

DEVELOPMENT AND CHARACTERIZATION OF SURFACE SOLID DISPERSION MORINGA OLEIFERA LEAF EXTRACT MICROCRYSTALLINE CELLULOSE BY CO-GRINDING METHOD

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ABSTRACT

The extract of *Moringa oleifera* leaves contain flavonoid compounds which potential as antioxidant source. The development of *Moringa oleifera* leaves extract into herbal product is still limited because the difficulty to handle the consistency, hygroscopicity, and low solubility of the extract. Surface solid dispersion (SSD) is a versatile method to improve not only the physical characteristics but also the solubility of the extract. The aim of this study was to improve the characteristics of *Moringa oleifera* leaf extract through SSD using microcrystalline cellulose as carrier. The preparation of the SSD was conducted by co-grinding method at two ratios of extract and carrier (1:2 and 1:4). The results of this study revealed that SSD was able to entrap the extract in the surface area of microcrystalline cellulose. Hence, the SSD powder performed better moisture content and flowability. The characterization of thermal characteristics and crystallinity also performed the reduction of crystal lattice regularity compared to the pure extract. It was observed from the reduction of enthalpy and distinctive peak intensity. The total flavonoid content of SSD 1:2 was 14.70 ± 0.35 mg QE/g, whereas SSD 1:4 was 7.00 ± 0.07 mg QE/g. The solubility of flavonoid compound from SSD 1:2 was 62.26 ± 0.62 ppm, while the solubility of SSD 1:4 was 63.58 ± 0.62 ppm. The solubility of flavonoid compound from SSD preparation increased about 1.16-fold compare to the physical mixture. The SSD powder with 1:2 and 1:4 ratio showed IC₅₀ value 539.38 ppm and 524.44 ppm respectively. The preparation of SSD of *Moringa oleifera* leaf extract can improve physical and chemical characteristics of the extract prior to formulation.

Keywords: *Moringa oleifera* leaf extract, microcrystalline cellulose, surface solid dispersion, co-grinding

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CONFERENCE PROGRAM AND ABSTRACT BOOK

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INTERNATIONAL CONFERENCE ON CONTEMPORARY SCIENCE AND CLINICAL PHARMACY (ICCSCP) 2023

*Faculty of Pharmacy, Universitas Andalas, Kampus
UNAND, Limau Manis, Padang, West Sumatera, Indonesia*

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WELCOME MESSAGE FROM THE ORGANIZING COMMITTEE



Bismillahirrohmanirrahim

Distinguished Speakers and Participants

Assalamualaikum Wr. Wb.

I would like to take this opportunity to extend a warm welcome to all the participants attending this conference. First, let us begin by thanking the Almighty God for His blessings, grace, and mercies that have enabled us to gather here in good health and excellent condition today.

Ladies and gentlemen

In Indonesia, specific regulations guarantee halal certification for various products. The law that outlines these requirements is Law No. 33 of 2014. The Minister of Religion of the Republic of Indonesia's Decision No. 982 of 2019 sets the standards for Halal Certification Services. This law mandates that food and beverage items, cosmetics, medicines, genetically engineered products, biological products, chemical products, and consumer goods used or exploited by the public must be halal-certified. Pharmacists who possess medical knowledge are responsible for raising public awareness about the halalness of pharmaceutical products. They must also provide information about the legitimacy of halal certification for food products, cosmetics, and medicines to guarantee Muslim life and ensure peace of mind for those who use halal products.

The Faculty of Pharmacy, Universitas Andalas, is hosting an international seminar called "INTERNATIONAL CONFERENCE ON CONTEMPORARY SCIENCE AND CLINICAL PHARMACY 2023." The conference aims to increase the knowledge related to pharmaceutical science, including the aspects of drug discovery, development, and pharmaceutical services. It will also focus on halal guarantees and processes. Therefore, the seminar theme is "*An Integrative Discovery, Development and Awareness of Halal and Healthy Pharmaceutical, Cosmetics, Food Products and Care.*" This seminar has been an annual event since 2011 and is attended by academics, government officials, practitioners, students, and industry players.

