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Retort Systems in Food Packaging: Revolutionizing Shelf-Stable Products

Historic Launch of WIFIdx Program by Her Royal Highness Sultanah Nur Zahirah

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UNIVERSITI MALAYSIA TERENGGANU (UMT)

FACULTY OF FISHERIES AND FOOD SCIENCES

NEW YEAR GREETING 2025

Dear Deputy Deans, Heads of Departments, Respected Faculty Members and Students,

Assalamualaikum warahmatullahi wabarakatuh and greetings.

First of all, let us together express our gratitude to Allah SWT because with His blessings, we can all step into this new year with full enthusiasm, hope, and determination to create even greater success.

This year, the Faculty of Fisheries and Food Sciences (FPSM) will continue to strive to become a faculty of excellence in education, research, and innovation related to fisheries, aquaculture, agrotechnology, and food science. Therefore, allow me to share the key strategies and initiatives that will be our focus together to ensure that this faculty continues to move forward:

1. Strengthening the Faculty's Identity as a Leader in Fisheries, Aquaculture, Agrotechnology and Food Science
    a. We will strengthen FPSM's branding as a competitive and unique faculty. This faculty is not just a place to study, but also a field to produce experts in the fields of fisheries, aquaculture, agrotechnology and food science who are able to contribute to society and the country
    b. Our alumni success stories will be highlighted to show how wide the career opportunities are available to FPSM students, from the food industry sector to marine sustainability research.
    c. We are also in the process of developing a new tagline for the faculty, which will symbolize our niche and strength in this field.
2. Increase Student Promotion and Enrolment
    a. One of our main challenges is to increase the number of students enrolling in the programmes offered at the faculty. Therefore, this year we will implement a comprehensive marketing strategy:
        i. Digital Promotion and Social Media:
            - FPSM will leverage digital platforms such as Facebook, Instagram, and TikTok to attract new students. Short videos featuring laboratory activities, field projects, and alumni success stories will be the main focus of our content.
        ii. School and College Networking:

- We will establish strategic relationships with secondary schools, polytechnics, and matriculation colleges to introduce our programmes. Interactive workshops, career talks, and 'A Day with the Faculty' sessions will be implemented to provide exposure to students.

iii. Scholarship Opportunities and Industry Sponsorship:

- The Faculty will collaborate with industry partners to offer scholarships or sponsorships to new students, thus making FPSM the first choice in this field.

3. Strengthening Industry Relations
    a. Strong industry relations are the cornerstone of the faculty's success. This year, we will further expand our collaboration with key companies in the aquaculture, fisheries, and food industries.
    b. Some of the steps that will be taken:
        i. Establishment of Innovation and Training Hub: The faculty will provide a dedicated space for research and innovation together with industry players.
        ii. Enhanced Industrial Training Programme: Our students will be given the opportunity to undergo industrial training in key companies, with the support of the faculty to ensure that their experience is the best.
4. Strengthening Industry Relations
    a. Strong industry relations are the cornerstone of the faculty's success. This year, we will further expand our collaboration with key companies in the aquaculture, fisheries, and food industries.
    b. Some of the steps that will be taken:
        i. Establishment of Innovation and Training Hub: The faculty will provide a dedicated space for research and innovation together with industry players.
        ii. Enhanced Industrial Training Programme: Our students will be given the opportunity to undergo industrial training in key companies, with the support of the faculty to ensure that their experience is the best.
5. Digital Transformation and Use of New Technologies
    a. We cannot ignore the role of technology in ensuring that this faculty remains relevant. This year, we will drive digital transformation at FPSM:
        i. Leveraging the latest technology in learning and research, including the use of big data and the Internet of Things (IoT) in the field of aquaculture.
        ii. Improving the faculty's ability to deliver education in a hybrid manner, with more interactive online learning modules.
6. Community and Sustainability Initiatives
    a. As a faculty closely linked to natural resources and society, FPSM will continue to play an active role in community projects:
        i. Involving students in coastal and marine conservation programs, such as beach cleanups and coral reef preservation.

ii. Organizing public awareness campaigns on the importance of food and marine resource sustainability.

7. Development of Bukit Kor as a Branch Campus
    a. One of our strategic focuses this year is the development of the Bukit Kor Campus as a new branch of FPSM.
    b. Bukit Kor will become a new center of excellence for this faculty, focusing on:
        i. New Academic and Research Programs: This campus will offer programs and studies that focus on coastal sustainability, food biotechnology, and aquaculture technology.
        ii. Industrial Innovation Hub: The Bukit Kor Campus will provide space for research collaboration between students, academic staff, and industry.
        iii. Modern and Eco-Friendly Facilities: This campus will be developed as a green campus that is in line with UMT's sustainability vision.
    c. With the development of Bukit Kor, we are confident that we will be able to attract more students and industry partners to contribute to the success of the faculty.

Call and Closing

I call on all FPSM members to play their respective roles in making the planned strategy a success. The success of this faculty is a joint effort, and I am confident that with the cooperation of all parties, we will be able to achieve the aspirations that have been outlined.

May this year be an excellent year for the Faculty of Fisheries and Food Sciences. Let us move forward with new enthusiasm and strong determination to make FPSM a superior faculty at the national and international levels.

Thank you for your trust and support.

That's it, wabillahi taufik walhidayah, wassalamualaikum warahmatullahi wabarakatuh.

Professor Ts. Dr. Mohd Effendy Abd Wahid FASc, FAPM
Dean
Faculty of Fisheries and Food Sciences, Universiti Malaysia Terengganu
10th January 2025

A Note from **the Editor**

Disember 2024

Another year, another opportunity to make an impact. The world of agriculture and academia isn't always smooth sailing, but that's what makes the journey so rewarding. We're not in it for the easy path; we're here to push boundaries, challenge the status quo, and make a real difference.

A massive shout-out to the folks who've secured grants this year. You've worked hard to earn that funding, and now you're armed with the resources to innovate, inspire, and make things happen. You're leading the charge. And to those who've earned well-deserved awards, congratulations! Whether in the field, the lab, or in the classroom, your work is a testament to the excellence this faculty stands for.

This year isn't just about celebrating achievements, it's about continuing the journey of discovery. We're in the business of learning, exploring, and growing, and every day brings new opportunities to push forward. But great work deserves to be shared. So, let's hear from you! Whether it's a research breakthrough, an interesting field experience, or even a thought-provoking opinion on the state of agriculture, AgriNews is your platform. Keep writing, keep sharing, and let's make sure the incredible work happening here reaches the audience it deserves.

So, here's to another year filled with progress, breakthroughs, and the pursuit of knowledge. Keep asking questions, keep striving for excellence, and keep telling the stories that make this faculty extraordinary.

Happy New Year. Let's make it count.

Best regards,

Prof. Dr. Shamsul Bahri Abd Razak
Editor-in-chief, AgriNews

Forging Strong Ties: UMT and Abeadi Group Collaborate for Future Innovation

By Ts. Dr. Wan Zawiah Wan Abdullah, Ts. Dr. Aidilla Mubarak, Assoc. Prof. Ts. Dr. Fauziah Tufail Ahmad & Mohd Zaidi Yahaya

Abeadi Group Sdn. Bhd., located in Besut, Terengganu, focuses on the production of various downstream coconut products. The company is led by Managing Director Mr. Haji Mohd Mahdi Haji Musa, with Mr. Mohd Asri Haji Musa serving as the Operations Manager. A Letter of Intent (LOI) between the Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu (UMT), and Abeadi Group Sdn. Bhd. was established on December 15, 2022, with a validity of two years. The first meeting regarding plan for collaboration took place in September 2022 at Abeadi Group Sdn. Bhd. in Besut, Terengganu where both parties agreed to collaborate on product quality improvement and research and development (R&D) in the coconut-based agro-industry.

The project involves four UMT researchers; Ts. Dr. Wan Zawiah Wan Abdullah, Ts. Dr. Aidilla Mubarak, Associate Professor Ts. Dr. Fauziah Tufail Ahmad, and Mr. Mohd. Zaidi Yahaya, who provides technical support for product development and food processing. Additionally, six final-year students from the Crop Science and Food Technology programs have benefited from this collaboration; participating in product development, post-harvest, food quality and food safety studies related to coconut-based products.

Other activities outlined in the LOI include farm visits, training sessions on the production of coconut-based products, demonstrations on coconut neera tapping, presentation and discussion of the final report with Mr. Mohd. Asri Musa, a representative of Abeadi Group Sdn. Bhd. Suggestions for quality improvement and food safety were also addressed during these discussions.

Looking ahead, the future direction of this collaboration involves seeking funding to scale up product development to an industrial level (pilot scale), filing intellectual property rights and publishing research findings in academic journals.




Figure 1-4: The activities undertaken during the collaboration between FPSM, UMT and Abeadi Group Sdn. Bhd.

Brewing New Life: The Functional Potential of Spent Coffee Grounds in Food and Beyond

By Assoc. Prof. Ts. Dr. Mohamad Khairi bin Mohd Zainol & Assoc. Prof. Ts. Dr. Zamzahaila binti Mohd Zin

Abstract

This article explores the untapped potential of spent coffee grounds (SCG) as a functional ingredient and sustainable resource. SCG, often regarded as waste from the coffee brewing process, has been found to contain numerous beneficial compounds, including antioxidants, dietary fibre, and essential fatty acids. This study aims to provide a comprehensive understanding of SCG's chemical composition, current and potential applications in food, cosmetics, and other industries, and its role in promoting sustainability.

Figure 1: Spent Coffee Ground (SCG)

1. Overview of Coffee Consumption and SCG Production

As coffee culture has grown, so too has the environmental footprint associated with coffee consumption, mainly through the waste generated by spent coffee grounds (SCG). It is estimated that the world produces around 9 to 12 million tons of SCG each year, most of which ends up in landfills from the coffee industry's large scale; in 2020 alone, global coffee production reached approximately 10.4 million tons. The United State, the top coffee-consuming country, disposes of roughly 1 million tons of SCG annually. With demand and production rates expected to increase, this waste issue will likely grow if alternatives SCG uses are not developed.

This volume of waste presents a dual challenge: the environmental impact of landfill disposal and the lost opportunity for reuse. When discarded in landfills, SCG decomposes anaerobically, releasing methane, a greenhouse gas significantly more potent than carbon dioxide, intensifying environmental impact.

Why Focus on SCG?

While spent coffee grounds are often considered waste, they retain many bioactive compounds and nutrients, suggesting potential uses across multiple industries. In addition to SCG's nutrient profile, recent studies have demonstrated promising results in its usage as a raw material for developing biofuels, functional foods, and organic fertilizers and, for example, spent coffee ground lipids, which can be processed into biodiesel and antioxidants that could be used in health-promoting food products.

2. Chemical Composition of Spent Coffee Grounds

Bioactive Compounds

SCG contains antioxidants such as polyphenols and flavonoids, contributing to its high oxidative stability. These compounds have been linked to health benefits like reducing inflammation and protecting against chronic diseases.

Dietary Fiber and Macronutrients

Rich in dietary fibre, proteins, and essential fatty acids, SCG can benefit food applications. Its high fibre content, specifically insoluble fibres, supports digestive health and can enhance various food products' texture and nutritional profile.

Residual Caffeine and Lipids

Although reduced compared to fresh coffee, spent grounds still contain a small amount of caffeine, contributing to its potential use in cosmetics and wellness products. Additionally, the lipid content in SCG offers possibilities for extraction and use in biofuels and biodegradable materials.

3. Production and Collection of SCG

From Coffee Shops to Industries

Discuss the journey of SCG from coffee shops and industrial brewing facilities to potential reuse applications. Various methods for collecting and processing SCG, such as drying and milling, will be covered to highlight efficient production pathways.

Environmental Impact

Most SCG currently ends up in landfills, where decomposition contributes to methane emissions, a potent greenhouse gas. Emphasizing SCG reuse aligns with global sustainability goals by reducing landfill contributions and potentially lowering emissions.

4. SCG as a Functional Food Ingredient

Nutritional Enhancement in Foods

Incorporating SCG as a dietary fibre or antioxidant source can improve the nutritional profile of baked goods, snacks, and beverages. SCG has already been tested in products like cookies, bread, and energy bars, showing potential as a food additive that contributes flavour, texture, and health benefits.

