



WONDERS

OF

NATURAL
PRODUCTS

IN

MALAYSIA

FREDDY KUOK SAN, YEO
SIONG FONG, SIM
NOR HADIANI ISMAIL



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FOREWORD

Sarawak is an ideal state for ecotourism. The richness in biodiversity as well culture diversity provides a wide experience to visitors. There are different themes of ecotourism. Ecotourism revolving around the theme of learning and appreciation can be aligned to the platform created by The Regional Conference & Exhibition on Natural Products, Traditional Medicines and Herbs 2021.



Local communities in Sarawak have been exploiting natural resources for generations. Their traditional knowledge on the application of natural resources in their everyday life is the preliminary reference for scholars to explore further on the different potential usage of the natural resources. In return, not only an acknowledgment of the traditional knowledge, but different stakeholders can also come together to create sustainable ecotourism projects in the theme of learning and appreciation to amplify and boost the income of the local communities. With properly planned activities, visitors may experience the nature where the communities harvested the natural resources, go through an educational trip, and appreciate the cultural value of a community.

This coffee table book, “Wonders of Natural Product in Malaysia” may serve as a trigger and the first motivational force to scholars and innovators of multidiscipline, to work together towards, not only to explore sustainably the potential uses of natural resources, but also to reciprocate or returning the favour to the communities.

YB Dato Sri Haji Abdul Karim Rahman Hamzah
Minister of Tourism,
Arts and Culture Sarawak

FOREWORD

The Regional Conference & Exhibition on Natural Products, Traditional Medicines and Herbs 2021, is a platform for different stakeholders to share



or display their innovations as well as findings. It is hope that this conference will foster interdisciplinary collaboration and create new opportunities. To expand the platform for innovators as well as researchers, this coffee table book, “Wonders of Natural Product in Malaysia” is published in conjunction with this conference, to showcase the diverse sources of natural products, along with their various applications. The editors and the article contributors have organized a selection of innovations and research findings to be shared, diffused and enjoyed by every walks of life.

In addition, this book deliberates on the importance of conserving the biodiversity of Malaysia. Scholars from different disciplines are encouraged to investigate in orchestration, to exploit sustainably natural resources and identify different potential natural products. They are also encouraged to publish research findings and share innovations to the public, to complete the knowledge and innovation cycle.

Mr. Hii Chang Kee
Permanent Secretary, Ministry of Tourism,
Arts and Culture Sarawak Malaysia

PREFACE

Natural products, in chemistry, refers to secondary metabolites or compounds synthesized by living organisms. In a broader sense, natural products also refer to green products i.e., products that are created using only natural ingredients.

In conjunction with the Regional Conference & Exhibition on Natural Products, Traditional Medicines and Herbs 2021, dedicated authors from various organizations and institutions have come together to share their innovations and research findings related to natural products, which allow the editors to produce this book, *Wonders of Natural Products in Malaysia*.

This book aims to showcase the innovations and potential uses of various valuable plants, microbes and agrowastes in Malaysia. The innovations and research findings published in this book are supported by numerous grants. The editors are grateful to all contributors and hopefully this book will trigger future collaborations between various stakeholders towards sustainable exploration of natural resources in Malaysia.

Freddy Kuok San, Yeo
Siong Fong, Sim
Nor Hadiani Ismail

ACKNOWLEDGEMENT

The editors would like to thank Tun Ahmad Zaidi Chair for inspiring and supporting the Regional Conference & Exhibition on Natural Products, Traditional Medicines and Herbs. The Chair supports theoretical and application research in local natural products in the area of chemistry, biochemistry, pharmacology, social science, socio-economy and social demography. The editors would like to extend their sincere gratitude to Ministry of Tourism, Arts and Culture Sarawak for the Tourism Event Grant to sponsor this conference and allow the production of this book.

Special thanks are due to Sarawak Trade and Tourism Office Singapore (<https://statos.com.sg>) and Business Events Sarawak (<https://businesseventssarawak.com>). Their valuable contributions have made the conference meaningful and significant to the tourism of Sarawak.

The editors also would like to acknowledge the continued support and effort from the conference organizers. Profound appreciation goes to Universiti Malaysia Sarawak (UNIMAS) for the continuous encouragement and assistance.

Finally, the editors cherish the authors in this book, who have contributed diverse, interesting and informative articles.

