciences and mathematics and to promote multi- and inter-disciplinary researches in sciences and their applications. We would be very honoured it you could come and share your frontier knowledge and experience in the 6th ICMNS. We believe that your contribution to this field is very beneficial for inspiring scientists and triggering the advancement of science, and in turn for future sustainable development of humanity.

We are very happy to cover expenses associated with transportation, and accommodation (2 nights on 1-3 November 2016).

We are very honoured if you could accept invitation to join us for this event. On behalf of the Faculty of Mathematics and Natural Sciences and the Organizing Committee, we are looking forward to meeting you in Bandung.

Yours Faithfully,

Prof. Edy Tri Baskoro
Dean of Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung

herbal standardization

by Gelgel Wirasuta

Herbal Fingerprint for authentication and quantification: an Increasing Indonesian Herbal Medicine Standardization

I Made Agus Gelgel Wirasuta

[1]

Pharmacy Department, Faculty of Mathematic and Natural Sciences - Udayana University

Abstract

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The spectrophotometric instrument, such as raman, FTIR; the chromatographic method implement to provide the phytochemical fingerprint. This method identify and measure the bio- or chemical – marker. The biomarker is the chemical constituents, which were detected and identified while the pre and clinical trial. The biomarker represent the claimed substance, which responsible to their pharmacological effect. Many traditional herbal medicine based on the empirical experiment, so there is no scientific information of their biomarker. In this case the phytochemical chromatographic fingerprint could be used as a tool to control the substances. Providing the fingerprint of the JAMU herbal medicine will increase their quality and potency to compete in the global herbal medicine market.

herbal standardization

ORIGINALITY REPORT

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SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Wirasuta, I Made Agus Gelgel, Ni Made Amelia Ratnata Dewi, Kadek Duwi Cahyadi, Luh Putu Mirah Kusuma Dewi, Ni Made Widi Astuti, and I Nyoman Kadjeng Widjaja. "Studying Systematic Errors on Estimation Decision, Detection, and Quantification Limit on Micro-TLC", Chromatographia, 2013. Publication	%4

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EXCLUDE BIBLIOGRAPHY	OFF		

herbal standardization For Future

by Gelgel Wirasuta

2

HPTLC Fingerprint: Authentication of Phytochemicals for Improving Herbal Drug Standardization

Dr.rer.nat., I Made Agus Gelgel Wirasuta, M.Si.
Pharmacy Department-Faculty Mathematic and Natural Sciences
Udayana University - Jimbaran - Bali, Indonesia

Increased use of herbal products: opportunities and threats

- Opportunities
  - Increased acceptability of health professional to use HM - CAM
  - Increased awareness of prevention strategies
  - Synergy (HM/CAM vs Modern Medicine)
  - Increasing clinical evidence for efficacy
  - Consumer choice
- Threats
  - Extravagant claims
  - Poor-quality materials
  - Lack of sufficient evidence base
  - Concerns over safety
  - Legislative and commercial pressures
  - Threats to conservation

P K Mukherjee and P J Houghton, 2009. The worldwide phenomenon of increased use of herbal products: opportunities and threats, In: Evaluation of Herbal Medicinal Products Perspectives on quality, safety and efficacy, P K Mukherjee and P J Houghton (Ed.), London, Pharmaceutical Press

OUTLINE

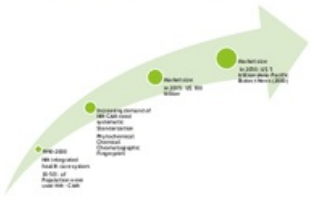
1. HMPs Trends
2. **Standardization Herbal Medicine**
3. Developing HMPs with quality, safety and efficacy
4. TLC/HPTLC Herbal medicine standardization
5. Finger Print HPTLC - Standardization Indonesian Herbal Medicine

Standardization Herbal Medicine

- Standardization is a system that ensures a predefined amount of quantity, quality & therapeutic effect of ingredients in each dose
- The development of authentic analytical methods which can reliably profile the phytochemical composition, including quant tative analyses of marker/bioactive compounds and other major constituents, is a major challenge to scientists
- Fingerprinting of herbal medicines is utilized for the authenticity and quality control of herbal medicines and herbal preparations

Choudhary, N. and B. S. Sekhon (2011). An overview of advances in the standardization of herbal drugs. Pharm Educ Res 1: 1-7

Increased use of herbal products: opportunities and threats

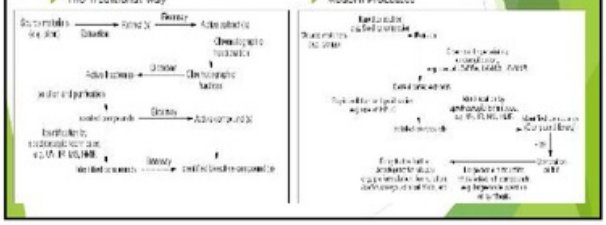


Developing HMPs with quality, safety and efficacy

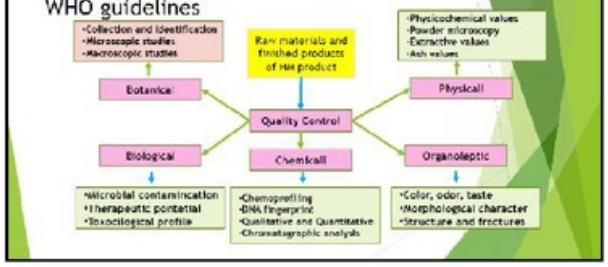
A. Development of biologically active plant products