Antioxidant Properties and Health Implications

The antioxidants in SCG could offer anti-ageing and anti-inflammatory effects. Discussing clinical trials or studies that explore the bioavailability of these compounds when ingested could offer insights into the potential health benefits of SCG-enriched foods.

5. Other Potential Applications of SCG

Cosmetics and Skincare

SCG's antioxidant and exfoliating properties make it an attractive ingredient for cosmetics. It has been used in formulations for scrubs, masks, and soaps. Caffeine in SCG is also valued for improving circulation and reducing puffiness, offering unique skincare benefits.

Agriculture and Soil Amendment

As a natural fertilizer, SCG provides organic matter that can enhance soil quality. Studies on SCG's effects on plant growth, pest deterrence, and soil pH adjustment will be discussed, emphasizing its role in sustainable agriculture.

Biofuel Production

SCG oil extraction for biofuels represents an innovative way to repurpose coffee waste. This section will delve into methods for converting SCG into biofuels, and discuss the economic and environmental benefits of such practices.

6. Challenges and Limitations

Toxicity and Safety Concerns

Discuss potential contaminants in SCG, such as mycotoxins, and address safety concerns related to its use as a food additive. Regulatory aspects of using SCG in food and non-food products will also be covered.

Processing and Economic Feasibility

Converting SCG into functional ingredients or products requires costly processing steps. This section will explore the economic challenges and propose solutions to make SCG processing more feasible for large-scale applications.

7. Future Directions and Research Needs

Optimizing Extraction Techniques

Future research could focus on more efficient methods to extract bioactive compounds from SCG, potentially enhancing its value across industries.

Exploring New Applications

Potential pharmaceuticals applications, biodegradable packaging, and water purification are areas ripe for exploration. Highlighting ongoing research and emerging studies will demonstrate SCG's broader application.

8. Unlocking the Potential of Spent Coffee Grounds in Food Products

The leftovers from making your daily cup of coffee, known as spent coffee grounds (SCG), are a hidden gold mine of antioxidants and nutrients. Rich in proteins, dietary fibre, and polyphenols, SCG has many health advantages. For example, it has more fibre than conventional sources like wheat bran, which helps digestion and gut health. SCG's antioxidants may reduce the risk of chronic illnesses by scavenging dangerous free radicals. Food designers have been motivated by this nutrient-rich composition to add SCG to baked items, snacks, plant-based meat, and beverages. Imagine chocolate loaded in antioxidants or energy bars enhanced with SCG's fibre that tastes just as decadent. By giving SCG a second chance at life, we can minimize waste, promote sustainability and obtain beneficial culinary ingredients.

SCG shortbread

SCG energy bar

SCG bar

Figure 2-4: Potential SCG Food Products

Coffee's Second Life - Valorisation of Byproducts into Agricultural Resources

By Ts. Dr Aidilla Mubarak, Dr Ramisah Mohd Shah, Associate Prof. Ts. Dr Wan Zaliha Wan Sembok

The Surge in Coffee Byproducts

Everyone loves their morning coffee, but each year the production of coffee generates huge amount of waste. The byproducts from the coffee processing sector include coffee pulp, spent coffee grounds, coffee husk, and coffee silverskin. Spent coffee grounds which are the residue left after brewing coffee, is commonly reutilized for home gardening as a soil enrichment material due to its rich content of organic matter and nutrients. Coffee husk, a byproduct from natural or dry processing methods of the coffee cherry, is typically discarded despite its nutrient-rich composition. Similarly, coffee silverskin, the lightweight outer layer of the coffee beans that detaches during roasting, is often disregarded as a useful resource. Coffee silverskin is a particularly common byproduct in Malaysia, where coffee roasting operations are growing. Unfortunately, inappropriate disposal of these materials can result in serious environmental threats.

Figure 1: Coffee silverskin – the only byproduct generated during roasting of coffee beans.

Figure 2: Coffee husk generated from the processing of coffee cherry

[Source: Rebollo-Hernanz et al., 2021, Foods, 10(3), 653].

Transforming Waste into Agricultural Resources

The valorisation of coffee byproducts is an essential step toward sustainable agriculture and environmental conservation. In addition to reducing ecological footprint of the coffee industry, utilising these materials can also create value-added applications. Making use of the nutrient-rich properties of coffee byproducts, agricultural output can be increased, and waste can be kept out of landfills.

This article discusses potential approaches to repurpose specifically coffee husk and coffee silverskin in agricultural applications, based on insights gained from our experiments. These utilization steps demonstrate the potential of the coffee byproducts to enhance agricultural practices and promoting food security.

Coffee Husk as the Perfect Mate for Fertilizer

One of our studies examined the use of coffee husk as a supplement to conventional NPK fertilizer in the cultivation of *Ipomoea aquatica* (*kangkong*), a widely consumed vegetable in Malaysia. The findings showed that coffee husk, when integrated at a controlled ratio, maintained similar growth performance and postharvest quality compared to using NPK fertilizer alone. Its use as a partial replacement for synthetic fertilizer offers cost-saving benefits for the farmers and supports sustainable agricultural practices by repurposing agricultural waste.

Figure 3 & 4: *Kangkong* grown with coffee husk-supplemented fertilizer

Coffee Silverskin Boosting Mushroom Cultivation

Another study investigated the use of coffee silverskin as an addition in mushroom growing. White oyster mushrooms, which are known for their high nutritional value, were grown on substrates enhanced with coffee silverskin at a specified ratio. The findings demonstrated a larger yield and enhanced nutritional content in the harvested mushrooms. Coffee silverskin, a single-source byproduct of the roasting process, thus demonstrated its' potential as a cost-effective and sustainable substrate enhancer.

Figure 5: Muhammad Haqiem Izzuddin (student) inoculating the substrate with oyster mushroom mycelium.

Figure 6: Grey oyster mushroom cultivated on coffee silverskin-enriched substrate.

Turning Waste into Worth

The valorisation of coffee byproducts demonstrates the potential of turning waste into opportunity. Incorporating these byproducts into agricultural methods encourages sustainable farming, food security and mitigates environmental risks. Economically, it offers farmers affordable and accessible alternatives to costly supplies. With the coffee industry expanding, it is important to maximize the potential of its byproducts. Together, we can give coffee a second life, one that benefits both the earth and its people.

Unlocking Nature's Potential: The Rise of Ultrasonic Extraction in Non-Chemical and Biochemical Applications

By Assoc. Prof. Ts. Dr. Mohamad Khairi bin Mohd Zainol & Assoc. Prof. Ts. Dr. Zamzahaila binti Mohd Zin

Introduction: Revolutionizing Biochemical Extraction

The history of extraction techniques begins in antiquity, when societies used solvent-based and mechanical pressing techniques to extract oils, resins, and essences from plants. Water and alcohol were the main solvents used for flavour extraction and herbal treatments for ages. Chemical solvents like hexane and chloroform were used in industrial settings during the 19th and 20th centuries, allowing for the mass manufacturing of medications, food additives, and essential oils. But because of their effects on the environment and the possibility of hazardous residues in finished goods, these chemical-intensive processes came under investigation.

By the end of the 20th century, new technologies made it possible to use non-chemical alternatives. In the 1990s, ultrasonic extraction became well-known as a flexible and effective method that could preserve bioactive substances while minimizing environmental damage.

The importance of ultrasonic extraction in the current extraction business is demonstrated by statistical evidence. Ultrasonic extraction is essential in a sector that is expected to grow to $6.2 billion by 2028 and is fuelled by functional foods and nutraceuticals. As it can increase yields by as much as 50% when compared to conventional procedures, it is a preferred option for natural product-focused enterprises. The increasing confidence in this technology was demonstrated by a 2024 research that showed 54% of industrial firms were investigating or using ultrasonic technologies for plant-based extractions.

This in-depth examination of ultrasonic extraction not only demonstrates its advantages for the environment and public safety, but also establishes it as a key component for sectors seeking to adopt sustainable innovation.

Unlocking the Power of Sound: How Ultrasonic Extraction Works

Imagine gently shaking important nutrients and chemicals from plants, herbs, or even algae with sound waves. That's the wonder of ultrasonic extraction, a state-of-the-art technique that is transforming the way we obtain natural ingredients without using harsh chemicals. This is how it functions and the reasons it's causing a stir.

Figure 1: A small scale ultrasonic apparatus

Figure 2: A lab scale ultrasonic apparatus

Figure 3: A factory scale ultrasonic apparatus

How Does Ultrasonic Extraction Work?

Fundamentally, high-frequency sound waves are used in ultrasonic extraction to produce microscopic bubbles in a liquid. The energy bursts released when these bubbles burst open the cell walls of bacteria or plants, releasing the n. Imagine it as gently nudging nature's treasure box rather than slamming it open.

This procedure is gentle in contrast to conventional techniques that use heat or chemicals. It preserves delicate substances like vitamins, antioxidants, and essential oils, which is very beneficial for producing natural, high-quality products.

Why Is It So Beneficial?

Ultrasonic extraction isn't just eco-friendly; it's a powerhouse of efficiency and quality. It reduces processing time, uses less energy, and eliminates the need for chemical solvents, which makes it safer for the environment and consumers. Moreover, it works with a wide variety of materials—from turmeric and tea leaves to citrus peels and even algae.

What Can We Extract?

Antioxidants: Herbs, tea, and berries contain these beneficial substances. Their complete potency is preserved during ultrasonic extraction.
Essential Oils: This technique captures pure, fragrant oils, whether it's mint for freshness or lavender for relaxation.
Enzymes and proteins: Proteins derived from plants, such as algae or soy, do not break down, which makes them ideal for vegan products and supplements.
Omega-3 Fatty Acids: It is more sustainable to use algae rather than fish oil, and sonication makes the process even more environmentally friendly.

Where Is It Employed?

Ultrasonic extraction has been included into commonplace items such as natural preservatives, superfood powders, and fortified beverages. For instance, this technology is responsible for the benefits of health drinks enhanced with extracted polyphenols or foods fortified with antioxidants from turmeric.

Challenges Ahead

Ultrasonic extraction is not without its challenges, like any new technology. As for large industries, it can be somewhat difficult to scale and costly to implement initially. More or less these issues are being addressed quickly due to the rising demand for sustainable, clean products.

A Sound Future

As technology develops, ultrasonic extraction will be able to easily combine with other cutting-edge methods to produce hybrid systems that optimize yield and efficiency. Combining sonication with enzymatic extraction or supercritical fluid extraction, for instance, may lead to even more efficient procedures that remove chemicals precisely and with the least number of resources. In addition to improving extraction performance, these synergies expand the range of applications, encompassing sustainable food items, nutraceuticals, and pharmaceuticals. These developments guarantee that ultrasonic extraction will keep developing to satisfy the needs of sectors looking for high-quality, sustainable solutions.

Beyond its technical capabilities, ultrasonic extraction's environmental appeal makes it a key component of the green revolution in production and manufacturing. It supports global sustainability goals and the growing customer preference for clean-label products by lowering dependency on chemical solvents and energy-intensive processes. Its promise to transform sectors ranging from cosmetics to functional meals is further supported by its capacity to extract important molecules from natural sources without sacrificing their integrity. Ultrasonic extraction is a game-changing technology that will soon become the norm in the industry because to its innovative and

environmentally conscious design.

