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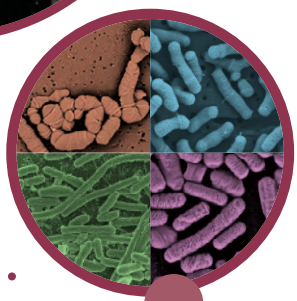
Annual Report
Food Industry Research and Development Institute



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Preface

Taiwan's economy remains closely intertwined with the international environment; however, in 2024, Taiwan's food industry was still able to overcome various external challenges. The production value of the Taiwanese food industry reached a new high of NT$1.044 trillion in 2024, marking 2024 the first time this value surpassed the NT$1 trillion threshold. This achievement highlights the crucial value of operational resilience and innovative capacity within Taiwan's food industry.

Through the collective efforts of its staff members, the Food Industry Research and Development Institute (FIRDI) in Taiwan achieved innovations and breakthroughs in its core operations in 2024, including research and development, technical guidance, inspection, certification, and training. For 4 consecutive years (2021–2024), FIRDI has ranked among the top performers in the performance evaluation of the Technology Project of the Ministry of Economic Affairs (MOEA) of Taiwan. The Chiayi Industry Innovation and Research Program led by FIRDI was also recognised with the "Outstanding Technology Project Award" by the MOEA. In addition, FIRDI won one platinum award, one silver award, and one bronze award in the patent invention competition at the 2024 Taiwan Innotech Expo (TIE). The platinum-award-winning "intelligent beverage preparation equipment" exhibited innovation and industrial applicability. This equipment facilitates linkages among the food industry, food machinery sector, and downstream industries, thereby expanding the market for freshly prepared beverages.

The market demand for plant-based foods and alternative ingredients remains robust, and FIRDI continues to invest in the research and development of related technologies. In 2024, FIRDI established precision formulation processes and equipment integration technologies for the manufacturing of plant-based protein beverages. The developed technologies included a system for evaluating the dissolution and dispersion of plant protein powder. This system can be used to determine quality indicators and optimal process parameters for various plant-based materials. When linked with a factory-oriented pilot-scale sterilisation system, the aforementioned system can reduce material waste during testing and accelerate commercial production. Subsequently, FIRDI integrated the capacities of other tenant organisations at the Chiayi Industry Innovation and Research Centre to jointly establish a commercialisation service model for ready-to-drink plant-based beverages, thereby assisting the plant-based beverage industry in market expansion. This model was applied in the plant-based beverage industry, yielding excellent results; thus, FIRDI received the "Outstanding Technology Project Award" from the MOEA. FIRDI also developed technologies to achieve goals such as multilayer flavour design for structured ingredients, functional modification of food materials, and microbial flavour transformation in the plant-based food industry in 2024. These developments can help fill technological or ingredient gaps in the supply chain, particularly in areas such as high-quality plant-based meat matrices, plant-based cream, and plant-based dairy-flavoured powders.

To realise the mid- to long-term policy goals of digital transformation and net-zero carbon emissions, FIRDI provides digital transformation support for the Taiwanese food industry. In 2024, FIRDI introduced digital tools and technologies to initiate transformation from multiple dimensions, with its objectives including the enhancement of production efficiency and the provision of support for production decision-making. In addition, FIRDI promoted various measures to support the upgrading and transformation of small- and medium-sized enterprises. For instance, it hosted multiple briefing sessions and talent retraining workshops. By leveraging the capabilities of cross-disciplinary expert teams in the food industry, FIRDI expanded knowledge-based consulting services for smart and low-carbon food processing, thereby accelerating the implementation of smart manufacturing and reducing carbon emissions.

FIRDI operates the Bioresource Collection and Research Centre (BCRC) that is certified to international quality standards and is actively establishing a commercialisation platform for bioresources. FIRDI has continued to strengthen its academic linkages in Taiwan and other countries. In 2024, it collaborated with the Westerdijk Fungal Biodiversity Institute in the Netherlands to jointly develop a high throughput microarray detection technology for the identification of invasive fungi. In addition, BCRC engaged in collaborative exchanges with Japan's Biological Resource Centre (NBRC), National Institute of Technology and Evaluation (NITE), to strengthen microbial strain resource management and cooperation in the field of biotechnology. It also partnered with the chip inspection company Quark Biosciences, Inc. and National Centre for Genetic Engineering and Biotechnology (BIOTEC) in Thailand to jointly promote cooperation between Taiwan and Thailand in the precision health industry. BCRC obtained ISO 17025 certification for the analysis of the antigen expression and differentiation capacity of pluripotent stem cells, moreover, it developed a clinically compliant hematopoietic progenitor cell expansion medium, which can accelerate the clinical feasibility of diverse regenerative and cell-based therapies and address gaps in Taiwan's manufacturing capacity for allogeneic cell therapy products.