The international seminar was attended by more than 130 presenters from five countries. We are grateful to all keynote speakers and invited presenters for joining us today to share advanced knowledge and expertise in this scientific event. We would also like to thank the International Journal of Applied Pharmaceutics (IJAP) and Jurnal Sains dan Farmasi Klinik (JSFK) for collaborating in this international seminar. Furthermore, we also thank Persatuan

Saintis Farmasi Indonesia for their role as an external reviewer. We thank the Rector of Universitas Andalas for their collaboration in this conference.

Additionally, we express our deep appreciation to the members of the Organizing Committee for their excellent teamwork and great effort in bringing success to this conference. Lastly, on behalf of the conference committee, we are sorry for any unexpected inconveniences you might have had during this two-day conference. Finally, we hope all participants enjoyed the conference and gained valuable knowledge.

Thank you very much

apt. Suryati MSc., Ph.D

Chairperson ICCSCP 2023



WELCOME MESSAGE FROM THE DEAN OF THE FACULTY OF PHARMACY UNIVERSITAS ANDALAS



Bismillahirrohmanirrahim

Assalamualaikum Wr. Wb.

In the name of the Almighty Allah and His Prophet, who imparted to us the lesson of life's purpose, I want to warmly greet everyone attending the International Conference on Contemporary Science and Clinical Pharmacy (ICCSCP) 2023, hosted by The Faculty of Pharmacy Universitas Andalas. The first ICCSCP was held in 2018, followed by virtual conferences in 2021 and 2022. This year, we are proud to present the fourth ICCSCP, which will also occur virtually. The theme of this international conference is **"An Integrative Discovery, Development and Awareness of Halal and Healthy Pharmaceutical, Cosmetics, Food Products and Care."**

Ladies and gentlemen,

Recently, a significant global movement has arisen to make better and more ethical choices about various aspects of life, including food, medicine, cosmetics, and personal hygiene. This movement has brought about essential changes in industries where health-conscious consumerism intersects with the need for products that adhere to religious values, especially the Halal concept. The Halal idea represents more than just adhering to religious doctrine; it embodies a commitment to morality and well-being. Products that receive Halal certification must adhere to strict requirements, ensuring they are of the highest quality and safe to consume. Consequently, integrating Halal values with health and wellness considerations creates a distinct and compelling niche in the market.

Given the current circumstances, it is urgent to investigate the complex relationship between Halal principles and various industries, including personal care, cosmetics, food products, and pharmaceuticals. Halal has evolved into a comprehensive paradigm prioritizing ethical sourcing, product quality, and safety beyond its religious associations. Our conference aims to explore the relationship between Halal principles and the pursuit of well-being, shedding light on the creative moves and thoughtful decisions that define these sectors. Keynote and invited speakers from Thailand, Malaysia, Japan, Brunei Darussalam, and Indonesia will be at ICCSCP 2023 on October 30-31, 2023. The presenters will discuss the latest developments in clinical pharmacy, pharmacology, pharmacoeconomics, natural products, and pharmacy regulations.

Over the next two days, we will be immersed in a whirlwind of discussions, presentations, and dialogues that promise to push the boundaries of our understanding. The insights gained, the

connections made, and the ideas shared within these walls will leave a lasting impact on our respective fields and the world at large.

I would like to give a brief overview of our organization to our esteemed guests and participants. The Department of Pharmacy, Faculty of Mathematics and Natural Sciences, has a long history and played a crucial role in establishing the Faculty of Pharmacy in 1964. In 2008, the Pharmacy Department was renamed the Pharmacy Faculty. The Master of Pharmacy Program started in 2002, while the Doctorate Program in Pharmacy began accepting students in 2019. Our Undergraduate, Pharmacist Professional, and Master's programs have all received excellent national accreditation, and the Doctoral program has received excellent accreditation. In 2020, the Pharmacy Undergraduate Program was recognized by the ASEAN University Network-Quality Assurance (AUN-QA). Our goal is to conduct research on medication development using natural materials, drug use, and drug safety in clinical practice and the community. We also collaborate with hospitals, government agencies, pharmaceutical companies, universities in Indonesia and abroad, and other organizations to enhance research, education, and community service initiatives. This year, on September 21, we celebrated the 59th anniversary of the establishment of Universitas Andalas' Faculty of Pharmacy, and this meeting is being held in honour of this occasion.

On behalf of the Faculty of Pharmacy at Universitas Andalas, I would like to express my gratitude to the speakers and participants of the ICCSCP 2023. I thank the committee for their hard work organizing this conference. Lastly, I want to acknowledge the Rector of Universitas Andalas for supporting this event.

