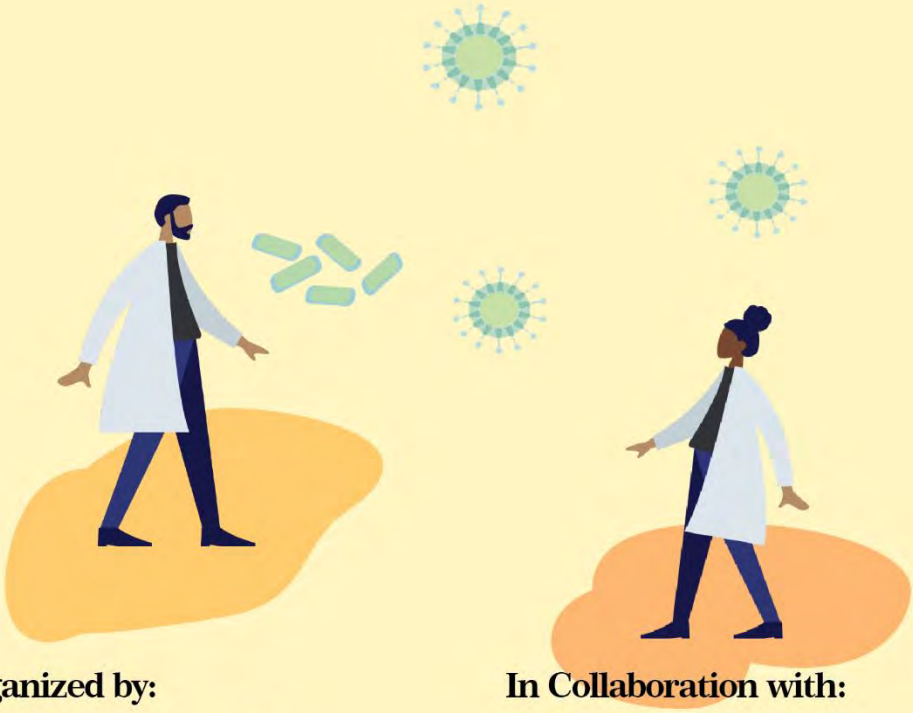
February 20-21, 2020

The 6th International Union of Microbiological Societies

IUMS outreach programme

on Food Safety and Microbial Toxins



Organized by:

IUMS
International Union of Microbiological Societies (IUMS)

PUSAT STUDI PANGAN DAN GIZI
UNIVERSITAS GADJAH MADA
Center for Food and Nutrition Studies

In Collaboration with:

APKEPI
Asosiasi Profesi Keamanan Pangan Indonesia

Patpi
Indonesian Association of Food Technologist

PERMI
Indonesian Society for Microbiology

Faculty of Agricultural Technology

TABLE OF CONTENTS

COMMITTEE OF

IUMS 6TH OUTREACH PROGRAMME

ON FOOD SAFETY AND MICROBIAL TOXINS

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Prof. Dr. Robert A. Samson

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INTRODUCTION

IUMS 6TH OUTREACH PROGRAMME ON FOOD SAFETY AND MICROBIAL TOXINS

In support of its mission to enhance the scientific background and professional effectiveness of basic and applied microbiologists, the International Union of Microbiological Societies (IUMS) is embarking on a program of educational outreach to developing countries and theirmicrobiologists. The Union offers series of course to groups of microbiologists that may include graduate students, postdoctora fellows, and practicing professionals from developing countries. These will be offered periodically in various regions and on different topics.

In order to raise the awareness of food safety, particularly from the microbial aspect, IUMS will organize workshop with the title of "Microbial Toxin in Food". The event is organised by The Center for Food and Nutrition Studies, Universitas Gadjah Mada. In collaboration with PERMI (Indonesian Society for Mircrobiology), PATPI (Indonesian Association of Food Technologist), APKEPI (Indonesian Food Safety Professional Association, Indonesia) and The Faculty of Agricultural Technology, Universitas Gadjah Mada, the event will be held on February 20-21, 2020 at Bulaksumur Hall, Gadjah Mada University Club.

PREFACE
Chairperson of Organizing Committee

To support its goal to improve skills of microbiologists in developing countries, International Union of Microbiological Societies, in collaboration with Center for Food and Nutrition Studies Universitas Gadjah Mada, hold The 6th International Union of Microbiological Societies (IUMS) Outreach Programme on Food Safety and Microbial Toxins on 20 – 21 February 2020 at University Club, Universitas Gadjah Mada. It is a great pleasure for us to be appointed as the organizer for this amazing event. Therefore, we want to express our sincere grattitude for this opportunity by sending our warmest regards.

This educational program will be attended by speakers from all over the world to present their researches and also participants, which are consisted of graduate students, postdoctoral fellows, and practicing professionals from various countries. It will be conducted for two days including seven plenary lectures and two parallel sessions.

We want to thank all the speakers, delegates, and participants for joining this program. Thanks to all sponsors on their supports. And also, we want to give appreciation to members of the organizing committee for their hard work and perseverance so that this event can be done successfully.

Perhaps, this event will be a great platform for attendees to extend their capabilities and network. It is expected that this program could raise awareness and contribute to food safety issues, globally. We wish you lots of accomplishment during the program and we hope you have a pleasant time in Yogyakarta.

Chairperson of Organizing Committee

Dr. Ir. Tyas Utami, M.Sc

PREFACE

Chairman of Center for Food and Nutrition Studies UGM

Firstly, on behalf of Center for Food and Nutrition Studies Universitas Gadjah Mada, I would like to give my warmest welcome to all speakers, delegates and participants at the 6th IUMS Outreach Programme on Food Safety and Microbial Toxins, which takes place in University Club, Universitas Gadjah Mada on 20 – 21 February 2020.

It is an honor for us to host this event, which is an amazing platform for microbiologists in developing countries to extend their capabilities and broaden connections globally while raising public awareness about food safety and mycotoxin issues, especially in Indonesia.

As the Center for Food and Nutrition Studies, it is our vision to support researches in Indonesia, related to food and nutrition study, which is realized by providing research facilitations and public services, conducting studies, and also cooperating with other parties, domestic or foreign, such as universities, institutes, and industries. Therefore, we collaborates with the International Union of Microbiological Societies (IUMS) to hold this outstanding program. We hope that this program will bring positive impacts to all of us, as our contribution on dealing with issues of food safety and microbial toxins.

Lastly, I want to thank the speakers, delegates and participants for attending this event, the sponsors for their everlasting support, and also the organizing committee for their efforts in coordinating this program successfully. We hope this program will be beneficial for all of us.

Thank you.

Chairman of Center for Food and Nutrition Studies UGM

Prof. Dr. Ir. Endang S. Rahayu, MS

PREFACE

Secretary General of International Union of Microbiological Societies (IUMS)

IUMS is one of the 31 Scientific Unions of the International Science Council (ISC). The objectives of the Union are to promote the study of microbiological sciences internationally: initiate, facilitate and coordinate research and other scientific activities which involve international cooperation; ensure the discussion and dissemination of the results of international conferences, symposia and meetings and assist in the publication of their reports; represent microbiological sciences in ISC and maintain contact with other international organizations.

The major goal of IUMS is to promote research and the open exchange of scientific information for advancement of the health and welfare of humankind and the environment and strongly discourages any uses of knowledge and resources to the contrary.

The scientific activities of the Union are conducted by the three Divisions of Bacteriology & Applied Microbiology (BAM), Mycology and Eukaryotic Microbiology (MEM) and Virology and by six specialist international committees, eight international commissions and two international federations. The three divisions are organizing the next congresses in Daejeon (South Korea) 12-16 October 2020 (www.iums2020.org). IUMS invite you all to join this important microbiological event.

In support of its mission to enhance the scientific background and professional effectiveness of basic and applied microbiologists, the IUMS has embarked on a program of educational outreach to developing countries and their microbiologists. These will be offered periodically in various regions and on different topics of interest and importance. It is expected that the IUMS outreach programs will boost the capability of the attendees in their microbiologic work after they return home, and we shall endeavour to forge a network of the attendees, so they can continue to communicate with each other and the instructors.

The first IUMS Regional Course was offered in Singapore, June 14-16, 2010. The second IUMS Regional Course on Food Safety was offered in Bali (Indonesia) 22 - 24 June 2011 and was organized in collaboration with the Indonesian Society of Microbiology, the International Commission on Food Mycology (ICFM) and the International Committee on Food Microbiology and Hygiene (ICFHM). The third IUMS outreach conference on Antimicrobial Resistance took place in Havana, Cuba on November 14-16, 2013. The fourth and fifth IUMS outreach programme on Food Safety and Mycotoxins, on 14-15 November 2014 and 19-20 January 2017 at the Faculty of Agricultural Technology, Universitas Gadjah Mada, Yogyakarta, Indonesia

The sixth IUMS outreach programme on Food Safety and Mycotoxins is now taking place in Yogyakarta, Indonesia 20-21 February 2020. We are very proud that this meeting is organized in close collaboration with CEMycoS, Faculty of Agricultural Technology, Universitas Gadjah Mada Yogyakarta, Indonesia, the Indonesian Society of Microbiology, and the International Commission on Food Mycology (ICFM) and the International Committee on Food Microbiology and Hygiene (ICFHM). IUMS is very grateful to these partners to make the IUMS outreach program to be a success.

On behalf of IUMS I all welcome you all and wish you a wonderful and interesting meeting.

Secretary General of International Union of Microbiological Societies (IUMS)

Prof. Dr. Dr. Robert A. Samson

PREFACE

Chairman of Indonesian Society for Microbiology (PERMI)

To all the speakers, delegates and participants from all over the world, on behalf of Indonesian Society for Microbiology or Perhimpunan Mikrobiologi Indonesia (PERMI), it is an honor for us to welcome you to the 6th International Union of Microbiology Societies (IUMS) Outreach Programme on Food Safety and Microbial Toxins in Yogyakarta, Indonesia on 20 – 21 February 2020.

Providing platforms for microbiologists to exchange knowledge is one of our goals. As member of IUMS and one of the ASEAN's leading organizations in microbiology expertise, Indonesian Society for Microbiology (PERMI) was thrilled to be appointed as the host of the 6th IUMS Outreach Programme in Yogyakarta . We believe that this program is an embodiment of our organization's purposes which can contribute for the development of microbiology especially in Indonesia. Through this program, we hope that we can strengthen our network, for academic and commercial parties, in microbiology sector.

We want to thank the International Union of Microbiological Societies (IUMS), Center for Food and Nutrition Studies Universitas Gadjah Mada, sponsors and all members of the organizing committee for helping us to conduct this event. Congratulations for all the speakers, delegates, and participants for contributing in this programs! Let's keep on doing our best for the future of Indonesia's microbiology!

Best Regards,

Chairman of Indonesian Society for Microbiology (PERMI)

Dr. Ir. Iman Rusmana

PROGRAM

IUMS 6TH OUTREACH PROGRAMME

ON FOOD SAFETY AND MICROBIAL TOXINS

DAY ONE – FEBRUARY, 20 2020

07.30 – 08.00	Registration
08.00 - 08.05	Opening
08.05 - 08.15	Welcoming Dance
08.15 - 08.20	Welcome Remarks from Dr. Iman Rusmana as President of PERMI
08.20 - 08.25	Welcome Remarks from Dr. Tyas Utami as Head of Event
08.25 – 08.30	Welcome Remarks from Prof. Dr. Ir. Endang S Rahayu, MS as Chairman of Center for Food and Nutrition Studies UGM
08.30 – 08.35	Welcome Remarks from Prof. Dr. Dr. Robert A. Samson as Secretary General of IUMS
Plenary Lecture 1: Food Safety	
08.35 – 09.00	Dr. Angel Medina Vaya - Climate Change and Mycotoxins: Implications for Food Safety (UK)
09.00 – 09.25	Dr. Antonio Logrieco - MycoKey: A Success Story for Minimizing Mycotoxins Along Chains (Italy)
09.25 – 09.50	Prof. Dr. Dr. Robert A. Samson - Mycotoxins and Food Fermentation (Netherlands)
09.50 – 10.15	Dr. Ir. Roy Sparringa - Food Safety Management in Indonesia (Indonesia)
10.15 – 10.30	***Coffee Break and Poster Session***
Plenary Lecture 2: Foodborne Fungi: Risks, Control, and Opportunities	
10.30 – 10.50	Dr. Celine Meerpoel - Mytox-South: Global Partnership for Mycotoxin Mitigation and Capacity Building (Belgium)
10.50 – 11.10	Dr. Shohei Sakuda - Chemical Biology of Aflatoxin Production Inhibitors (Japan)
11.10 – 11.30	Dr. Warapa Mahakarnchanakul - Mycotoxigenic Fungi and Mycotoxins in Selected Cereals in Thailand and Theirs Exposure Assessment (Thailand)
11.30 – 11.50	Prof. Dr. Ir. Endang S. Rahayu - Mycotoxins: Regulation and Risk Management in Indonesia (Indonesia)
11.50 – 12.10	Prof. Dr. Ir. S Joni Munarso - Recent Advances in Reducing Microbial and Mycotoxins Contamination in Fresh Produces of Indonesia (Indonesia)

12.10 – 13.10	***Lunch Break***
Plenary Lecture 3: Methods and Approach in Food Safety	
13.10 – 13.30	Prof. Dr. Vasilis Valdramidis - A Systematic Approach to Model (Myco-)toxin Production of Common Microbial Contaminants (Malta)
13.30 – 13.50	Dr. Widiastuti Setyaningsih - Analytical Extraction Methods for Mycotoxins in Foods (Indonesia)
13.50 – 14.10	Prof. Dr. Naresh Magan - Minimisation Strategies for Control of Toxins Using Natural Compounds for Improving Food Safety (UK)
Plenary Lecture 4: Foodborne Fungi: Risks, Control, and Opportunities II	
14.10 – 14.30	Prof. Dr. Emmanuel Coton - Mycotoxin Migration in Moldy Foods: 2 Case Studies (France)
14.30 – 14.50	Prof. Dr. Jens C. Frisvad - The Most Important Mycotoxins in Warm Climates (Denmark)
14.50 – 15.10	Prof. Dr. Okky S. Dharmaputra - Mycotoxins in Indonesia Food (Indonesia)
15.10 – 15.30	Dr. Latiffah Zakaria - Black Aspergillus from Various Substrates and Indoor Environment in Malaysia and Ochratoxin a Production (Malaysia)
15.30 – 15.50	Dr. Ignatius Srianta - Development of Monascus-fermented Products and Its Safety Aspect (Indonesia)
15.50 – 16.05	***Coffee Break and Poster Session***
Plenary Lecture 5: Food Safety II	
16.05 – 16.25	Prof. Dr. Ratih Dewanti-Hariyadi - Challenges in Global Food Safety (Indonesia)
16.25 – 16.45	Dr. I Nengah Sujaya - Microbial Safety Aspect of Balinese Traditional Fermented Foods (Indonesia)
16.45 – 17.05	Dr. Yoyok Budi Pramono - Development of Scoring Methods on the Application of HACCP and GMP in The Micro, Small, and Medium Food Industries in Indonesia to Maintain Food Safety (Indonesia)
17.05 – 17.25	Dr. Erryana Martati - Safety Assessment of Plant-based Food Supplement (Indonesia)
17.25 – 20.00	**Dinner**

PROGRAM

IUMS 6TH OUTREACH PROGRAMME

ON FOOD SAFETY AND MICROBIAL TOXINS

DAY TWO – FEBRUARY, 21 2020

07.30 - 08.00	Registration
	Parallel Session Program
08.00 – 09.40	**Room 1**
	Indun Dewi Pupita - Growth rate, Histamine Production, and Biofilm Formation of Histamine-producing Bacteria Isolated from Skipjack Tuna
	Isti Handayani - Inhibition of Escherichia coli FNCC 0097 by *Lactobacillus plantarum* Mut 7 FNCC 250 in Probiotic Okara Drinks During Storage
	Thanapoom Maneeboon - Potential of Patulin Production of Heat Resistant Mold (HRM) from Plantation Soils in Thailand
	Devita Safitri - Influence of Giving Extract and Basil Leaf Powder (*Ocimum basilicum*) to Decrease in Cholesterol Levels in Squid (*Loligo sp*.) and Vaname Shrimp (*Litepenaeus vannamei*)
	Sponsorship Session
	Room 2
	Utami Sri Hastuti - Contaminant Mold Identification and Aflatoxin Analysis in Damaged Coriander (*Coriandrum sativum L.*)
	Deli Lilia - Mycotoxins Exploration and Ochratoxin Quantity in Coffee Beans during the Drying Process using the LC-MS method in South Sumatra
	Slamet Fauzi - Hot Water Treatment as Effort to Inhibits the Anthracnose Disease and Maintain the Quality of Situbondo Mango Fruit
	Retno Tri Astuti - Screening, Isolation and Identification of Potential Bacteria Producing Cold-Adapted Lipase from Fish Cold Storage
	Sponsorship Session
09.40 – 09.55	**Coffee Break and Poster Session**

Parallel Session Program	
09.55-11.25	**Room 1**
	MMA Retno Rosariastuti - Rice Absorption of Lead (Pb) in Remediation of Land Contaminated by Lead (Pb) Using Agent Bioremediation and Inorganic Fertilizers
	Karseno - Antimicrobial Activity of Coconut Shell and Fiber and its Potential to be Used as Natural Preservatives for Coconut Sap
	Osfar Sjofjan - Effect of Red Ginger (*Zingiber Officinale Var. Rubrum*) as Feed Additive on Hybrid Duck Performance and Intestinal Microflora
	Nurhayati - Microbiology Safety and Halal Investigation of "Cilok" Meatball at UNEJ Campus Surrounding
	Anggie - Safety of Functional Drink of Coffee, Gambir and Ginseng Based on Microbe Test
	Room 2
	Rahmawi Annis Setiawati - Effect of Activated Carbon Adsorbent from Variations of Raw Material to Acid and Peroxide Number of Waste Cooking Oil
	Adi Saputrayadi - Ratio the Addition of Soursop Fruit Extracts to Several Components of The Quality Sweet Corn Milk Yoghurt
	Agus Wijaya – The Loss of Antibacterial Activity in Kinang Prepared with Extraction and Pulverization Method
	Syerina - Safety of Functional Drink of Coffee and Gambir Based on Microbe Test
	Diatari Agustini - Safety of Functional Drink Green Coffee and Gambir Based on Microbe Test
11.25 – 13.30	***Lunch Break***
Plenary Lecture 6: Foodborne Fungi: Risks, Control, and Opportunities	
13.30 – 13.50	Dr. Angel Medina Vaya - Non-invasive Methods for Detecting Spoilage Microorganisms in Fruits and Vegetables (UK)
13.50 – 14.10	Prof. Dr. Naresh Magan - Microbiota from Fermented Foods: Potential for Control of Toxigenic Moulds (UK)
14.10 – 14.30	Prof. Dr. Emmanuel Coton - In Vitro Toxicological Evaluation of Mycotoxins: Getting Closer to Reality (France)
14.30 – 14.50	Prof. Dr. Jens C. Frisvad - New Potentially Important Co-occurring or Emerging Mycotoxins (Denmark)

14.50 – 15.05	***Coffee Break and Poster Session***
Plenary Lecture 7: Quantitative Microbiology	
15.05 – 15.25	Dr. Antonio F. Logrieco - Genomic Analysis of Toxigenic Fungi and Inter-, Intraspecific Variability of Mycotoxin Gene Clusters (Italy)
15.25 – 15.45	Prof. Dr. Vasilis Valdramidis - Principles of Predictive Modelling in Food Mycology and Beyond (Malta)
15.45 – 16.05	Dr. Celine Meerpoel - Overview of the current analytical techniques for the determination of mycotoxins and methodologies for health risk assessment (Belgium)
16.05 – 16.25	Dr. Francisco B. Elegado - Development of a DNA-based Nanobiosensor System for Rapid and Accurate Detection of Food, Feed, and Water-borne Pathogens (Philippines)
16.25 – 16.45	Prof. Dr. Naresh Magan – MyToolBox: Smart Strategies for Effective Mycotoxin Management in Staple Food Chains (UK)
16.45 – 16.50	**CLOSING**

PARALLEL SESSION PROGRAMME

07.30 - 08.00	Registration
Parallel Session Program	
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08.00 – 08.20	Indun Dewi Pupita - Growth rate, Histamine Production, and Biofilm Formation of Histamine-producing Bacteria Isolated from Skipjack Tuna
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09.20 – 09.40	Sponsorship Session
09.40 – 09.55	***Coffee Break and Poster Session***

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11.05 – 11.25	Diatari Agustini - Safety of Functional Drink Green Coffee and Gambir Based on Microbe Test

LIST OF POSTER

Code	Presenter	Title
P-001	Susana Ristiarini	Antibacterial Of Angkak by *Monascus purpureus* Strains Producing High Pigments and Low Citrinin
P-002	Lalita Khacharat	Effect of Banana Peel Powder on Citrinin Production by *Monascus purpureus*
P-003	Maylan Iga Prastika	Food Safety Analysis on Wet Noodle in Karanganyar District, Central Java
P-004	Tri Marwati	The Effects of *Lactobacillus plantarum* Hl-15 Inoculum Addition in The Cocoa Beans Fermentation to Mold Growth During Fermentation
P-005	Titiek Farianti Djaafar	The Assessment of Good Manufacturing Practice (GMP) Application and Critical Control Point (CCP) Determination on Cacao Powder Processing in Agricultural Techno Park Nglanggeran, Yogyakarta
P-006	Nurwulan Purnasari	Perception and Practices Regarding Food Safety and Health Profile of College Student In Central Java
P-007	Jessica Angela	Effect of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink
P-008	Destine Mahadevi Loman	Effect of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink
P-009	Ratna Puspa Citra Ningrum	Effect of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink
P-010	Vidjerinalisa Handojo	The Effect of Jackfruit Seed Flour Addition of Physiochemistry Properties Tomato Ketchup
P-011	Kenya Gathaya Psari	The Effect of Jackfruit Seed Flour Addition of Physiochemistry Properties Tomato Ketchup
P-012	Kristinawati Asnadi	The Effect of Jackfruit Seed Flour Addition of Physiochemistry Properties Tomato Ketchup

P-013	Retty Putri Utami Dwipa	Competition of Toxigenic Isolates of *Aspergillus flavus* and *Aspergillus carbonarius* Under Shifting Temperature
P-014	Ketsaree Klinsukhon	Antibacterial Activity of Ethanol Extract and Essential Oil of Piper betle Leaves Against Foodborne Pathogens
P-015	Ilzamha Hadijah Rusdan	A Preliminary Study on Food Safety Knowledge and Attitude Of Licking Fingers After Eat Among Early Adulthood in Central Java Indonesia
P-016	Alfindo Prayogo	Utilization Of White Oyster Mushroom as a Substitute for Chicken Meat in Making Nuggets
P-017	Chananya Chuaysrinule	Influence Of Temperature and Water Activity on Growth and Production Of Aflatoxin B1 by *Aspergillus flavus* and *Ochratoxin A* by *A. carbonarius* Isolated from Dried Chili
P-018	Sandriana J Nendissa	AntiFungal Inhibitor Activity Test of Nutmeg Extract (Myristica fragrans Houtt) Against *Aspergillus flavus*
P-019	Supunnika Somjaipeng	Efficacy Of Hot Water Treatment to Control *Fusarium sp.* and *Penicillium sp*. Strains Isolated from Pepper Fruits (*Piper nigrum* L.): In Vitro Studies
P-020	Angela Dea Rachmasari	Microbiology Quality Of Probiotic Jelly Candy *Lactobacillus plantarum* Dad-13
P-021	Mifta Gatya	Detection of Microbiological Contamination in Probiotic Chocolate Candy with Addition of *Lactobacillus plantarum* DAD-13
P-022	Gabriela Belinda A.	Study of Heavy Metal Contamination in Probiotic Chocolate Candy with Addition of *Lactobacillus plantarum* DAD-13
P-023	Rachma Wikandari	A Preliminary Study of The Occurrence of Toxigenic Fungi and Mycotoxin in Commercial Chili Products Marketed in Yogyakarta, Indonesia

ABSTRACTS OF INVITED SPEAKER

Mycokey Strategies for Mycotoxin Management in The Food and Feed Chain

A. F. Logrieco

Research National Council, Institute of Sciences of Food Production, Via Amendola 122/O, Bari, Italy.
Email: Antonio.logrieco@ispa.cnr.it

ABSTRACT

Mycotoxins are major food contaminants affecting global food security, especially in low and middle income countries. The management of good agricultural practices in the pre- harvest is a key issue for minimizing the risk of mycotoxin accumulation in the crops before the harvest. Such practices can involve crop rotation, tillage, proper fertilization and fungicide or biological control distribution, variety selection, timely planting and harvests. On the other hand, the reduction of mycotoxins along the food and feed chain is also highly depending from a correct post-harvest management that must aim firstly at the separation of the infected crop products from the healthy material. Therefore, the use of different tools such as manual sorting or optical sensors is also a crucial point for reducing the level of mycotoxin contamination of a given crop. Moreover, it is extremely important to prevent post-harvest contamination and develop practical and effective post-harvest procedures for mycotoxin reduction in the food supply chains and to provide alternative and safe use options for contaminated batches. An update review will be given on integrated management of pre-and post harvest practices aiming at the minimizing the risk of mycotoxin contamination along malting and brewing chain and main effective solutions, including the development of a MycoKey app, proposed and reached by EU project MycoKey (http://www.mycokey.eu/). In the MycoKey project a Mycotoxin Charter (http://charter.mycokey.eu/) was launched with the aims to sharing the needs of a global harmonization regarding legislation and policies related to mycotoxins in order to optimize the efforts and minimize human and animal exposure worldwide with particular attention to poor and not regulated third countries. This presentation has been supported by the EU Project MycoKey N. 678781.

