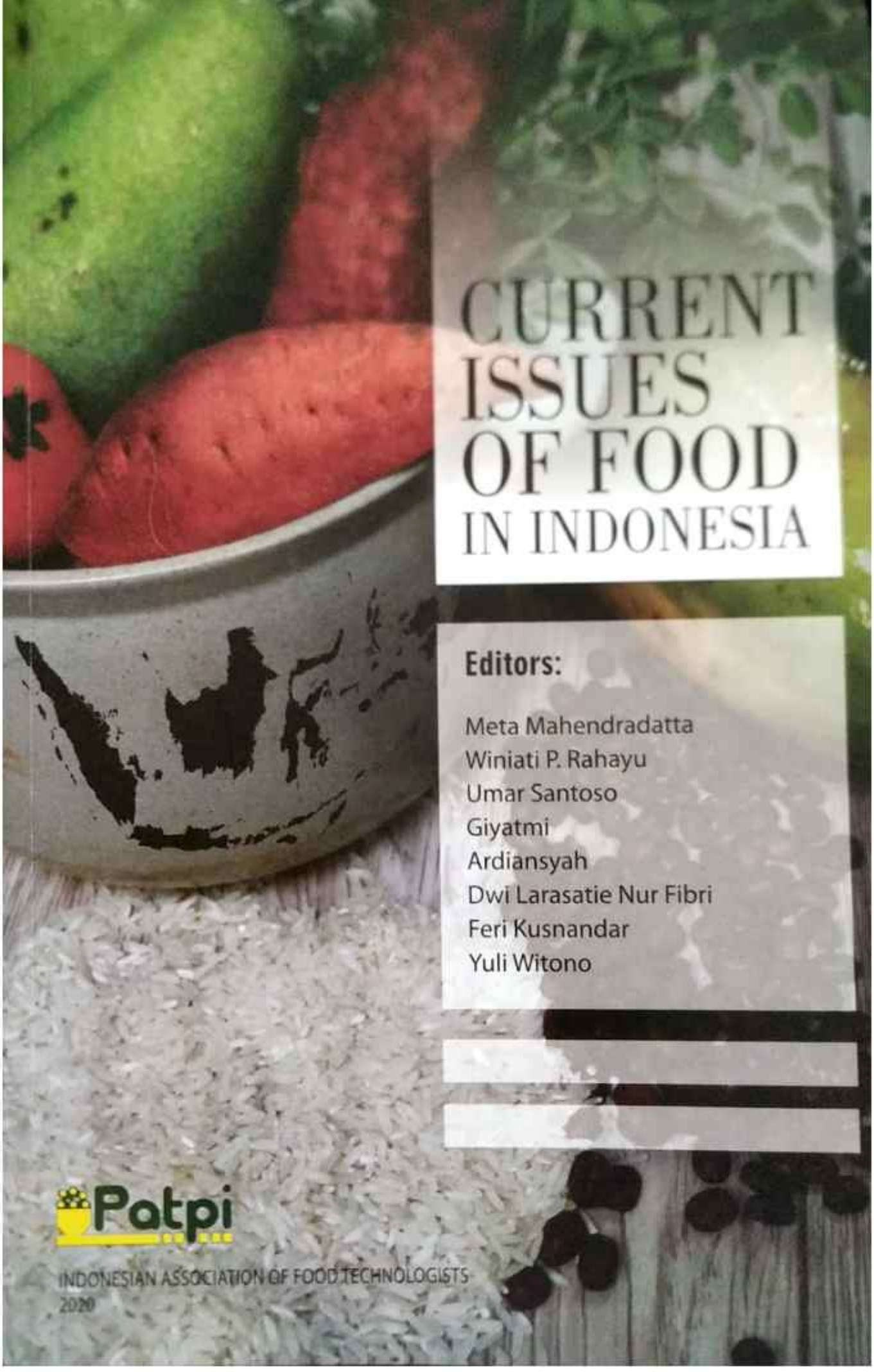

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PREFACE

Thank you and sincere gratitude to the almighty God because after a long process, finally, the book entitled **Current Issues of Food in Indonesia** can be published. This is IAFT's first book in English which contains a collection of ideas from members in Indonesia. They come with the same goal of reviewing the current condition of food in Indonesia, its problems, and alternative solutions.

A total of 33 authors have contributed their articles to this book with a total number of 35 articles. The contribution of the writers' ideas is very useful for information about the status of food in Indonesia to the wider community. Publishing English-language books are the target of IAFT, considering that this professional organization needs to expose the idea, thinking, and concept of its members globally. This book contains five parts, namely Food Security and Safety, New Technology, Functional Foods, Ingredients, and Nutrition, and the last part is about the Specific Issues. Some of these articles have been published in previous IAFT's book entitled "Pangan Indonesia Berkualitas, 2018 which was written in Bahasa Indonesia.