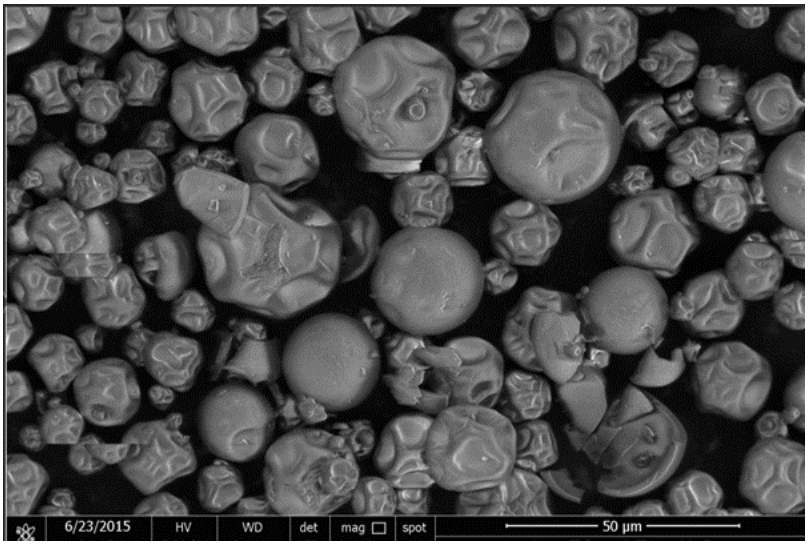

Figure 4: Bunga telang undergone ultrasonic extraction (under SEM)

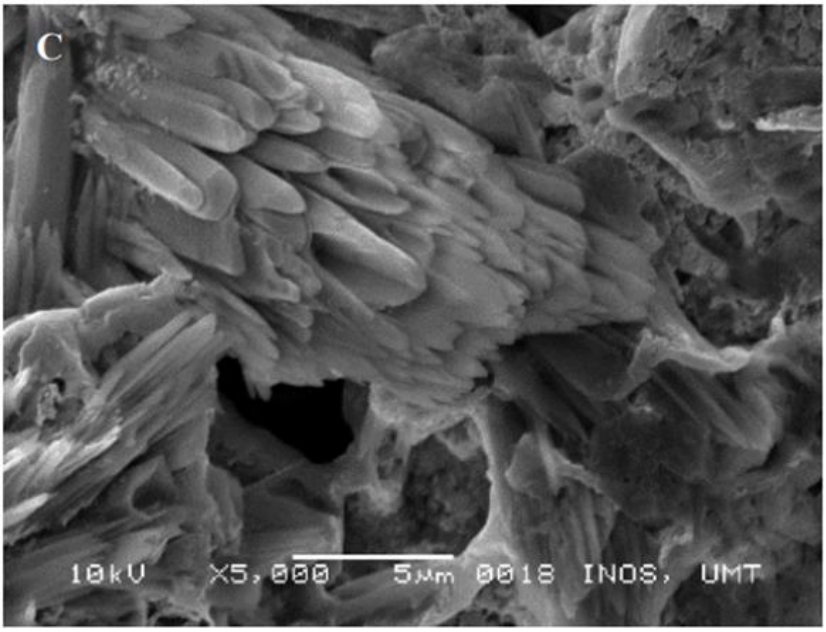

Figure 5: Kacang koro's protein hydrolysate undergone ultrasonic pre-extraction (under SEM)

Retort Systems in Food Packaging: Revolutionizing Shelf-Stable Products with Pouch Technology

By Mohd Zaidi Yahaya, Dayang Normiah Mohamad, Assoc. Prof. Ts. Dr. Mohamad Khairi Mohd Zainol, Wan Nor Haryani Wan Mohamad

The desire to improve food safety, increase shelf life, and satisfy customer needs for sustainability and convenience has led to an interesting evolution in food packaging. From the development of glass jars for food preservation in the early 19th century to the widespread use of metal cans after the Napoleonic Wars, packaging advancements have historically reflected shifts in society. The invention of the retort system in the 19th century was a significant breakthrough among these developments. Retort processing, which was initially created for canning, uses heat sterilization to guarantee food's microbiological safety while preserving its nutritional value and sensory appeal. By drastically lowering spoilage and facilitating worldwide food distribution, this method became widely used in the food sector.

Figure 1: Canned and pouch foods

More adaptable and environmentally friendly packaging options, such as the retort pouch, have become the main emphasis of retort systems in recent decades. These pouches, which were first employed in military rations in the middle of the 20th century, combine the portability of lightweight plastic laminates with the robustness of metal cans (Figure 1) . The global retort pouch industry, which was estimated to be worth USD 6.7 billion in 2020 and is expected to reach USD 10 billion by 2030, representing an annual growth rate of more than 5%, is a testament to their increasing popularity. Today, the global market for retort packaging is valued at approximately USD 4.5 billion (as of 2023) and is expected to grow at a compound annual growth rate (CAGR) of 6-8% over the next decade. Retort packaging accounts for a significant share of the ready-to-eat food market, which itself is expanding due to increasing consumer demand for convenience. The benefits of retort pouches in lowering package weight, improving transportation efficiency, and satisfying contemporary customer expectations for single-serve quantities and ready-to-eat meals are primarily responsible for this change.

There are numerous instances of retort systems being used successfully. For example, retort pouches are widely used in the tuna industry to produce high-quality, shelf-stable products. Similarly, retort systems are used to prepare pet food, soups, and baby meals, guaranteeing ease and safety while lowering the need for refrigeration. The physics and technology of retort packing, its effects on the environment, and its revolutionary position in contemporary food systems are all covered in detail in this article.

Historical Background: The Retort Revolution

The origins of retort systems can be found in the early 19th-century heat sterilization studies of Nicolas Appert, which gave rise to canned goods. Retort technology has evolved throughout the years, moving the emphasis from stiff containers to lightweight, flexible alternatives. The development of retort pouches in the mid-20th century, originally for military uses, represented a turning point. These days, a variety of sectors use these pouches, including pet and baby food as well as ready-to-eat meals.

Understanding Retort Technology

Retort technology has revolutionized the preservation and packaging of food, making it a cornerstone in modern food processing. It utilizes high-pressure thermal sterilization, where food products are sealed in packaging and subjected to temperatures exceeding 121°C (Figure 2) . This process effectively eliminates pathogens and spoilage microorganisms, ensuring food safety and extending shelf life without the need for refrigeration.

Figure 2: A retort equipment

Applications in Food Industry

Retort packaging is common place today. Due in large part to the popularity of ready-to-eat meals, the retort packaging sector is actually worth billions of ringgit and continues to expand. Retort pouches are available in:

Canned Soups and Stews:

These were among the earliest products to benefit from retort processing.

Baby Food:
Retort pouches provide a safe and lightweight alternative to traditional glass jars.

Pet Food:
Flexible retort packaging ensures extended shelf life while maintaining nutritional value.
Ready-to-Eat Meals:
A staple in both military and consumer markets, retort pouches are ideal for meals requiring long-term storage.

The adaptability of retort systems to different packaging types has solidified their importance in meeting global food supply demands while addressing sustainability goals.

Material Compatibility:
Analyzing the properties of retort pouches, including their multilayer structure for durability, heat resistance, and barrier properties.

Versatility Across Product Types:
Compatibility with various foods, including acidic, low-acid, and liquid products.

Why Retort Pouches Are So Special

Retort pouches are more than just fancy food packaging; they are high-tech materials designed to keep your food safe, tasty, and fresh for a long time. These pouches are made with multiple layers, each playing a specific role to ensure durability, heat resistance, and excellent protection against spoilage (Figure 3) .

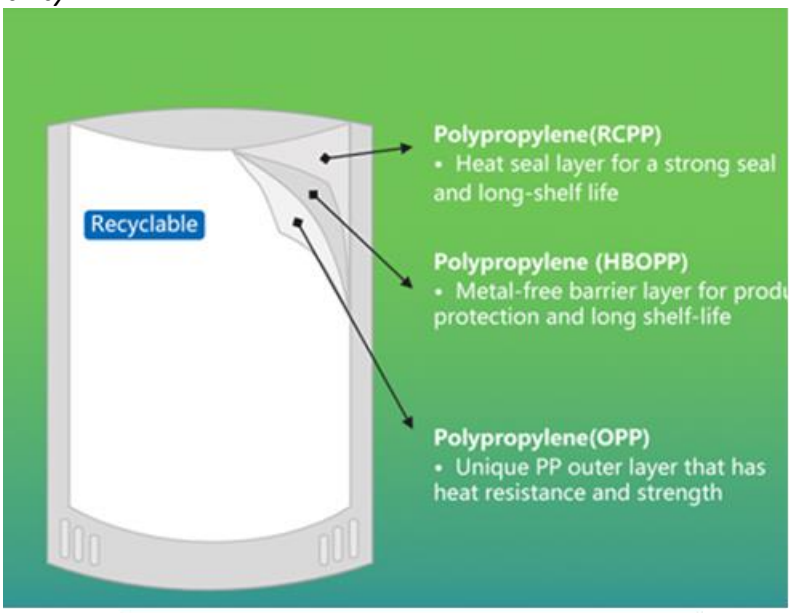

Figure 3: A Cross section of the retort

What's Inside the Layers?
Think of a retort pouch as a sandwich, where each layer has a job:

Outer Layer:
Made of polyester, this gives the pouch strength and prints the branding you see on the package.

Middle Layer:
Usually aluminium foil, this acts as a barrier to block light, oxygen, and moisture, keeping the food safe.

Inner Layer:
Made of heat-sealable plastic, this layer directly touches the food and keeps it safe during the heating process.

Advantages of Retort Systems

Shelf Stability Without Refrigeration:
How retort packaging maintains food quality for extended periods, reducing reliance on cold chains.

Convenience and Portability:
Benefits of lightweight, easy-to-open pouches compared to traditional cans.

Environmental Impact:
Comparison of carbon footprints between retort pouches and conventional packaging, emphasizing material efficiency.

Future Trends:
Innovations in Retort Systems
Emerging technologies promise to refine retort processing:

Smart Packaging:
Integrating QR codes or RFID tags to monitor product freshness.

Advanced Materials:
Developing biodegradable or recyclable retort pouch alternatives.

Automation:
Enhancing production efficiency with automated retort systems.

A Paradigm Shift in Food Packaging
Retort systems have redefined the standards of food safety and convenience. With the rising popularity of retort pouches, manufacturers can deliver high-quality, shelf-stable products that align with consumer demands for sustainability and innovation. As research continues to enhance the efficiency and environmental impact of retort systems, the future of food packaging looks brighter, greener, and more consumer-focused.

Affordable Aquaponics (A2M)

By Siti Aisyah Mohammad Taupik

Aquaponics is a fusion of agricultural technology that combines aquaculture and hydroponics. “Aqua” represents the aquaculture aspect, while “ponics” is derived from hydroponics. Soil-less plants grow by absorbing nutrients from the aquarium water. Fish and plants thus benefit each other because the fish provide the plants with nutrients through the excretions and the plants act as filters by cleaning the fish water. This process continues in a cycle in which the fish provide nutrients to the plants and the plants purify the water for the fish. This mechanism makes aquaponics a sustainable and efficient system as it integrates natural cyclical processes with modern cultivation technology.

A2M is an abbreviation for Affordable Aquaponics, a system for producing food sustainably at a lower cost (Figure 1). A2M is an aquaponics system design that utilizes an ebb and flow system that is easier to build and maintain. This system features uncomplicated design, efficient water use, environmental friendliness, sustainability and suitability for limited spaces. Interestingly, this aquaponics system can be built to fit individual budgets, making it accessible to anyone who is interested. Additionally, if implemented on a larger scale, there is the potential to become an ecotourism destination and generate revenue. With this approach, restaurants, hotels, schools, resorts or theme parks can integrate A2M as an additional attraction to attract tourists or visitors seeking a unique experience and impactful education while contributing to environmental sustainability.

The benefits of using the A2M system at home on a small scale include improving

household economics through cost savings on grocery shopping. By growing vegetables and raising fish for daily needs, families can enjoy fresher food. A2M is ideal for growing culinary plants such as *kesum* (Vietnamese coriander), *pandan*, water spinach, chives, cherry tomatoes and others. Plants that require little care are also suitable, such as herbs such as mint and *pegaga* (Centella asiatica). For fish farming, hardy and fast-growing species such as red snapper and catfish can be an excellent choice. Families can also use the A2M system as an additional source of income by selling excess vegetables and fish to neighbors, farmers markets or local stores. For example, *pegaga*, scientifically known as Centella asiatica, is an herb widely known for its traditional medicinal properties and popular in Malaysia as a salad or *ulam*. By using the A2M system at home, it can be further developed into value-added products for a lucrative revenue stream, such as crispy *pegaga* (Figure 2) or *pegaga* juice. The benefits of this approach include maximizing crop yields, increasing their commercial value and boosting the local economy through product sales.

The benefits of the A2M system go beyond environmental protection as water is used more efficiently compared to traditional farming methods. It also produces high-quality agricultural crops such as *pegaga* (Figure 3) and mint. This system is easily accessible and should be part of every home to promote a healthy lifestyle by consuming fresh, organic food. In addition, a calm and green environment is created, which has a positive effect on mental well-being. Unexpectedly, the first attempt of A2M aquaponic system with a touch of innovation successfully won a silver medal (Figure 4) at the Innovation Management Practice Competition (AIPN), Karnival Inovasi@UMT2024, held from November 17th to 21st, 2024.