Genomic Analysis of Toxigenic Fungi and Inter-, Intraspecific Variability of Mycotoxin Gene Clusters

Susca A., A. Villani, M. Haidukowski, **A. F. Logrieco** and A. Moretti.
Institute of Sciences of Food Production, Italian National Research Council (ISPA-CNR), Via Amendola 122/O, 70126, Bari, Italy.
E-mail: antonio.logrieco@ispa.cnr.it

ABSTRACT

Fungal genomes carry many more biosynthetic pathways than known compounds, demonstrating that the fungal kingdom has been an underexploited resource of secondary metabolites (SMs), including the mycotoxins. Knowing the diversity of biosynthetic pathways encoded in fungal genomes is therefore a powerful tool for screening their intra- and interspecific variability of mycotoxin gene clusters. Among plant pathogens, great concern is due to the occurrence of toxigenic fungi on food and feed crops, since the mycotoxin accumulation in the final products represents a serious risk for human and animal health. Among the species that produce mycotoxins *in planta*, fungi belonging to *Aspergillus* and *Fusarium* genera are the most common and show a great variability of their mycotoxin profile among species, even in close phylogenetically related species, but also at intraspecific level. We report here results of our studies conducted using Whole Genome Sequencing approach, which allow us to evaluate the: *i*) variability of ochratoxin A (OTA) production related to the occurrence of gene (*ota*) cluster in *Aspergillus niger* clade; *ii*) variability of beauvericin (BEA) production and BEA gene cluster occurrence in *Fusarium subglutinans* and *Fusarium temperatum*, two phylogenetic sister species where toxigenic potential is not related to real production capacity *in vitro*; *iii*) variability of trichothecenes (TRI) production in the *Fusarium equiseti/incarnatum* species complex and related variability in TRI genes cluster. Taken together, these data show that mycotoxin gene clusters can dramatically differ within a single species, or among very closely related species, and the lack of a given mycotoxin production, at least *in vitro* conditions, is frequently but not always related to the absence of genes cluster.

This presentation has been supported by the EU Project MycoKey N. 678781

(http://www.mycokey.eu/).

A Systematic Approach to Model (Myco-)toxin Production of Common Microbial Contaminants

Vasilis P. Valdramidis[1*], Efstathios Z. Panagou[2], So nia Mar n Sillue [3]
[1]University of Malta, Department of Food Science and Nutrition, Msida, Malta

[2]Agricultural University of Athens, Department of Food Science and Human Nutrition, Athens, Greece

[3]University of Lleida, Department of Food Technology, Lleida, Spain

*vasilis.valdramidis@um.edu.mt

ABSTRACT

Mycotoxins are secondary metabolite products of fungal contaminants which have been reported to contaminate a product, raw or processed, all over the food chain, in the field as well as during storage, or at later points. They are known to be toxic to human and animal and, consequently, they can also pose a heavy economic burden to the industry. It is therefore imperative to describe accurately their responses in the food chain with the use of mathematical expressions. Modelling mycotoxin production is challenging due to the high variability in mycotoxigenic potential among species and isolates. Besides, mycotoxin biosynthesis pathways and factors influencing them are still poorly understood. Deterministic modelling approaches describing the kinetics of different mycotoxins, i.e., aflatoxins, ochratoxin, deoxynivalenol (DON) and zearalenone (ZEA), in relation to intrinsic and extrinsic variables under various substrates and storage conditions, will be reviewed. Additionally, logistic models based on binary response analysis will be presented as an alternative approach to assess the presence or absence of different mycotoxins, while examples of more mechanistic approaches integrating gene expression and toxin production will also be outlined. Research regarding mycotoxin modelling and climate change has been of great interest the past years. Therefore, current trends on modelling the impact of climate, pathogen and host, including cropping systems, will be highlighted and approaches on taking into account dynamic temperature/water activity scenarios will be demonstrated. All the presented modelling approaches will be presented as powerful tools for providing great support on disease and mycotoxin risk under realistic anticipated scenarios.

Principles of Predictive Modelling in Food Mycology and Beyond

Vasilis P. Valdramidis[1*], Efstathios Z. Panagou[2], So nia Mar n Sillue [3]

[1]University of Malta, Department of Food Science and Nutrition, Msida, Malta

[2]Agricultural University of Athens, Department of Food Science and Human Nutrition, Athens, Greece

[3]University of Lleida, Department of Food Technology, Lleida, Spain

Email: vasilis.valdramidis@um.edu.mt

ABSTRACT

The development and application of models in food safety and food spoilage falls within the discipline of quantitative microbiology/mycology. Overall, the models developed in predictive mycology aim at the quantification of the effects of intrinsic, extrinsic and/or processing factors on the resulting microbial growth, inactivation or inhibition in food (model) products. These models rely on the possibility to interpolate the resulting microbial proliferation for combinations that are not only originally examined, but also included in the range of the experiment design. Numerous modelling approaches have been published the past years in the literature to describe the relationship between driving variables and each step of fungi infection cycle (i.e., sporulation, infection or toxin production). These models aim at addressing different issues such as identifying microbial risks and deciding on interventions in the food chain, optimising a food process, assessing the food shelf life, etc. The main principles of predictive modelling in food mycology will be discussed by providing an overview and interpretation of terms used in the area as well as demonstrating a classification and a description of the procedure to develop models. The importance of choosing informative experimental designs, selecting appropriate modelling structures, performing identification techniques for estimating accurate and precise parameters and validating the models will be outlined. Specific focus will be given to the mathematical models used to quantify the influence of different factors on mould growth and assessing the inhibition capacity of antifungal compounds. Future trends and needs on quantitatively assessing strain variability and heterogeneity, of for example stress-resistance, and its implication on the development of mycological risk assessment models will be discussed.

Minimisation Strategies for Control of Toxins Using Natural Compounds for Improving Food Safety

Naresh Magan and Angel Medina
Applied Mycology Group, Cranfield University, Cranfield, Beds. MK43 0AL, U.K.

Email: n.magan@cranfield.ac.uk

ABSTRACT

There has been significant interest in the development of alternative more environmentally friendly natural compounds for control of mycotoxigenic fungi and there associated mycotoxin contamination of food and feed. This presentation will cover the potential use of different anti-oxidants, essential oils and other plant extracts for the control of a range of mycotoxigenic fungi including *Aspergillus flavus*, *Aspergillus carbonarius*, *Fusarium* species and *Penicillium graminearum*. It is important that we consider both control of growth and mycotoxin production. Individual compounds and interacting mixtures of compounds may differ in their controlling effect. In addition, while under some abiotic conditions control of growth and toxin production may be effective, under others the presence of the controlling compounds can lead to a stimulation of toxin production and thus a higher risk in specific food and feed chains. This presentation will highlight the importance of examining such efficacy in the context of hurdle technology and the use of rapid methods for screening for efficacy against specific toxin producing species using examples from both essential oils, anti-oxidants and other types of plant extracts.

Microbiota from Fermented Foods: Potential for Control of Toxigenic Moulds and Pathogens

Naresh Magan, Azlina Mohd Danial* and Angel Medina.

Applied Mycology Group, Cranfield University, Cranfield, Beds. MK43 0AL, U.K.
Email: n.magan@cranfield.ac.uk
*Present address: MARDI, Kuala Lumpur, Malaysia

ABSTRACT

There has been significant interest in the isolation of useful secondary metabolites from fermented foods in Asia, These could be alternative novel compounds for use as preservatives in both food safety applications and for control of medically important fungal pathogens. In this study 66 Lactic Acid Bacteria (LABs) strains, isolated from Malaysian fermented foods, were screened for activity and efficacy against *Aspergillus fumigatus, Fusarium verticillioides, Penicillium verrucosum* and the dermatophyte *Trichophyton rubrum*. In additiona metabolites from a Strepomyces AS1 were also screened for efficacy. Only four LAB strains had good efficacy in controlling germination, growth and sporulation of the dermatophyte *T.rubrum in-vitro*. The *Streptomyces* AS1 extracts were effective against all the fungal pathogens tested. Detailed studies with some LAB strains showed that *L.plantarum* strain VS1 alone contributed the highest antifungal activity compared to the other three strains examined, alone or in co-culture. Growth of the dermatophyte *T.rubrum* was inhibited significantly ($p<0.05$) by VS1 supernatant when using the optimized culture conditions. The best culture conditions were 35^{o}C, pH 6.2 + glucose as the carbon source. Six metabolites were found in the LABs, with the two major metabolites L-lactic acid (19.1 mg/g cell dry weight (CDW)) and acetic acid (2.2 mg/g CDW). The MIC, IC_{50} and MFC were 20 mg/mL, 14 mg/mL and 30 mg/mL, respectively. A comparative study showed that the supernatants gave higher efficacy ($p<0.05$) than the single compound identified in the supernatants and the major compound responsible for the antifungal activity against *T.rubrum* was L-lactic acid.

For the *Streptomyces* AS1 strain, the ethyl acetate extract was very effective at inhibiting spore germination of *P.verrucosum* when compared to that of *A.fumigatus* and *F.verticillioides*. The efficacy was further confirmed in studies on a conducive semi-solid YES medium in Bioscreen C assays. The increment of time to detection (TTD) at OD = 0.1 for *P.verrucosum* treated with AS1 extract at 0.95 and 0.99 a_w was the highest amongst the three fungi. Ten metabolites were identified and three of these were present in concentrations >10 µg/g CDW. These were identified as valinomycin, cyclo(L-Pro-L-Tyr) and cyclo(L-Pro-L-Val). Comparative studies showed that the AS1 ethyl acetate extract which contained a naturally

produced mixture of the various compounds significantly ($p<0.05$) inhibited growth and OTA production by *P.verrucosum* than the individual compounds.

MyToolBox: Smart Strategies for Effective Mycotoxin Management in Staple Food Chains

Naresh Magan[1]and Rudolf Krska[2]

[1]Applied Mycology Group, Cranfield University, Cranfield Bedford MK43 0AL, U.K.

[2]Department IFA-Tulln, BOKU, Vienna, Austria.

ABSTRACT

The MyToolBox project (www.mytoolbox,com; 2016-2020) is an EU project which has a multi-actor and multi-disciplinary approach to throughout staple food and feed chains with 40% industrial participation. This project has developed pre-harvest and post-harvest mycotoxin and processing minimisation strategies for wheat, maize and peanuts. This has included the successful development of pre-harvest use of non-toxigenic strains of *A.flavus* for aflatoxin control in Europe as well as the use of biofumigation approaches to reduce inoculum of *Fusarium* and associated mycotoxins in small grain cereals. This has been complimented by the integration of static and dynamic information on cereal agronomy and weather data to obtain real time data on relative risk of pre-harvest mycotoxins (e.g. Deoxynivalenol, Zearalenone, Fumonisins and Aflatoxins). Post-harvest management of stored commodities has been improved by the development of real time sensors for CO_2, temperature and R.H. to obtain information on an hourly basis on any changes in CO_2 due to mould growth and mycotoxin contamination. These physical measurements are linked to biological boundary models for growth and toxin production in wheat, maize and peanuts for relevant mycotoxins. This allows remedial action to be taken in a timely and effective manner. Processing of cereals is important and novel systems have been developed in association with industry (Barilla, Parma, Italy) on improved approaches for reducing mycotoxins from entering cereal food chains. The effective use of contaminated batches (so-called safe use options) has also been successfully addressed by the development of bioethanol production systems. Finally, most of the data has been integrated into a E-platform which has static and dynamic components which can be easily used by farmers, post-harvest managers and processors for reducing mycotoxin contamination in food and feed chains.

Acknowledgement: This project has been funded by the European Commission (EC) under the Horizon 2020 grant agreement Nr. 678012.

Climate Change and Mycotoxins: Implications for Food Safety

Angel Medina*[1], Carol Verheecke-Vaessen[1], Esther Garcia-Cela[1], MatthewK Gilbert[2], Michael Sulyok[3], Deepak Bhatnagar[2], Naresh Magan[1]

[1]Applied Mycology Group, Cranfield University, MK43 0AL, UK

[2]USDA, Agricultural Research Service, New Orleans, LA

[3]Centre for Analytical Chemistry, University of Natural Resources and Life Sciences Vienna (BOKU), Austria

*Presenter: a.medinavaya@cranfield.ac.uk

ABSTRACT

There is a significant interest in the impact that climate change factors may have on mycotoxigenic fungi. We have, in the last 5 years, examined on under different media and grains the impact that three-way interactions between water stress (a_w; 0.99-0.90), temperature (current *vs* +2 or +5°C) and CO_2 exposure (400 *vs* 1000 ppmv) have on: (i) growth, (ii) the relative expression of genes un the biosynthetic clusters using both RT-qPCR and RNAseq, and (iii) the phenotypic toxin production by several species/mycotoxins. This includes *Aspergillus flavus* and aflatoxins, *Fusarium langsethiae* and T-2 and HT-2 and *Aspergillus* spp. and ochratoxin A, amongst others.

Generally, the results have shown that for growth rates of the different species exposed to climate change interacting factors were relatively little unaffected. In contrast, the three-way interacting conditions (elevated CO_2, a_w, T) had a profound effect on mycotoxin production, both in media and grains. Importantly, under slightly elevated CO_2 conditions there was a stimulation in the production of some mycotoxins. These changes in toxin production were confirmed through gene expression experiments and metabolomic tests to study potential shifts in secondary metabolites production under the forecasted climatic conditions in the coming decades. These studies provide important data which is necessary to improve the more accurate assessment and allow the correct prediction of the real impacts of Climate Change on mycotoxigenic fungi and food safety.

Non-invasive Methods for Detecting Spoilage Microorganisms in Fruits and Vegetables

Angel Medina, Maria Gutierrez-Pozo, Sofia Kourmpetli, Leon Terry and Naresh Magan

Applied Mycology Group, Environment and AgriFood Theme, Cranfield University, Cranfield Beds. MK43 0AL, U.K.

*Presenter a.medinavaya@cranfield.ac.uk

ABSTRACT

Agri-food is an important industrial sector with high economic value worldwide. Due to year-round consumer demand, fresh fruit and vegetables need to be stored for long periods post-harvest. In turn, a significant percentage of these fruit and vegetables is lost (20-30%) due to fungal spoilage or degradation during handling, storage and transportation between the farm to fork chain. It is thus necessary to find simple and reliable early biomarkers to identify at risk perishables due to latent infections or surface fungal pathogens, including toxigenic ones.

In this area, our research group has focussed on the utilization of Volatile Organic Compound (VOC) fingerprinting of both fruit and vegetables to detect early spoilage by bacterial and fungal pathogens. There are very few systems to reliably quantify and measure simultaneously several relevant volatile biomarkers in real time with sufficient sensitivity in the storage atmosphere or on the production and packaging lines. The current available sensing systems range from GC-MS systems with excellent selectivity/sensitivity that require skilled operators (high cost, not real time) and E-noses which are relatively inexpensive but only provide qualitative fingerprints using head space analyses.

At Cranfield we have been working for the last 5 years in several projects with the aim of developing tools to quickly identify VOCs as biomarkers that allow the industry to identify potential problems in both production/packaging lines and in storage facilities. This presentation will focus on some of the successful approaches and limitations we have encountered in this research for the identification of latent fungal pathogen infections in soft fruit and potatoes and the technologies that are currently being developed, including the use of photonics and related technologies.

Mycotoxin Migration in Moldy Foods: 2 Case Studies

Monika COTON, Philippe DANTIGNY, **Emmanuel COTON**

Univ Brest, Laboratoire Universitaire de Biodiversité et Écologie Microbienne, F-29280 Plouzané, France

*Email : Emmanuel.Coton@univ-brest.fr)

ABSTRACT

Molds can contaminate a variety of food products and fungal spoilage is estimated to represent 5-10% of food losses and waste. The main problem with mold spoiled foods is the possible production of mycotoxins that can diffuse from the mycelium to the product. In the context of a growing world population and the need to reduce food waste, providing recommendations to the consumer to discard or to cut off part of the product can be considered. However, these recommendations should be supported by data concerning mycotoxin diffusion in the food product and should ensure food safety. To study mycotoxin migration, a worst-case scenario should be privileged by selecting the highest mycotoxin producing strain and the most toxic mycotoxin(s) for humans. Moreover, experimental setup should mimic as close as possible consumer habits in terms of food storage temperature, relative humidity and duration. Using this approach, i) the production of ochratoxin A and citrinin by *Penicillium verrucosum* and migration in Comté cheese and ii) the production and migration of patulin in *Penicillium expansum* molded apples were studied. The obtained data led to possible recommendations for consumers.

In Vitro Toxicological Evaluation of Mycotoxins: Getting Closer to Reality

Nolwenn HYMERY, **Emmanuel COTON**

Univ Brest, Laboratoire Universitaire de Biodiversité et Écologie Microbienne, F-29280 Plouzané, France

Email : Emmanuel.Coton@univ-brest.fr

ABSTRACT

Toxicological evaluation of mycotoxins, especially for regulations, is usually performed individually and in acute conditions, while the reality of contamination in the food chain is rather multi-occurrence of mycotoxins and chronic exposure. Moreover, at least part of these toxicity evaluations are performed on animal models that are not always representative of humans and ethical questions can be raised. In this context, in vitro approaches are of interest and respond to the 3Rs (Replacement, Reduction and Refinement for more humane animal research); however, one of their downfalls is the lack of representativity of in vivo model complexity. In this presentation, some results based on comparisons between the classical approaches and co-exposure and/or chronic studies using more complex cellular models (co-cultures, spheroids) will be provided.

Mycotoxins in Fermented Food

Robert A. Samson
Westerdijk Fungal Biodiversity Institute, Uppsalalaan 8, 3584CT Utrecht, The Netherlands

ABSTRACT

Fungi growing on food mostly can spoil the products which can cause enormous economic losses. In addition, many species produce toxic compounds, known as mycotoxins which are harmful when these toxins are consumed. However, fungi are used for centuries to make food and beverages more edible and enhance the texture and flavour. It is usually assumed that these fungi are beneficial for us, but there is ample information that fungi used in fermentation may also produce mycotoxins. In the presentation an overview of species used in food fermentation is given with the differences whether these fungi are used in the Western world or in South East Asia. The concept of fungal domestication and its implication for food will be discussed with examples of *Aspergillus flavus* and *A. oryzae* and *Rhizopus microsporus* and *R. oligosporus*. The presence of the mycotoxin rhizonin in *Rhizopus microsporus* will be elaborated. The use of the related species *Rhizopus oligosporus* in Indonesian tempe have started the discussion whether tempe is unsafe. In the presentation the facts will be discussed. The use of *Aspergillus oryzae* and possible occurrence of aflatoxins will be illustrated with the use of this fungus in the fermentation of soybeans in South Korea. *Monascus purpureus* which is widely used for the fermentation of rice and known as the red Chinese rice or angkak. The species can produce the mycotoxin citrinin. The fermented product is used in South East Asia but also becomes popular as a medicine in the Western world because certain metabolites of *Monascus* (e.g. monacolin K, also known as lovastatin) have a healing property improving blood circulation by decreasing cholesterol and triglyceride levels. However, because of the production of high levels of citrinin it is banned in Europe and the USA.