Special thanks go to the President of IAFT for the support to the editorial team from the beginning until the publication of this book. High appreciation also goes to all the authors who contributed to this book. To the reviewer and editor team who have worked hard to do their job, thank you so much. Our high appreciation and thanks also go to Mr. Ryan Salfarino, STP,

M.Si, who has provided technical assistance in the editing and lay-outing process and Dr. Februadi Bastian, who designed the cover of this book. Likewise, Darmawan, S.TP, Nandita Irsa Ulul Nurhisna, S.TP, and Wibisono Adhi, S.TP who assisted in finalizing the editing process, and in completing the articles. Finally, to all parties who played a role from the beginning until the publication of this book, many thanks to all of you. We realize that there is still a shortage in this book so that it is expected many inputs from various parties to make it better in the future. We sincerely hope that this book will be of great benefit to readers who are both in Indonesia and abroad.

Wassalamualaikum warahmatullahi wabarakatuh.
Peace to all of us.

Makassar, August 2020
Editor in Chief

Meta Mahendradatta

TABLE OF CONTENTS

(II-5)

THE NOVEL FRACTION OF RICE BRAN AND ITS POTENTIAL AS FUNCTIONAL INGREDIENTS

Ardiansyah

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IAFT - Jakarta Branch

Lifestyle-related diseases have become prevalent worldwide, including in Indonesia, as a result of changes in lifestyle and eating habits. Intake of the western diet with low dietary fiber and less exercise activity are causes of these diseases and major risk factors of death in recent years. These diseases were associated with several serious medical complications, such as coronary heart disease, hypertension, type 2 diabetes, nonalcoholic fatty liver, and certain cancers.

Currently, there is increasing linked science and knowledge between functional food, diet intake, and health. Consumption of various functional food and nutraceutical derived from edible plants, vegetables, fruits, cereals, and fermented food has been regarded as a preventive factor against these diseases. Therefore, any active compounds from food having the ability to reduce lifestyle-related diseases are a potential candidate for functional food. Hypertension is one manifestation of lifestyle-related diseases and continues to be a top major cause of death besides stroke in Indonesia. The control and management of hypertension through food intake has been a focus of public health strategies

in recent years. A 5-mm Hg decrease in hypertension has been equated with a 16% decrease in this disease (FitzGerald *et al.*, 2004).

Presently, much effort is being invested in detecting bioactive components in foods that can contribute to a decreased risk of lifestyle-related diseases. Among these compounds, rice bran, a by-product of the rice milling process which is produced during the process of brown rice into polished rice, abundantly contains phytochemicals and various antioxidants that impart beneficial effects on rodent and human studies (Sugano *et al.*, 1997). In the rice milling process, approximately 8-10% bran of rice is produced (Lavany *et al.*, 2017). It is well known that major rice bran contains highly unsaponifiable components such as tocotrienol, γ-oryzanol, and β-sitosterol; all these compounds may have the capacity to the lowering plasma lipid levels. Rice bran also contains a high level of dietary fibers (β-glucan, pectin, and gum). In addition, it also contains 4-hydroxy-3-methoxycinnamic acid (ferulic acid), which may also be a component of the structure of non-lignified cell walls (Figure 1).

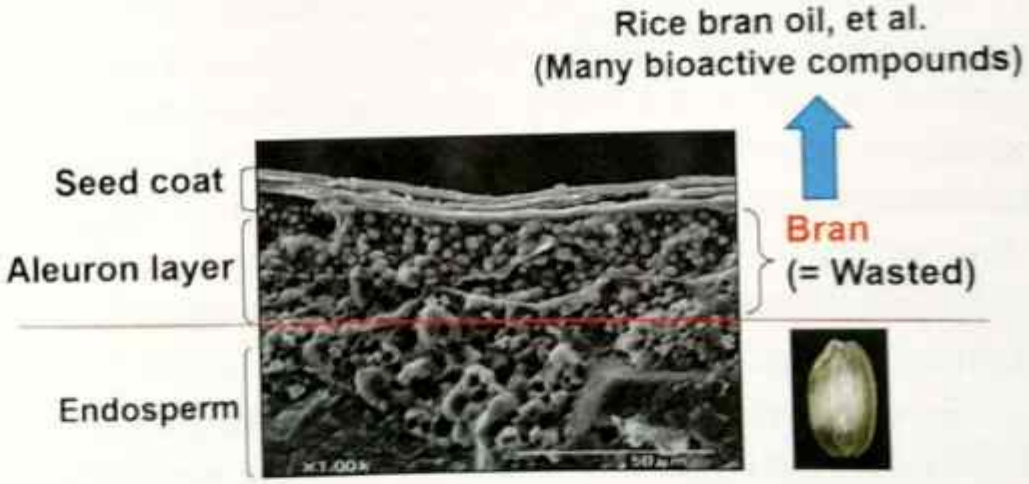

Figure 1. Brown rice morphology (Koseki *et al.*, 2006)