INTRODUCTION

Malaysia is blessed with bountiful biodiversity, from which, various flora and fauna are at the disposal of humankind as food sources, medicine, building materials and many more. There are still much to be discovered and explored.

Authors from eight institutions have contributed their innovative products and research findings in this book. About 30 species of plants and microbes were discovered of which 27 species were studied for their properties and secondary metabolites whilst 5 species were innovations in natural products with values of commercialization.

Overall, this book has taken a modest snapshot of the wealth of Malaysian biodiversity which consists of more than 160,000 species, not including microorganisms (<https://www.cbd.int/countries/profile/?country=my>). It is hoped that the interesting knowledge discovered by the researchers in natural products in this region can be shared with the public.

Plant Based Plastic and Leather-Like Material

Vu Thanh Tu Anh* & Kavitha Vijeandran

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Synthetic plastic and animal leather: we love both. Plastic is convenient, and leather is durable and elegant. However, have we ever thought about their downsides? United Nations Environmental Programme has warned us that we are drowning in plastic pollution. Leather and its production process, on the other hand, pose damaging effects on environment and on human health. Probably, it is the time for us to change. But would it be possible? The answer is yes.

Scientists, engineers, and designers have been endeavouring to create ecologically friendly materials such as biodegradable plastics and leather-like materials. Fermentation is one of the technologies currently being employed in production of plastic and leather substitute. Substrates used in the fermentation process involve plant-based materials (viz. grain and tuber starch, fruit juice and brewed tea). Fungi and bacteria are used to

turn these organic matters into biomass – polymer – which then be dehydrated and compressed to produce desired materials. The microbial polymer can also be grown into any desired shape and structure to meet the needs of different applications. The polymers produced by bacteria and fungi were reported to have good physical and mechanical properties, such as high elasticity, tensile strength, and absorbency.



Leather-like sheets made from fermentation of brewed tea, pulp of fruit juice and coconut water.

We are presenting herewith some prototype products, which were synthesised naturally by yeasts and a bacterium from a home-made fermented tea using various plant-based substrates (brewed tea, pulp of fruit juice, fruit peels, vegetable wastes and soybean pulp). The resultant pellicles from the fermentation process were coloured with plant-based dyes (beet root or turmeric), moisturised with coconut oil, sun dried before being assembled into products (bags and purse). The synthesised materials are non-toxic as they were produced from edible materials. They are also compostable, thus environmentally friendly. However, more work is required to produce the materials which are more refined that meet consumer aesthetic and functional expectations.



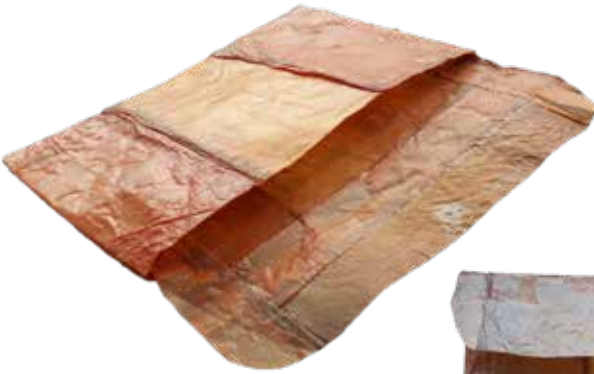
Wrapping sheet produced from fermentation of soy pulp.



Bag produced from fermentation of soy pulp.



Bag made of sheets produced from fermentation of brewed tea, pulp of fruit juice and coconut water.



Purses made of sheets produced from fermentation of brewed tea.

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THIS BOOK AIMS TO SHOWCASE THE INNOVATIONS AND POTENTIAL USES OF VARIOUS VALUABLE PLANTS, MICROBES AND AGROWASTES IN MALAYSIA. THE INNOVATIONS AND RESEARCH FINDINGS PUBLISHED IN THIS BOOK ARE SUPPORTED BY NUMEROUS GRANTS. THE EDITORS ARE GRATEFUL TO ALL CONTRIBUTORS AND HOPEFULLY THIS BOOK WILL TRIGGER FUTURE COLLABORATIONS BETWEEN VARIOUS STAKEHOLDERS TOWARDS SUSTAINABLE EXPLORATION OF NATURAL RESOURCES IN MALAYSIA.


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