Development of DNA-Based Nanobiosensor Prototype for the Detection of Food and Water Borne Pathogens*

D. J. Mendoza[1], J. R. Noe[1], M. K. Suministrado[1], I. A. Lopez[1], Z. K. Baybay, J. E. I. Zapater[2], M. T. M. Perez[1], L. C. Trinidad[1], M. T. J. A. Atienza[1], L. M. Fernando[2], M. J. B. Aguila[3], F. E. Merca[3], E. C. Alocilja[4] and **F. B. Elegado**[1*]

[1]National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños, College, Laguna, Philippines
[2]Institute of Crop Science, College of Agriculture and Food Science, University of the Philippines Los Baños, College, Laguna, Philippines
[3]Institute of Chemistry, College of Arts and Sciences, University of the Philippines Los Baños, College, Laguna, Philippines
[4]Nanobiosensor Laboratory, Dept. of Biosystems and Bioengineering, Michigan State University, East Lansing, MI, USA

*Corresponding & presenting author, E-mail: fbelegado@up.edu.ph/fbelegado@hotmail.com

ABSTRACT

Nanobiosensors which combine bio-specific recognition systems with physical or electrochemical signaling and utilizes nanoparticles may have the potential for a simpler, more rapid, cost-effective and highly sensitive and specific detection compared with standard culture-based methods and other assays (ELISA, PCR, qPCR, LAMP). Aside from the expensive equipment, most of these assays need enrichment step(s) for better sensitivity and selectivity but which could be time-consuming. Nanobiosensors could also be quantitative and field-operable for a 'point-of-care' (POC) detection system.

A nanobiosensor prototype is being developed using detector and capture probes attached to magnetic nanoparticles and biotin, respectively. The nanoparticles provide a strong electrochemical signal after magnetic extraction, washing and capture. The probes designed from the *stx1* gene of *E. coli* O157:H7, *yaiO* gene of *E. coli*, and *hilA* gene of *Salmonella enterica* have shown selectivity toward their target DNAs over that of their non-target DNAs with sensitivity as low as 0.1 – 0.3 ng/µL of genomic DNA (approximately 100 cells/ml) which can be successfully extracted using the modified 30-second cellulose-based extraction protocol. Stability tests on the DNA-probes functionalized with the electrically-active magnetic nanoparticles (PRO-EAM-NPs) showed minimum detachment of the detector probe, Ph-PRO, from the EAM-NPs up to 48 h at 4°C. Biosensing validations of *E. coli* in water, *E. coli* O157:H7 in fresh produce and *Salmonella* in

eggs have been successfully demonstrated. Calibration experiments are being conducted to replace cyclic voltammetry using potentiometer with a digital output using an electrochemical reader.

The developed prototype is also being applied on the detection of plant pathogens such as *Lasiodiplodia theobromae* and *Ralstonia solanacearum* by another research team. This could also be applicable to the detection of mycotoxin-producing fungi.

Keywords: DNA nanobiosensor, *E. coli, E. coli* O157:H7, electrically-active magnetic nanoparticles, *Salmonella enterica*

Mycotoxigenic Fungi and Mycotoxins in Selected Cereals in Thailand and Theirs Exposure Assessment

Warapa Mahakarnchanakul[1]*, Retty Putri Utami Dwipa[1], Chananya Chuaysrinule[1], and Thanapoom Maneeboon[2]
[1] Department of Food Science and Technology, Faculty of Agro-industry, Kasetsart University, Bangkok, Thailand
[2] Scientific Equipment and Research Division, Kasetsart University Research and Development Institute, Kasetsart University, Bangkok, Thailand

Corresponding Author E-mail: fagiwpm@ku.ac.th

ABSTRACT

Mycotoxins are secondary metabolites produced by several species of filamentous fungi such as *Aspergillus, Fusarium* and *Penicillium*. Mycotoxins are toxic to human and animal causing a variety of adverse health effects including carcinogenicity, hepatotoxicity, *hepatotoxicity* and teratogenicity. Contamination of mycotoxigenic fungi and mycotoxins can also occur during harvesting, transport and storage of agricultural commodities and their products. Problem of food and feed contamination with mycotoxins remain a great challenge to food safety and of public health and economic significance. This work investigate the presence of mycotoxigenic fungi and mycotoxins in glutinous rice, Job's tears and dried lotus seeds in retail markets and assess the risk for adverse effect of mycotoxins in different age groups of Thai population. *Aspergillus* section *Flavi*, *Aspergillus* section *Nigri* and *Eurotium* were the predominant fungi contaminated in cereal samples. The concentrations of aflatoxin B1, citrinin, ochratoxin A and zearalenone detected in glutinous rice samples were below the regulation levels. The mean cancer risk by aflatoxin B1 exposure was 0.23/(100,000 persons.year), while exposure to citrinin, ochratoxin A and zearalenone was less than the acceptable daily intake (ADI) values. For Job's tears and lotus seeds, low level contaminations of aflatoxin B1, deoxynivalenol and ochratoxin A were typically found in more than 90% of samples. High contamination of zearalenone was found in Job's tears samples. The exposure of zearalenone through Job's tears consumption for Thai population age of 3-6 years and 6-13 years exceeded the ADI value, while all the estimated exposure levels of zearalenone by consuming lotus seeds were lower than the ADI.

Keywords: Mycotoxigenic fungi, Mycotoxins, Cereals, Exposure Assessment

Chemical Biology of Aflatoxin Production Inhibitors

Shohei Sakuda

Department of Biosciences, Teikyo University, 1-1 Toyosatodai, Utsunomiya 320-8551, Japan

ABSTRACT

Aflatoxin production inhibitors are possible candidates as drugs to prevent food and feed from aflatoxin contamination. They are also useful as biological probes to investigate the regulatory mechanism for aflatoxin production in aflatoxigenic fungi, which is important to develop an effective method for aflatoxin control. Inhibitory activities of many plant constituents toward aflatoxin production have been tested as they are important for understanding and developing crop resistance to aflatoxin contamination. On the other hand, we have been using bioassay-guided screening method to obtain useful inhibitors. Microbial metabolites, essential oils, chemical library, pesticides, and food additives were used as sources for the screening. We have found aflatoxin production inhibitory activities of aflastatin A, blasticidin A, dioctatin A, and cyclo(L-Ala-L-Pro) obtained from microbes, dillapiol, spiroether, and precocene II obtained from essential oils, and respiration inhibitors in known pesticides and food additives. In this paper, our recent studies on modes of action of these aflatoxin production inhibitors are introduced. Our results suggest that normal mitochondrial function and decrease of intracellular ROS are very important for starting aflatoxin production.

Overview of The Current Analytical Techniques for The Determination of Mycotoxins and Methodologies for Health Risk Assessment

C. Meerpoel[*], A. Vidal and S. De Saeger
Department of Bioanalysis, Centre of Excellence in Mycotoxicology and Public Health, Faculty of Pharmaceutical Sciences, Ghent University, Ghent, Belgium -

[*]Celine.Meerpoel@UGent.be

ABSTRACT

Mycotoxins are secondary fungal metabolites which may cause toxic effects such as hepatotoxicity, carcinogenicity, nephrotoxicity and even death in both humans and animals. For many decades, the occurrence of these toxic metabolites have been extensively studied by use of various analytical procedures. Although biological matrices, food and feed and their raw materials are the group of most significance for mycotoxin analysis, other matrices are also subjected to analysis, e.g. dust, water and air. Several different analysis techniques are used for the mycotoxins quantification, however, nowadays, liquid and gas chromatography together with ELISA are probably the most common ones. Each analytical technic has its advantages and drawbacks taking into consideration the performance, costs, duration, safety and ecological aspects of the extraction and analytical procedure, which will be discussed during the presentation.

Considering their toxic and carcinogenic effects, mycotoxin risk assessment assumes particular importance. In the context of food chemical safety, risk assessment is a conceptual framework that provides mechanisms for a structured review of relevant information to estimate health outcomes in relation to chemicals exposure through food. The process of risk assessment comprises four steps: 1) hazard identification; 2) hazard characterization (including dose–response assessment); 3) exposure assessment; and 4) risk characterization. The risk assessment is the most crucial part of a complete risk analysis, which further consists of risk management and risk communication. During the talk, all procedures will be described in the context of mycotoxin risk analysis, outlining the outcomes of most significance from recent research.

Mytox-South: An Intercontinental Partnership to Improve Food Security and Food Safety in Developing Countries

C. Meerpoel, A. Vidal, M. De Boevre and S. De Saeger

Department of Bioanalysis, Centre of Excellence in Mycotoxicology and Public Health, Faculty of Pharmaceutical Sciences, Ghent University, Ghent, Belgium – Celine.Meerpoel@UGent.be

ABSTRACT

Mycotoxins are toxic fungal secondary metabolites and can contaminate agricultural commodities during cultivation, harvesting, transport, processing, and storage. Mycotoxins are globally distributed and are observed in a vast range of agriculture commodities and environments. This results in contaminated cereal crops, spices, nuts, fruits not suitable for human consumption, leading to enormous economic losses, worldwide. Mycotoxins are present in a wide range of products, from agricultural crops (rice, wheat, rye, barley, corn, soybeans, sorghum, nuts, spices), cereal-based foods (baking products, pasta, breakfast cereals), beverages (fruits, juices and purees, beer and wine), and animal feed to several animal products (dairy products, meat, eggs). Mycotoxin intake may lead to autoimmune illnesses, metabolic and biochemical deficiencies, allergic manifestations, reduction of reproductive efficiency, and may also lead to teratogenicity, carcinogenicity, mutagenicity, and death.

The co-occurrence of different types of mycotoxins results in serious food safety issues all over the world, with sub-Saharan areas being one of the regions at high risk. Moreover, in Africa and other developing countries, the possibilities for regular mycotoxin analysis are scarce to non-existent: analytical tests are expensive; there is a lack of expertise and training; there is insufficient technical support from companies selling analytical instruments, and focus is mainly put on the aflatoxins, while other mycotoxins are being neglected.

To tackle in an efficient and global way the mycotoxin problem the MYTOX-SOUTH partnership was created. MYTOX-SOUTH (http://mytoxsouth.org) intends to harness the expertise and infrastructure available at Ghent University to strengthen the capacity of the Southern partners to tackle the mycotoxin problem and the associated food safety and food security issues at global level. For this reason, the long-term aims for MYTOX-SOUTH are: 1) building human and infrastructural capacity through training of the Southern scientific community, 2) bridging the gap between research and development, and 3) stimulate the scientific environment to create a sustainable network.

New Potentially Important Co-Occurring or Emerging Mycotoxins

Jens C. Frisvad

Department of Biotechnology and Biomedicine, Technical University of Denmark, Soltofts Plads, B. 221, DK-2800 Kongens Lyngby, Denmark

E-mail: jcf@bio.dtu.dk

ABSTRACT

The producers of the most important mycotoxins are nearly always producing a cocktail of mycotoxins and less toxic molecules that may anyway contribute additively or synergistically to toxicity. On top of that, co-occurring filamentous fungi may produce even further mycotoxins. This is primarily a problem regarding acute toxicity and foods and feeds of a low quality, especially stored foods and feeds with obvious mould growth, because of occasional poor food and feed supply. Known mycotoxicoses have mostly been reported in cases of acute toxicity. It is much more difficult to evaluate chronic toxicity of mycotoxin mixtures, and aflatoxins are probably the most important to monitor as they are the most carcinogenic natural products known. Examples of multi-mycotoxin production are *Aspergillus flavus* and related species in *Aspergillus* section *Flavi* (the combination of aflatoxins, cyclopiazonic acid and 3-nitropropionic acid), *Aspergillus niger* and other section *Nigri* species (ochratoxins, fumonisins, oxalic acid), *Aspergillus westerdijkiae* and other *Aspergillus* section *Circumdati* (ochratoxins, penicillic acid, xanthomegnin and stephacidins) and *Talaromyces purpurogenus* (rubratoxins, luteoskyrin, rugulovasins and spiculisporic acid). *Penicillium verrucosum* (ochratoxins, citrinin, oxalic acid) and *Fusarium* species (trichothecenes, zealalenone, enniatins, moniliformin, fusaric acid) are more problematic in temperate and subtropical regions, but may also occur in warmer climates. Most of these secondary metabolites (SMs) are acidic and in all combinations from the different species, a small acid is included in the SM profile. It is suggested that 3-nitropropionic acid (3-NPA) and oxalic acid should be monitored in search for mycotoxins, especially 3-NPA. However a dedicated analytical chemical method for such very acidic mycotoxins cannot easily be included in multimycotoxin screening methods, and so a combination of two methods may have to be developed to cover the SM combinations listed above.

The Most Important Mycotoxins in Warm Climates

Jens C. Frisvad

Department of Biotechnology and Biomedicine, Technical University of Denmark, Soltofts Plads, B. 221, DK-2800 Kongens Lyngby, Denmark

E-mail: jcf@bio.dtu.dk

ABSTRACT

Many mycotoxins have been reported throughout the years, but it is only few of them that are of general importance in warmer climates. Aflatoxins B1 is by far the most common and most important mycotoxin in warm climates. It is produced by species occurring in warm climates such as the common and wide-spread species *Aspergillus flavus*, *A. aflatoxiformans*, *A. cerealis*, *A. austwickii*, *A. minisclerotigenes*, *A. novoparasiticus*, and *A. parasiticus*. *A. nomius* and *A. pseudonomius* are less common (common on brazil nuts, however), and other efficient aflatoxin producers are apparently rare in foods and feeds such as *A. mottae*, *A. luteovirescens* (= *A. bombycis*), *A. pipericola*, *A. pseudocaelatus*, *A. pseudotamarii*, *A. sergii* and *A. transmontanensis*. One other species in section *Flavi* produces aflatoxins, *A. togoensis*, but this species has never been found in foods. Aflatoxin producers in other sections of *Aspergillus* (*Ochraceorosei, Nidulantes*) have not been found in foods either. For prevention of aflatoxin production, it is important with an accurate identification of aflatoxin-producing species to the species level. Many isolates identified as *A. flavus* have later been shown to be *A. minisclerotigenes, A. aflatoxiformans, A. austwickii* or *A. cerealis*. Most of the common aflatoxigenic species in section Flavi produce aspergillic acid, giving an orange colony reverse on the AFPA medium (Aspergillus flavus parasiticus agar). Ochratoxins are produced by the common species *A. niger, A. carbonarius, A. westerdijkiae, A. steynii* and *A. ochraceus* and fumonisins by *A. niger*, but until now only smaller amounts of ochratoxin A and fumonisins has been found, and ochratoxin and fumonisins are only class 2B potential carcinogenic mycotoxins. Among field fungi in warmer climates, *Fusarium* spp. are most important and isolates of these species may produce trichothecenes, zearalenone, fumonisins and several emerging mycotoxins such as enniatins. Occasionally other fungi such as 3-nitropropionic acid producing *Nigrospora* spp. will cause mycotoxicosis in children, but in general regulated mycotoxins are the most important.

Black *Aspergillus* from Various Substrates and Indoor Environment in Malaysia and Ochratoxin A Production

Latiffah Zakaria and Wardah Abdul Rahman
School of Biological Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia

ABSTRACT

Aspergillus section *Nigri* or black *Aspergillus* is characterized by dark brown to black colonies and occurs in a wide range of substrates. Several species of black *Aspergillus* are ochratoxin A (OTA) producer particularly on food and feed. In the present study, black *Aspergillus* was isolated from rice, groundnuts, spices, corn grains, agricultural soil, and indoor environment. Based on internal transcribed spacer regions, β-tubulin, and calmodulin sequences, the isolates were identified as *A. niger* (144 isolates), *A. aculeatus* (24 isolates) and *A. tubingensis* (nine isolates). OTA gene was detected in only six *A. niger* isolates from rice and indoor environment. These *A. niger* isolates produced 8 to 308 µg/g of OTA as quantified using UPLC analysis. OTA gene was not detected in any of the *A. tubingensis* and *A. aculeatus* isolates. In conclusion, three black *Aspergillus* species, *A. niger*, *A. aculeatus* and *A. tubingensis* were identified from rice, groundnuts, spices, corn grains, agricultural soil, and indoor environment. Only six isolates (4.2%) of *A. niger* produced OTA indicating most of the *A. niger* isolates were non-OTA producers. These results could thus portray the occurrence of OTA in the field. Since both the number of isolates producing OTA and the levels of OTA production were low, it could be possibly assumed that the occurrence as well as the levels of OTA in the field are also low.

Food Safety and Its Human Resources Professional in Indonesia

Roy Sparringa

Indonesian Food Safety Professional
Accelerice Indonesia, Ariobimo Sentral, Annex Building, JL H.R.Rasuna Said No 5
East Kuningan, South Jakarta City, Indonesia
E-mail: rsparringa@apkepi.or.id, sparringa@gmail.com

ABSTRACT

Successful risk management depends on the effectiveness of National Food Control Systems. Unfortunately, the food control system in Indonesia is generally perceived as normative five building bloc, such as food law and regulation; food control management; inspection services; and information, education, communication and training with lack of coordination, communication and collaboration amongst the actors. Indonesia National Integrated food safety system with the risk analysis approach had been officially launched in 2004 and demonstrated a promising food control management system in Indonesia. But it needs to be revitalized to transform the networks more structured, consistent and sustainable. A strong leadership of regulators is required to play important role as risk manager. Whilst food business operator and industry are encouraged to strengthen self-regulation to comply with standard and provision. Given the complex condition in Indonesia, such as poor food safety culture, poor hygiene and sanitation, lack of clean water, lack of cold chain system, large number of actors mainly small-scale actors, poverty, large informal sectors limited civil society involvement, and relatively little organization which are difficult to monitor, it is necessary to make national movement for food safety empowerment in strategic communities. such as school, wet market, fish auction, fisherman / farmer group community, traditional retail, culinary center, or targeted group of SMEs including start-up / food business incubation. The main goal is to make them more self-governing to control food safety by themselves. Indonesian Food Safety Professional Association (APKEPI) is a group of food safety practitioners who have the competencies for food safety assurance and supervision as a strategic partner for government, local government, business operator and community. It is a forum among food safety professions to improve work competency standard of food safety profession from farm to table, capacity building, community education, active participate in development of food safety standard, regulation and conformity assessment; and encourage the acceleration of the implementation of work competency certification in the field of food safety. APKEPI established a Professional Certification Body for Food Safety and Quality Assurance (LSP-JMKP) licensed by the National Professional Certification (BNSP) in 2015 conducting more than 30,000 certifications as of January 2020.

Mycotoxins: Regulation and Risk Management in Indonesia

Endang S Rahayu

Department of Food and Agricultural Product, Faculty of Agricultural Technology, Universitas Gadjah Mada, Yogyakarta, Indonesia

ABSTRACT

Mould and mycotoxins contamination in agricultural commodities is a major problem in Indonesia. This problem is attributable to the high temperature and humidity, which favour to the growth of mould followed by mycotoxins production. Five mycotoxins considered as the major concerns in Indonesia are aflatoxins, deoxynivalenol, fumonisin, ochratoxin, and patulin. Maximum levels of mycotoxins contamination in food are laid down in the Indonesian National Standard No. SNI 7385:2009 and Regulation The Indonesian National Agency of Food and Drug Control No. 8/2018.

Aflatoxins is of the highest priority of mycotoxins contamination in Indonesia, particularly in corn and peanut. Maximum level of AFB_1 and total aflatoxins in corn- and peanut-based food products are 15 ppb and 20 ppb, respectively. A survey was conducted to determine the occurrence of aflatoxins contamination in the supply chain of corn- and peanut-based food products. Samples of corn and peanut and products thereof were obtained from farmer, retailer, wholesaler, processor, and market. Results showed that contamination of aflatoxins in corn and peanut had occurred since primary production (during harvest and postharvest). Contamination level increased along the supply chain at retailer, small trader, and wholesaler with contamination level in several peanut-based products were higher than maximum level.

Besides in corn and peanut, aflatoxins contamination are also prevalent in other products. Our current data also showed that aflatoxins contamination occurred in dried chili powder and salted dried fish. Furthermore, nutmeg as Indonesia's main export commodity is frequently contaminated by aflatoxins, resulted in detention and border rejection in countries with stricter standards such as the European Union. Very low concentration of AFB_1 and AFM_1 were also detected in beef and cow liver, chicken and its liver. Aflatoxins and other mycotoxins were also detected in feed available in the market.

Aflatoxins and other mycotoxins are difficult to be completely removed once they contaminated food. Therefore, occurrence of these toxins should be

prevented since primary production as well as in the next supply chain (processing, transporting, storage, etc). Occurrence of aflatoxins at farmer level indicated that postharvest was not properly managed. Meanwhile, increased level of aflatoxins at retailer, small trader, and wholesaler indicated improper material handling and storage. It can be concluded that all stakeholders along the food supply chain, including the government, are responsible for aflatoxins contamination management. Therefore, a multi stakeholders and integrated framework is important for effective control and management of aflatoxins and mycotoxins contamination in Indonesia. (WMF 2020)

Mycotoxin in Indonesian Food and Feedstuff

Okky Setyawati Dharmaputra* and Santi Ambarwati

Southeast Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP), Bogor, Indonesia

*Corresponding author: okky@biotrop.org

ABSTRACT

In a humid tropical climate, like Indonesia, food and feedstuff can easily be infected by mycotoxigenic fungi, which produce mycotoxins, including aflatoxin, deoxynivalenol (DON), fumonisin, and ochratoxin A (OTA). The infection can occur due to drought stress prior to harvest, during drying phase in the field, or under poor storage conditions. Aflatoxin contamination is a worldwide major problem, including Indonesia. A number of studies in Indonesia have been conducted on aflatoxin contamination in peanuts and their processed products; maize and their processed products; as well as nutmeg and sorghum. As for other mycotoxins, quite many studies have been done on DON in maize; fumonisin in maize, feedstuff and chicken feed; as well as OTA in coffee beans and maize. Most samples were collected from different points in the delivery chain. The contents of mycotoxins were varied. Based on research results, the postharvest handling method of food and feedstuff plays an important role in the occurrences of fungal infection (including mycotoxigenic fungi) and mycotoxin contamination. Assessments on dietary exposure by aflatoxin B1 from processed peanuts products in Bogor, Indonesia as well as risk assessments of aflatoxin B1 exposure in maize and peanuts have been carried out, revealing that aflatoxin B1 exposure from maize, peanuts, and their processed products in Indonesia is worrisome. The National Agency for Food and Drug Controls (Badan POM RI) (2018) has a regulation on Maximum Tolerable Limit of mycotoxins (aflatoxin, DON, fumonisin, OTA and patulin) in processed food products.

Challenges in Global Food Safety

Ratih Dewanti-Hariyadi

Department of Food Science and Technology, Bogor Agricultural University (IPB), Indonesia

ABSTRACT

Food safety is an important factor contributing to public health as well as a major requirement in international food trade. At the global level it has been estimated that 600,000 of foodborne illnesses happens annually and 25 percent of it takes place in South East Asia. While poor sanitation practices persist as the foremost reason, food safety has been challenged with other issues such as the emergence of new pathogens, changes in life style, climate change, water scarcity and sustainability etc. *Listeria monocytogenes*, Enterohemorrhagic *Escherichia coli*, *Cronobacter* spp are examples of emerging pathogens affecting global market and regulations. Heavy rainfall and flooding are thought to disperse zoonosis while increase in humidity could potentially increase the probability of the growth of toxigenic molds. Additionally, water scarcity has also affected food industries. Increase in environmental awareness has resulted in practices to minimize environmental impact which may affect food safety. With international food trade currently valued at over 1 trillion USD, food adulteration has also surfaced as a very crucial issue. Food adulteration, both due to economic or malicious intent, is now an integral component in food safety management. The complexity of food safety issues in global market as well as its effect to Indonesia will be discussed.