May God bless us all.

Prof. apt. Fatma Sri Wahyuni, Ph.D.

Dean of Faculty of Pharmacy, Universitas Andalas



KEYNOTE SPEAKERS



**DR. IR. H.
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AREA OF EXPERTISE

- *Regulation*
- *Politics*
- *Business*

WORK EXPERIENCE



- *Deputy Governor, West Sumatra Province, Indonesia, 2021-present*
- *Lecturer at Bogor Agricultural Institute and Gadjah Mada University*
- *Chairman of Perbakin, West Sumatra*
- *Chairman of LPTQ, West Sumatra*
- *Commissioners and Directors of several companies in Indonesia*
- *Chairman of the Advisory Board of the Indonesian Doctoral Friendship Forum (FORSILADI) West Sumatra*

EDUCATION HISTORY



- *Bachelor of Animal Science from Bogor Agricultural University, 2005.*
- *Master of Science from Wageningen University, Netherlands, 2007.*
- *Master of Management from Hasanuddin University, Makassar, 2011.*
- *Engineering (Ir.) degree from Gadjah Mada University, 2019.*
- *Madya Profesional Engineer from the Indonesian Engineers Association, 2019*
- *ASEAN Engineering (ASEAN.Eng) from the ASEAN Federation Engineering Association (AFEO), 2009*
- *Doctoral studies at the School of Business, Bogor Agricultural University, 2021.*
- *Master of Political Science at Andalas University, 2021-present.*

AWARDS



- *Indonesian World Records Museum (MURI), Deputy Governor with the Most Academic Degrees*
- *The youngest Deputy Governor of West Sumatra in history, appointed by the President of the Republic of Indonesia*



ASSOC. PROF. DR. WINAI DAHLAN

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AREA OF EXPERTISE

- Halal Science and Analysis
- Halal Industry
- Halal Product

WORK EXPERIENCE



- *Founding Director, The Halal Science Center, Chulalongkorn University, 2004-present*
- *Lecturer, Chulalongkorn University, 1993-present*
- *Vice President, The Central Islamic Council of Thailand (CICOT), 2013-present*
- *Chairman, The Halal Standard Institute of Thailand (HSIT), 2014-present*
- *Member, Thailand Halal Task Force (Ministry of Agriculture and Cooperatives), 2022 - present*
- *Member, Committee of Muslim-friendly tourism promotion (Ministry of Tourism and Sports), 2022 - present*

EDUCATION HISTORY



- *B.Sc. Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok, Thailand, 1976*
- *M.S. Nutrition, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand, 1982*
- *Ph.D. Applied Medical Biology (grand distinction), Faculty of Medicine and Pharmacy, St-Pierre Hospital, Université Libre de Bruxelles, Brussels, Belgium, 1989*

AWARDS



Awards

- *The Award for The Continuous International Affirmation of Halal in The World from Agency for Halal Quality Certification, Sarajevo, Bosnia and Herzegovina, 2023*
- *The Public Sector Excellence Award (for E-Number), Office of Public Sector Development Commission, Office of Prime Minister, Bangkok, Thailand, 2020*
- *The Dushdi Mala Medal, 2008*

Honours

- *One of The 500 World's Most Influential Muslims for 14 consecutive years by the Royal Islamic Strategic Studies Centre.*



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AREA OF EXPERTISE

- *Food Chemistry and Biochemistry*
- *Halal Science and Authentication*
- *Food Quality and Safety*

WORK EXPERIENCE



- *Chairman, Korea-Inhart Halal Certification Authority*
- *Consultant, Halal Centre, Saudi Food and Drugs Authority (SFDA), Kingdom of Saudi Arabia*
- *Senior Consultant of Food Safety, Pure and Good Ltd, Singapore*
- *Consultant, Aladdin Group (Halal E-Commerce) Sdn Bhd. Kuala Lumpur, Malaysia*
- *Board Member, Haebara Pte Ltd (Halal Poultry), South Korea*
- *Board Member, Skinmatch Sdn Bhd (Halal Cosmetics), Kuala Lumpur*