Figure 1: Affordable Aquaponics (A2M) is a system designed to produce food sustainably at a lower cost, developed at the hatchery, FPSM.

Figure 2: Crispy *pegaga* has been developed as a value-added product from crops grown using the Affordable Aquaponics (A2M) system.

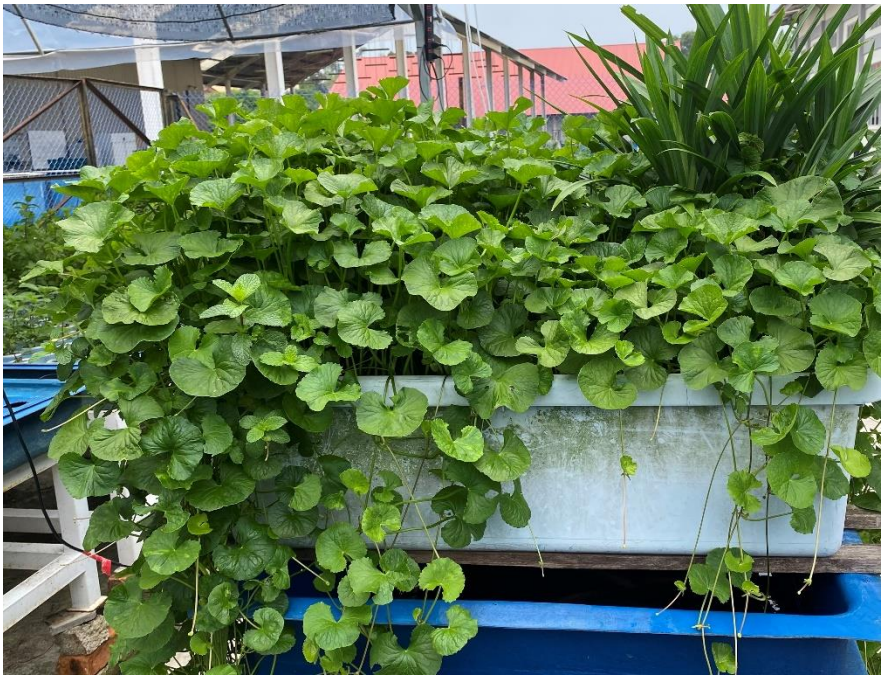

Figure 3: *Pegaga* plants grown in the A2M system thrive with 100% organic fertilizer.

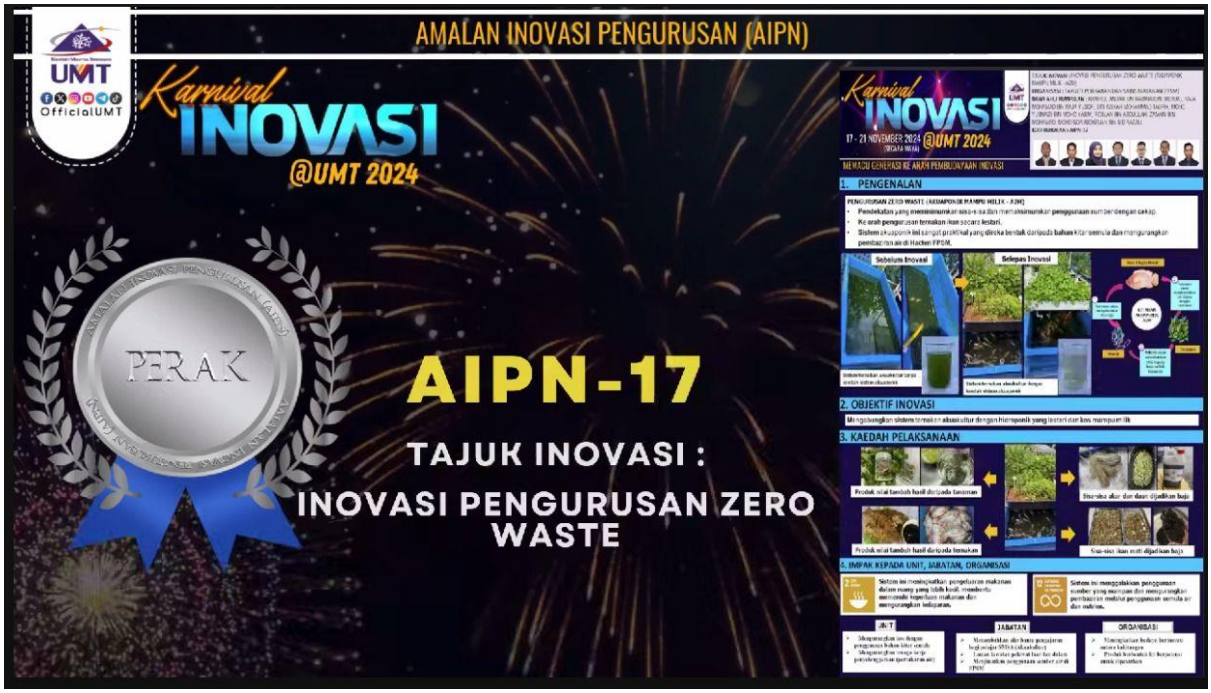

Figure 4: Affordable Aquaponics (A2M) has won a silver medal representing FPSM.

Mycotoxins and Health: A Silent Epidemic

By Dr. Mannur Ismail Shaik, Assoc. Prof. Ts. Dr. Norizah Mhd Sarbon, Khairun Nasuha Binti Azmi, Nurul Syamimi Binti Abdul Manaf, Nur Alis Syazwina Binti Mohd Zaifuriniswan, and Nur Najwa Binti Hairunizan

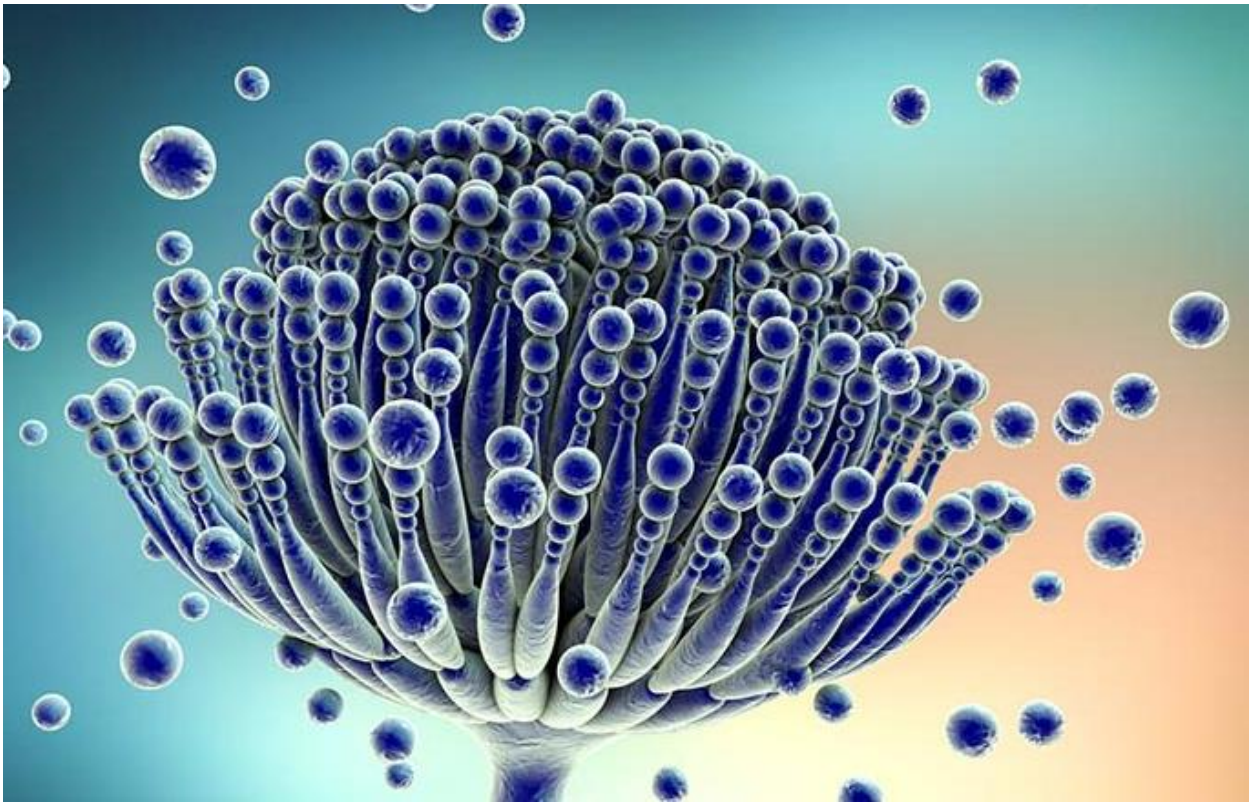

Figure 1: Mycotoxin

Mycotoxins, secondary metabolites produced by filamentous fungi, severely threaten human and animal health. Contamination of food and feed by these toxins occurs through inhalation, ingestion, or skin contact with affected commodities. Depending on the type, exposure level, and route, mycotoxin toxicity can result in acute or chronic poisoning, manifesting as diseases collectively termed mycotoxicoses. These diseases include immunosuppression, mutagenicity, teratogenicity, carcinogenicity, and even fatal outcomes. Susceptibility to mycotoxicosis is influenced by species, age, gender, and existing illnesses.

Types of Mycotoxins:

Mycotoxins are toxic secondary metabolites produced by fungi such as *Aspergillus*, *Fusarium*, and *Penicillium*, contaminating food and feed. Key types include aflatoxins, ochratoxins, fumonisins, zearalenone, patulin, and trichothecenes, each associated with specific health risks. For instance, aflatoxins are carcinogenic and hepatotoxic, while ochratoxins cause kidney damage. Fumonisins are linked to esophageal cancer, and zearalenone disrupts hormonal balance due to its estrogenic properties. Patulin targets the gastrointestinal system, and trichothecenes

suppress protein synthesis and immunity. These toxins pose serious health risks depending on exposure levels and are regulated globally to ensure food safety. The health risks associated with key mycotoxins include aflatoxins, ochratoxins, zearalenone, fumonisins, trichothecenes, and patulin

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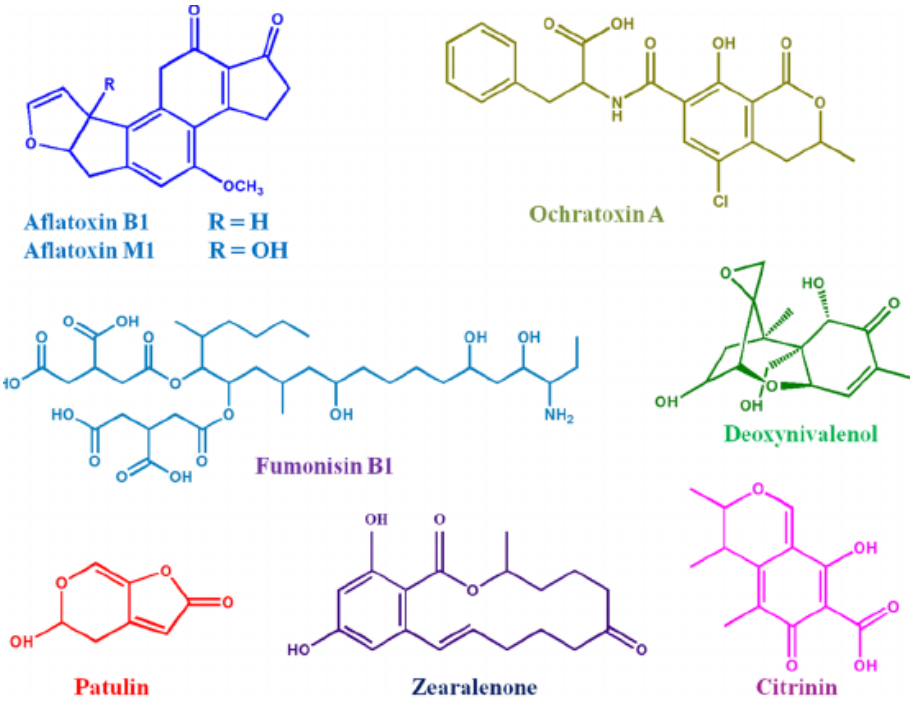

Figure 2: Structure of Mycotoxins

Aflatoxins: Hepatotoxic Threats

Aflatoxins, produced by *Aspergillus flavus* and *Aspergillus parasiticus*, are among the most researched mycotoxins due to their hepatotoxic and carcinogenic effects. Acute exposure can cause abdominal pain, vomiting, and oedema, while chronic exposure is linked to liver cirrhosis and hepatocellular carcinoma (HCC), responsible for over 80% of HCC cases in developing countries. The Turkey X disease outbreak in England (1960), caused by aflatoxin-contaminated groundnut meal, underscores its significance. Aflatoxins also synergize with cyclopiazonic acid (CPA), another mycotoxin, exacerbating toxic effects on muscle, liver, and spleen by disrupting intracellular calcium flux.