Development of Monascus-Fermented Products and Its Safety Aspect

Ignatius Srianta

Department of Food Technology, Faculty of Agricultural Technology, Widya Mandala Catholic University Surabaya, Jalan Dinoyo 42-44 Surabaya 60265, Indonesia
Correspondence: srianta_wm@yahoo.com; phone +62 315678478

ABSTRACT

Monascus fermentation products (MFPs) have been consumed by people especially in Asian countries for centuries. The MFPs are consumed as natural food colorant, supplement and traditional medicine since its pigments and other beneficial bioactive metabolites content. Traditionally, MFPs are produced through solid state fermentation on rice grain substrate. Recently various non-rice substrates, in the form of agricultural products and its residues, have been explored as the alternative substrates. Various cereals (corn, barley, oat, wheat, sorghum), tubers (cassava, sweet potato, potato, dioscorea), soybean, agricultural residues (cereal bran, peanut meal, soybean meal, jackfruit seed, durian seed) have been studied as the alternative substrates. In some cases, non-rice MFPs have been successfully developed. Several MFPs have good bioactivities such as antioxidant, antihypercholesterol, antidiabetes and anticancer in vitro and in vivo. Since citrinin (a nephrotoxic mycotoxin) detected in MFPs, concern on the MFPs safety aspect increased. Citrinin content in MFPs has been included in food regulations of some countries or regions such as USA, Europe, Japan and China with different limit levels. Citrinin content can be determined by using various methods such as Thin Layer Chromatography, Liquid Chromatography and immunoassay with various accuracy. The citrinin production depends on Monascus strain, substrate type and fermentation conditions.

Keywords: Monascus-fermented products, safety, secondary metabolites, citrinin

Microbial Safety of Balinese Ethnic Foods

I N. Sujaya[1] and K.A. Nocianitri[2]
1) School of Public Health, Fact. Medicine, Udayana University
2) Dept. Food Science and Technology, Fact. Agricultural Technology, Udayana University Bali Indonesia
Email : nsujaya@unud.ac.id

ABSTRACT

Traditional and ethnic foods are integral component of tourism industry in Bali. There are more than 500 types of ethnics and traditional foods and beverages documented in Bali. These foods are play role not only in religion, culture and tradition but also in Balinese diet. The foods are mainly produced in traditional manners, under various sanitation and hygienic quality, therefore they contribute significantly to foodborne diseases in Bali. The microbiological studies in meat-based, fish and vegetables revealed that the foods were contaminated by some pathogenic bacteria such as *E. coli, Salmonella* sp., *Shigella* sp*., Virbrio* sp., *Listeria* sp.. In addition, *E. coli* also detected in some snacks sold in traditional markets. High microbial contamination of traditional and ethnic foods were found determined by several factors such as knowledge of food handlers to food safety, personal hygiene, attitude and behaviour where they were mostly not equiped with approprite protection devices, water and environment sanitation. This data suggest that the traditional and ethnic foods are good vehicle of foodborne pathogens. Comprehensive approces are necessary to improve safety of traditional and ethnic Balinese foods.

Keywords : Food safety, Balinese ethnic foods, foodborne disease

Analytical Extraction Methods for Mycotoxins in Foods

Widiastuti Setyaningsih
Department of Food and Agricultural Product Technology, Faculty of Agricultural Technology, Gadjah Mada University, Jalan Flora No. 1, Bulaksumur, Depok, Sleman, 55281 Yogyakarta, Indonesia.

ABSTRACT

Mycotoxins are secondary metabolites produced by fungi that can cause adverse effects on human health. The toxins could contaminate a wide range of foodstuffs, both in-field or during post-harvest treatments. Moreover, due to mostly resistance by food processing, the toxins are yet retained in the finished products. In order to assure food safety, reliable analytical methods as tools to assess the route of contamination and to control the level of mycotoxins in agricultural products are needed. Henceforth, numerous studies for identification and quantification of mycotoxins in food have been established mostly by chromatographic techniques. However, prior to the analysis, pre-analysis steps are required for food samples, viz., extractions. Due to the complexity of the matrices and the vast different chemical properties among the toxins, the development of the extraction method is challenging, especially for multi-toxins analysis. The currently developed extraction methods provided some advantages and drawbacks, depending on the suitability of the matrices and the analytes to the extraction systems. The most popular extraction methods utilized QuEChERS (quick, easy, cheap, effective, rugged, and safe) for its simplicity and applicability for groups of mycotoxin namely alternariol, tentoxin, aflatoxins (B1, B2, G1, G2), citrinin, and ochratoxin A in various food samples. Other extraction methods, i.e., solid-phase extraction (SPE), microwave-assisted extraction (MAE), and ultrasound-assisted extraction (UAE) have gained some attention and met various modifications for mycotoxin extractions to achieve the best result. Therefore, the development of novel extraction methods to reach full recovery for mycotoxins analysis, the extraction factors shall be optimized corresponding to the characteristics of the analytes, matrices, and the extraction systems.

Keywords: QuEChERS, SPE, MAE, UAE, multi-toxins analysis

Development of Scoring Methods on The Application of HACCP and GMP in The Micro, Small, and Medium Food Industries in Indonesia to Maintain Food Safety

Yoyok Budi Pramono
Universitas Diponegoro, Jl. Prof. Soedarto, Kampus Tembalang, Semarang 50275, Semarang, Indonesia

ABSTRACT

The food industries in Indonesia were growing rapidly. There are micro, small, and medium food industries. This is in line with the target of increasing tourist destinations along with an increase in culinary tourism. This must be the main concern of the food industry players in improving quality, one of which is food safety.

So far, to maintain food safety, strict implementation of HACCP and GMP is carried out by food industry players. To maintain the consistency of the regulator, or the government gives authority to several institutions to provide certification to food industry players. The application of HACCP and GMP requires innovation and development for better processes, one of which is by the scoring method. This method can suppress the aspect of subjectivity in the assessment process provided by the assessor because there are objective values.

Another advantage is that food industry players can evaluate and improve the side of the reduction so that a better process can be obtained. Objective assessment results will provide results that are easy to improve.

Keywords : Scoring methods, HACCP, GMP, Food Industry

Safety Assessment of Plant-Based Food Supplement

Erryana Martati*

*Study Program of Food Science and Technology Universitas Brawijaya Malang Indonesia

Email: erryana_m@ub.ac.id; erryana_m@yahoo.com

ABSTRACT

The use of herbal medicinal plants or plant-based food supplements for health benefit are widely accepted in the world. Some of those are consumed to maintain and promote health or reduce risk of diseases and it is consumed for a long period of time. Consumers recognized plant derived products as safe, but some plants can give adverse effects on human health due to natural occurrence of genotoxic and carcinogenic compounds. Therefore, safety assessment of plant-based food supplements is required because of the occurrence of natural compounds that are genotoxic and carcinogenic and the other potential contaminants entering to the raw materials especially during post-harvesting such as mycotoxins. Natural compounds in plants that are indicated as genotoxic and carcinogenic are alkenyl benzenes (estragole, safrole, methyl eugenol, myristicin, elemicin, and apiol), pyrrolizidine alkaloids and aristolochic acids. The expert groups of European Food Safety Authority (EFSA), the Joint FAO/ WHO expert committee on Food Additives (JECFA) and the International Life Sciences Institute (ILSI) recommends a Margin of Exposure (MOE) approach to do risk assessment of genotoxic carcinogens in food. The MOE approach uses a reference point $BMDL_{10}$ which is defined as the lower 5% confidence bound on a dose resulting in a 10% (EFSA, 2005). Together with this, risk assessment of mycotoxins occurring in plant-based food supplement should also be conducted.

Study of 15 samples of herbal medicine marketed around Malang showed those products contains alkenyl benzenes of estragole, myristicin, methyl eugenol and safrole. A few herbal medicines gave MOE below 10,000 if consumed daily for a lifetime. Meaning a high priority for risk management actions and would be of high concern from a public health point of view. Method of extraction and solvent used in preparation of extract plants results different of composition of bioactive compounds. Study of fennel (*Foeniculum vulgare* Mill.) showed capacity of antioxidant of methanolic extract of fennel were significantly higher than that of ethanolic extract. Simulation of intake of an alkenyl benzene of estragole in methanolic and ethanolic extracts of fennel which was > 168-331 and > 49- 97 mg/60 kg bw per day for a life time resulted an MOE of < 10,000. Consumption of botanicals and its extract should consider both the health benefit and the risk potential to the health.

Recent Advance in Reducing Mycrobial and Mycotoxin Contamination in Fresh Produces in Indonesia

S Joni Munarso and Sari Intan Kailaku
Indonesian Center for Agricultural Postharvest Research and Development
Jl. Tentara Pelajar no. 12, Bogor 16114, Indonesia
jomunarso@gmail.com

ABSTRACT

Food is not only human's basic need, but also basic right. Over the years, the awareness of modern society has increased from only concerning on quantity of food to paying more attention to quality. With this comprehension in mind, Indonesian Government has focused on conducting efforts to increase national food safety, one of which is by assigning the Ministry of Agriculture (MoA) to prevent and reduce the level of contamination in fresh produces. Problem identification had revealed pesticide residue and microbial contamination in vegetables, and mycotoxin contamination in several commodities, four of which were pepper, nutmeg, corn and cocoa. Poor postharvest handling technique has been observed in various production centers, driven by the lack of knowledge and limited facilities and infrastructure. Indonesian Agency of Agricultural Research and Development has developed technology innovation for the handling of these commodities. Handling technology such as washing, rubbing, hydrolysis and the use of sanitizers has been specifically applied for different vegetables, targeting different types of microbes such as *E. coli* and *Salmonella* and also to reduce the residues of pesticide. A combination of improved harvesting technique, ozone treatment, perforated packaging and cold temperature transportation is recommended for chili. A rapid detection technology is available for aflatoxin in corn and nutmeg, using an ultra-violet lights with certain wavelength, assembled in a simple box for farm-friendly use. Improved handling technology for pepper and cocoa has also been developed in order to prevent microbial contamination and increase the overall quality of these commodities to meet export quality requirement. To ensure the implementation process of developed technology, regulation, standard and capacity building are needed. In order to put the process in motion, policies regarding food safety were developed and renewed, eg. Government Regulation no. 86/2019 concerning Food Safety, and standards as reference for stakeholders, eg. Indonesian National Standard 7388:2009 concerning Maximum Limit of Microbial Contamination. Furthermore, the MoA has an active role in adopting international standards of food safety, by managing Codex Alimentarius activities. Not only adopting, Indonesia has actively involved in proposing and drafting Standards and other Codex documents. Parallel to that, the MoA has declared the 300% Export Movement, which set the target to triple the national export volume, expected to be achieved by 2024.

ABSTRACTS OF ORAL PRESENTER

O-001

Antimicrobial Activity Of Coconut Shell and Fiber and It's Potential To Be Used as Natural Preservatives for Coconut Sap

Karseno* and Tri Yanto
Department of Food Science and Technology, Faculty of Agriculture

Jenderal Soedirman University, Purwokerto, Indonesia

*Corresponding Author: karseno@unsoed.ac.id

ABSTRACT

Coconut sap is easily fermented by microbial contamination and resulting in low quality of coconut sugar product. The addition of preservation is one method to prevent sap fermentation occured. This study examined the antimicrobial activity of coconut shell and fiber and it's potential to be used as natural preservatives for coconut sap. The coconut shell consisting of fresh old coconut shell, dry old coconut shell, fresh young coconut shell, dry young coconut shell, and coconut fiber including fresh old coconut fiber, dry old coconut fiber, fresh young coconut fiber, and dry young coconut fiber, respectivelly. Microbial in sap fermented, *Saccharomyces cereviceae* and *Acetobacter aceti* were used to determine the antimicoal activity of coconut shell and fiber. Qualitative test to phytochemicals contents of the coconut shell and fiver were also investigated. The results showed that coconut shell and coocnut fiber extract inhibit to microbial in sap fermented, *Saccharomyces cereviceae*, and *Acetobacter aceti*. The antimicorbial activity of those extract are classified into medium inhibitory level. The antimicrobial activity of coconut shell was higher than coconut fiber. In addition, the old coconut shell show higher antimicrobial activity than young coconut shell, especially to *Acetobacter aceti*. Qualitative test to phytochemicals contents indicating that coconut shell and coconut fiber extract contains tannin, saponins and steroids. These results indicating that coconut shell and coconut fiber are potential to be used as preservatives for coconut sap. The formulation of sap preservatives based on coconut shell and coconut fiber are interesting to be investigated.

Keywords: Antimicrobial activity, coconut shell, coconut fiber, phytochemicals, sap preservatives.

O-002

Growth Rate, Histamine Production, and Biofilm Formation of Histamine-Producing Bacteria Isolated from Skipjack Tuna

Indun Dewi Puspita*[1], Aldino Dityanawarman[1], Akhmad Awaludin Agustiar[1], Ika Safitri[1] and Mark Tamplin[2]

[1]Department of Fisheries, Faculty of Agriculture, Universitas Gadjah Mada, Jl. Flora A4 Bulaksumur Yogyakarta 55218 Indonesia

[2]Tasmanian Institute of Agriculture, Private Bag 54, Hobart, Tasmania 7001 Australia

*Corresponding author: +62 8164225599; indun_dp@ugm.ac.id

ABSTRACT

This study aimed to isolate histamine-producing bacteria (HPB) from skipjack tuna landed in Sadeng Fisheries Port, Yogyakarta, and to measure the bacterial growth rate and histamine production at various incubation temperatures. Fresh and spoiled fish (kept for 2 days at room temperature) were used as samples. Isolation was carried out with Niven's agar (selective medium). All positive colonies were tested for Gram staining. TSBH cultures were incubated at 5, 20, and 37°C. Culture turbidity (OD_{600}) was measured periodically to obtain bacterial growth curve using the DMFit program. TLC was used to detect the histamine formation in the culture medium. Screening of biofilm formation was conducted by crystal violet staining method. The results show that the positive HPB obtained from the fresh and spoiled sample was 29 and 30 isolates, respectively. Most of HPB positive isolates were Gram-positive bacteria (46 isolates). However, only 6 isolates from spoiled sample showed positive histamine formation in culture medium detected by TLC. All 6 isolates, namely CK01, CK02, CK03, CK04, CK05, and CK06, belonged to Enterobacteriaceae group as confirmed by biochemical test and partial 16srRNA gene identification. The highest growth rate at 20 and 37°C were showed by isolate CK04, while the growth of all isolates at 5°C were inhibited. The highest histamine production was shown by isolate CK06 at 37°C, meanwhile the strongest biofilm producer was shown by isolate CK01.

Keywords: biofilm, growth rate, histamine-producing bacteria, skipjack

O-003

Inhibition of *Escherichia coli* FNCC 0097 by *Lactobacillus plantarum* Mut 7 FNCC 250 in Probiotic Okara Drinks During Storage

Isti Handayani

Department of Food Technology, Faculty of Agriculture, Universitas Jenderal Soedirman. Jl. Dr.Soeparno, Karangwangkal Purwokerto, 53123, Central Java, Indonesia
Email: isti_handayaniunsoed@yahoo.co.id

ABSTRACT

Okara is the side product of making tofu which still has some nutrition value. This study aims to study the ability of okara probiotic drinks to inhibit *Escherichia coli* FNCC 0097 during storage. The probiotic agent used was *Lactobacillus plantarum* Mut 7 FNCC 250. Fermentation of okara probiotik drink is carried out at 37^{o}C for 2 days. The study was conducted using a randomized block design with a storage time of 0, 2; and 4 weeks in the refrigerator (6^{o}C). Variables observed included viability of lactic acid bacteria, inhibition of *E. coli* FNCC 0097, pH, total titrated acid and dissolved protein. The result show that *L. plantarum* Mut 7 FNCC 250 could inhibited *E. coli* FNCC 0097 equal to 1.37 log cycle during 4 weeks of storage. Viability of lactic acid bacteria also decreased by 2.33 log cycles, while decreasing of *L. plantarum* Mut 7 FNCC 250 in control (okara probiotic drink without the addition of *E. coli* FNCC 0097 was equal to 1.8 log cycle. Cold storage causes a decrease in total titrated acid and an increase in pH value, but has no effect on dissolved protein levels. Total titrated acid, pH and dissolved protein of okara probiotic drink after 4 weeks of storage were 0.4%, 5.27 and 0.67% respectively.

Keyword: okara, probiotic, storage, inhibit, *L. plantarum*, *E. coli*

O-004

Effect Of Red Ginger (*Zingiber officinale var. Rubrum*) as Feed Additive on Hybrid Duck Performance and Intestinal Microflora

Sjofjan O. [1)], D.N. Adli[1)], E. Widodo[1)] , N. Jatmiko[1)]

[1)]Faculty of Animal Science, Feed Animal Nutrition, University of Brawijaya
Email: osofjan@yahoo.com
CP: +62 818 217 354

ABSTRACT

The present study was conducted to determine the effect of red ginger (*Zingiber officinale va. Rubrum*) juice as feed additive on hybrid duck intestinal mikroflora included the number of colonies *Lactic Acid Bacteria (LAB), Escherichia coli* and *Salmonella* sp. The materials used for this research were red ginger juice and 120 unsex of 14 days old hybrid duck with average body weight of 198,45±17,91 g. Method in this research was experiment with 5 treatments (P_0 = control feed; P_1 = control feed + 300 mg/kg feed of tetracycline; P_2 = control feed + 10 ml/kg feed of red ginger juice; P_3 = control feed + 20 ml/kg feed of red ginger juice; P_4 = control feed + 30 ml/kg feed of red ginger juice. Every treatment was repeated 4 times, with 6 ducks each. Parameters measured were performance and number of colonies *Lactic Acid Bacteria (LAB), Escherichia coli* and *Salmonella* sp The data obtained in this study were transformed into logarithmic then analyzed by analysis of variance (Anova) of the Completely Randomized Nested Design. If there was a significant effect, then it will be followed by Duncan's Multiple Range Test. The result showed that adding of red ginger juice as feed additive at 30 ml/kg feed gave a highly significant ($P < 0.01$) effect on the number of colonies of *Escherichia coli* as well as *Lactid Acid Bacteria (LAB)* and *Salmonella* sp. It can be concluded that adding of red ginger juice as feed additive can be used extended to level 30 ml/kg feed considering a preferable intestinal microflora number.

Keywords: red ginger juice, phytobiotic, microflora, hybrid duck.

O-005

Contaminant Mold Identification and Aflatoxin Analysis in Damaged Coriander (*Coriandrum sativum* L.)

Utami Sri Hastuti[1a)], Anindya Nirmala Permata[1], Sulisetijono[1], Chomisatut Thoyibah[1], Siti Hartina Pratiwi[1]

[1]Biology Departement, Faculty of Mathematics and Natural Sciences, State University of Malang, Malang, Indonesia

[a)]Corresponding author: tuti_bio_um@yahoo.com

ABSTRACT

Coriander is a kind of spices that ussualy used as food flavour. Damaged on coriander could be caused by insects. Some contaminant mold could grow in damaged coriander and some spices have an ability to produce mycotoxin. This research is done to: 1) identify contaminant molds on damaged coriander, 2) analyse aflatoxin content in damaged coriander. Damaged coriander sample with the characters i.e: have holes, powdery, or broken was grinded and diluted in 0,1% peptone solution. Then the solution was diluted gradually until 10^{-5}. Each solution was inoculated 0,1 ml each on Potato Dextrose Agar medium and incubated in 27°C for 7x 24 hours. Each kind of contaminant mold colony was isolated and described. Afterwards each kind of contaminant mold was examined and described microscopically for identification. The aflatoxin in content in damaged coriander sample was analysis with HPLC method. The research result are: 1) there are 9 species of contaminant mold species in the damaged coriander, i e: *Penicillium citrinum*, *Aspergillus wentii*, *A. restrictus*, *A. niger*, Neosartorya *fischeri*, *Cladosporium cladosporoides*, *Paecilomyces variotii*, *A. penicilloides* and *A. versicolor*; 2) the aflatoxin B_1 content is: <0,43 µg/kg and aflatoxin G_1 content is: <1,53 µg/kg in damaged coriander sample.

Keywords: damaged coriander, contaminant mold, aflatoxin

O-006

Mycotoxins Exploration and Ochratoxin Quantity in Coffee Beans during the Drying Process using the LC-MS method in South Sumatra

Deli Lilia, Nurhayati, Zulkarnain, Rindit Pambayun

ABSTRACT

Generally, post-harvest handling processes in South Sumatra remains conventional, with drying highly dependent on sunlight and carried out in yards using tarpaulin. This has, however, become one of the factors that cause the susceptible of coffee beans to mycotoxins infection leading to low quality coffee. This study aims to determine the percentage and species of mycotoxin contained in coffee beans in South Sumatra.The research was conducted at the Microbiology Laboratory of the Department of Biology, Faculty of Mathematics and Sciences, Sriwijaya University, while the LC-MS test was carried out at the Laboratory of the *Saraswanti Indo Genetech* Company in Bogor (SIG Laboratory). This is a descriptive study with the ANOVA test used to describe the drying process, while the independent T-test data analysis compared the drying process using tarpaulin and asphalt road.The result showed thatthe water content of coffee beans before and after drying was 60.56% and 9.70%, respectively on the asphalt road, with an average of 22% moldy coffee beans. In addition, using the tarpaulin, the water content before and after drying was 60.76% and 14.56%, respectively after 10 days with an average of 51.60% moldy coffee beans. After surface sterilization, 1 and 3 fungus isolate were obtained from the coffee beans dried in the asphalt road and tarpaulin, namely *Aspergillus flavus, Aspergillus niger* and *Aspergillus ochraceus*, which ranged between 3.00-3.01.