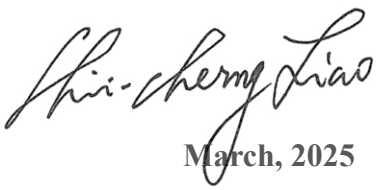
FIRDI also act as a food inspection organisation certified under the ISO international quality management system and has signed the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAS-MRA) to ensure that its inspection quality aligns with international standards. In 2024, FIRDI continued to expand its testing services. For instance, it established testing methods for chocolate specifications in response to industry needs, thereby assisting the Taiwanese chocolate industry in aligning with global standards. Additionally, it upgraded the online query system of the Food Nutrition Composition Database established by Taiwan's Food and Drug Administration (TFDA), Ministry of Health and Welfare (MOHW), to incorporate intelligent web-based query services into this system, thus expanding the application scope of the system. It also expanded the database of food additive inspection methods to promote the safe use and management of food additives, thus helping to monitor food safety and meet industry needs. In coordination with the TFDA, FIRDI conducted multiple proficiency testing programs, thereby enhancing its professional capacity to organise such activities.

FIRDI provides various food certification services that comply with the requirements of the Taiwan Accreditation Foundation (TAF), as well as international standards such as ISO 17021, ISO 17065, and ISO 22003. These services cover certifications for Certified Agricultural Standards (CAS), Alcohol Quality Certification, Taiwan Quality Food (TQF), ISO-22000, and Safe Quality Food (SQF). FIRDI is a certification body recognised by the Safe Quality Food Institute (SQFI); thus, it can assist domestic food industry in aligning its quality assurance systems with international standards. In addition, the Greenhouse Gas Verification Project Office of FIRDI has acquired accreditation as a greenhouse gas verification body in 2024, which allowed FIRDI to continuously expanding its professional verification services, strengthening its role in supporting climate-related compliance and sustainability efforts.

FIRDI has enhanced its capabilities and service offerings related to food safety, quality assurance consulting, and professional talent training, consistently assisting manufacturers in establishing comprehensive environmental monitoring plans. By promoting risk-prevention-oriented thinking and action through its services, FIRDI aims to strengthen the domestic food industry's export competitiveness. Food Industry Academy in FIRDI continues to improve the quality of its training courses and provides competency assessment services for industry talent certification. In the past year, FIRDI launched many specialised courses, including courses related to carbon emission reduction, artificial intelligence technologies, and food texture customisation for elder-friend foods development. Moreover, it integrated information platforms and optimised its education and training website for a better service experience.

As the Taiwanese food industry continues to face challenges related to harnessing and cultivating its core strengths, enhancing the intelligence and resilience of its operations, expanding into new international markets, and developing new partnerships. FIRDI aspires to become an international research institution in food and biotechnology with high-quality innovation capabilities. Over the past 50 years, FIRDI has stood alongside industry pioneers in joint efforts, and it hopes that all relevant sectors will continue to offer encouragement and supports, thus enabling it to adopt a more active and influential role in the development of Taiwan's food and biotechnology industries.