Ochratoxins: Nephrotoxic Hazards

Ochratoxins primarily target the kidneys, causing nephrotoxicity and chronic kidney disease in cases of prolonged exposure. Short-term effects include nausea, vomiting, and headache. Ochratoxins are also associated with oxidative stress, immunosuppression, and teratogenic risks, especially during pregnancy. Studies in China revealed significant ochratoxin contamination in cereal and apple-based products, highlighting its prevalence in dietary sources.

Zearalenone: Hormonal Disruptor

Zearalenone (ZEA), a non-steroidal estrogenic mycotoxin, mimics estrogen and binds to estrogen receptors, leading to hormonal imbalances. It primarily affects the urogenital tract, causing reproductive disorders in humans and livestock. Bioaccumulation of ZEA can disrupt endocrine functions, potentially leading to prostate, ovarian, and breast cancers. Piglets studies demonstrated ZEA's impact on hormonal levels and genital organ morphology.

Fumonisins: Catalysts of Oxidative Stress

Fumonisin B1 (FB1), produced by *Fusarium* species, is a common contaminant in agricultural products. It induces oxidative stress by generating reactive oxygen species (ROS), damaging cellular molecules such as DNA. Studies in South Africa, China, and Iran have linked chronic exposure to FB1 to esophageal cancer.

Trichothecenes: Inhibitors of Protein Synthesis

Trichothecenes, including deoxynivalenol (DON) and T-2 toxin, inhibit protein synthesis and modulate immune responses. Although their toxicity is well-documented in animal studies, they rarely affect humans due to dietary exposure levels being below toxic thresholds.

Patulin: A Multi-Systemic Threat

Patulin, primarily found in moldy fruits, exhibits mutagenic, teratogenic, and genotoxic properties. It damages vital organs, including the liver and kidneys, and disrupts intestinal tissues and immune function. However, its carcinogenic potential in animal models remains poorly established.

Table 1: Permissible Levels of Mycotoxins in Foods and Regulations

Mycotoxin	Source Food	Regulatory Limits	Food Act/Regulations
Aflatoxin B1	Peanuts, corn, milk, dried fruits	2–20 µg/kg (depending on food type)	Codex Alimentarius, EU Regulation (EC) No. 1881/2006, US FDA guidelines
Ochratoxin A	Cereals, coffee, wine, dried fruits	3–10 µg/kg (cereals and derived products)	EU Regulation (EC) No. 1881/2006, Codex Alimentarius
Zearalenone	Maize, wheat, barley	100–200 µg/kg (depending on food type)	EU Regulation (EC) No. 1881/2006
Fumonisins	Maize, maize-based products	200–4000 µg/kg (depending on food type)	Codex Alimentarius, EU Regulation (EC) No. 1881/2006
Patulin	Apples, apple juice, fruit-based products	50 µg/kg (fruit juice and cider)	Codex Alimentarius, US FDA guidelines
Deoxynivalenol (DON)	Cereals (wheat, maize, barley)	200–1250 µg/kg (depending on product)	EU Regulation (EC) No. 1881/2006, Codex Alimentarius

T-2 Toxin	Grains, maize, barley	Not widely regulated; proposed limits vary	EU and individual country guidelines
Ergot Alkaloids	Rye, wheat, barley	500 µg/kg (in cereal grains)	Codex Alimentarius

- **Codex Alimentarius** is the international food standard-setting body under the FAO/WHO.
- Regulations may vary by country; for example, the US FDA has separate limits for aflatoxins in milk (0.5 µg/kg).
- **Global** guidelines like Codex Alimentarius are often used as references **in countries without specific regulations**.

In Malaysia, the permissible levels of mycotoxins in food are regulated under the **Food Act 1983** and **Food Regulations 1985**, specifically addressing aflatoxins, ochratoxin A, and patulin, among others. These regulations align with Codex Alimentarius standards and international guidelines to ensure food safety. The Malaysian government periodically revises these regulations to stay consistent with scientific findings and Codex standards. Additionally, enforcement includes regular sampling and testing to ensure compliance, particularly for imported and locally produced foods.

Table 2: Permissible Levels of Mycotoxins in Malaysia

Mycotoxin	Source Food	Regulation	Permissible Limit	Food Act/ Regulation
Aflatoxins (B1, B2, G1, G2)	Peanuts, maize, nuts, and processed products	Maximum level for food safety	15 µg/kg (total aflatoxins)	Food Regulations 1985
Ochratoxin A	Cereals, dried fruits, and coffee	Food safety limits	5 µg/kg (for cereal-based foods)	Food Act 1983
Patulin	Apple juice and derived products	Health risk assessment-based limits	50 µg/kg	Food Regulations 1985

Conclusion

Mycotoxins represent a significant global health challenge, necessitating vigilance in food safety practices to minimize exposure. Their diverse toxicological profiles of these compounds emphasize the need for continued research, public awareness, and policy interventions to mitigate their impact on health.

Work Visit and Guest Lecture Program by the Faculty of Science and Technology, University of Muhammadiyah Sidoarjo, Indonesia, at the Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu

By Dr. Rudiyanto

The Faculty of Science and Technology, University of Muhammadiyah Sidoarjo (UMSIDA), Indonesia, and the Faculty of Fisheries and Food Science (FPSM), Universiti Malaysia Terengganu (UMT) have developed a collaborative relationship since signing a Letter of Intent (LOI) on April 12, 2022. To further the agreement established in the LOI, a delegation from UMSIDA's Faculty of Science and Technology conducted a working visit to FPSM UMT on August 14, 2024.

The UMSIDA delegation was led by the Dean of the Faculty of Science and Technology, Iswanto, ST., MMT., and included: Dr. Ir. Jamaaluddin, MM. (Deputy Dean), Dr. Izza Anshory, ST., MT (Head of the Electrical Engineering Department), Dr. Fachruddin, ST., MT. (Head of the Mechanical Engineering Department), Indah April, ST., MT. (Head of the Industrial Engineering Department), Utami Rahma, ST., MT. (Head of the Food Technology Department), Dr. Atik Wahyuni, ST., MT. (Head of the Civil Engineering Department) and Dr. Hindarto, ST., MT. (Head of the Informatics Department).

The UMSIDA delegation was warmly received by the Dean of FPSM, Professor Ts. Dr. Mohd. Effendy Bin Abd. Wahid, at the

Bilik Mesyuarat Sayed Zain, FPSM. Following remarks from both deans, discussions cantered on expanding the collaboration into a full Memorandum of Understanding (MOU).

The program concluded with a guest lecture session featuring presentations by Utami Rahma, ST., MT. from UMSIDA and Dr. Rudiyanto from FPSM UMT. Utami Rahma presented her research titled “Kombucha Pineapple Juice,” while Dr. Rudiyanto shared his work on “Phenology-Assisted Machine Learning Method for Automated Mapping of Rice Extent in Selangor, Malaysia, Using Sentinel-1 and Sentinel-2 Temporal Data.”

The event was attended by several FPSM faculty members, including Dr. Rohayu binti Ma`Arup, Dr. Ramisah binti Mohd Shah, Dr. Iffah Hazirah binti Mohd Nawi, Dr. Nor Akma binti Ismail, Dr. Nur Suaidah binti Mohd Isa, Dr. Nurmahani binti Mohd Maidin, and En Muhammad Syahrunizan Bin Abdul Rashid and a staff from Faculty of Science and Marine Environment (FSSM): Dr. Maulidiani. Additionally, 12 postgraduate students from Indonesia, representing the Persatuan Pelajar Indonesia (PPI) and currently studying at UMT, participated in the program.

Figure 1 & 2: Exchange of souvenirs between Professor Ts. Dr. Mohd Effendy Bin Abd Wahid (in UMT corporate uniform), Dean of FPSM, UMT, and Iswanto, ST., MMT. (In batik attire), Dean of the Faculty of Science and Technology, UMSIDA.

Figure 4: The warm welcome from both deans and the engaging discussion session

Figure 5: Utami Rahma presenting her research titled about Kombucha pineapple juice

Figure 6: Dr. Rudiyanto presenting his research titled about application of remote sensing for mapping paddy rice cultivation

FPSM Staff Mobility Outbound At Faculty Of Fisheries And Science Marine (FPIK), Bogor Agricultural Universiti IPB, Indonesia.

By Mr. Abdul Muhaimin Mohamad Rodzi and Mr. Mohd Irwan Mohd Hussin

Dr. Muhamad Naimullah Muhammad Ikhwanuddin, Mr. Mohd Irwan Mohd Hussin, and Mr. Abdul Muhaimin Rodzi, staff from the Faculty of Fisheries and Food Science (FPSM) UMT, visited the Department of Fisheries Resource Utilization, Faculty of Fisheries and Marine Science (FPIK), IPB University, Bogor, Indonesia from 03th September 2024 until 06th September 2024.

Dr. Muhamad Naimullah Muhammad Ikhwanuddin, as a responsible individual, played a key role in facilitating the cooperation between IPB University and UMT through a Memorandum of Understanding (MoU) signed at the IPB International Convention Center in Bogor, Indonesia, on the opening day of the 11th East Asian Fisheries and Technologist Association (EAFTA) symposium. The MoU was signed in the presence of Professor Dr. Arif Satria, the Rector of Bogor Agricultural University, who also observed the participation of several other universities on the first day. A meeting was concurrently held in the conference room, attended by the Dean, Professor Dr. Ir. Fredinan, and the Deputy Dean, Professor Dr. Mala from the Faculty of Fisheries and Marine Sciences (FPIK), IPB University, as well as the Dean, Professor Ts. Dr. Mohd Effendy Abd. Wahid, Dr. Muhamad Naimullah Muhammad Ikhwanuddin, Mr. Mohd Irwan Mohd Hussin, and Mr. Abdul Muhaimin Mohamad Rodzi, who are the academic support staff for the study visit program from LASBELA participated in the meeting. Additionally, Mr. Shahrol Idham Ismail and Mr. Anderi Muhammad, two other academic support staff from FPSM, UMT, were part of the LASBELA program. The discussions centred around the future direction of both universities, focusing on collaboration and shared goals under the IPB-UMT partnership.

Figure 1: The signing of the Memorandum of Understanding (MoU) between Bogor Agricultural University (IPB) and the University of Malaysia Terengganu (UMT) took place in the presence of the Rector of IPB University, Indonesia.

Figure 2: A photo session was conducted with representatives from various universities around the world that have signed agreements with Bogor Agricultural University (IPB) in Indonesia.

Figure 3: Professor Ts. Dr. Mohd Effendy Abd. Wahid, Dean of the Faculty of Fisheries and Food Science (FPSM) at the University of Malaysia Terengganu (UMT), presented a souvenir to Professor Dr. Ir. Fredinan, Dean of the Faculty of Fisheries and Marine Science (FPIK) at Bogor Agricultural University (IPB).

Figure 4: Discussion session was attended by the Dean and academic staff from FPIK, IPB University, as well as the Dean, academic staff, and supporting academic staff from FPSM, UMT.

Figure 5: Dr. Muhamad Naimullah Muhammad Ikhwanuddin provided a brief overview of the vision of Universiti Malaysia Terengganu (UMT).

The Dean, academic staff, and academic support staff from LASBELA at the University of Malaysia Terengganu (UMT) were invited to join a dinner hosted by Universiti IPB, featuring several participating international universities. During the event, Dr. Muhamad Naimullah Muhammad Ikhwanuddin, as the responsible individual and representative of UMT, was requested to briefly introduce the background and future direction of Universiti Malaysia Terengganu.