Keywords: Mycotoxin, Ochratoxin, coffee beans

O-007

Hot Water Treatment As Effort To Inhibits The Anthracnose Disease and Maintain The Quality Situbondo Mango Fruit

Slamet Fauzi[*a], Moh. Affan Afifudin[b], Dodo Brilliant P[c], M. Gazza Daffa Viali[d], Gen Deardi I[e]
[a,b,c,d,e]Department of Plant Protection, University of Jember, Jember, Indonesia
Co- Author : *slamfauzi99@gmail.com , Phone : +62 82-3302-45207

ABSTRACT

Situbondo is one of the producers of mango which is quite high and has a distinctive taste compared to other regions in East Java. Mango fruit production in Situbondo in 2015 reached 222,471 Kwintal. One that causes damage to mango postharvest products is anthracnose disease. The purpose of this study was to determine the effect of hot water treatment in inhibiting anthracnose disease and maintaining the quality of mangoes. The study was conducted at the Plant Clinical Laboratory in January 2019 at the Faculty of Agriculture, University of Jember. The study design used was a completely randomized design with one factor, namely washing temperature (59 ± 1 ° C, 53 ± 1 ° C, normal water temperature). Washing with a temperature of 53 ± 1 ° C can be used to clean fruit. Results Treatment that can inhibit changes in weight loss, fruit hardness, acid content (total titrated acid), and total dissolved solids is storage at low temperatures (15.1 ± 1 ° C and 18.1 ± 1 ° C). Treatment that gives a good appearance, can suppress the development of anthracnosis, and inhibits fruit discoloration is the treatment of 53 ± 1 ° C washing temperature.

Keywords: Situbondo Mango, Hot Water Treatment, Anthracnos, Postharvest Quality

O-008

Potential of Patulin Production of Heat Resistant Mold (HRM) from Plantation Soils in Thailand

Thanapoom Maneeboon[1,2], Chananya Chuaysrinule[3] and Warapa Mahakarnchanakul[1,2,3*]

[1]Center for Agricultural Biotechnology, Kasetsart University, Kamphaeng Saen Campus,
Nakhon Pathom 73140, Thailand

[2]Center for Agricultural Biotechnology: (AG-BIO/PERDO-CHE), Bangkok 10900, Thailand

[3]Department of Food Science and Technology, Faculty of Agro-Industry, Kasetsart University,

Bangkok 10900, Thailand

Corresponding author email: fagiwpm@ku.ac.th

ABSTRACT

Heat resistant mold (HRM) is an important spoilage fungal group which survive certain heat treatment using in food processing. The heat resistance of these fungi is due to the formation of sexual spores called ascospores. HRM causing spoilage problems, especially in fruits and fruit products, and some of them are able to produce mycotoxins. This study examined the presence of HRM in 13 soil samples from sugarcane and pineapple plantations in Kamphaeng Phet and Chonburi provinces, Thailand. Heat treatment at 75 °C for 30 min was used for isolation. All soil samples were contaminated with HRM ranged from 3.2 to 123.8 CFU/g soil. *Neosartorya* species was the most prevalence fungi (82.83%). A total of 80 HRM isolates were recovered and identified based on morphological characteristics and β–tubulin gene sequence. The isolates were classified into 7 genera: *Aspergillus, Byssochlamys, Eupenicillium, Hamigera, Neosartorya, Penicillium* and *Talaromyces*. Seven isolates representing in each genera were further evaluated for their heat resistant. Ascospores of *H. terricola* HR7-1 and *B. nivea* HR13-3 were able to survive heat treatment at 85 °C for 60 min. In addition, 1 strain of *Byssochlamys*, 8 strains of *Eupenicillium* and 28 strains of *Penicillium* were evaluated for their ability to produce patulin in YES medium at 25 °C for 7 days. HPLC analysis revealed that HRM isolates produced widely differing levels of patulin (2.1 to 343.6 μg/g, limit of detection of 0.5 μg/g). Patulin production was found in *Byssochlamys* (1), *Eupenicillium* (4) and *Paecilomyces* (9).

Keywords: heat resistant mold, thermal inactivation, mycotoxin, patulin, soils

Influence of Giving Extract and Basil Leaf Powder (*Ocimum basilicum*) to Decrease in Cholesterol Levels in Squid (*Loligo* sp.) and Vaname Shrimp (*Litepenaeus vannamei*)

Elis Safinatun, Nur Hidayati, Dian Kresnadipayana*, **Devita Safitri**
Faculty of Health Sciences, Setia Budi University,
Jl. Letjend Sutoyo, Mojosongo Surakarta 57127, Jawa Tengah, Indonesia
**Corresponding author*: dian.kresnadipayana@gmail.com &
diankresna@setiabudi.ac.id

ABSTRACT

Squid *(Loligo* sp*.)* and vaname shrimp *(Litopenaeus vannamei)* have high nutritional content, but contain high cholesterol. Basil *(Ocimum basilicum)* contain flavonoids, essential oils, saponins and tannins. This study aims to determine the effect of giving extract and basil *(Ocimum basilicum)* powder to decrease cholesterol levels in squid (*Loligo* sp*.)* and vaname shrimp *(Litopenaeus vannamei).*
Basil leaf extract *(Ocimum basilicum)* was obtained using maceration method with 70% ethanol. Squid cholesterol and vaname shrimp cholesterol levels were determined by variations in immersion concentration and CHOD-PAP method at a wavelength of 546 nm.

The results of the research on cholesterol levels before soaking the leaves of basil *(Ocimum basilicum*) on squid were 163 mg/100g and vaname shrimp at 125 mg 100g. Cholesterol levels of squid in media immersion extract concentrations of 0.5%, 1.0%, 1.5% of 93 mg/100g, 73 mg 100g, 60 mg/00g. In soaking powder at 106 mg/100g, 81 mg/100g, 68 mg/100g. The cholesterol content of vaname shrimp in soaking media extract concentration of 0.5%, 1.0%, 1.5% of 86 mg/100g, 72 mg/100g, 66 mg/100g. Soaking powder is 95 mg/100g, 85 mg/100g, 75 mg/100g. The percentage of reduction in cholesterol content of vaname shrimp in the soaking of extract media obtained results of 40%, 58% and 62% while the yield of soaking powder was 23%, 36%, and 40%. The percentage reduction in squid cholesterol levels in the soaking of extract media obtained results of 55%, 60% and 71% while the soaking of powder steeping yielded 39%, 43% and 48%.

The conclusion of this study is steeping extracts and steeping basil leaves *(Ocimum basilicum)* 1.5% concentration has a decrease in the best cholesterol levels of vaname shrimp and squid.

Keywords: cholesterol, squid, vaname shrimp, basil leaves *(ocimum basilicum)*

Effect Of Activated Carbon Adsorbent from Variations Of Raw Material to Acid and Peroxide Number Of Waste Cooking Oil

Tia Octaviani, Nur Hidayati, Dian Kresnadipayana*, **Rahmawi Annis Setiawati**
Faculty of Health Sciences, Setia Budi University,
Jl. Letjend Sutoyo, Mojosongo Surakarta 57127, Jawa Tengah, Indonesia
**Corresponding author*: dian.kresnadipayana@gmail.com &
diankresna@setiabudi.ac.id

ABSTRACT

The waste cooking oil has decreased the quality of the change of color, taste, smell, chemical composition and contain carcinogenic compounds. The activated carbon is an adsorbent that can reduce the level of acid and peroxide in waste cooking oil. The raw material of an active carbon is a waste that containing many cellulose, hemicellulose and lignin. This study aims to determine the level of acid and peroxide of the waste cooking oil before and after the addition of each variation of the type of activated carbon as well as to know the type of activated carbon which is made from what the most optimum raw materials in decreasing level of acid and peroxide.

This study uses the variation on the raw material of the activated carbon that is sugarcane dregs, coconut shell, coconut husk, and rice husk. Carbonation process uses furnace with the temperature 400 ^{o}C for 30 minutes and it's activated with KOH 2 N solvent. The purification of waste cooking oil is made by adding the activated carbon and stirring with the tempo 400 rpm for 1 hour. The determination of acid number is made with alkalimetry method while peroxide number with iodometry method.

The average results of the level of acid number on the waste cooking oil after adding the activated carbon of sugarcane dregs, coconut shell, coconut husk and sugarcane dregs successively, that is 0.87 mg KOH/g, 0.35 mg KOH/g, 0.41 mg KOH/g, 0.46 mg KOH/g and 0.48 mg KOH/g. The average results of the level of peroxide number on the waste cooking oil after adding the activated carbon of sugarcane dregs, coconut shell, coconut husk and sugarcane dregs successively, that is 13.45 mek O_2/kg, 4.89 mek O_2/kg, 5.89 mek O_2/kg, 7.22 mek O_2/kg dan 8.22 mek O_2/kg. The results show that the activated carbon of sugarcane dregs is the most optimum in decreasing the number of acid and peroxide.

Keywords: waste cooking oil, active carbon, acid number, peroxide number

O-011

Screening, Isolation and Identification Of Potential Bacteria Producing Cold-Adapted Lipase from Fish Cold Storage

Retno Tri Astuti[1,a)], Hefti Salis Yufidasari[1,b)], Happy Nursyam[1], Jekmal Malau[2]
[1] Faculty of Fisheries and Marine Science, University of Brawijaya, Malang, 553512, Indonesia

[2] Sciencewerke PT, West Jakarta, 11480, Indonesia

[a]Corresponding author : retnoastuti@ub.ac.id

[b]hefti_salis@ub.ac.id

ABSTRACT

Lipases constitute as the third most important group of enzymes after carbohydrases and proteases, and are widely used in various industries. Study about this enzyme for industrial process is always interesting. One of the trend study is to find and characterize lipase that show high activity at low temperatures, or referred as Cold-Adapted Lipases (CLPs). This unique feature is the main advantage of CLPs in the industry because it requires a low energy source that is correlated with lower costs and energy. Reactions occur in cold temperatures may result in better product quality. The purpose of this research is to perform screening and isolation of the lipase-producing bacteria that shown high activity at low temperatures using Rhodamine B and olive oil as lipase substrat. This research obtained four bacterial isolates produce lipase on screening media. Bacterial isolate B5 showed the highest crude extract activity of 3.21 U / mL, followed by isolates B4 (3.09 U / mL), H5 (2.56 U / mL and B9 (1.02 U / mL). Lipase enzyme B5 showed optimal activity in the range of 20-30^{o}C that it can be categorized as CLPs potential. Identification of B5 isolates based on 16s rRNA analysis showed 99.62% similarity with *Bacillus amyloliquefaciens* H strain (CP041693.1)

Keywords: Fish cold storage; cold-adapted lipase; *Bacillus amyloliquefaciens*

O-012

Safety of Functional Drink Green Coffee And Gambir Based on Microbe Test

Diatari Agustini

Agriculture Faculty of Sriwijaya University
diatari11@gmail.com

ABSTRACT

The aim of this research was to evaluate the antibacterial activity of a functional drink from the combination of green coffee Robusta and gambir using *Staphylococcus aureus.* Green coffee is known as source of chlorogenic acid, which these compounds can inhibit bacterial growth. Whereas catechin in gambir can inhibit the growth of gram-positive bacteria. The antibacterial activity was measured by disc diffusion. The result showed that, the clear zone only formed in gambir as a control with a diameter of ± 5 mm. while for the treatment did not form clear zone. This is due to non-synergistic interaction between bioactive compounds when combined at certain concentration. the extracts that are impure and contain other compounds, also the presence of antagonistic compounds. The combination of green coffee and gambir has not been able to inibit the groeth of *Staphylococcus aureus,* so futher studies are needed to determine the concentration that can inhibit bacterial growth.

Keywords: functional drinks, gambir, green coffee robusta, disc diffusion

O-013

Rice Absorption of Lead (Pb) in Remediation of Land Contaminated by Lead (Pb) Using Agent Bioremediation and Inorganic Fertilizers

Retno Rosariastuti[1]*, Sutami[2]

[1] Department of Soil Science, Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami 36A Surakarta 57126, Indonesia. Tel./Fax. + 62-271-663375, *email: retnobs@staff.uns.ac.id

[2] Student of Master of Soil Science, Sebelas Maret University, Jl. Ir. Sutami 36A Surakarta 57126, Indonesia. Tel./Fax. + 62-271-663375

ABSTRACT

Food security is important for human life. Therefore, we need agricultural land that is free of pollution and healthy. Many industrial wastes contain heavy metals and pollute agricultural land. Agricultural products contaminated by heavy metals, if consumed will endanger human health. This study aims to examine the results of phytoremediation that have been done before, using Mendong plants on agricultural land related to their safety for rice cultivation using bioremediation agents and inorganic fertilizers. This study was conducted in rice fields in Kaling Village, Tasikmadu District, Karanganyar Regency, Central Java Province, Indonesia. This research design was factorial, Completely Randomized Block Design as the base design, with two factors. First: inorganic fertilizer (P0 = without inorganic fertilizer; P1 = with inorganic fertilizer). Second: bioremediation agents (K0 = without bioremediation agents; K1 = with *Agrobacterium sp.* I_{37}; K2 = with cow manure), so that 6 combinations of treatments were obtained, and each was repeated 4 times. The results showed that the K2 (Manure) treatment decreased soil Pb level up to 56,70% than control. Combination of without inorganic fertilizer + manure (P0K2) treatment increased the weight of 1000 seeds up to 17.63% compared with control. The lowest Pb absorption of rice was in combination of without inorganic fertilizer + *Agrobacterium sp.* I_{37} (P0K1) treatment with a value of 2.61µg, its was 48% lower than control. The lowest Pb content of rice was found in a combination of inorganic fertilizer + manure (P1K2) treatment with a value of 0.04µg.g-1, 50% lower than control.

0-014

Ratio The Addition of Soursop Fruit Extracts to Several Components of The Quality Sweet Corn Milk Yoghurt

Adi Saputrayadi[1)], Asmawati[2)], Yeni Sulastri[3)] Firman[4)]

1) Lecturer in Agricultural Product Technology Study Program, Faculty of Agriculture Muhammadiyah University Mataram, Mataram, Indonesia, adhigondris@gmail.com
2) Lecturer in Agricultural Product Technology Study Program, Faculty of Agriculture Muhammadiyah University Mataram, Mataram, Indonesia, asmawatiraba@gmail.com
3) Lecturer in Agricultural Product Technology Study Program, Faculty of Agriculture Muhammadiyah University Mataram, Mataram, Indonesia.
4) Student in Agricultural Product Technology Study Program, Faculty of Agriculture Muhammadiyah University Mataram, Mataram, Indonesia

ABSTRACT

Corn milk yoghurt can be made so that the resulting types of fermented milk products in different forms. One ingredient that can be added is soursop fruit extract to increase levels of vitamin C because soursop fruit has a high Vitamin C content of 20.00 mg. This study aims to determine the effect of the ratio of the addition of soursop fruit extracts to several components of the quality of sweet corn milk yoghurt. The research method used was an experimental method. This study was designed using a Completely Randomized Design (CRD) with various treatments as follows: T1 = soursop fruit extract 0 ml + 250 ml sweet corn milk, T2 = soursop fruit extract 12.5 ml + sweet corn milk 237.5 ml, T3 = 25 ml soursop fruit extract + 225 ml sweet corn milk, T4 = 37.5 ml soursop fruit extract + 212.5 ml sweet corn milk, T5 = 50 ml soursop fruit extract + sweet corn milk 200 ml. The research data were processed by analysis of diversity (Analysys of Variance) at 5% significance level and if there were treatments that had a significant effect, it was continued with BNJ test at 5% level. The results showed that the ratio of the addition of fruit extracts soursop has a significant effect on all parameters of chemical properties, namely lactic acid, pH value, vitamin C content and organoleptic properties, namely color, aroma, taste and texture. The higher the ratio of the addition of soursop fruit extract, the higher levels of lactic acid and vitamin C levels while the pH value is lower. The higher the ratio of the addition of soursop fruit extracts, the color score of organoleptic values with the criteria of cream, the taste with the criteria of very like and the smell with the criteria of very like while the thickness decreases with the criteria being rather thick. The best

addition ratio of soursop fruit extract was obtained in T5 treatment, which was a mixture of 50 ml of soursop fruit extract with 200 ml Sweet corn.

Keywords: Soursop Fruit Extract, Cornmilk Yoghurt, Yoghurt, Sweet Corn

0-015

Safety of Functional Drink of Coffee, Gambir and Ginseng Based on Microbe Test

Rindit Pambayun, **Anggie Rizky Putri Utami**, Tri Wardani Widowati
Agriculture Faculty of Sriwijaya University
Email: arizkyputriutami@gmail.com

ABSTRACT

The aim of this research was to evaluate the antibacterial activity of a functional drink from the combination of coffee Robusta, gambir and ginseng as antimicrobial such as *Staphylococcus aureus, Bacillus cereus, Listeria monocytogenes* and *Porphyromonas gingivalis.* Ginseng contain various bioactive components including ginsenoside, which these compounds can inhibit bacterial growth. Whereas catechin in gambir can inhibit the growth of gram-positive bacteria. The result showed that, antibacterial activity worked by damaging bacterial cell membrane integrity, triggered perturbation of plasma membrane and formed the clean zone with disc diffusion method. The best treatment was 90% coffee, 2.5% gambir extract and 15% ginseng powder ratio with the following characteristics : solubility percentation 36.91%, antioxidant activity 71.3 ppm, pH 5.81, total phenol 92.08 mg/mL, taste 1.64 , color 2.00 and aroma 2.00.

Keywords: functional drinks, robusta coffee, gambir, ginseng, disc diffusion

O-016

Safety of Functional Drink of Coffee and Gambir Based on Microbe Test

Rindit Pambayun, **Syerina Raihatul Jannah**, Agus Wijaya
Agriculture Faculty of Sriwijaya University
Email: syerinaraihatuljannah@gmail.com

ABSTRACT

The aim of this research was to evaluate the antibacterial activity of a functional drink from the combination of coffee Robusta and gambir as antimicrobial such as *Enterococcus faecalis* and *Staphylococcus aureus*. Gambir is known as source of catechin which these compounds can inhibit of gram-positive bacteria. The antibacterial activity was measured by disc diffusion. Catechin can inhibit bacteria by damaging bacterial cell membrane integrity because it form a catechin-peptide complex on the bacterial cell wall peptidoglycan, so it can caused lysis. The results showed that ratio of coffee and gambir had significant effects on solubility percentation, antioxidant activity, pH and total phenol. The best treatment was 90% coffee and 10% gambir ratio with the following characteristics : solubility percentation 28.42%, antioxidant activity 50.48 ppm, pH 5.48, total phenol 67.11 mg/mL, taste 3.24, color 3.00 and aroma 2.98.

Keywords: functional drinks, gambir, coffee robusta, disc diffusion

O-017

Microbiology Safety and Halal Investigation of "Cilok" Meatball at UNEJ Campus Surrounding

Nurhayati Nurhayati[1*], Maria Belgis[1], I'anatun Nisa'[1], Elza Putri Nurindahsari[1]
[1]Program Studi Teknologi Hasil Pertanian, Fakultas Teknologi Pertanian
Universitas Jember
Jl. Kalimantan No. 37 FTP UNEJ, Jember 68121
Correspondence: nurhayati.ftp@unej.ac.id

ABSTRACT

"Cilok" is a derivative of meatballs with a lower meat content than meatballs. This food are one of the popular food, that are made from meat and flour given seasoning. The existence of meat needs to be observed in the halal aspect. This study aimed to investigate the microbiology safety and the halal of the cilok from pork ingredients sold at the UNEJ campus surrounding. Prok ingredients is detected using the PCR method and electrophoresis wuth specific marker DNA of pigs. Stratified random sampling technique was used to take cilok samples at four (4) points on the UNEJ campus. The locations for food sampling was as A factor i.e Kalimatan Street (A1), DPR Ringroad (A2), Bangka Street (A3), while the sampling time was as B factor i.e in the afternoon immediately after displayed (B1), and in the night after 5 hours displayed (B2). Microbiology safety of "Cilok" was conducted in three stages, namely media preparation, sampling, isolation and identification of pathogenic bacteria using the API 20E kit. The results showed that the prevalence of enteric bacterial contamination on "Cilok" up to10^4 CFU/g. The exposure of enteric bacteria exceeds the threshold of the Indonesian National Standard 3818: 2014 (<3 for *Escherichia coli* and negative (-) / 25 g for *Salmonella* sp). Fermentative profile of suspected enteric bacterial isolates in "Cilok" samples were tested using the API 20E kit. Based on fermentative profile showed that the enteric bacterial was detected as *Raoutella Planticola*. Determination of "Cilok" halal was based the DNA method. The isolated DNA was followed by the PCR process using p14 primers to amplify the PRE-1 locus in the pig genome. The process of DNA amplification with an initial denaturation program at 93 °C for 2 minutes, followed by 45 cycles consisting of denaturation of 93 °C for 1 minute, annealing 62 °C for 30 seconds, extension 72 °C for 1 minute, then ending with extension 72 °C for 2 minutes. The expected PCR product to appear is 481bp. Sampled "Cilok" was reported no contain the pork ingredients. However, "Cilok"
was just one that has the higest beef composition among the others based on DNA quantification.

Keywords: "cilok", halal, meatballs, UNEJ, PCR

O-018

The Loss of Antibacterial Activity in *Kinang* Prepared with Extraction and Pulverization Method[1]

Wida Priyanka Savira[2], **Agus Wijaya**[2*] and Rindit Pambayun[2]
[1]Oral presentation at the 6th IUMS Outreach Programme, Yogyakarta, Indonesia February 20-21, 2020
[2]Department of Agricultural Technology, Faculty of Agriculture, Universitas Sriwijaya, Indonesia
[*]correponding author, email: agus_wijaya@hotmail.com

ABSTRACT

Kinang is tradition of eating betel leaf along with lime betel, gambier, tobacco and betel nut. This culture has been practiced in Indonesia, including Sumatera, Java, Kalimantan, Nusa Tenggara and Papua and has positive effect on dental health. A new preparation for *kinang* was developed in order to simplify its use and to deliver active compounds more optimally, namely extraction and followed by pulverization. Two factors were investigated, i.e. extraction time and shieve size. The results showed that extraction time had significant effects on antioxidant activity, total phenol, antibacterial activity, water content and bulk density, whereas shieve size showed significant effects on water content and bulk density. Moreover, interaction of the two factors revealed significant effects on antibacterial activity and bulk density. However, the resulted clear zone diameters were below 5 mm, suggesting that the antibacterial activity of kinang was negligible.