> Natural Product Drug Discovery

- The Traditional Way
- Modern Processes

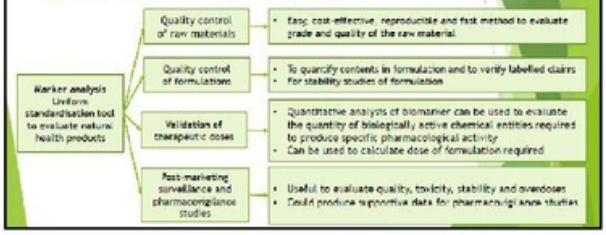


Developing HMPs with quality, safety and efficacy
B. Establishing the quality of herbal products
WHO guidelines

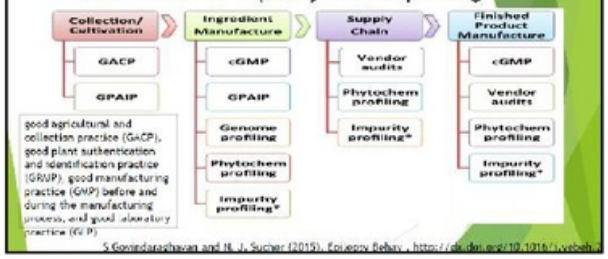


Developing HMPs with quality, safety and efficacy
C. Standardisation of marker using phytochemical fingerprint

- Importance of marker analysis in drug development from natural resources



Developing HMPs with quality, safety and efficacy
B. Establishing the quality of herbal products
Future chain HMPs quality control paradigms



S Govindaraghavan and NL J. Sucher (2015). Epilepsy Behav. , http://dx.doi.org/10.1016/j.yebeh.2

Developing HMPs with quality, safety and efficacy
D. Safety of herbal products

- Regulation aspect
- Selection of Appropriate Bioassay
- Toxicity study
- Bioassay-Directed Isolation Bioactive Marker(s)
- Standardization of Pre-clinical and Clinical Extract
- Production of Biologically and Chemically Standardised Dosage Forms
- Pharmacokinetic and Bioavailability
- Clinical study

Developing HMPs with quality, safety and efficacy
C. Standardisation of marker using phytochemical fingerprint

- Authentication of HM species
- Quality Evaluation of the Crude Drugs
- Distinguishing the adulterant from the Authentic Sample
- Monitoring Rationality of Dosage Form During R&D Period
- Monitoring the Dynamic Change Due to Interaction of Mixed Herbal Drugs During Extraction

HPTLC technology for the analysis of botanical materials and products: analytical tasks

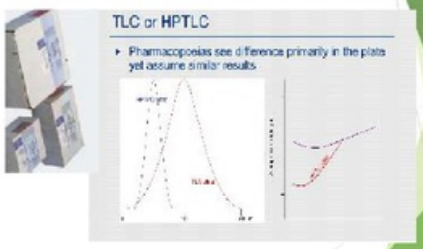
- HPTLC has been used as standard method for HM identification in Herbal Pharmacopeia (USP, Ph.Eur, PhPRC dan AHP).
- HPTLC is suitable method for identification of complex compound

Why use HPTLC-TLC Scanner?

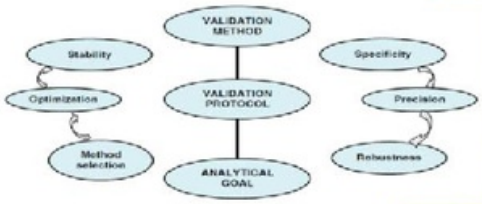
- Output Visual - e file
  - Direct visualized under white lamp or UV to obtain TLC-image
  - Combined with TLC-scanner to obtained densitogram, in-situ UV spectra
  - Data base of HM profile
- Multiple Detection
  - pre/ post-derivative
  - Bio-assay
- Disposable plates
- Batch analyses
- Cost-efficiency
- Flexible
- cGMP-compliance

Instrumentals are needed for HPTLC

TLC vs HPTLC



Basic Validation Process



Schematic Procedure of HPTLC-Thechnique

Fig. 1.3 Schematic procedure for HPTLC method development

TLC- Method Standardization

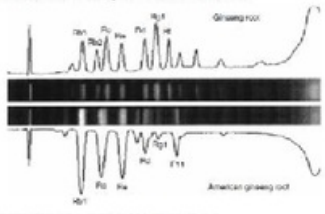
- Preparation and Plat handling
- Sample spotting
- Chamber saturation and humidity control
- Developing / eluting distance
- Staining / Derivative
- Documentation (TLC image / chromatogram)
- Evaluation