EDUCATION HISTORY



- *Bachelor Degree (with honours) in Food Technology and Human Nutrition, Bogor Agriculture University, Indonesia, 1993*
- *Master of Science (M.Sc.) in Food Science and Biotechnology, Universiti Pertanian Malaysia, 1996*
- *Philosophy of Doctor (Ph.D) in Food Chemistry and Biochemistry, Universiti Putra Malaysia, 2000*
- *Ph.D Exchange Programme, Dept. of Food, Nutrition and Health, University of British Columbia, Canada, 1989*
- *Diploma in Islamic Revealed Knowledge, International Islamic University Malaysia. 2003*
- *Postdoctoral Fellowship in Lipid Biochemistry, National Food Research Institute, Tsukuba, Japan, 2006-2008*

AWARDS




- *King Faisal International Prize Laureate 2018 ('Nobel Prize of Muslim World')*
- *Indonesian Institute for Science (LIPI) Award 2019*
- *Habibie Award 2013 Recipient in Medicine and Biotechnology*
- *Islamic Product Innovation Award, 2016 & 2017*
- *Asia Pacific Young Scientist Award by Scopus in 2010*
- *Kedaireka Matching Fund Awardee, Kemdikbud Ristek, 2021*



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AREA OF EXPERTISE

- *Pharmaceutical Technology*
- *Solid State Pharmaceuticals*

WORK EXPERIENCE



- *Head of Pharmacy Doctoral Program, Faculty of Pharmacy, Andalas University*
- *Deputy Dean of the Faculty of Pharmacy, Andalas University*
- *Editor in Chief of Jurnal Sains Farmasi dan Klinis (JSFK)*
- *Editorial board of several national journals*

EDUCATION HISTORY



- *Bachelor degree, Pharmacy, Andalas University, 1997*
- *Master degree, Pharmaceutics, Bandung Institute of Technology, 2002*
- *Doctoral degree, Pharmaceutics, Bandung Institute of Technology, 2010*

REVIEWER/ASSESSOR EXPERIENCE



- *Reviewer of the Student Creativity Program by the Ministry of Education and Culture, Republic of Indonesia.*
- *Reviewer for research by the Ministry of Education and Culture, Republic of Indonesia*
- *Reviewer of several national and reputable international journals: Carbohydrate Polymer (Elsevier), Drug Development Industrial Pharmacy (Taylor Francis Group), ACS Omega (ACS Publications), Sains Malaysiana (UKM Malaysia), Indonesian Journal of Chemistry (UGM)*
- *National assessor of scientific journals*



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AREA OF EXPERTISE

- *Enzyme Production*
- *Applied Biochemistry*
- *Fermentation*

WORK EXPERIENCE



- *Executive director (Vice President for International affairs), Okayama University, 2017 – 2018*
- *Dean, The Graduate School of Environmental & Life Science, Okayama University,*
- *President in of Okayama University Library, 2011-2013*
- *Dean, Faculty of Agriculture, Okayama University, 2007-2011*
- *Vice dean, Faculty of Agriculture, Okayama University, 2005-2007*

EDUCATION HISTORY



- *Faculty of Agriculture, Kyoto University, Awarded the degree of Bachelor of Agriculture*
- *Faculty of Agriculture, Kyoto University, Awarded the degree of Master of Agriculture*
- *Faculty of Agriculture, Kyoto University, Awarded the degree of Doctor of Agriculture*

RESEARCH EXPERIENCE



- *Professor, Okayama University working on 'search and production of useful bioactive compounds using cells or enzymes', 2004-present*
- *Associate professor, Okayama University working on 'search and production of useful bioactive compounds using cells or enzymes', 1993-2004*
- *Visiting Scientist in National Institute of Health, USA working on enzymology of tryptophan synthase, 1988-1989*
- *Assistant Professor working on 'search and production of useful bioactive compounds using cells or enzymes', 1987-1993*
- *JSPS postdoctoral fellow at Faculty of Agriculture, Kyoto University, working with Professor Hideaki Yamada on 'enzymatic synthesis of useful compounds', 1986-1987*



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AREA OF EXPERTISE

- *Enzyme Modification and Protein Engineering*
- *Microbial Biotechnology*
- *Molecular Biology*
- *Halal Sciences*