Keywords: antibacterial activity, kinang formulation, antibacterial activity

ABSTRACTS OF POSTER PRESENTER

P-001

Antibacterial Of Angkak by *Monascus purpureus* Strains Producing High Pigments and Low Citrinin

Susana Ristiarini[*)], Ira Nugerahani, Indah Kuswardani
Food Technology Department, Widya Mandala Catholic University Surabaya, Jl. Dinoyo 42-44 Surabaya 60265, Indonesia
[*)] email: ristiarini@ukwms.ac.id

ABSTRACT

Angkak is a rice fermentation product by *Monascus purpureus* which has long been used as a natural coloring, flavor enhancer, and traditional medicine. *Monascus* produces secondary metabolites, including pigments and citrinin during fermentation. Citrinin, and amino acid derivatives contained in pigments have antimicrobial effects. This study aims to determine the antibacterial effect of angkak extract made using three strains of *M. purpureus:* JK2, JK9A and JK9B. The three strains are different in producing pigments and citrinin in rice media. *M. purpureus* JK9A produces high pigments and citrinin, in contrast to JK9B, whereas JK2 produces high pigment and low citrinin. The medium used in this study was IR64 variety rice (long grain rice) enriched with 1% glycine. The study design used was a randomized block design with three replications, and the test parameters included antibacterial effect, pigments estimation, yield and citrinin content. The antibacterial effect test of angkak extract was carried out by well diffusion method and compared with pure citrinin 1000 ppm against *Bacillus* sp., *Bacillus subtilis*, *Staphylococcus aureus* ATCC 25923, *Escherichia coli*, and *Salmonella typhii*. Pigments estimation was determined using a spectrophotometer, while the content of citrinin using LC-MS. Data were analyzed using ANAVA (α = 5%) and continued with LSD test if there were significant differences. The test results show there is a significant difference in the dry yield. Angkak from *M. purpureus* JK9A produced the highest red color and citrinin content. Angkak extract from the fermentation of the three strains of *M. purpureus* had an antibacterial effect only on *Salmonella typhii,* in contrast to the standard citrinin used.

Keywords: Angkak, antibacterial, citrinin, pigments, strains, *M. purpureus*

P-002

Effect of Banana Peel Powder on Citrinin Production by *Monascus purpureus*

Lalita Khacharat[1,2], Warapa Mahakarnchanakul[1]*, Udomlak Sukatta[2], Prapassorn Rugthaworn[2], Thanapoom Maneeboon[3] and Ketsaree Klinsukhon[2]
[1] Department of Food Science and Technology, Faculty of Agro-Industry, Kasetsart University, Bangkok, 10900

[2] Kasetsart Agricultural and Agro-Industrial Product Improvement Institute, Kasetsart University, Bangkok, 10900
[3] Kasetsart University Research and Development Institute, Kasetsart University, Bangkok, 10900

Corresponding author e-mail address: *fagiwpm @ku.ac.th.*

ABSTRACT

Citrinin is a mycotoxin and has been known to be a nephrotoxic to humans and animals. Contaminations of citrinin has been reported in fermented red yeast rice. Recently plant extracts have been widely investigated for their inhibitory anti mycotoxigenic effect. Phenolic compounds are main composition in plant extract have wide range to inhibit mycotoxin production. In the present study, the efficacy of Hom Thong banana peel powder on the citrinin and bio pigment production of *M. purpureus* TISTR 3003 were investigated. The powder of Hom Thong banana peels at different stages (mature green and overripe) and different ratios (25, 75 and 125 mg/mL) were supplemented in culture medium and tested for citrinin production from *M. purpureus* TISTR 3003. Citrinin was qualitatively and quantitatively analyzed by HPLC. The result showed that using overripe Hom Thong banana peels at ratio 125 mg/mL presented the lowest citrinin concentration of 169.20 ± 9.09 ng/mL and the highest total orange pigment intensity at OD_{440} was detected at 203.25 ± 4.52 Unit/g DW in the same condition. Whereas the control treatment (without added banana peel powder) contained the citrinin 245.90 ± 10.05 ng/mL. The result indicated that banana peels has effect on citrinin and bio pigments production. Hom Thong banana peels has the potential to be used safely as anti mycotoxigenic agent.

Keywords: citrinin, banana peels, pigments

P-003

Food Safety Analysis on Wet Noodle in Karanganyar District, Central Java

Maylan Iga Prastika, Nanik Suhartatik, Merkuria Karyantina
Faculty of Technology and Food Industry, Slamet Riyadi University,
Sumpah Pemuda Street No. 18, Joglo, Kadipiro, Surakarta
E-mail: Maylanigaprastika@gmail.com

ABSTRACT

Wet noodle is one of the most popular food in Indonesia. Nowadays, wet noodle can be an alternative food instead of rice as a staple food. The shelf life of wet noodle is very short because of the water content on wet noodle is high. This study analyzed the safety of wet noodle according to its water content, ash content, the presence of formalin and borax, the amount of Total Plate Count (TPC) and the amount of *Escherichia coli* according to Indonesia National Standard or SNI (2987:2015). The determination of water and ash content using thermogravimetric method, the qualitative analysis of formalin using $KMnO_4$, the qualitative of borax analysis using turmeric paper, the quantitative analysis of formalin and borax using spectrophotometer, the analysis of TPC using Nutrient Agar media and the analysis of *Escherichia coli* using Violet Red Bile Agar The samples were taken from 17 sub-district in Karanganyar district and were taken 2 samples from traditional market for each sub – district. The results showed that the average of water content is 51.49% and the average of ash content is 1.38% were meet the requirements of wet noodle based on SNI. All of the 34 samples of wet noodle didn't contain formalin, but it is found that 24 samples (12 sub-district) contain borax according to qualitative analysis, but there were samples from 9 district that contain borax according to quantitative analysis with the average amount is 2296.305 ppm. The average amount of TPC is 9.39 x 10^6 CFU/ gram were didn't meet the requirements of SNI and the average amount of *Escherichia coli* is 2.54 x 10^7CFU/ml also didn't meet the requirements of SNI.

Keywords: Wet noodle, formalin, borax, food safety

P-004

The Effects Of *Lactobacillus plantarum* HL-15 Inoculum Addition In The Cocoa Beans Fermentation To Mold Growth During Fermentation

Tri Marwati[1]*, Titek Farianti Djaafar1*, Ni'matuzzahra[2], Fiametta Ayu Purwandari[2], Tyas Utami[2]*, and Endang Sutriswati Rahayu[2]*

[1]Postharvest Department, Assessment Institute for Agricultural Technology Yogyakarta, Indonesia
[2]Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta, Indonesia
Corresponding author: watipasca2@gmail.com

ABSTRACT

The existence of mold in cocoa beans fermentation is undesired because it potentially produces mycotoxin. *Lactobacillus plantarum* HL-15 is known to have the ability to inhibit mold growth. Many kind of cocoa beans variety in Indonesia possibly can effect the ability to inhibit mold growth. The objective of this study are to know the effect of *L. plantarum* HL-15 inoculum additional to inhibit mold growth in the fermentation of Criollo, Sulawesi, and Lonsum varieties cocoa beans and the quality, especially on the total population of mold, of dried cocoa beans. The material used in this research are Criollo, Sulawesi, and Lonsum varieties cocoa fruits which harvested from Gunungkidul Yogyakarta; and *L. plantarum* HL-15 inoculum. The fermentation was conducted in a bamboo basket with a capacity of 2 kg of fresh cocoa beans, for 5 days at room temperature, designed in 6 treatments: (1) Criollo variety without inoculum additional; (2) Criollo variety with inoculum additional; (3) Sulawesi variety without inoculum additional; (4) Sulawesi variety with inoculum additional; (5) Lonsum variety without inoculum additional; dan (6) Lonsum variety with inoculum additional. During fermentation, the total population of yeast, LAB, AAB, TPC, and mold were analyzed. Dried cocoa beans is analyzed the total population of LAB, TPC, and mold; and it was analyzed in accordance with Indonesian National Standard for cocoa beans. The addition of *L. plantarum* HL-15 inoculum in the fermentation process can inhibit mold growth during fermentation of Criollo, Sulawesi and Lonsum cocoa beans with the decrease of total population of the mold in Lonsum variety is greater than Sulawesi and Sulawesi varietiy is greater than Criollo. The addition of *L. plantarum* HL-15 inoculum during fermentation can also reduce the total population of the mold on the dried cocoa beans.

Keywords: Cocoa beans fermentation, Lactobacillus plantarum HL-15, Criollo var., Sulawesi var., Lonsum var.,

P-005

The Assessment Of Good Manufacturing Practices (GMP) Application and Critical Control Point (CCP) Determination on Cacao Powder Processing in Agricultural Techno Park Nglanggeran, Yogyakarta

Titek Farianti Djaafar[1*], Tyas Utami[2*], Tri Marwati[1*], Putrika Citta Pramesi[2], Rachma Wikandari[2] and Endang Sutriswati Rahayu[2*]

[1] Assessment Institute for Agricultural Technology Yogyakarta
[2] Food Science Department, Faculty of Agricultural Technology, UGM
**Main Contributor*
Corresponding author : titiekfd1212@gmail.com

ABSTRACT

Cacao powder is a cacao-based food product. Indonesian cacao powder has big potential in the ASEAN (*Association of Southeast Asian Nations*) market. Agricultural Agro Techno Park is a company that produced cacao powder in Gunung Kidul, Yogyakarta. This company had realize the importance of improving its product safety. Therefore, the aim of this research is to determine the safety quality of cacao powder produced by Agricultural Agro Techno Park with evaluating their Good Manufacturing Practice (GMP) application and determining critical control point. The results of the GMP application assessment showed that it is categorized in Level IV (lowest level). Thus it is strongly recommended to do corrective actions to deviations identified before planning HACCP. The flow chart assessment showed two steps that may affect cacao powder's quality produced which are the acceptance of raw material and storing in low temperature steps. From the determination of critical control point conducted to improve cacao powder's safety quality, there are two steps that is appointed as critical control point. The steps are acceptance of raw material and storing in low temperature because the steps mentioned may decrease the final product quality.

Keywords: Cocoa powder, good manufacturing practice, critical control point

P-006

Perception and Practices Regarding Food Safety and Health Profile of College Student In Central Java

Nurwulan Purnasari[1], Ilzamha Hadijah Rusdan[1]

[1]Centre for Science and Technology IAIN Surakarta

Email: nurwulan.purnasari@yahoo.com

ABSTRACT

College students are one of the educated parts of urban society. Adults are considered more bearable to foodborne illness due to higher immune function. The objectives of this study are to compare the food safety perception and practices of college students and determined associations with their health profile. The method of this study was using a structured questionnaire. A cross-sectional survey was undertaken among 200 college students in Central Java. A pre-validated, structured questionnaire was used to asses the perception and practices among college students. We found that more than 90% of college students were likely to follow recommended food safety practices. More than 60% of college students reported eating potentially hazardous foods. Fever and diarrhoea were reported by 52% and 47,5% of college students. The result of this preliminary research will conduct the next level of analysis that include gut microbiota profile.

Keywords: food safety, perception, practices, health profile, foods

P-007

Effect Of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink

Jessica Angela, Ratna Puspa Citra Ningrum, Destine Mahadevi Loman, Susana Ristiarini, Ignatius Srianta*

Departement of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-22, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 315678478

ABSTRACT

Anka is fermented product of rice (*Oryza sativa*) by fungus *Monascus purpureus*. Anka mostly used as colorant, enhance the flavor of food, and also good for health. Besides rice, solid medium that can be use to produce anka is durian seed. Durian (*Durio zibethinus* Murr.) known as king of fruit, is a climacteric fruit and grow a lot in the tropics, such as Southeast Asia. Durian production in Indonesia steadily increased, until 2018 reached up to 1.142.094 ton. The only part of durian that consumed is only the flesh (30%), whereas durian seed (20-25%) and skin as a waste. One way to increase the utilization of durian seed waste is by processing durian seeds into Monascus Fermented Durian Seed (MFDS). MFDS potent to reduce cholesterol and blood glucose in human body. To exploit that functional properties are by processing MFDS into jelly drink with adding roselle extract. Additional roselle extract caused the MFDS jelly drink has bad aroma and pale orange color. So, roselle extract can improve the color, taste, and aroma of MFDS jelly drink. The purpose of research is to know the effect of adding roselle extract on physicalochemical and organoleptic properties of MFDS jelly drink. The research design used was a Randomized Block Design (RCBD) with one factor, namely the concentration of roselle extract consisting of six levels, that are 1,25%, 1,5%, 1,75%, 2%, 2,25%, and 2,5%. This experiment was repeated four times. The parameters tested were pH, syneresis, slurping, color, and organoleptic (color, taste, and mouthfeel).

Keywords: MFDS, roselle extract, jelly drink, durian seed

P-008

Effect Of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink

Jessica Angela, Ratna Puspa Citra Ningrum, **Destine Mahadevi Loman**, Susana Ristiarini, Ignatius Srianta*

Departement of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-22, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 315678478

ABSTRACT

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Keywords: MFDS, roselle extract, jelly drink, durian seed

P-009

Effect Of Adding Roselle Extract on Physicochemical and Organoleptic Properties of Monascus Fermented Durian Seed Jelly Drink

Jessica Angela, **Ratna Puspa Citra Ningrum**, Destine Mahadevi Loman, Susana Ristiarini, Ignatius Srianta*

Departement of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-22, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 315678478

ABSTRACT

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Keywords: MFDS, roselle extract, jelly drink, durian seed

P-010

The Effect Of Jackfruit Seed Flour Addition Of Physiochemistry Properties Tomato Ketchup

Vidjerinalisa Handojo, Kenya Gathaya Psari, Kristinawati Asnadi, Sutarjo Surjoseputro dan Erni Setijawaty*

Department of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-44, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 31 5678478

ABSTRACT

Tomato ketchup is one of food addition as a flavoring agent which made by tomato slurry and spices addition allowed. Generally, tomato ketchup has a relative high viscosity level, yet can be flowing and the flavor is sweet sour due to acetic acid addition. Tomato ketchup processing mostly is added by thickening agent to increase the viscosity. Starches can be used as a good thickening agent because of its amylose and amylopectin contents are high. Flour product which can be used as thickening agent is jackfruit seed flour. Jackfruit seed flour has 70.22% starch content, contains amylose and amylopectin contents respectively 15.72% and 84.28%. The application of making jackfruit seeds flour as a thickener is attempting to utilize the wastes of jackfruit. The research design used a randomized block design (RBD) with one factor, namely jackfruit seed flour concentration consisting of six levels, 1.5%, 3.0%, 4.5%, 6.0%, 7.5%, and 9.0% (w/w). This experiment was repeated four times. The parameters which were tested are moisture content, viscosity, pH, total soluble solid, and color. Different concentration of jackfruit seed flour increased pH (3.66-3.80), increased total soluble solids (34.95-46.58^{o}Brix), increased water content (62.00-73.29%), increased viscosity 269,50-2688,75 cP. Lightness range of tomato ketchup was 40.12-46.56, chroma range was 32.04-38.01, and hue range is 34.53^{o}-36.77^{o}.

Keywords: tomato ketchup, jackfruit seed flour, thickening agent, jackfruit waste

P-011

The Effect Of Jackfruit Seed Flour Addition Of Physiochemistry Properties Tomato Ketchup

Vidjerinalisa Handojo, **Kenya Gathaya Psari**, Kristinawati Asnadi, Sutarjo Surjoseputro dan Erni Setijawaty*

Department of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-44, Surabaya, Indonesia
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Keywords: tomato ketchup, jackfruit seed flour, thickening agent, jackfruit waste

P-012

The Effect Of Jackfruit Seed Flour Addition Of Physiochemistry Properties Tomato Ketchup

Vidjerinalisa Handojo, Kenya Gathaya Psari, **Kristinawati Asnadi**, Sutarjo Surjoseputro dan Erni Setijawaty*

Department of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic University, Jalan Dinoyo 42-44, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 31 5678478

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Keywords: tomato ketchup, jackfruit seed flour, thickening agent, jackfruit waste

P-013

Competition of Toxigenic Isolates of *Aspergillus flavus* and *Aspergillus carbonarius* Under Shifting Temperature

Retty Putri Utami Dwipa*, Thanapoom Maneeboon**, Chananya Chuaysrinule**, Warapa Mahakarnchanakul***
*The Graduate School, Kasetsart University, Bangkok 10900, Thailand
**Scientific Equipment and Research Division, KURDI, Kasetsart University, Bangkok 10900, Thailand
***Department of Food Science and Technology, Faculty of Agro-Industry, Kasetsart University, Bangkok 10900, Thailand
Email address : fagiwpm@ku.ac.th
Phone : +66832596363

ABSTRACT

Based on prediction of Southeast Asia START Regional Center (2010), the night time is warmer more rapidly than day time resulting in wider differences between those times. Subsequently, the shifting temperatures have been proved to cause oxidative stress in fungi by which the growth and mycotoxin production could be induced. Therefore, this research aims to study whether fluctuating temperatures could induce growth rates and mycotoxin production of single and interactive cultures of *A. flavus* and *A. carbonarius.* The temperatures employed include static temperature of 20ºC, and abruptly shifting temperatures of 20/30ºC, 20/35ºC and 20/40ºC. Growth rates of *A. flavus* under shifting temperatures of 20/30ºC and 20/35ºC were higher than those observed at 20ºC and 20/40ºC, while the higher growth rates of *A. carbonarius* and the interactive cultures were observed at 20ºC and 20/30ºC, in addition at 20/35ºC than 20/40ºC. In regard to aflatoxin B1, the production by *A. flavus* was significantly higher at 20ºC and 20/30ºC than those observed at 20/35ºC and 20/40ºC. Meanwhile, AFB1 secreted by interactive cultures was significantly increased at 20/35ºC and 20/40ºC compared to 20ºC and 20/30ºC. In terms of ochratoxin A, the production by *A. carbonarius* and interactive cultures were decreased at shifting temperatures and wider differences of temperature caused lowered production of OTA. Based on growth rates, the shifting temperatures could induce growth on cultures as long as the final temperatures employed was favorable for the growth of cultures. In this study the shifting temperature would only induce aflatoxin B1 production, particularly in interactive cultures.

Keywords: fungal competition, *Aspergillus sp*, AFB1, OTA

P-014

Antibacterial Activity of Ethanol Extract and Essential Oil of Piper betle Leaves Against Foodborne Pathogens

Ketsaree Klinsukhon, Prapassorn Rugthaworn, Lalita Khacharat and Udomlak Sukatta*
Kasetsart Agricultural and Agro-Industrial Product Improvement Institute (KAPI), Kasetsart University, Bangkok, 10900 and Thailand

Corresponding author email: aapuls@ku.ac.th

ABSTRACT

Foodborne disease caused by bacterial contamination is still one of the biggest problems affecting human health and food safety. Consuming contaminate foods annually causes 420,000 people die worldwide. Natural extracts is one of the good choices for use to control pathogenic bacteria because it's safe and the consumer's trend avoid food containing chemicals. This research aims to evaluate antibacterial potential of ethanol extract and essential oil from betel leaves against 9 selected foodborne pathogens consist of *Bacillus cereus*, *Staphylococcus aureus*, *Escherichai coli Salmonella* Typhimurium, *Pseudomonas aeruginosa*, *Shigella flexneri*, *Klebsiella pneumonia*, *Proteus mirabilis*, and *Vibrio cholerae*. The antibacterial activity of ethanol extract and essential oil from betel leaves was determined by disc diffusion method. The result showed that betel extract and betel essential oil had high efficacy to inhibit the growth of all tested bacteria. Both of extracts was then subjected to MIC value determination using micro dilution method. It was found that ethanol extract of betel leaves showed the highest effective as antibacterial agent against Staphylococcus *aureus* with MIC value of 32 μg/ml. Betel essential oil showed a little less activity to inhibit the growth of all tested bacteria than ethanol extract of betel leaves. The ethanol extract ethanol extract and essential oil from betel leaves might have a potential application as natural food preservative to improve the microbiological safety of the foods.

Keywords: Foodborne Pathogens, Antibacterial activity, Piper betle, Extracts, Essential Oil

P-015

A Preliminary Study On Food Safety Knowledge and Attitude Of Licking Fingers After Eat Among Early Adulthood in Central Java Indonesia

Ilzamha H Rusdan[1], Nurwulan Purnasari[1]
[1]Centre for Science and Technology, Institut Agama Islam Negeri Surakarta, Indonesia
Email: ilzamha.rusdan@iain-surakarta.ac.id

ABSTRACT

The objective of this study was to assess the food safety knowledge and attitude of licking fingers after eating. The exploratory research method was used in this survey. A total of 200 early adulthood respondents (age 18-25) were selected randomly from several college students in Central Java, Indonesia. Questionnaire was used to get primary outcome measure of food safety knowledge and attitude; there are knowledge about types of bacteria (pathogens) that endanger health, habitat and how these bacteria can contaminate, natural microflora in the human body, recommended attitude of licking fingers after eating using the hands directly, and to get attitude of frequency of licking fingers after eating using the hands directly and frequency of washing hands before eating. The result of this preliminary study are more than 50% respondents know pathogens, how they can contaminate, and know kind of natural body microflora, most of them (82%) know the recommendation of licking fingers after eating using the hands directly. While, resulting in the attitude, 55.5% of respondents often and always licking fingers after eating using the hands directly, and 94% respondents often and always washing hands before eating. This exploratory data of this preliminary study will use to next phase of the whole research.

Keywords: Food safety, Knowledge, Attitude, Licking fingers.

P-016

Utilization Of White Oyster Mushroom as a Substitute for Chicken Meat in Making Nuggets

Alfindo Prayogo, Vincentius Kenyanto, Ignatius Srianta*

Departement of Food Technology, Faculty of Agricultural Technology of Widya Mandala Catholic
University, Jalan Dinoyo 42-22, Surabaya, Indonesia
*Email: srianta2601@gmail.com, phone number: +62 315678478

ABSTRACT

White oyster mushroom is an edible mushroom that has the potential to be developed in Indonesia because of its easy cultivation but its use is still limited so that processing technology needs to be developed. Oyster mushrooms have properties such as chicken meat so that it is potential to be used as substitution material for chicken meat, one of the processed products that people like is a nugget. The purpose of this paper is to determine the effect of the substitution rate of chicken meat with oyster mushrooms on the characteristics of chicken nuggets. Chicken nuggets are one of the food products that have high protein and fiber content, so that they are consumed by all people, especially for children and people who are on a diet, their needs are not sufficient. The addition of white oyster mushrooms has an influence on the physicochemical properties of nugget products. The use of edible mushrooms is able to increase the fiber content in nuggets. Therefore a literature study on the effect of adding white oyster mushrooms to the characteristics of chicken nuggets and determining the right concentration also needs to be done so that chicken nuggets that have high protein content but are low in fiber have sensory properties that are still preferred by consumers. Based on the literature study, the addition of white oyster mushrooms in high amounts (50% concentration) did not give a real difference to the physicochemical properties and consumer acceptance of the sensory properties of oyster mushroom chicken nuggets, so the addition of white oyster mushrooms can still be done up to 50%. Addition of white oyster mushrooms with a concentration ratio with chicken: white oyster mushrooms 70%: 30% gives the best results, because it is most preferred by consumers and not significantly different from controls, namely chicken nuggets without the addition of white oyster mushrooms.