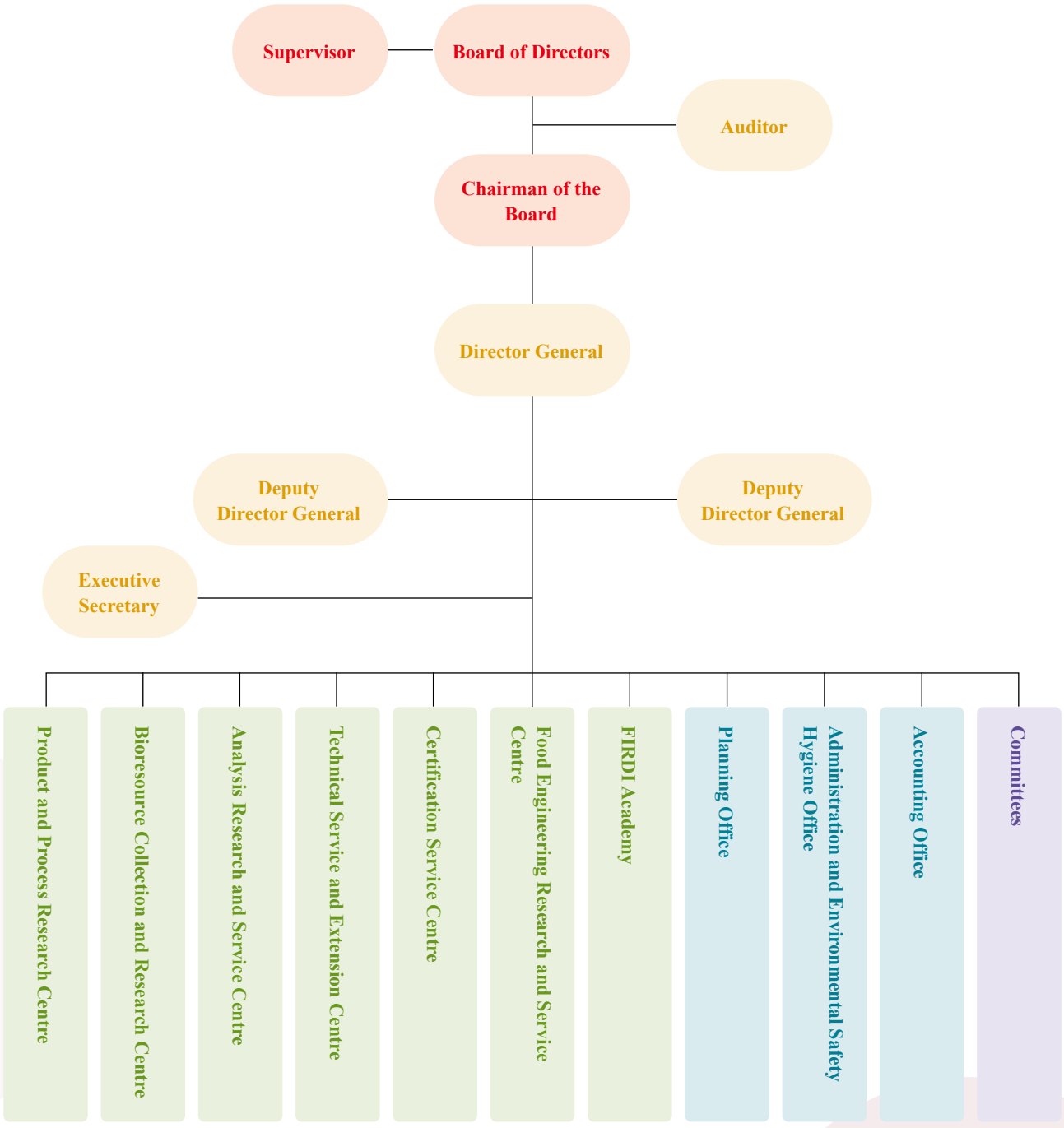
Dr. Chii-Cherng Liao



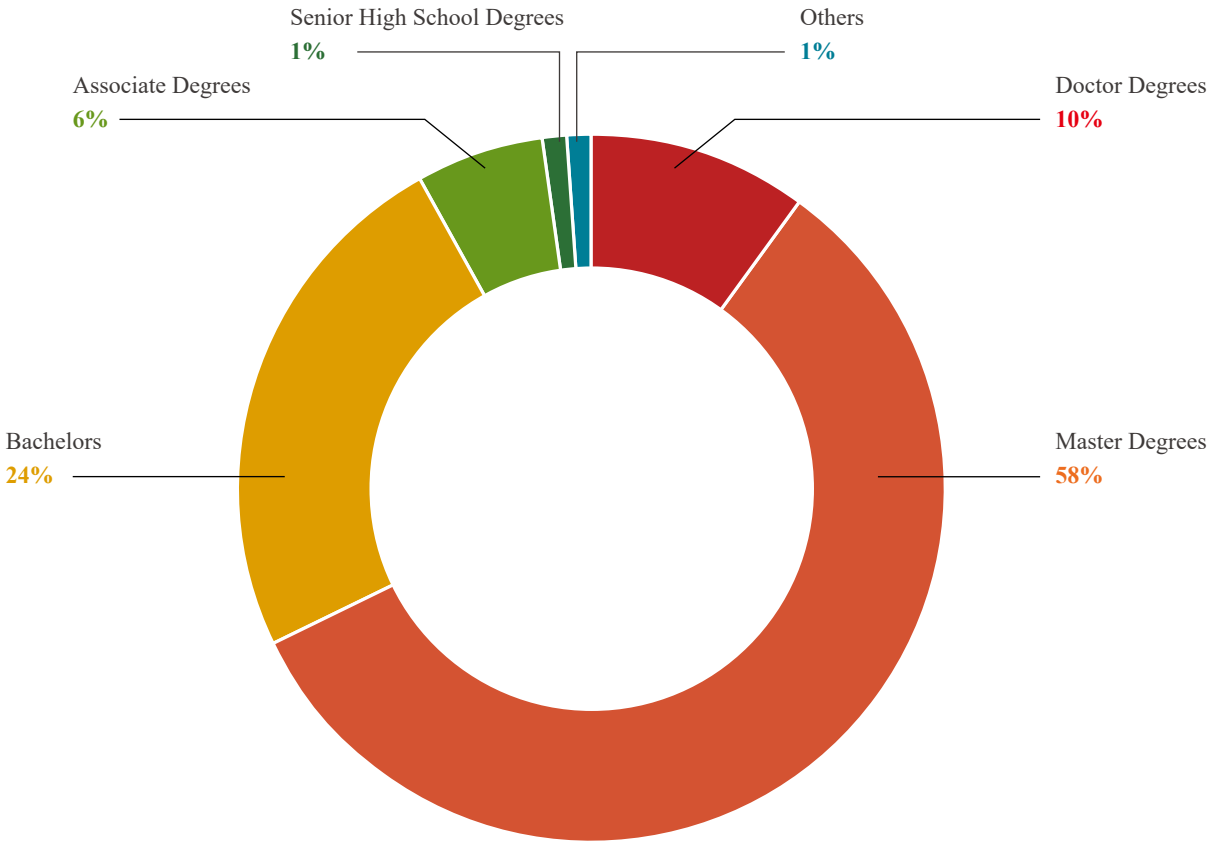
March, 2025

Organisation and Human Resources

☆ Organisation



☆ Human Resources



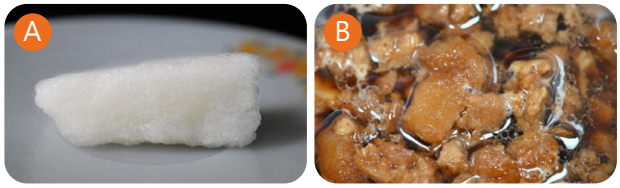
01 Technology Research and Development

Product and Process Development

With the global trend of net-zero carbon emissions and the advent of a super-aged society, the main research focus of Product and Process Research Centre around innovative plant-based foods, novel processing technologies, and high-nutrient-density foods for elderly. The aims are to improve the industry's technological level and assist businesses in expanding domestic and international markets to meet consumer demand.

☆ Manufacturing Technologies for Plant-Based Foods that Mimic Real Meat Textures

By introducing a three-phase feeding system into the extrusion process, an air and oil injection technology was developed to create plant-based meat that is soft, tender, and juicy, which would enable the development of the whole-cut plant-based meat application market in the future. Through composite bonding and molding technology, the team has developed fibrous alternative ribs and