On the second day, we went for a comprehensive visit to the facilities and infrastructure at IPB University with the guidance of Mr. Hafidz and Mr. Mario, the third-year students of Fisheries Technology and Management.

Figure 6: A group photo at the campus of Bogor Agricultural University, IPB University.

Figure 7: At the University History Museum Gallery, together with gallery staff Ms. Nata and Mr. Mario, as well as Mr. Hafidz as the tour guide for this visit.

Next, the LASBELA staff visitation program proceeded to the Faculty of Fisheries and Marine Science (FPIK) at IPB University for the Department of Fisheries Resource Utilization. Concurrently, during the gathering, a brief meeting and introduction took place with several academic lecturers from the Department of Fisheries Resource Utilization. The discussion and presentation commenced with several active FPIK academic lecturers involved in fish-catching equipment research, who shared their opinions on the latest technology to realize fish-catching technology.

Figure 8: The model by Dr. Roza Yusfi Andayani (researcher at IPB) is one of the creators of the ePAD mobile device.

Figure 9: A brief discussion on research and collaboration took place with Dr. Iin Solihin, Secretary of the Department of Fisheries Resource Utilization, Faculty of Fisheries and Marine Sciences, IPB University.

Figure 10: Prof. Dr. Ir. Mulyono S. Baskoro explained the research conducted, stating that "Squid-Inspired Propulsion Technology can be used as a method to naturally enrich squid resources."

Figure 11: Dr. Ir. Zulkarnain explained the study conducted on "Fish Aggregators and Frozen Bait Stimulants in Small-Scale Commercial Fisheries."

Figure 12: A group photo with academic staff from the Department of Fisheries Resource Management, Faculty of Fisheries and Marine Sciences, Bogor Agricultural University.

On the third day, Dr. Muhamad Naimullah Muhammad Ikhwanuddin, Mr. Mohd Irwan Mohd Hussin, and Mr. Abdul Muhaimin Mohamad Rodzi joined a visit to the Jakarta port accompanied by FPIK lecturers Dr. Vita Rumanti Kurniawati, Dr. Am Azbas Taurusman, Dr. Ir. Zulkarnain, and Dr. Didin Komarudin, as well as several undergraduate students in Fisheries Technology and Management, some students from other programs, and some postgraduate and doctoral students in fisheries technology courses, who would participate in the " Capture Fisheries School 2024" program.

Upon arriving at Jakarta Port, we proceeded with our visit to the Nizam Zachman Jakarta Ocean Fishing Port, where the urban planning officer, Mr. Nur Alimin, and other officers warmly welcomed us. Firstly, a formal briefing session was conducted by the officers at the Nizam Zachman Jakarta Ocean Fishing Port. Then, we visited the fisheries technology vessel owned by the Ministry of Maritime Affairs and Fisheries on board the training and research vessel MADIDIHANG 03 "Politeknik Ahli Usaha Perikanan Jakarta" at the Jakarta port.

Figure 13: A group photo featuring officers from the Nizam Zachman Jakarta Ocean Fishing Port.

The MADIDIHANG 03 is a training and research vessel for fisheries technology equipment. The ship's design was created by a Spanish architect in 2009. It was completed on March 3, 2010, at the Astilleros Gondan shipyard in Spain, arriving at the Nizam Zachman Fisheries Port in Jakarta on May 8, 2010. The vessel is equipped with machinery and fishing gear for training and research.

Figure 14: Writers with the one of the ships owned by the Ministry of Marine Affairs and Fisheries.

Figure 15: Briefing by the captain and the first officer of MADIDIHANG 03, covering the design, passenger capacity, cargo, load, engine room, and other relevant matters.

Figure 16: Fishing gear of the ship.

The next visit was to the nearby fishermen's dock adjacent to the integrated transportation office to observe the various sizes of fishing boats at this dock. At the same time, fishermen start unloading their catches and frozen fish to be sent to entrepreneurs at the fish market.

Figure 17: The net used by the fishermen. This net is taken down from the fishing boat to repair the torn net and install new floats.

Figure 18: Staff from the integrated service office are monitoring the docking of fishermen's boats, categorized by type or grade, at the harbor area as they unload their catch.

Figure 19: The caught tuna was frozen on board, then removed and placed into fish containers.

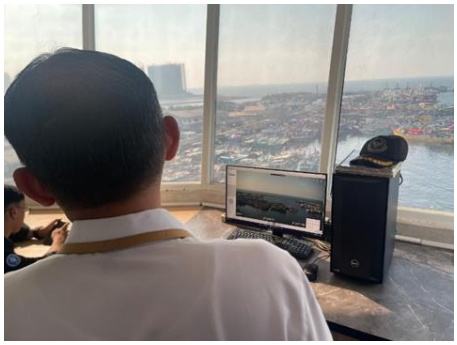

Figure 20 & 21: Visit the control tower for boats and ships at the integrated service office.

The last visit to the "Pasar Ikan Modem Muara Baru-Jakarta" revealed that the fish market has relocated from its old location to a new office building. The fish vendors operate from 5:00 pm to 2:00 am at the “Pasar Ikan Modem Muara Baru-Jakarta”. This fish market was officially opened on March 13, 2019, with the “Pasar Ikan Modem Muara Baru-Jakarta” launch in North Jakarta. The “Pasar Ikan Modem Muara Baru-Jakarta” building, which occupies an area of 2 hectares, was built on a land area of approximately 4.15 hectares. This modern fish market is also equipped with comprehensive facilities, including 896 stalls selling fresh fish, 155 maritime kiosks, and 8 food court units. here are 2 ice-making machines with a capacity of 10 tons, a retail market area, a laboratory, a cold room with a capacity of 30 tons, and other facilities.

Figure 22: The model of of the "Pasar Ikan Modem Muara Baru-Jakarta"

On the fourth day of the final visit to IPB University, we attended the presentations by several lecturers on the research and studies conducted by the academic staff of FPIK. The topics presented were;

i. A Summary of Indonesian Marine Fisheries.
ii. An Overview of Fishing Gear in Indonesia.
iii. The design of the fishing net and the categories of net sizes used for fishing gear in Indonesia.
iv. The development of LED fishing lamps as Harmonious Eco-Technology: A case study in Indonesia.
v. The Impact of Fisheries on Ecosystems within the Framework of Sustainable Fisheries Management (EAFM).

Finally, the event was closed with a closing remark by Prof. Dr. Eko Sri Wiyono, Head of the Department of Fisheries Resource Utilization, FPIK, IPB University, and Dr. Muhamad Naimullah Muhammad Ikhwanuddin as the person in charge, accompanied by the FPSM supporting academic staffs.

Special thanks to the UMT Registrar for funding the LASBELA program and to the to Dean Prof. Dr. Ir. Fredinan and Deputy Dean Prof. Dr. Mala for their role in the collaboration between IPB-UMT under the Memorandum of Understanding (MoU), as well as all our new friends from the Department of Fisheries Resources at the Faculty of Fisheries and Marine Science (FPIK), IPB University.

The Usage and Applications of Food Additives: A Course for Polytechnic and Community College Educators

By Ts. Dr Aidilla Mubarak and Ts. Dr Wan Zawiah Wan Abdullah

Food additives are a critical component of the food industry, playing vital roles in preserving quality, enhancing flavour and ensuring food safety. Their usage requires a clear understanding of their functions, risks and regulations. A course on The Usage and Applications of Food Additives was conducted from 9th to 12th September 2024 at Politeknik Sultan Haji Ahmad Shah (POLISAS), Pahang. This program was part of an Upskilling and Reskilling Program designed for educators from polytechnic and community colleges across Malaysia.

Participants and Objectives

The course brought together 27 educators from various polytechnic and community colleges, including Politeknik Tun Syed Nasir Syed Ismail, Politeknik Merlimau, Politeknik Sultan Haji Ahmad Shah, Kolej Komuniti Arau, Kolej Komuniti Jelebu, Kolej Komuniti Jerantut, Kolej Komuniti Lahad Datu, Kolej Komuniti Pasir Salak, and Kolej Komuniti Sik.

The course's primary objective was to provide participants with a comprehensive understanding of food additives, focusing on their functions, safety, regulatory compliance, and techniques for optimal use in food production. The program also aimed to enhance educators' capacity to teach this knowledge within their institutions.

Key Topics Covered and Activities in the Course

The course covered various topics, delivered through lectures, discussions and group activities. Participants gained insights into the function and classifications of additives, techniques for their effective and safe usage, and the importance of risk management. Ts. Dr Wan Zawiah Wan Abdullah provided an in-depth overview of guidelines and regulations governing food safety usage, helping participants recognise the complexities of food additive compliance and safety standards. Additionally, Ts. Dr Aidilla Mubarak delved into risk management, current research and innovations, emphasizing innovations in identifying natural alternatives to meet growing consumer demands for safe food products.

The program also included interactive tasks where participants worked in groups to discuss and present solutions related to the topics covered. These activities raised critical thinking and encouraged collaboration, ensuring a deeper understanding of the course material.

Conclusion

This course successfully provided the participants with an understanding of advanced concepts related to food additives. Through the course, participants gained valuable insights into the control methods and challenges faced by the food industry in ensuring food additives' safe and effective use.

Figure 1: Ts. Dr Aidilla Mubarak delivering a lecture on recent innovations in natural food additives

Figure 2: Ts. Dr Wan Zawiah Wan Abdullah delivering a lecture on guidelines and regulations on the use of food additives

Figure 3: Participants engaged in group discussions and presentations during the course.

Empowering Local Women Through a Basic Cake Decoration Course: Transforming Skills into Opportunities

By Dr. Siti Nur`Afifah binti Jaafar and Fadlina binti Yusof

The Basic Mini Cake Decoration Course, jointly organised by the Faculty of Fisheries and Food Sciences (FPSM), Universiti Malaysia Terengganu (UMT), and the Persatuan Kebajikan Wanita Sepakat Terengganu (SEPAKAT), was held on 27 September 2024. This course aimed to empower local women through a mix of theoretical knowledge and practical application in cake decorating.

The course began with a welcome speech by Ms. Fadlina Yusof, the programme director. The short speech highlighted that the goals of the course were to build skills, strengthen the community, and share knowledge. The speech also emphasised the importance of collaboration between SEPAKAT and FPSM in creating meaningful opportunities for women's development in Terengganu.

The first session started with a theoretical session on the basics of mini cake decoration, delivered by Mr. Aziz Yusof at the Commercial Food Laboratory. During this session, participants were introduced to the fundamentals of cake decorating, including the use of various tools, preparation techniques, and an overview of decorating styles. Mr. Aziz emphasised the importance of mastering basic techniques to build a strong foundation for more intricate cake designs in the future.

Following the theoretical session, Mr. Mohamad Rahijan Abdul Wahab conducted a practical demonstration on making buttercream frosting at the Staple Food Preparation Laboratory at FPSM. In this hands-on session, participants were guided step by step through the process of preparing buttercream frosting, focusing on key techniques for achieving the perfect texture, consistency, and flavour balance. The demonstration included valuable tips on selecting quality ingredients, using proper mixing methods, and understanding the various types of buttercreams suitable for cake decoration. Participants had the opportunity to closely observe the process and ask questions to ensure they fully understood the nuances of frosting preparation.

The next activity featured a demonstration of mini cake decorating by Dr. Siti Nur'afifah Jaafar and Ms. Nor Azni Mohd Yunos. During this session, participants learned a variety of decorating techniques, including piping different frosting designs, using edible embellishments, and creating themed decorations. Both demonstrators provided valuable advice on achieving precision and creativity and encouraged participants to experiment with their designs. This practical demonstration showcased how basic techniques could be adapted and customised for different occasions to enhance the market appeal of their creations.

The highlight of the course was a hands-on cupcake decorating lesson. Under the guidance of the instructors, participants applied what they had learned by decorating their mini cakes. This activity allowed them to express their creativity, refine their skills, and receive immediate feedback and guidance. Instructors were always on hand to offer practical advice, troubleshoot issues, and demonstrate advanced techniques for participants who wished to further challenge themselves.

Overall, the course provided a comprehensive learning experience that combined theoretical understanding, expert demonstrations, and practical application. Through the collaboration between SEPAKAT and FPSM, the goal was successfully achieved in equipping women with marketable skills, strengthening their self-confidence, and promoting knowledge transfer. By the end of the day, participants had not only acquired practical skills but also gained the inspiration to explore new avenues for self-employment and contributions to their communities.