Keywords : chicken nuggets, white oyster mushrooms, fiber replacement

P-017

Influence Of Temperature and Water Activity on Growth and Production Of Aflatoxin B1 by *Aspergillus flavus* and Ochratoxin A by *A. carbonarius* Isolated from Dried Chili

Chananya Chuaysrinule[1,2], Warapa Mahakarnchanakul[1] and Thanapoom Maneeboon [2*]

[1]Department of Food Science and Technology, Faculty of Agro-Industry, Kasetsart University, Bangkok 10900, Thailand

[2]Scientific Equipment and Research Division, Kasetsart University Research and Development Institute (KURDI), Kasetsart University, Bangkok 10900, Thailand

*Corresponding author email: rditpm@ku.ac.th

ABSTRACT

Aflatoxins and ochratoxin A (OTA) are frequently found in dried chili available in many ASEAN countries. In tropical and temperate climates, aflatoxin and OTA contaminations are usually caused by *Aspergillus* section *Flavi* and section *Nigri*, respectively. The aim of this study was to determine the effect of temperature (22.9-37°C) and water activity (a_w) (0.885-0.984) on radial growth and production of aflatoxin B1 by *A. flavus* and OTA by *A. carbonarius* isolated from dried chili. Fungal growth and mycotoxins production on CYA medium were studied following a central composite design (CCD). Colony diameter was measured and mycotoxins was extracted from culture media after 7 days of incubation. Result of analysis of variance showed that temperature, a_w and their interaction had a significant effect on growth and mycotoxins production. Both strains were able to grow at all temperatures and a_w tested, while no mycotoxins production was detected at temperature of 37°C. Response surface analysis showed that the most favorable growth condition for *A. flavus* was found at temperature range of 25-30°C and a_w higher than 0.970. The maximum aflatoxin B1 production was obtained at temperature of 22.9°C and 0.984 a_w. For *A. carbonarius,* optimum growth and OTA production were observed at temperature of 22.9°C and 0.970-0.984 a_w. Our results are useful to control and prevent growth and mycotoxin production of post-harvest mold in dried chili.

Keywords: temperature, water activity, growth, aflatoxin, ochratoxin A, *Aspergillus*

P-018

AntiFungal Inhibitor Activity Test of Nutmeg Extract (*Myristica fragrans Houtt*) Against *Aspergillus flavus*

Sandriana J Nendissa[*], Dessyre M Nendissa[**]

[*]Student Of Agriculture Science-UnHas. Makasar
[**]Lecturer in The Departement of Fisheries Product Technology.FPIK-UnPatti. Ambon

ABSTRACT

Aspergillus flavus is a fungus that produces toxins or toxins known as alfatoksin found in peanuts, seeds, fish and wheat. Aflatoxin is carcinogenic so it is very dangerous for health, it can even cause death in animals and humans. Maluku is known since centuries ago as the area of origin of nutmeg (Myristica fragrans) of the family Myristicaceae. This plant became very popular among Europeans because of its various benefits and uses, especially its fruit. Based on previous studies nutmeg meat contains essential oils with main components of hydrocarbon monoterpenes (61 - 88% such as α-pinene, β-pinene), monoterpene acid (5-15%), aromatic ether (2-18% such as myristicin, safrole) . The aim of the study was to find the antifungal inhibitory activity of the nutmeg meat extract and the effective inhibitory concentration on the growth of Aspergillus flavus. This research uses laboratory experiments. Nutmeg meat was extracted by maceration using 96% ethanol. Antifungal activity test using the Kirby Bauer Disc diffusion method 10%, 30%, 50% and 70%. Ketoconale 15 ug / disk was used as positive control while 10% DMSO was used as negative control. The results showed that the extract of nutmeg (Myristica fragrans Houtt) had antifungal activity on the growth of the fungus Aspergillus flavus. Effective concentration of nutmeg meat extract that can inhibit the growth of Aspergillus flavus is at a concentration of 50% with the largest inhibitory zone.

Keywords: Aflatoxin, Antifungal, *Aspergillus flavus*, Nutmeg Flesh Extract

P-019

Efficacy Of Hot Water Treatment to Control *Fusarium* sp. and *Penicillium* sp. Strains Isolated from Pepper Fruits (*Piper nigrum* L.): *In Vitro* Studies

Supunnika Somjaipeng[1*] and Rangsiya Kaewwichian[1]
[1]Division of Agricultural Technology, Faculty of Science and Arts Burapha University, Chanthaburi Campus, Chanthaburi, THAILAND
[*] Corresponding author: supunnika@buu.ac.th

ABSTRACT

Hot water treatment has been demonstrated to be a safe and environmental-friendly procedure controlling post-harvest fungi. This study examined the inhibitory activity of hot water treatments on mycelial growth and spore germination of *Fusarium* sp. and *Penicillium* sp. Strains were isolated from pepper fruit in Chanthaburi, Thailand. Overall, mycelial growth rate and spore germination of both isolates decreased with increasing temperature and time of hot water treatments. *Penicillium* sp. exhibited more sensitive response to hot water treatments. No mycelial growth of *Penicillium* sp. were observed for temperature above 55°C, 10 minutes. Whereas this condition reduced mycelial growth rate of *Fusarium* sp. by 15-fold comparing with control. Spore germination of *Fusarium* sp. were totally halted for 6 hours when immersed hot water at 55°C for 5 and 10 minutes. While under this condition, less than 6% (55°C, 5 minutes) and 3% (55°C, 10 minutes) of *Penicillium* sp. spores germinated. Data obtained from this study show that hot water treatment may represent an effective non-chemical approach to minimize *Fusarium* sp. and *Penicillium* sp. in pepper.

Keywords: *Fusarium* sp., *Penicillium* sp., Hot water treatment, Pepper,

P-020

Microbiology Quality of Probiotic Jelly Candy *Lactobacillus plantarum* Dad-13

Rafli Zulfa K., **Angela Dea R**, Fida Hasna F., Endang S. Rahayu, Rini Yanti, Dian Anggraini S.
Department of Food and Agricultural Product Technology, Faculty of Agriculture Technology, Universitas Gadjah Mada

ABSTRACT

Jelly candy is a probiotic's carrier suitable for its bacterial protection caused by gelatin in its formula. The isolate of *Lactobacillus plantarum* Dad-13 chosen as probiotics strain has been proven that it can survive in Indonesian healthy human's colon and it is an indigenous strain isolated from Indonesian local product. Up till now, Indonesian's national standard (SNI) has no standardized method in finding the amount of microbial contamination in probiotic products. This research aims to test microbiology contamination of probiotic jelly candy according to SNI and find if the method of microbiology contamination test written in SNI of jelly candy can be used to probiotic jelly candy *Lactobacillus plantarum* Dad-13.

Theresearch is done by testing the amount of microbiology contamination (Total Plate Count (TPC), *Staphylococcus aureus, Coliform, Escherichia coli, Salmonella*, number of mold and yeast) of probiotic *jelly candy Lactobacillus plantarum* Dad-13 using methods written in *jelly candy* SNI (2008). The test is done twice for each parameter of microbiology contamination. The result of the test then being compared to SNI's standard. The results of this research show that all of the microbiology contamination (*Staphylococcus aureus, Coliform, Escherichia coli, Salmonella*, and the number of yeast and mold) except for TPC are suitable to SNI's standard and five methods of parameter microbiology (except for TPC) contamination can be used to *probiotic jelly candy.*

Keywords: jelly candy, *Lactobacillus plantarum* Dad-13, probiotic, microbiology contamination, SNI.

P-021

Detection of Microbiological Contamination in Probiotic Chocolate Candy with addition of *Lactobacillus Plantarum* DAD-13

Mifta Gatya[1], Novia Nur Aini[1], Gabriela Belinda Aulia[1], Imelda Damarwati[1], Hariya Amalina[1], Tri Marwati[2], Titiek Farianti Djaafar[2], Tyas Utami[1], Endang S. Rahayu[1]
[1]Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta, Indonesia
[2]Postharvest Department, Assessment Institute for Agricultural Technology, Yogyakarta, Indonesia

ABSTRACT

Chocolate candy is a product made from cocoa beans that become a trend for everyone. Therefore, there must be some methods to increase its functional value. One of them is to add probiotic *Lactobacillus plantarum* DAD-13 that has been isolated from *dadih* (traditional fermented buffalo milk). *Lactobacillus plantarum* DAD-13 as probiotic is known to be able to increase our digestion system, so the absorption of nutrition will be better. But, chocolate candy is susceptible for contamination, especially microbiological contamination that comes from its raw material, ingredients and machines. Because of this, the objective of this research is to know the presence of microbiological contamination in probiotic chocolate candy compared to SNI (Indonesian National Standard). There were four samples obtained from each chocolate candy processing. There were fermented cocoa beans, pasta, tempered pasta and chocolate candy. Based on SNI, there are four microbiology contaminations that need to be observed in probiotic chocolate candy product, such as Total Plate Count, *Salmonella*, *Escherichia coli*, mold and yeast. Pour plate method was used for Total Plate Count, mold and yeast, while *Salmonella* and *Escherichia coli* was used streak plate method. The results showed that *Salmonella* and *Escherichia coli* were negative in final product. Meanwhile, mold and yeast was 1,175 x 10^3 CFU/g and there was 2,51 x 10^5 CFU/g for Total Plate Count (TPC). It exceeded the limit of Indonesian National Standard. The reason is because there was probiotic *Lactobacillus plantarum* DAD-13 (10^{10} CFU/g) added during the processing. In conclusion, probiotic chocolate candy *Lactobacillus plantarum* DAD-13 is safe to be consumed based on microbiological contamination.

Keywords: Chocolate candy, microbiological contamination, probiotic, *Lactobacillus plantarum* DAD-13

P-022

Study of Heavy Metal Contamination in Probiotic Chocolate Candy with Addition of *Lactobacillus plantarum* DAD-13

Gabriela Belinda Aulia[1], Hariya Amalina[1] , Imelda Damarwati[1], Mifta Gatya[1], Novia Nur Aini[1], Titiek Farianti Djaafar[2] , Tri Marwati[2], Tyas Utami[1], Endang S. Rahayu[1]

[1]Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta, Indonesia

[2]Postharvest Department, Assessment Institute for Agricultural Technology, Yogyakarta, Indonesia

ABSTRACT

Indonesia known as one of the biggest exporters cacao in the world. One of the concern of harvesting cacao is the metal contamination. Metal contamination can caused by contamination in soil and the processing to make chocolate candy. The accumulation of metal from soil can affect the quality of food and the food safety itself. The contamination of metal can affect health risk too. Because of this reason, the objective of this research is to know is there any heavy metal contamination in probiotic chocolate candy based on SNI (Indonesian National Standard). There were five samples to do this research, from the raw material or cocoa beans, cacao nib, pasta, tempered pasta, and chocolate candy. Heavy metal that need to be observed based on SNI are arsenic (As), cadmium (Cd), lead(Pb), lead (Sn) and mercury (Hg). The result of this research showed that As detected in cacao beans, cacao nib and pasta, Pb detected in the chocolate candy, Cd detected in cacao beans, Sn not detected in any samples, and Hg not detected in any samples. The results is safe because it didn't exceed the standard. So, the conclusion is probiotic chocolate candy *Lactobacillus plantarum* DAD-13 is safe to be consumed based on the heavy metal contamination

Keywords: Chocolate candy, heavy metal, metal contamination, probiotic, *Lactobacillus plantarum* DAD-13

P-023

A Preliminary Study of The Occurrence of Toxigenic Fungi and Mycotoxin in Commercial Chili Products Marketed in Yogyakarta, Indonesia

Rachma Wikandari[1], Inggrid Chrisanti Mayningsih[1], Maura Dania Permata Sari[1], Fiametta Ayu Purwandari[1], Widiastuti Setyaningsih[1], Endang Sutriswati Rahayu[1], and Mohammad J. Taherzadeh[2,*]

[1] Department of Food and Agricultural Product Technology, Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta, Indonesia
[2] Swedish Centre for Resource Recovery, University of Borås, Borås, Sweden
***** Correspondence: mohammad.taherzadeh@hb.se (+4633-4355908)

ABSTRACT

Indonesia is the largest chili producer in Southeast Asia and the fourth in the world. However, the potential aflatoxin contamination of the chili has not yet reported. In this study, fifteen marketed dried and powdered chili samples were collected from various traditional and modern markets in Yogyakarta Province, Java, Indonesia. The cultivars of chilli samples provided from open markets were green cayenne chilli, white bird's eye chilli, red pepper, red bird's eye chilli, and red cayenne chilli. *Aspergillus* spp. was the dominant contaminant in dried chili both from traditional and supermarket, in which half of them were identified as *A. parasiticus* and *A. flavus*. A complete set of targeted genes involving in aflatoxin production was detected in two isolates of *A. flavus*. Meanwhile, gene involving in ochratoxin A biosynthesis was detected in one isolate of *A. carbonarius*. The level of aflatoxin B1 and B2 in the contaminated dried chillies were varied in the samples, whereas no aflatoxin G1 and G2 were detected. The toxin concentration and micobiota diversity and occurrence frequency of the fungal contamination in the traditional market were higher than modern market thus it is highly advisable to do proper harvesting, drying, handling, storage, and transportation conditions in order to reduce the risk of contamination.

Keywords: Chili, toxigenic fungi, Indonesia, aflatoxin, ochratoxin

CURRICULUM VITAE

- Director of ISPA CNR - Institute of Sciences of Food Production, National Research Council of Italy
- He is the founder of the Agro-Food Microbial Culture Collection "ITEM", the co-founder and former Past-President of International Society for Mycotoxicology and President of Mediterranean Phytopathological Union. He was President of ISPP "Fusarium Committee"
- Elected as a member of Hungarian Academy of Sciences and nominated as Distinguished International Supervisor of Institute of Food Science and Technology, Chinese Academy of Agricultural Sciences.
- Email: antonio.logrieco@ispa.cnr.it

Dr. Antonio F. Logrieco

Prof. Dr. Vasilis Valdramidis

- He is an Associate Professor at the Department of Food Sciences and Nutrition at the University of Malta.
- Member of International Committee of Predictive Modeling in Foods, the International Committee on Food Microbiology and Hygiene of the IUMS, while he served as a Publication Committee member at the International Life Sciences Institute (ILSI) Europe.
- He has published 54 peer of review journal papers, 4 book editions, 15 book chapters (h-index of 21)
- He was Scientist in Charge for one Marie Curie (CIG) award, he was/is coordinator of two Erasmus and Cooperation for innovation and the exchange of good practices in the area of Process Analytical Technologies, Food processing, and Innovative technologies and partner in several European FP7, H2020 projects
- Email: vasilis.valdramidis@um.edu.mt

- Head, Applied Mycology Group, Environment and AgriFood Theme, Cranfield University, College Road, Cranfield, Beds. MK43 0AL, U.K. He holds the Chair in Applied Mycology at Cranfield University.
- Current research: climate change impacts on fungal pathogens, ecology and control of mycotoxins in staple food/feed chains, Biocontrol of plant pathogens/pests and mycotoxigenic fungi, novel preservation systems for controlling spoilage molds, development of DSS systems and potential for using biodegradable packaging systems
- Email : n.magan@cranfield.ac.uk

Prof. Dr. Naresh Magan

Dr. Angel Medina Vaya

- The Senior Lecturer in Food Mycology Cranfield Soil and Agrifood Institute
- Research interest: the impact that environmental stress has on the functioning of fungi, the mechanisms used for ecophysiological tolerance, and the molecular basis of secondary metabolite production, especially mycotoxins.
- He has published 75 peer reviewed Journal papers, 10 book chapters and has an H-factor of 24 (Scopus) and 27 (Google Scholar)
- Email: a.medinavaya@cranfield.ac.uk

Prof. Dr. Emmanuel Coton

- Professor at the "*Université de Bretagne Occidentale*" where he teaches molecular biology, microbiology and crop production at the "*Ecole Supérieure d'Ingénieurs en Agroalimentaire de Bretagne atlantique*" (ESIAB)
- He is a member of the "*International Commission on Food Mycology*", the "*Société Française de Microbiologie*" and the Editorial Board of "*Food Microbiology*"
- His research fields concerned all aspects of food quality and safety, especially in fermented products (cheese, cider, olives).
- Email: Emmanuel.Coton@univ-brest.fr

Prof. Dr. Dr. Robert A. Samson

- The Secretary General of the International Union of Microbiological Societies since 2005 and is also involved as chair or member of several international mycological commissions.
- He is Honorary Member of the Hungarian Society of Microbiology and American Mycological Society, and member of the World Federation of Culture Collections
- Research interest: the polyphasic taxonomy of the important fungal genera *Penicillium* and *Aspergillus*
- Email: r.samson@wi.knaw.nl

- The Research Program Leader of the Biotechnology for Industry, Energy and Environment Program of the National Institute of Molecular Biology and Biotechnology, UPLB.
- Research interests : bacteriocins of lactic acid bacteria, fermentation technology and nanobiosensors to advance food safety.
- He is the current Secretary General of the Asian Federation of the Societies for Lactic Acid Bacteria (AFSLAB) and was the Past President of Philippine Society for Microbiology, Inc. (PSM), Philippine Society for Lactic Acid Bacteria (PSLAB)
- Email: fbelegado@up.edu.ph

Dr. Francisco B. Elegado

Dr. Warapa Mahakarnchanakul

- Lecturer at Department of Food Science and Technology, Faculty of Agro-Industry, Kasetsart University, Bangkok
- She is a Director of Kasetsart University Reseach and Development Institute (KURDI)
- Recent published article is Two-Step Washing with Commercial Vegetable Washing Solutions, and Electrolyzed Oxidizing Microbubbles Water to Decontaminate Sweet Basil and Thai Mint: A Case Study
- Email: warapa.m@ku.ac.th

- The assistant professor in the Faculty of Engineering at Osaka University, and as an associate professor in the Graduate School of Agricultural and Life Sciences at the University of Tokyo
- In 2018, moved to the Faculty of Science and Engineering of Teikyo University as a professor and dean of the Graduate School of Science and Engineering
- He is a president of Japanese Society of Mycotoxicology
- Recent research topics are mycotoxin production inhibitors, chitinase inhibitors, and microbial signal molecules.
- Email: sakuda@nasu.bio.teikyo-u.ac.jp

Dr. Shohei Sakuda

Dr. Celine Meerpoel

- She started her doctoral study at the Centre of Excellence in Mycotoxicology and Public Health at the Faculty of Pharmaceutical Sciences and performed half of her PhD research at the Department of Pharmacology, Toxicology and Biochemistry at the Faculty of Veterinary Medicine, Ghent University
- She investigated the occurrence of the mycotoxin citrinin in various food and feedstuffs, and the risk for human and animal health
- She is author and co-author of several scientific papers in international peer reviewed journals and presented her work at different national and international conferences
- Email: Celine.Meerpoel@ugent.be

Prof. Dr. Jens C. Frisvad

- Professor of industrial mycology at DTU, Denmark
- Research interests: species concepts in *Aspergillus*, *Penicillium* and *Talaromyces*, species-specific profiles of secondary metabolites in fungi, specific association of those species to different substrates (especially foods and feeds) and taxonomy (including identification), cladonomy, ecology and physiology of filamentous fungi.
- He has published 340 scientific peer reviewed papers and 80 chapters in scuientific books, and has a H-factor of 73.
- Email: jcf@bio.dtu.dk

Dr. Latiffah Zakaria

- Deputy Dean of Postgraduate, Innovation and Industry-Community Engagement in the School of Biological Sciences, USM
- Current Research: Biodiversity, Systematics and Phylogenetic of Microfungi (plant pathogens, spoilage fungi, endophytes and toxigenic fungi) in Malaysia
- She is member society of Systematics Biologist, British Mycological Society, British Society for Plant Pathology
- She has published 102 papers in peer review journals and 115 proceedings
- Email: Lfah@usm.my

- Chair of Indonesian Food Safety Professional Association (APKEPI) and Chair of Governing Board of Quality and Food Safety Assurance - Professional Certification Body (LSP-JMKP)
- He is currently a Member of National Codex Committee Indonesia, Indonesian Pharmacist Association (IAI), and The Indonesian Association of Food Technologist (PATPI) and also member of KKHPRG
- He is active as a reviewer at Ministry of Research and Technology / National Agency for Research and Innovation the Republic of Indonesia (BRIN), Senior Advisor at the Agency for the Assessment and Application of Technology, the Republic of Indonesia (BPPT)
- Email: rsparringa@apkepi.or.id, sparringa@gmail.com

Dr. Ir. Roy Alexander Sparringa

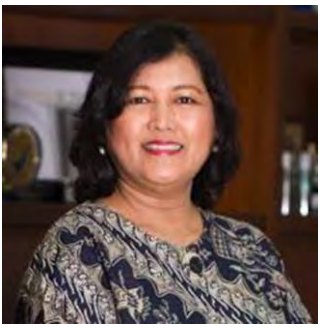
Prof. Dr. Ir. Endang S. Rahayu

- Professor at the Universitas Gadjah Mada, Yogyakarta
- In 5 years, she published 45 journal papers such as: Gut Microbiota Profile in Healthy Indonesians, Development of the Traditional Tape Ketan into Probiotic Drink, Screening of lactic acid bacteria producing uricase and stability assessment in simulated gastrointestinal conditions
- Her research experiment in 5 years, there's 27 research experiment,
- Email : endangsrahayu@ugm.ac.id

- Principal scientist at SEAMEO BIOTROP
- She is an expert member in the National Agency for Food and Drug Controls of the Republic of Indonesia (Badan POM RI).
- She is a member of Indonesian Society of Mycology, Indonesian Society for Plant Pathology, Indonesian Society for Microbiology, Indonesian Society for Human and Animal Mycology, Indonesian Association for Food Technologist, Indonesian Society for Horticulture, and International Society for Mycotoxicology.
- She has published more than 90 publications, mainly related to postharvest fungi and mycotoxins, either in national or international levels
- Email: okky@biotrop.org

Prof. Dr. Okky S. Dharmaputra

Prof. Dr. Ratih Dewanti-Hariyadi



- Professor in Food Microbiology at the Department of Food Science and Technology and the Southeast Asian Food & Agriculture Science and Technology (SEAFAST) Center, Bogor Agricultural University (IPB), Indonesia
- She is the head of Food Science Study Program, Post Graduate School, IPB
- Research interests: Behavior and control of bacterial pathogens in foods, formation and control of biofilm of pathogenic bacteria on food contact surfaces, sanitation program for food industry, use of quality assured microbiological assays
- Email: rdewantih@yahoo.com

- He is the Head of Food Analysis and Instrumentation Laboratory, Department of Food Technology, Faculty of Agricultural Technology, Widya Mandala Catholic University Surabaya
- Research interest: Food Technology, Food Microbiology, Fermentation, Food Bioprocess, Functional Foods, Food Safety, Food Analysis
- Member of Indonesian Association of Food Technologists
- E-mail : srianta_wm@yahoo.com

Dr. Ignatius Srianta

Dr. I Nengah Sujaya

- Lecturer at School of Public Health, Fact Medicine, Udayana University, Bali
- Field of research: Food microbiology, Gut microbiota, Microbial ecology and systematics
- Current research: Development of Prebiotic and Probiotic from Indonesian Biodiversities
- Email: sakabali@hotmail.com