Our studies have successfully developed a new extraction method of rice bran using ethanol or enzymatic treatment to produce new fractions (ethanol fraction; EF and Driselase fraction; DF) of rice bran. With the new method of extraction, we found many surprising results not covered by other studies before (Ardiansyah *et al.*, 2006). We have made the first report that our

fraction of rice bran has the potential to decrease hypertension in the rat model of hypertension. We have found that our fraction has improved the parameter related to hypertension, such as kidney function, angiotensin-1 converting enzyme inhibitory activity, lipid, and glucose metabolisms. The new findings of our study is that the DF as the filtrate of rice bran treated with plant cell wall-degrading enzyme mixture has a beneficial effect on hypertension and improving lipid profiles, and these effects were observed as well as with EF as lipid soluble fraction of rice bran that contains highly unsaponifiable compounds. The synergistic effect of bioactive components contained in the DF and EF is responsible for the reduction of high blood pressure, lipid profile, and glucose metabolism in SHRSP.

The continuation of our studies was then we developed a fractionation method for the identification of active components contained in the DF of rice bran with silica gel column and HPLC by using ODS column. By NMR analyses regarding an active fraction, we found that adenosine and L-tryptophan were the active components. Hypertension, plasma lipid, nitric oxide (NO), insulin, leptin, adiponectin, and glucose metabolism were significantly improved in the adenosine group. The mRNA expression levels of genes involved in fatty acid and glucose metabolism were altered in the adenosine group. Single oral administration of adenosine improved hypertension, plasma triglyceride, glucose, and NO levels 2 h after administration (Ardiansyah *et al.*, 2009).

In summary, we described that dietary supplementation of diets with the DF-treated fraction of rice bran has resulted in numerous protective effects against hypertension, hyperglycemia, and hyperlipidemia in the animal model of lifestyle-related diseases. Moreover, the DF-treated of rice bran could be an excellent functional food derived from the waste of rice milling process. It can be used for dietary functional food ingredient in the absence of therapeutic agents.

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Anton Rahmadi, is a lecturer at Dept. of Agricultural Products Technology, Faculty of Agriculture, Mulawarman University, Samarinda, Indonesia. PhD degree was obtained in 2013 from School of Medicine, University of Western Sydney, Australia. Beforehand, M.Sc degree was awarded by The University of New South Wales, Australia in Food Science and Technology. bachelor was completed at IPB, Indonesia. Currently, he is the head of Agricultural Products Post Harvest and Packaging Laboratory. His position in Indonesian Association of Food Technologists (PATPI) is branch head for East Kalimantan. The research interests are functional food, antioxidant, drying, and post-harvest processing of local food products.

Ardiansyah, obtained his PhD in Agricultural Science from Tohoku University, Sendai. Japan in 2007. He continued his research as Postdoctoral fellowship at the same University until 2012. His career started as Lecturer at Department of Food Technology, Universitas Bakrie since 2012 up to now. His research is currently focusing on functional food especially functional properties of rice bran and its products. He is appointed as secretary general of IAFT (PATPI) (2014-now) and ISFFN (P3FNI) (2015-now). He also active as Journal Editors of Journal of Food Technology and Industry (*Jurnal Teknologi dan Industri Pangan*), Food and Nutrition Journal (*Jurnal Gizi Pangan*), Hayati Journal of Biosciences, and Current Research in Nutrition and Food Science.

SYNOPSIS

The Indonesian Association of Food Technologists (IAFT/PATPI) published a new book as a collection of essays written by members of IAFT come from around Indonesia. Different from the previous books published by IAFT that written in the Indonesian language, the present book was written in English so that this book can be understood and beneficial to the readers from FIFSTA and other countries in the world. Publishing English-language books are the target of IAFT, considering that this professional organization needs to expose the idea, thinking, and concept of its members globally. This book contains five parts, namely Food Security and Safety, New Technology, Functional Foods, Ingredients, and Nutrition, and the last part is about the Specific Issues. A total of 33 authors have contributed their articles to this book with a total number of 35 articles. The contribution of the writers' ideas is very useful for information about the status of food in Indonesia to the wider community. May this book be useful as a reference in preparing policy related the food development, especially in Indonesia, and may give inspiration for further research and development related to food science and technology.

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