Figure 1: Participants attentively listened to the demonstrator's guidance during the hands-on frosting session.

Figure 2: The participants had the opportunity to decorate the cakes with their creativity.

Figure 3: The participants took commemorative photos with the instructors and the mini-cakes they decorated.

Historic Launch of WIFIdx Program by Her Royal Highness Sultanah Nur Zahirah

By Prof. Dr. Shamsul Bahri Bin Abd Razak

In a momentous event for Universiti Malaysia Terengganu (UMT), the Women ICT Frontier Initiative (WIFIdx) program was officially launched by Her Royal Highness Tuanku Sultanah Nur Zahirah of Terengganu on 19th October 2024. The ceremony took place at Taman Tamadun Islam Terengganu, amidst the 22nd Convocation Ceremony celebrations, marking a historic milestone as UMT was appointed the 13th institution globally to join the exclusive WIFIdx network. The launch was honored by the presence of Dr. Ki Young Ko, President of the Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) from Korea, along with four of his esteemed delegates. Their attendance reinforced APCICT's commitment to supporting women's empowerment and entrepreneurship across Asia and the Pacific through the advancement of ICT.

Launched in 2016, WIFIdx is part of the Women ICT Frontier Initiative (WIFI), a flagship program by APCICT, affiliated with the United Nations. This initiative aims to promote women's entrepreneurship across Asia and the Pacific through ICT capacity development. The program specifically supports women-led micro, small, and medium enterprises (MSMEs), helping them leverage digital technologies for growth. Additionally, it provides training for government leaders and policymakers to create a supportive environment for women entrepreneurs. The presence of Her Royal Highness underscored the transformative

impact of WIFIdx in driving progress and inclusion across the region, highlighting the program's potential to empower women in the digital economy and strengthen community resilience through ICT.

UMT's inclusion in the WIFIdx network marks a significant achievement, underscoring the university's commitment to gender equity in ICT. By equipping women entrepreneurs with essential digital skills and resources, UMT aims to contribute to a more inclusive and sustainable digital future. This milestone reflects UMT dedication to fostering an environment that promotes sustainable development and empowers women to lead in the digital era.

WIFIdx Training of Trainers Workshop Equips UMT Team to Support Women Entrepreneurs

By Prof. Dr. Shamsul Bahri Bin Abd Razak

Following the official launch of the Women ICT Frontier Initiative (WIFIdx) at Universiti Malaysia Terengganu (UMT), a specialized Training of Trainers (ToT) workshop was held on UMT's campus from 20th to 22nd October 2024. This intensive training session was designed to prepare the UMT WIFIdx Secretariat team with essential skills and knowledge in social media applications, empowering them to support women entrepreneurs in utilizing digital tools effectively for business growth. The training was conducted by experienced trainers from the WIFIdx UN Secretariat, who shared best practices, insights, and strategies for using social media to enhance business visibility and engagement. The workshop covered a range of topics, including social media strategy, digital marketing, content creation, and the effective use of platforms to drive business growth. Through hands-on activities and practical modules, participants developed competencies that will enable them to guide women-led micro, small, and medium enterprises (MSMEs) in leveraging digital technologies, expanding their reach, and enhancing their business resilience. This ToT workshop aligns with WIFIdx's mission to foster women's entrepreneurship across Asia and the Pacific by promoting ICT capacity development. As part of the broader WIFIdx framework, UMT's newly trained facilitators will now be equipped to deliver workshops and mentorship tailored to the needs of women entrepreneurs, helping them to optimize digital platforms and effectively engage their target audiences.

With the expertise imparted by WIFIdx's skilled trainers, UMT is well-positioned to support women-led businesses and promote sustainable growth through digital empowerment. This initiative not only contributes to bridging the digital divide but also adds significant value to the socio-economic development of the region by empowering women entrepreneurs to lead confidently in the digital era.

Unexpected Visit from Higher Education Minister Sparks Hope for Pangkor's Stingless Bee Project

By Prof. Dr. Shamsul Bahri Bin Abd Razak

Pulau Pangkor, October 29, 2024 — In a twist of fate, what was meant to be a quiet homecoming for YB Dato' Seri Diraja Dr. Zambry Abd Kadir, Malaysia's Minister of Higher Education, turned into a symbolic moment for a community beekeeping project. While the minister was on the island to visit family and join the local Indian community for Deepavali, a sudden detour brought him to Teluk Raja Bayang, where a new stingless bee initiative is taking root with the guidance of Universiti Malaysia Terengganu (UMT). The project—focused on sustainable stingless beekeeping—is aimed at providing economic resilience to the villagers. Supported by UMT, ten local participants—fishermen who are also native inhabitants of Pulau Pangkor—have been trained to manage 20 newly introduced stingless bee colonies using best practices in sustainable beekeeping. For these villagers, mostly engaged in fishing and small-scale agriculture, the project offers a potential lifeline, adding an income stream that could grow alongside the local tourism industry.

What makes this project unique is its alignment with Malaysia's goals for community-led, sustainable agriculture. The fishermen of Teluk Raja Bayang are pioneering a movement that could set a model for other rural areas seeking economic growth through eco-friendly practices. UMT's support is integral, not only providing the expertise to manage the bee colonies but also ensuring that participants can maximize long-term yields from the hives. As stingless bees produce a rare, high-value honey, even small production can

translate to meaningful revenue for families involved.

The minister's unscheduled visit wasn't just a quick check-in; it was a morale boost, affirming the government's support for grassroots efforts like these. Standing among the bee colonies, Minister Zambry, a Pangkor native, voiced his pride in seeing such an initiative take off in his hometown. His encouragement, as both a policymaker and a local, left participants feeling seen and supported in their mission to establish a lasting source of income. The chance encounter underscored a shared commitment: both the government and UMT have a vested interest in fostering rural economic development in ways that preserve local culture and biodiversity. By nurturing community projects like Pangkor's stingless bee plot, Malaysia is fostering a model of progress where locals can thrive while preserving their land and resources. As UMT's representatives packed up and prepared to leave the island, they reflected on the minister's visit—a poignant reminder of how small, community-driven efforts can capture the attention of leaders and bring hope to those working hard to build a sustainable future.

Kelulutologi Crowned Best Scholarly Work of 2024

By Prof. Dr. Shamsul Bahri Bin Abd Razak

On October 6, 2024, at the Ipoh Convention Centre, Professor Dr. Shamsul Bahri Abd Razak received the Anugerah Buku Dewan Bahasa dan Pustaka 2024 for his influential book, Kelulutologi: Merungkai Misteri Kelulut, Alam dan Kehidupan Manusia. Presented by Prime Minister Datuk Seri Anwar Ibrahim, this award recognizes the book as the best in the Science and Technology category during the Bulan Bahasa Kebangsaan 2024 celebration.

Kelulutologi has quickly risen to prominence, capturing the attention of both scholars and practitioners with its detailed exploration of sustainable practices in stingless beekeeping and beautiful photos of stingless bees. By focusing on ecological stewardship and innovative stingless beekeeping techniques, the book addresses critical issues in biodiversity and agricultural sustainability. Its impact is reflected in a series of accolades, including the Anugerah Buku Negara in 2022, Anugerah Julangan Bakat UMT in the same year, and the Anugerah Akademik Negara in 2023. During the award ceremony, Dr. Shamsul expressed his deep gratitude for the recognition, stating, “This award is not just a personal achievement; it reflects our collective responsibility toward sustainable practices in agriculture. I hope Kelulutologi inspires future generations to embrace ecological balance.”

With its latest honor, Kelulutologi stands as a beacon of knowledge and innovation, reinforcing the critical role literature plays in addressing contemporary challenges. As Malaysia continues to elevate its cultural narrative through the celebration of language and literature, Dr. Shamsul's contributions serve as a poignant reminder of the power of scholarship in promoting a sustainable future.

UMT Strengthens Academic Network at MACFEA-INTI International Conference

By Dr. Wan Hafiz bin Wan Zainal Shukri and Dr. Siti Nur'afifah binti Jaafar

On November 7, 2024, two academicians from the Faculty of Fisheries and Food Sciences (FPSM), represented Universiti Malaysia Terengganu (UMT) at the 28th MACFEA-FBC INTI IU International Conference 2024 held at Mövenpick Hotel & Convention Centre KLIA. Organized by INTI International University in collaboration with the Malaysian Consumer and Family Economics Association (MACFEA), the conference themed "Navigating the Digital Consumer Landscape: Innovations, Challenges, and Opportunities" highlighted the growing impact of digital technology in everyday life, transforming how consumers interact with markets and make purchasing decisions.

The conference focused on issues such as digital transformation, sustainability, and consumer behaviour in the digital era, addressing topics relevant to both academia and industry. Participants had the opportunity to gain valuable insights into contemporary research approaches to consumer behaviour and to explore the challenges and opportunities emerging from digital transformation.

This event served as a platform not only for knowledge exchange but also for strengthening ties between UMT, INTI International University, and MACFEA. Such collaborations are crucial for addressing consumer-related issues effectively. By combining expertise in consumer behaviour research and digital transformation, these partnerships aim to introduce innovative solutions to contemporary challenges.

The collaboration also aligns with UMT's strategic efforts to enhance research focusing on the East Coast, an area often

overlooked in consumer studies compared to the more economically and infrastructurally developed West Coast. As an institution located on the East Coast, UMT is uniquely positioned to highlight the region's cultural distinctiveness and socioeconomic challenges influencing consumer behaviour.

This focus enables UMT to advocate for future research that reflects the needs of the East Coast's communities, offering valuable input for policymakers and industry players in crafting effective strategies to improve local economies. While UMT is renowned as a marine-focused university, its contributions to consumer behaviour research enhance its reputation nationally and internationally, attracting both students and researchers to the field.

The conference also allowed UMT to expand its academic network in consumer research, paving the way for joint publications and research grants. Collaborations with INTI International University and MACFEA provide opportunities for securing funding for extensive research projects, particularly those requiring fieldwork and larger datasets. These grants can also support the development of advanced research facilities, including cutting-edge technologies for analysing consumer behaviour and the impacts of digital transformation.

Furthermore, joint publications would enhance UMT's academic credibility, offering its researchers wider recognition for their contributions to consumer research. Publishing in international journals boosts UMT's visibility within the global academic community, strengthening its reputation in social and consumer research.

At the conference, both academicians presented the outcome of their research entitled "Factors Affecting Consumers' Willingness to Buy Food Products from TikTok". The research has been funded by the Mini Grant of MACFEA 2023. In short, the findings of this research indicate that TikTok live streaming, consumers' positive attitude towards purchasing food products from TikTok, subjective norm, e-WOM and perceived risk have significant influence on purchase intention of food products from TikTok except for perception towards product quality. In addition, a significant difference was reported on the mean scores of genders on consumers' positive attitude towards purchasing food products from TikTok, subjective norm, and electronic word of mouth (eWOM). Significant differences were also reported on the mean scores of races on TikTok live streaming and subjective norm.

The findings provide significant insights into tailoring marketing strategies to maximize impact, especially on popular social media platforms like TikTok. A Graduate Research Assistant, Nur Fatihah Adriana binti Shamsull Anuar, also attended the conference, supporting UMT's presence and gaining exposure to innovative approaches in consumer behaviour research and current trends. Her involvement reflects UMT's dedication and commitment to developing young researchers and encouraging participation in academic events.

These insights are invaluable for industries aiming to improve digital marketing effectiveness and attract more customers. The conference also offered new perspectives on how consumer behaviour research can inform the development of more effective marketing strategies. Future research recommendations include comparative consumer behaviour studies across different social media platforms and expanding the scope to the East Coast region.

UMT's presence at the conference highlights its commitment to high-quality research and active engagement with contemporary consumer issues. By fostering academic networks and strategic partnerships, UMT continues to lead in consumer behaviour research, particularly in the East Coast region. These initiatives not only strengthen UMT's reputation nationally and internationally but also position the university as a leader in impactful consumer research that addresses societal needs.

Figure 1: UMT's representatives, Dr. Siti Nur'Afifah binti Jaafar and Dr. Wan Hafiz bin Wan Zainal Shukri, with one of the MACFEA executive committee members, Assoc. Prof. Dr. Doris Padmini A/P Selvaratnam, during the conference networking session.