Dr. Widiastuti Setyaningsih

- Lecturer at the Department of Food and Agricultural Product Technology, Faculty of Agricultural Technology, Gadjah Mada University, Indonesia
- She is a member of the editorial boards of a national food science journal (AGRITECH) and Indonesian Association of Food Technologists (PATPI).
- Research interests: Analytical Chemistry, Chemometrics, Functional Food
- Her research were published in certain high impact factor journals and presented at some international conferences in 13 countries where she has been awarded the best oral and poster presentations.
- Email: widiastuti.setyaningsih@ugm.ac.id

Dr. Yoyok Budi Pramono

- Associate Profesor at Food Technology Department, Faculty of Animal and Agricultural Sciences, Diponegoro University
- Recent publication: The Effect of Purple Sweet Potato and Green Bean Formulations on Solubility, Rehydration Power and Rehydration Time of Breast Milk Complementary Food in The International Journal Of Science & Technoledge ISSN 2321 – 919X
- Email: yok_b_p@yahoo.com

- She is a lecturer at Study Program of Food Science and Technology in Universitas Brawijaya Malang Indonesia and now the head of Study Program of Doctoral in Food Science in Universitas Brawijaya
- Her research now mostly about phytochemical exploring and its role as antioxidant and anti-cancer.
- Her awards were some project funding from Directorate General Higher Education and Universitas Brawijaya

Dr. Erryana Martati

Prof. Dr. Ir. S Joni Munarso

- He is the Principal Researcher of Center for Post-Harvest Agriculture Research and Development
- He became Research Professor with the title of the speech "Postharvest Technology Innovation for Improving Quality, Safety and Competitiveness of Fresh Food Commodities"
- Field of research: Postharvest Technology
- Email: s.jonimunarso@pertanian.go.id

LIST OF PARTICIPANTS

No	Full Name	Institution	Contact
1	Abigail Nicole S.	Universitas Gadjah Mada	bigel_san@yahoo.com/ 081291422411
2	Adi Saputrayadi	Universitas Muhammadiyah Mataram	adhigondris@gmail.com/ 082340990038
3	Adina Amy R.	Universitas Gadjah Mada	reilanisuji@gmail.com/ 082136802003
4	Adinda Budi P.	Universitas Gadjah Mada	adindabpsptsr@gmail.com/ 083115986673
5	Agus Wijaya	Universitas Brawijaya	agus_wijaya@hotmail.com/ 081377844401
6	Agussalim Matti	Politekik Pertanian Negeri Pangkep	agussalim.matti@mail.polipangkep.ac.id/ 082211990817
7	Ahmad Reza Khan	Shoolini University	rezaahmad7209941109@gmail.com/ 918083029403
8	Aiman Arkan	Universitas Gadjah Mada	aimanarkan@gmail.com/ 082135377000
9	Ais	Universitas Gadjah Mada	ais.januadi@gmail.com/ 082122844388
10	Ajeng Hanindya P.	Universitas Gadjah Mada	ajenghanindyap@gmail.com/ 082387395955
11	Alfindo Prayogo	Universitas Katolik Widya Mandala	alfinpray@gmail.com/ 085809019099
12	Alif Kevin H. A.	Universitas Gadjah Mada	alifkevin99@mail.ugm.ac.id/ 089611619813
13	Ambar Rukmini	Universitas Widya Mataram	ambar_rukmini@yahoo.co.uk/ 082136721921
14	Andriati Ningrum	Universitas Gadjah Mada	andriati_ningrum@ugm.ac.id/ 085717325431
15	Angela Dea R.	Universitas Gadjah Mada	angeladea98@gmail.com/ 082134704030
16	Anggie Rizky P. U.	Universitas Sriwijaya	arizkyputriutami@gmail.com/ 081225749886
17	Aniek Wulandari	Universitas Widya Dharma	aniekunwidha@gmail.com/ 081392740844
18	Aninditya R.	Universitas Gadjah Mada	aninditya r@gmail.com/ 087843324882
19	Anindya Nirmala P.	Universitas Negeri Malang	anindyanirmala1996@gmail.com/ 085859040440
20	Anna Fajariyah	Balai Pengkajian Teknologi Pertanian Yogyakarta	aannafajar.bptpyogya@gmail.com / annafajariyah@pertanian.go.id/ 087739053084
21	Annisa Berlianti U.	Universitas Mercu Buana Yogyakarta	annisaberlianti07@gmail.com/ 085242693093
22	Annisa Silvianti	Universitas Gadjah Mada	annisasilviantia@gmail.com/ 081902278883

23	Anto Budiharjo	Universitas Diponegoro	anto.budiharjo@fulbrightmail.org/ 087836267209
24	Aprilia Nur K.	Universitas Gadjah Mada	apriliakha@gmail.com/ 085719326014
25	Aristya Tjahjadi	Universitas Gadjah Mada	aristyasmp@yahoo.co.id/ 0896 1135 8135
26	Arum Darmastuti	Universitas Gadjah Mada	arumdarmastuti@gmail.com/ 082227397346
27	Asti Rosalia Hadini	PT. Denasti Arrashvia Profesional	astirosa@denastiarrashvia.com/ 082110886006
28	Aulia Ardhi	Universitas Gadjah Mada	aulia.ardhi@ugm.ac.id/ 085258167299
29	Auradiva Z. A.	Universitas Gadjah Mada	divazhahira@gmail.com/ 087781890189
30	Bagas Aji	Universitas Gadjah Mada	ajibagus1155@gmail.com/ 081326761188
31	Carmelia Setia D.	Universitas Gadjah Mada	carmelliacs12@gmail.com/ 085770148803
32	Caroline Jilbert	Universitas Gadjah Mada	carolinejilbert@gmail.com/ 082311493659
33	Chananya C.	Kasetsart University	chananya29@gmail.com/ 66850654468
34	Chomisatut T.	Universitas Negeri Malang	chomisatutthoyibah@gmail.com/ 085785374336
35	Christophorus R.O.	Universitas Gadjah Mada	haechristo@gmail.com/ 0859 0031 5994
36	Deli Lilia	Universitas Sriwijaya	delililia@student.pps.unsri.ac.id/ 081278821194
37	Deo Mahendra	Universitas Gadjah Mada	deomahendra@mail.ugm.ac.id/ 087875942931
38	Destine M. L.	Universitas Katolik Widya Mandala	destinemahadevi@gmail.com/ 081283540824
39	Devita Safitri	Universitas Setia Budi	devitasafitth@gmail.com/ 081298818624
40	Dian K.	Universitas Setia Budi	dian.kresnadipayana@gmail.com/ 085725010808
41	Dian Kumala Ratna	Universitas Gadjah Mada	diankumalaratna48@gmail.com/ 085729245614
42	Diatari Agustini	Universitas Sriwijaya	diatari11@gmail.com/ 081929320511
43	Dina Aulia Nurfiana	Universitas Gadjah Mada	dinaaulianurfiana@gmail.com/ 085643219449
44	Dini Andriani	Universitas Gadjah Mada	diniandriani993@gmail.com/ 085227788371
45	Eis Thiara Nepa	Universitas Gadjah Mada	nepaeisthiara@gmail.com/ 082362544876
46	Eko Farida	Institut Pertanian Bogor	f_rida_mw@yahoo.com/ 081519291475
47	Elian Hansel	Universitas Gadjah Mada	hanselsihotang@gmail.com/ 085370930859

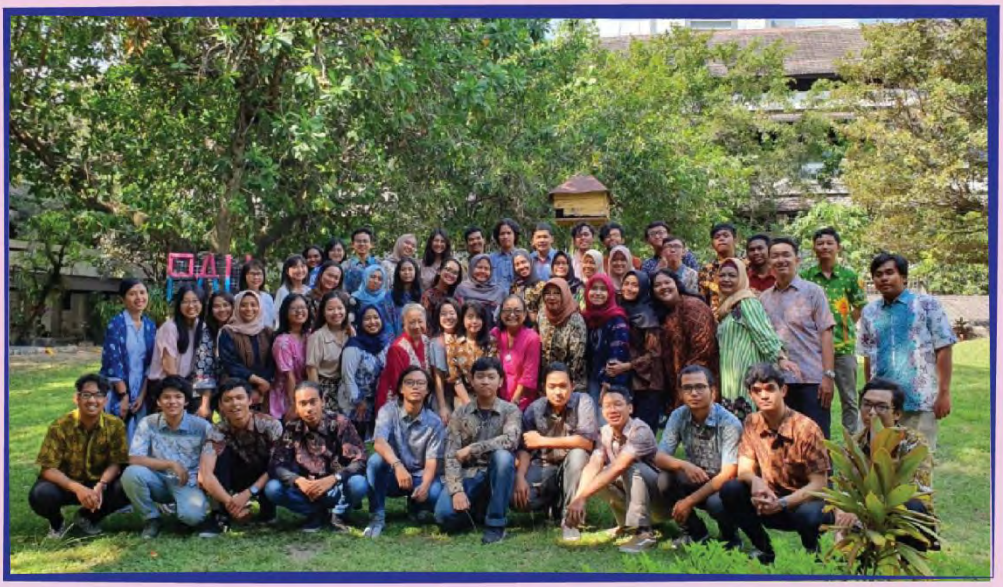
48	Elisa Nurnawati	Universitas Sriwijaya	nurnawati@yahoo.com/ 08127382564
49	Enny Purwati N.	Universitas 17 Agustus 1945 Semarang	enny.purwati@gmail.com/ 08122869216
50	Erline Yuniarti	Badan Pengawas Obat dan Makanan (BPOM)	yun_far05@yahoo.com/ 081392125421
51	Erna Rahmawati	Direktorat Registrasi Pangan Olahan (BPOM)	ernaakur@gmail.com/ 085718124789
52	Fajar Hidayat	Universitas Gadjah Mada	fajarh23@gmail.com/ 085742542119
53	Fathyah Hanum P.	Pusat Studi Pangan Gizi UGM	fh.pamungkaningtyas@gmail.com/ 085707346606
54	Fatimah Alida	Universitas Gadjah Mada	fatimahalida00@mail.ugm.ac.id/ 0813 5332 5125
55	Fatma Juliana	Universitas Sebelas Maret	fatmadya@gmail.com/ 082376611415
56	Fetisov Sergii M.	-	fsod74@gmail.com/380675900703
57	Fida Hasna Fadhila	Universitas Gadjah Mada	fhfidaaaa@gmail.com/ 085702070113
58	Firstnandita K. A.N.	Universitas Gadjah Mada	first.keisha@gmail.com/ 085742764874
59	Gabriela Belinda A.	Universitas Gadjah Mada	gabrielaabelindaa@gmail.com/ 085790202709
60	Gerarda Tania Y.	Universitas Gadjah Mada	gerarda0499@gmail.com/ 087839731877
61	Hammam P.	Universitas Gadjah Mada	hammam.husodo00@gmail.com/ 085643935683
62	Hardyan Adika N.	Universitas Gadjah Mada	hardyan.noor.5@gmail.com/ 0817888943
63	Hariya Amalina	Universitas Gadjah Mada	amalinahariya@gmail.com/ 085726622297
64	Husnita Komalasari	Universitas Gadjah Mada	husnita.komalasari96@gmail.com/ 087869619117
65	I Nyoman Anggie P.	Universitas Gadjah Mada	inyomananggi22@mail.ugm.ac.id/ 082281975178
66	Ilham Firdhausi	Universitas Gadjah Mada	ilhamf250@mail.ugm.ac.id/ 0895347760029
67	Ilzamha Hadijah R.	IAIN Surakarta	elzamha7@gmail.com/ 08563873833
68	Imelda Damarwati	Universitas Gadjah Mada	imeldadamar1@gmail.com/ 081568330653
69	Indah Kuswardani	Universitas Katolik Widya Mandala	kuswardaniindah@yahoo.com/ 08123010511
70	Indun Dewi Pupita	Universitas Gadjah Mada	indun_dp@ugm.ac.id/ 08164225599
71	Irma Laxiana	Institut Pertanian Intan Yogyakarta	laxianairma@gmail.com/ 08157949158
72	Isti Handayani	Universitas Jenderal Soedirman	isti_handayaniunsoed@yahoo.co.id/ 08122733084

73	Jessica Angela	Universitas Katolik Widya Mandala	jessicaangela51@gmail.com/ 081703474042
74	Jocelyn Tanya	Universitas Gadjah Mada	jocelyn.tanya@mail.ugm.ac.id/ 0878 8722 7771
75	Johan Kurniawan	Universitas Gadjah Mada	johan_kurniawan98@yahoo.com/ 087831510905
76	Juvy	Yakult	aquino_juvy@yahoo.com/ 8925858
77	Karseno	Universitas Jenderal Soedirman	karseno@unsoed.ac.id/ 0281638791
78	Kenya Gathaya P.	Universitas Katolik Widya Mandala	kenya.gathaya@gmail.com/ 082132390611
79	Ketsaree K.	Kasetsart University	aapkrk@ku.ac.th/ 66934655994
80	Kevin Kusuma Lie	Universitas Gadjah Mada	kevinlie594@gmail.com/ 081234901505
81	Kristinawati A.	Universitas Katolik Widya Mandala	kasnadi70@gmail.com/ 082144762673
82	Lalita Khacharat	Kasetsart University	aapltk@ku.ac.th/ 66986454145
83	Lilis Sulandari	Universitas Gadjah Mada	lissofyan.unesa@gmail.com/ 081216723574
84	Lucia Dhiantika W.	Universitas Gadjah Mada	dhiantea_k@ugm.ac.id/ 081548206020
85	Luthfi Fathul Huda	Universitas Gadjah Mada	upikmobile@gmail.com/ 085743366964
86	Marcella Jessica	Universitas Gadjah Mada	marcellajsc99@gmail.com/ 08111058726
87	Maria Angel P. R.	Universitas Gadjah Mada	mariaangela2510@gmail.com/ 0878 0900 7113
88	Maria Marantha E.	Universitas Gadjah Mada	089630141416
89	Maria Thesa A. S.	Universitas Gadjah Mada	maria.thesa13@gmail.com/ 08977358509
90	Mariyatun	Pusat Studi Pangan Gizi UGM	maria_slimshady@yahoo.com/ 085643736235
91	Marsellina Tirza S.	Universitas Gadjah Mada	tirza.marsellina@gmail.com/ 0896 4455 0031
92	Martha Verena	Universitas Gadjah Mada	081908884787
93	Maya Prilia Nur F.	Universitas Gadjah Mada	mayaprilianf3@gmail.com/ 081337648016
94	Maylan Iga Prastika	Universitas Slamet Riyadi	maylanigaprastika@gmail.com/ 085642427571
95	Merkuria K.	Universitas Slamet Riyadi	kar_yantina@yahoo.com/ 08122982622
96	Mifta Gatya	Universitas Gadjah Mada	miftagatya@gmail.com/ 087843283744
97	Miftakhussolikhah	Universitas Gadjah Mada	miftalipi@gmail.com/ 085643423377

98	MMA Retno Rosariastuti	Universitas Sebelas Maret	retnobs@staff.uns.ac.id/ 082185455812
99	M. Bagus P. Y.	Universitas Gadjah Mada	m.yudhanandabagus1@gmail.com/ 087712358981
100	Muh. Taufik H.	Universitas Sebelas Maret	taufiekimansyah@gmail.com/ 085602844374
101	M. Bimo Satrio W.	Universitas Gadjah Mada	bimowidjokongko1901@gmail.com/ 081214972076
102	M. Hafizhuddin R.	Universitas Gadjah Mada	hikkiroy@gmail.com/ 0882 2636 4629
103	M. Wijdaan A. Y.	Unversitas Gadjah Mada	wijdanay@gmail.com/ 081328503228
104	M. Wildan A.S.	Universitas Gadjah Mada	123mwildanash123@gmail.com/ 089671710895
105	M. Yusril Hana	Universitas Gadjah Mada	Yusrielhana@gmail.com/ 081770264682
106	Nancy Eka P.M.	Universitas Gadjah Mada	nancyekaputri@gmail.com/ 085385654062
107	Nanik Suhartatik	Universitas Slamet Riyadi	n_suhartatik@yahoo.com/ 085743287178
108	Nova Wahyu P.	Universitas Riau	nova.wahyu.pratiwi@gmail.com/ 085265653915
109	Novia Nur Aini	Universitas Gadjah Mada	novianuraini22@gmail.com/ 081215601415
110	Nur Aeni Ariyanti	Universitas Negeri Yogyakarta	nuraeni@uny.ac.id/ 081232315854
111	Nur Asiyah	Pharmacy	asya_nura@yahoo.com/ 081391652199
112	Nurhayati	Universitas Jember	nurhayati.ftp@unej.ac.id/ 082257195295
113	Nurul Ain M.	Universitas Gadjah Mada	nurulainmahfuzah@gmail.com/ 085648475805
114	Nurul Ikka S.	Badan Pengawas Obat dan Makanan (BPOM)	nurul.sekardani@gmail.com/ 085729437655
115	Nurwulan P.	IAIN Surakarta	nurwulan.purnasari@yahoo.com/ 085294558401
116	Omar Atmadhani	Universitas Gadjah Mada	omaratmadani05@gmail.com/ 085848803307
117	Osfar Sjofjan	Universitas Brawijaya	osofjan@yahoo.com/ 0818217354
118	Pratama Nur Hasan	Pusat Studi Pangan Gizi UGM	pratama.nurhasan@gmail.com/ 081332270455
119	Rachma Wikandari	Universitas Gadjah Mada	081513373120
120	Rafli Zulfa Kamil	Universitas Gadjah Mada	rafli.zulfa@gmail.com/ 082221282047
121	Rahmawi Annis S.	Universitas Setia Budi	rahmawiannis@gmail.com/ 089649353982
122	Ratna Handayan	Universitas Gadjah Mada	08562555187

123	Ratna Puspa C.N.	Universitas Katolik Widya Mandala	ratnapuspaaa@gmail.com/ 081230593459
124	Renno Meidi A.	Universitas Gadjah Mada	rennomeidi.a@gmail.com/ 081353063022
125	Retno Tri Astuti	Universitas Brawijaya	retnoastuti@ub.ac.id/ 082112313738
126	Retty Putri U. D.	Kasetsart University	rettyputriutami@gmail.com/ 66648370907
127	Richardo C.T.	Universitas Gadjah Mada	richardosiahaan20@gmail.com/ 081298582698
128	Rini Yanti	Universitas Gadjah Mada	riniyanti@ugm.ac.id/ 081328330354
129	Rizqi Padhli	Universitas Gadjah Mada	rizkypadhli44@gmail.com/ 0895602328848
130	Ryan Haryo S.	Institut Ilmu Pengetahuan Indonesia	haryo.ryan@gmail.com/ 081213391085
131	Salsabila Ayu S.	Universitas Gadjah Mada	salsabilayusya@gmail.com/ 085540667581
132	Sandriana J. N.	Universitas Hasanuddin	sandriananendissa@gmail.com/ 081240372679
133	Santi Ambarwati	Seameo Biotrop	ambarwati@biotrop.org/ 08129505270
134	Sari Intan Kailaku	Pusat Penelitian dan Pengembangan Pascapanen Pertanian Indonesia	sari.kaylaku@gmail.com/ 08129932441
135	Shofie Nurul Azmi	Universitas Gadjah Mada	azmi.shofie@gmail.com/ 085726388867
136	Siti Hartina Pratiwi	Universitas Negeri Malang	hartina.pratiwi26@gmail.com/ 085648060011
137	Siti Nur P.	Universitas Widya Mataram	siti_nurp@yahoo.co.id/ 085821986181
138	Siti Rahayu	Universitas Gadjah Mada	087738564872
139	Slamet Fauzi	Universitas Jember	slamfauzi99@gmail.com/ 082330245207
140	Supeni Sufaati	Universitas Cenderawasih	penisufaati@gmail.com/ 085244063302
141	Supunnika S.	Barupha University	supunnika@buu.ac.th/ 66915029903
142	Susana Ristiarini	Universitas Katolik Widya Mandala	ristiarini@ukwms.ac.id/ 081553002296
143	Sutami	Universitas Sebelas Maret	tammysutami@gmail.com/ 085236777372
144	Syerina Raihatul J.	Universitas Sriwijaya	syerinaraihatuljannah@gmail.com/ 082175800458
145	Tabas Gabe M.S.	Universitas Sumatra Utara	tabassiagian@gmail.com/ 089635833877
146	Taufik Ihsan N.B.	Universitas Gadjah Mada	taufikihsan2018@mail.ugm.ac.id/ 082221804543

147	Taufiq Ali M.	Direktorat Registrasi Pangan Olahan (BPOM)	taufiqali.m@gmail.com/ 085215451369
148	Thanapoom M.	Kasetsart University	rditpm@ku.ac.th/ 66897177465
149	Titiek Farianti D.	Balai Pengkajian Teknologi Pertanian Yogyakarta	titiekfd1212@gmail.com/ 081227925997
150	Tri Marwati	Balai Pengkajian Teknologi Pertanian Yogyakarta	watipasca2@gmail.com/ 08128114249
151	Tri Nurhayati	PT. Media Pangan Indonesia	trinur.muslimah@yahoo.com/ 087772234870
152	Utami Sri Hastuti	Universitas Negeri Malang	tuti_bio_um@yahoo.com/ 08170506846
153	Verdy Ageng P.	Universitas Gadjah Mada	verdyd812@gmail.com/ 082242657795
154	Vidjerinalisa H.	Universitas Katolik Widya Mandala	vidjerinalisa_h@ymail.com/ 08997828125
155	Viera Nu'riza P.	Universitas Brawijaya	vieranpratiwi@gmail.com/ 082139477738
156	Vindhya Tri W.	Universitas Brawijaya	widayanti.vt@gmail.com/ 082141466742
157	Voni Sekar Ayu P.	Universitas Gadjah Mada	vonisekar99@gmail.com/ 085848803307
158	Wahidah M. R.	Universitas Ahamad Dahlan	wahidah.rahayu@tp.uad.ac.id/ 081215575227
159	Wahyu Krisna Yoga	Universitas Gadjah Mada	mangde_2@yahoo.com/ 087756281876
160	Wednes Aria Yuda	Cokelat nDalem	wednesyuda@cokelatndalem.co.id/ 08122743435
161	Wisnu Adi Yulianto	Universitas Mercu Buana Yogyakarta	wisnuadi@mercubuana-yogya.ac.id/ 087719967799
162	Yahya Baihaqi	Universitas Gadjah Mada	yahyabaihaqi7506@gmail.com/ 0813911041734
163	Yunika Mayangsari	Universitas Gadjah Mada	yunika.mayangsari@ugm.ac.id/ 081215176662



Secretariat:
Center For Food and Nutrition Studies
Gadjah Mada University
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