1

A Standardized Approach to Modern High-Performance Thin-Layer Chromatography (HPTLC). Reich, E., Schibli, A. (2004). J. Planar Chromatogr. 17, 438-443

Chapter 7
HPTLC Fingerprint Analysis: A Quality Control for Authentication of Herbal Phytochemicals

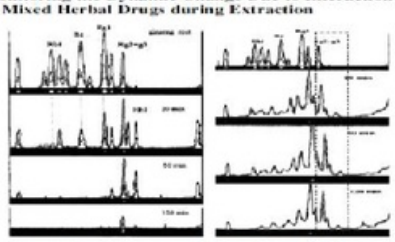
Authentication of the Species Prone to Confusion



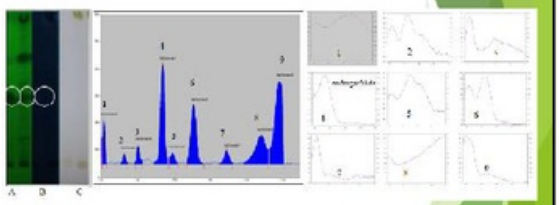
Sambiloto (King Bitter, *Andrographis paniculata* (Burm. F.)

- Major active compound (marker) andrografolid (Rosidah *et al.*, 2012; Saranya *et al.*, 2010).
- Pharmacological effect of andrografolid :
  - antipyretic, Anti inflammation, anti allergy, anti diabetes, immune-stimulant, hepatic- protective, antioxidant.
  - Our focus research anti hyperlipidaemia.

Monitoring the Dynamic Change Due to Interaction of Mixed Herbal Drugs during Extraction



HPTLC-Fingerprint of crude extract Sambiloto



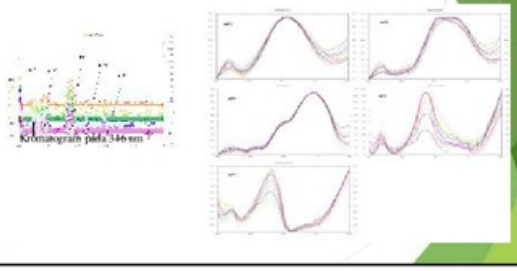
Finger Print HPTLC – Standardization Indonesian Herbal Medicine

PENGEMBANGAN STANDARISASI OBAT HERBAL INDONESIA DENGAN METODE FITOKIMIA *HPTLC-FINGERPRINT*

UNTUK
PENELITIAN UNGGULAN PERGURUAN TINGGI

...cont.

Peak Pattern Identification



ARTICLE IN PRESS

Journal of Traditional and Complementary Medicine

Journal homepage: http://www.elsevier.com/locate/jtcme

Original Article

Authentication of *Piper betle* L. folium and quantification of their antifungal-activity

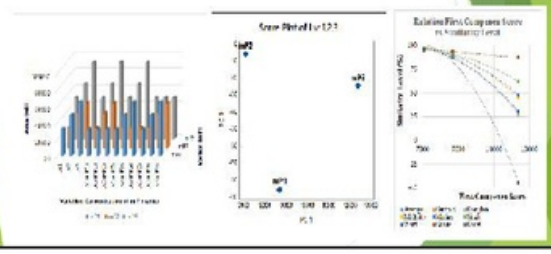
I Made Agus Gelgel Wirasuta [a,*], I Gusti Ayu Made Srinadi [b], Ida Bagus Gede Dwidasmara [c], Ni Luh Putu Putri Ardiyanti [a], I Gusti Ayu Arya Trisnadewi [a], Ni Luh Putu Vidya Paramita [a]

[a] Pharmacy Department, Faculty of Mathematic and Natural Science, Udayana University, Indonesia
[b] Mathematic Department, Faculty of Mathematic and Natural Science, Udayana University, Indonesia
[c] Computer Science Department, Faculty of Mathematic and Natural Science, Udayana University, Indonesia

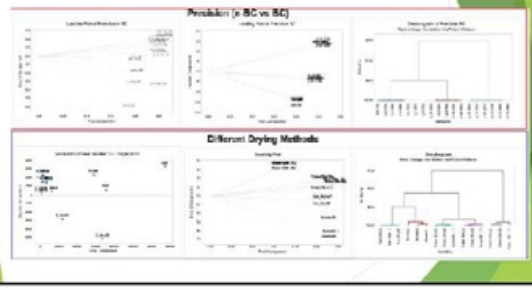
Conclusion

- TLC/HPTLC a robust method is suitable for first - advantage HM standardization

The theoretical dose variation of three markers (nP1, nP2, and nP3) (left), the PCA score plot graph (middle), and the relation between first component score versus similarity level (right).



Quantification assessment under different drying methods



herbal standardization For Future

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