Figure 2: Dr. Wan Hafiz bin Wan Zainal Shukri shared his research findings during his presentation at the 28th MACFEA-FBC INTI IU International Conference 2024.

Figure 5: Dr. Siti Nur'Afifah binti Jaafar delivering her presentation at the 28th MACFEA-FBC INTI IU International Conference 2024

Food Technology Sports Day: Fostering Unity, Strength and Fun!

By Dr. Elham Taghavi, Dr. Wan Aizuddin Wan Razali, Ts. Dr. Fisal Ahmad and Assoc. Prof. Ts. Dr. Amir Izzwan Zamri

Students Club of Food Technology (SCOFT) has successfully hosted a Sports Day for the Bachelor of Food Science (Food Technology) with honors students on November 8, 2024. The theme of this event is '*Rumah sukan'*, a nostalgia that reminds us of all for good old days in school. Hence, this event hopefully foster camaraderie for all students, promote teamwork, and enhance the sense of community among students and faculty members.

The Sports Day brought together students from various semesters total 380 students, who were grouped into four teams—Green, Blue, Red, and Yellow house—to participate in a diverse range of sports, including badminton, volleyball, basketball, ping pong, netball, futsal and others. The event starts with warming up to ignite the sport day spirits. Each team was accompanied and guided by four lecturers, reflecting the department's commitment to fostering collaboration and strengthening bonds between students and academic staff.

A whopping 110 medals up for grabs by four sport houses and the points were meticulously calculated for all sports. At the end of the day, yellow team won with the total points of 1082, followed by red (953 points), green (760 points) and blue (741 points) and participation prizes were awarded to all participants in recognition of their efforts.

Beyond promoting physical health and well-being, the event sought to create an engaging platform for students and lecturers to interact outside the academic setting, cultivating a collaborative and inclusive environment within the faculty. It also inculcate the sense of togetherness and belonging to the academic programme. The activities carried out are also in line with Sustainable Development Goal 3 (SDG3) to "ensure healthy lives and promote well-being for all at all ages". In addition, in line with the government of Malaysia in fostering a sports culture in young generations, this event will be an annual event. Hopefully, it will be a sweet memory for all students and later strengthen and bond the alumni with the program. Overall, this program has been able to achieve the objective of cultivating the University community that is interested in sports, staying fit and having a healthy body. Encouraging active and healthy interactions among students and lecturers so as to foster consensus and unity. Strengthening good relationships and instilling and cultivating good values through sports activities.

Figure 1-4: Vibrant Booth Displays Presented by Student Groups.

Figure 5 & 6: Academic Staffs and Students Collaborating in Supportive Teams

Figure 7-10: Showcasing a Diverse Array of Sports on Sports Day

Figure 11-12: Medals awarded to all participants in recognition of their efforts.

Figure 13-14: Celebrating the achievements by students.

International Hands-On Training Course: Utilising Microbiome and Genomic Resources for Understanding and Mitigating Antimicrobial Resistance in the One Health Context

By Assoc. Prof. Dr. Sandra Catherine Zainathan and Dr Sharifah Noor Emilia Syed Jamil Fad'aak

Figure 1: Group photograph of participants at the International Hands-On Training Course: Utilising Microbiome and Genomic Resources for Understanding and Mitigating Antimicrobial Resistance in the One Health Context at Nitte University, Mangalore, Karnataka, India

The International Hands-On Training Course: Utilising Microbiome and Genomic Resources for Understanding and Mitigating Antimicrobial Resistance in the One Health Context was organized by the Food and Agriculture Organization of the United Nations (FAO) in association with Nitte University, Mangalore and the Indian Council of Agricultural Research (ICAR). The training was held at Nitte University Medical Campus and Nitte University Centre for Science, Education and Education, Mangalore, Karnataka, India from 18th November 2024 till 22nd November 2024. Nitte University (India) is one of the FAO Reference Centre for Antimicrobial Resistance and Aquaculture Biosecurity led by Prof Dr. Indrani Karunasagar and Dr. Iddya Karunasagar. A total of 40 participants from 22 countries including Malaysia, India, Thailand, Cambodia, Uzbeskistan, Nepal, Zambia, Sri Lanka, Saudi Arabia, Tanzania, United Kingdom and USA were selected to join the prestigious workshop. Universiti Malaysia Terengganu' lecturers: Assoc Prof. Dr. Sandra Catherine Zainathan and Dr. Sharifah Noor Emilia Syed Jamil Fad'aak were honored to be selected to attend the international workshop under the Human Resource Development Travel Grant (UMT).

The first day of the international training was filled with the inauguration ceremony, keynote talks based on international and national experiences on Antimicrobial Resistance (AMR), current activities at FAO Reference Centres from India, China, UK and USA as well as AMR status from participating countries. On the second day, the workshop focused on practical constraints in understanding AMR and quality control in AMR testing laboratory via talks by international speakers such as Dr. Athina Papadopoulou, Dr. Manfrin Amedeo and Dr. Luana Cortinovis. At the end of the second day, the participants joined laboratory session on disk diffusion and broth dilution methods. On 20th November 2024, the participants were introduced to Next Generation Sequencing (NGS) and sequence analysis via talks and hands on session that included working with NGS data, read processing, genome assembly, bioinformatic tools for AMR detection and characterization as well as other applications related to bioinformatics tools. The fourth and fifth day were filled with hands on sessions related to comprehensive genome analysis: AMR gene detection, virulence and phage detection as well as whole genome metagenomics. The 5 days' workshop ended with feedback session from participants and certificate ceremony for all the participants.

Figure 2: Assoc. Prof. Dr. Sandra Catherine Zainathan and Dr. Sharifah Noor Emilia at Seminar Room, Nitte University Centre for Science, Education and Research.

Figure 3: Assoc. Pro.f Dr. Sandra Catherine Zainathan (second from left) alongside participants from Uzbeskistan, India, Thailand, Nepal, Ethiopia and Cambodia during the disk diffusion and broth dilution method hands on session.

Figure 4: Dr. Sharifah Noor Emilia (second from right) conducting the disk diffusion and broth dilution method during the hands-on session.

Figure5: Photography session with other Malaysian participants from Universiti Putra Malaysia (UPM), Department of Fisheries (DOF) and National Fish Health Research Center (NaFisH).
From left: Dr. Sharifah Noor Emilia, Dr.. Wan Nurhafizah (UPM), Mrs. Rohana Johari (DOF), Assoc. Prof. Dr. Sandra Catherine Zainathan, Prof. Dr. Natrah Ikhsan (UPM), Dr. Azila Abdullah (NaFisH) and Mr. Mohd Shafiq (NaFisH).

FPSM Strengthens Community Livelihoods through ESSG Initiative

By Dr. Roslizawati Ab. Lah

Kuala Nerus: November 26, 2024, Faculty of Fisheries and Food Science (FPSM), UMT has demonstrated its commitment to enhancing local communities' livelihoods through implementation of economic activities aimed at empowering rural populations. This impactful initiative was funded under Environmental and Social Sustainability Grants (ESSG), a program designed to encourage UMT academicians' involvement in community development program. As part of this effort, FPSM organized a unique workshop on the production of smoked fish (*ikan asap*) and dipping sauce (*air asam*) for the Hulu Terengganu community, aiming to enhance their skills and providing an avenue for additional income generation.

The workshop was carefully designed to equip participants with both the theoretical knowledge and practical skills necessary for smoking fish, a traditional preservation method that also increases the value of the product. Additionally, participants learned how to prepare *air asam*, a popular Malaysian dipping sauce that pairs perfectly with smoked fish. By combining these two elements, the program offered a comprehensive approach to creating market-ready food products that cater to local culinary preferences. Through this initiative, FPSM at UMT seeks to address key challenges faced by rural communities, such as limited access to diversified income opportunities and sustainable food production practices. By focusing on local resources and traditional methods, the workshop empowers participants to maximize the potential of their natural surroundings while preserving cultural heritage.

This initiative aligns with several Sustainable Development Goals (SDGs), particularly SDG 1: No Poverty, SDG 2: Zero Hunger, SDG 8: Decent Work and Economic Growth, SDG 12: Responsible Consumption and Production, and SDG 13: Climate Action. These goals reflect UMT's commitment, through FPSM, to fostering economic empowerment, food security, and environmental stewardship in rural areas.

Led by Dr. Roslizawati Ab Lah and Dr Azizah Mahmood from FPSM, the workshop involved

nearly 30 participants, including women from Kampung Kua, Hulu Terengganu, members of PAWE Kuala Nerus, and undergraduate students from the Bachelor of Fisheries Science program. Together with their team, Dr. Roslizawati and Dr Azizah provided hands-on guidance throughout the workshop, teaching participants the proper techniques for smoking fish to ensure that the final product met hygiene and quality standards suitable for market distribution. The preparation of *air asam* was also included in the workshop, with valuable assistance from Mr. Mohammad Ikhwan Faizuddin bin Azman, a member of the smoked fish team. This addition enriched the workshop by equipping participants with the skills needed to offer a complete culinary experience that aligns with consumer preferences.

We would like to extend our heartfelt thanks to the entire team for their dedication and hard work, including Mr. Mohd Zaidi bin Yahaya, Mr. Khairul Anuar bin Kamarudin, Mr. Nik Mohd `Aqil bin Nik Pa, Mr. Mohd Irwan Hussin, Mr. Tarmizi Abdullah, Mrs Wan Nor Haryani binti Wan Mohamad, Mrs. Dayang Normiah binti Mohamad and Mrs. Hartini Badaudin. Their contributions played a crucial role in making this workshop a success and empowering participants with practical skills for economic growth.

This program is part of the FPSM's broader commitment to environmental and social sustainability. By leveraging the expertise and resources of the faculty, UMT seeks to uplift marginalized communities, contributing to regional socio-economic development. The ESSG initiative is a testament to UMT's dedication to empowering communities by providing them with practical skills, promoting self-reliance, and encouraging sustainable practices.

For the Hulu Terengganu community, this workshop represents not just an opportunity to learn a new skill, but also a stepping stone toward greater economic resilience. The community members expressed their satisfaction with the results and the detailed explanations provided during the workshop, appreciating the knowledge and skills gained.

Looking ahead, FPSM plans to expand this initiative by offering more programs tailored to the specific needs of rural communities across Terengganu and beyond. By fostering collaboration between academia and community, UMT aims to promote sustainable livelihoods, preserve local traditions, and build stronger, more resilient communities. The smoked fish and *air asam* workshop serve as a prime example of how universities, especially FPSM, can play a pivotal role in driving grassroots change, demonstrating that academic institutions are not just centres of knowledge but also key agents of community empowerment.

Figure 1: Participants are excited to start the workshop

Figure 2: Dr. Azizah and Dr. Roslizawati (two from left) with the participants preparing the smoked fish.

Figure 3: Mr. Mohammad Ikhwan demonstrating the *air asam* preparation.

Figure 4: Smoke House briefing by Mr. Mohd Zaidi

Figure 5: Smoked Fish using Tilapia is done.

Figure 6: Happy faces after completing the workshop.

Announcement (seminar, talk, conference etc)

1. Congratulations to all the winners of Karnival Inovasi 2024

GOLD AWARD

Assoc. Prof. Ts. Dr. Wan Zaliha Wan Sembok
Dr. Yusnita Hamzah
Nor Afifah Abd. Rahman (Postgraduate Student)
*Che Mohd Shokri Jusoh
*Tengku Arman Harris Tengku Ismail
*Nul Anawiyah Ismail
*Nor Shariah Mohamad
(*Terengganu Deaf Association)

Dr. Siti Nur'afifah binti Jaafar
Dr. Wan Hafiz bin Wan Zainal Shukri
Prof. Madya Dr. Azrilawani binti Ahmad @ Othman (FSSM)

SILVER AWARD

ChM. Dr. Azlin Shafrina Hasim
Lee Tze (FYP Student)
Assoc. Prof. Dr. Asma' Ali

Dr.Faridah Yahya
Dr.Nor Hayati Ibrahim
Dr.Nabilah Abdul Hadi
Prof.Madya Ts.Dr.Zamzahaila Mohd Zin

Siti Aisyah binti Mohamad Taupik
Raja Mohamad bin Raja Yusof
Mohd Yusnaizi bin Mohd Yasim
Roslan bin Abdullah
Zamani bin Mohamed
Mohd Nor Ridhzuan bin Md Razali

2. Come and join us!