freeze-resistant alternative chicken, which can be expanded to the development of plant-based meat products for different cuts of the animal. In addition, by introducing thermal reaction and oleogel technologies, unsaturated vegetable oils were structured into fat analog resembling animal fat tissue, thereby enhancing the mouthfeel and processing performance of plant-based meat.



▲ Plant-Based animal fat analog (A), and its application in braised minced pork (B).

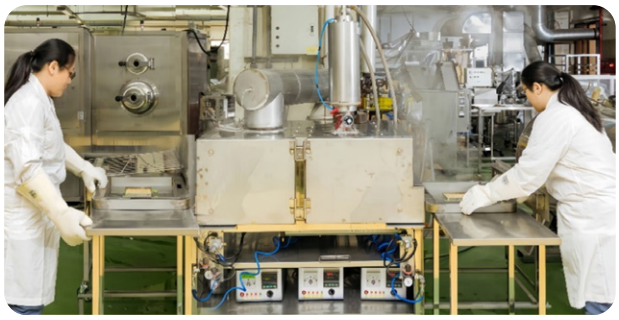
☆ High-Quality Low-Fat and Low-Sugar Products for Vegan

Through the application of enzymatic hydrolysis and formulation optimisation, a series of plant-based low-fat whipping cream have been developed, including oat-based formulations and those enriched with whole grains and legumes. Levels of both sugar and fat are also reduced to further enhance the products' health appeal. By incorporating aroma-enhanced sweetness strategies and sensory evaluation methods, a plant-based reduced-sugar ice cream that maintains perceived sweetness was formulated. In addition, adoption of yeast bioconversion allows us to develop a new generation of nutrient-fortified, plant-based fat spreads.