WORK EXPERIENCE



- *Associate Professor in Science and Halal Science at Halalan Thayyiban Research Centre, Universiti Islam Sultan Sharif Ali (Unissa), March 2023-present*
- *Director of Centre for Research and Industrial Linkages (CRIL), Universiti Selangor, Malaysia, 2020-2023*
- *Director of International Halal Institute (INSHA), Centre of Excellence, Universiti Selangor, Malaysia, 2018-2023*
- *University Representative, Malaysian Society for Biochemistry and Molecular Biology (MSBMB), 2020-2023*
- *Selangor Halal Industry Committee Member under Exco for Islamic Affairs, Consumers and Halal Industry, 2020-2023*
- *Internal Auditor (ISO 9001:2015 & 21001:2018 EOMS), Universiti Selangor, Malaysia, 2021-2023*

EDUCATION HISTORY



- *BSc. Microbiology in Al Azhar University, Cairo, Egypt, 1995*
- *MSc. Microbial Biotechnology in Universiti Putra Malaysia, Malaysia, 2006*
- *PhD. Enzyme Technology in Universiti Putra Malaysia, Malaysia, 2015*

AWARDS



- *Invention, Innovation & Design Exposition (Silver award), 2020*
- *Intellectual Research & Innovation Showcase (Bronze award), 2019*
- *Finalist at Tech Plan Demo Day in Malaysia, 2019*
- *Universiti Selangor Award as Excellent Researcher, 2018*
- *Best Oral Presenter at Thailand Halal Assembly, 2016*
- *Best Oral Presenter at Compendium of Unisel & Research Publications, 2012*
- *Al-Biruni Academic 2005 Award*



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AREA OF EXPERTISE

- *Analysis of Halal Products*
- *Authentication*
- *Analytical Chemistry*

WORK EXPERIENCE



- *Head of Center of Excellence, Institute of Halal Industry and Systems, Universitas Gadjah Mada.*
- *Lecturer in Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Universitas Gadjah Mada Yogyakarta*
- *Editor in Chief Indonesian Journal of Pharmacy (Q3-Scopus Indexed Journal)*
- *Guest editors and reviewers in several reputed journals.*

EDUCATION HISTORY



- *Bachelor degree at Pharmaceutical Sciences, Faculty of Pharmacy, Gadjah Mada University, Indonesia, 1998-2002*
- *Master degree at Pharmaceutical Sciences, Faculty of Pharmacy, Gadjah Mada University, Indonesia, 2004-2006*
- *Ph.D degree from Institute of Halal Product Reseach, Universiti Putra Malaysia, 2011*

AWARDS



- *Young Scientist Scopus Award on Sustainable Agriculture in 2014*
- *"Anugerah Kekayaan Intelektual Luar Biasa or AKIL" in the field of international publication from the Ministry of Research, Technology and Higher Education year 2014.*



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AREA OF EXPERTISE

- *Halal System and Regulatory*
- *Halal Product Assurance and Certification*
- *Digitization*

WORK EXPERIENCE



- *Head of the Halal Product Assurance Organizing Agency (BPJPH) of the Ministry of Religious Affairs, Republic of Indonesia, 2021-present*
- *Deputy Secretary-General of Nahdlatul Ulama Central Board, 2015 - 2020*
- *Secretary-General of Gerakan Pemuda Ansor, 2011 - 2016*
- *Chairman of IMT GT HAPAS, 2023-present*
- *Speaker at The Embassy of the Republic of Indonesia in Tokyo about Mandatory Halal in Indonesian Regulations, 2023*
- *Chair Working Group on Halal Product Services (WGHAPAS) Startegic Planning Meeting IMT-GT- Thailand, 2023*
- *Speaker at the Speaker 2nd Indonesia Syariah Awards, 2022*
- *Speaker at Malaysia-Indonesia Halal Forum and Industry Engagement, 2023*

EDUCATION HISTORY



- *Bachelor degree in Aqidah and Islamic Philosophy, IAIN Raden Intan, Indonesia, 1992*
- *Master degree in Sociology, University of Indonesia, 2000*
- *Doctoral degree in Sociology, University of Indonesia, 2015*

AWARDS



- *First Best Central Echelon 1 Unit by Minister of Religious Affairs , 2023*
- *20 Years of Loyal Service by President of the Republic of Indonesia, 2018*
- *Certificate of Merit as a Civic Education Lecturer by ICCE-IAIN Syahida Jakarta, 2001*