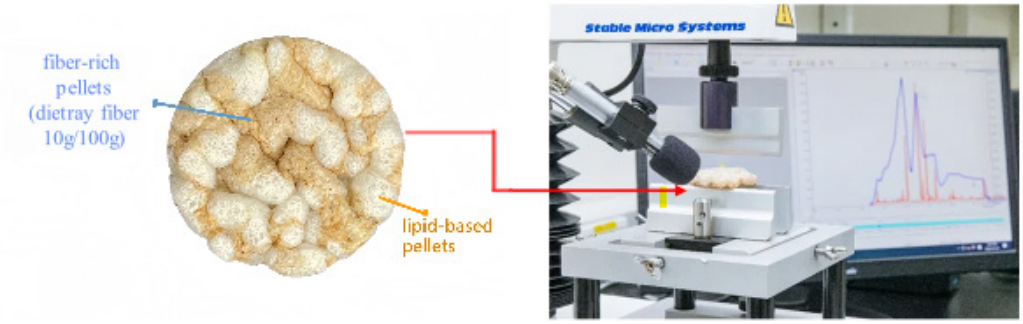
▲ A plant-based fat spread enriched with naturally occurring B-complex vitamins.

☆ Development and Quality Analyses of Reduced-Fat Crispy Food

To address the problems of high fat content and poor reheated texture of fried food, a semi-continuous equipment with superheated steam and impingement flow heating chambers was developed by integrating key modules such as innovatively designed electric heating tubes and specially configured nozzles. Under traditional frying process, the adoption of this equipment allows the production of reduced-oil products while maintaining flavour and crispy texture. Additionally, a heterogeneous dispersion expansion technique for reduced-oil food matrices was established, which effectively mitigating negative sensory perceptions often associated with reduced-fat contents. This not only enhances product appeal but also increases the versatility of ingredients and applications across diverse food categories. The resulting products exhibit excellent acoustic and crispness characteristics, significantly elevating the sensory dining experience.



▲ Semi-continuous equipment with superheated steam and impingement flow heating modules.



▲ Heterogeneous dispersion expansion technology for oil-reduced products and texture analysis.

☆ Value Addition of Agricultural and Livestock Products

A number of technologies were applied to increase value of agricultural and livestock products and their by-products, as well as to solve the problems of time- and energy-consuming production, low drying efficiency and short shelf life. These included researches on application of impingement drying technology to fish floss products, radio frequency heating on thawing of frozen meat products, high efficient hybrid drying technology on dried mullet roe products, and microwave parameters for puffed pork skin and cheese products.

▲ Impingement drying equipment (left) and sample of dried fish floss (right).

▲ Microwave vacuum equipment (left) and puffed cheese (right).

☆ Texture Modification and Development of Nutrient-Dense Products for the Elderly

As parts of program to promote utilisation of local ingredients, a series of texture modified products for the elderly were developed using domestic livestock and legume. Multiple products with "easy to chew" and "tongue-mashable" texture were formulated, including Chinese-style sausages, coin-shaped meat jerky, black soybean rice puddings, and chicken liver purée. Additionally, a 'natural' thickening agent without traditional additives featuring stable viscosity was developed. Taste trials featuring this innovative product were conducted in collaboration with several healthcare institutions, including Shuang Ho Hospital, Taichung Veterans General Hospital, and Mennonite Christian Hospital in Hualien.

▲ 'Natural' thickening agent without food additive.

Process Equipment Integration

The professional food engineering knowledge cooperated with food process and machinery design technology knowhow, FIRDI lead the researches of food processing operations as well as developments of mechanical equipment in the field. Establishments of core technical capabilities and efficiency verification platform, and developments of equipment that are user-friendly, simple to operate, and, most importantly, with full intellectual property protections, allowed the industries to have stronger competitive strength in terms of equipment and quality products.

☆ Innovations in Smart Preparation of Targeted Nutritional Beverages and Integrated Industrial Chain Applications

As Taiwan transitions into a super-aged society by 2025, and consumer demands continue to evolve in the post-COVID-19 era, FIRDI has successfully developed smart machinery for nutritional beverages, integrated with intelligent formula computing functions that enable precise, data-driven blending based on targeted nutritional needs. Utilising high-protein flavoured drink blending and quality stabilisation technologies, the team has also developed customised nutritional drink formulas tailored to the needs of specific demographic groups, including teenagers, elderly, and individuals with sarcopenia. These efforts aimed to address diverse nutritional requirements, enhance product stability, and strengthen consumer confidence. Furthermore, the development of this smart machine serves as a bridge between the food industry and the freshly prepared beverage sector, enhancing the value of domestic food production and facilitating the expansion of beverage brands into overseas markets.

▲ Smart Nutritional Beverage Preparation Machine

☆ Plant-based Beverage Processing Equipment and Mass Production Process Integration

To address the issues of high solid content and viscosity characteristics in plant-based products, materials such as nuts, fruits, vegetables, and grains were selected as carriers to create high-viscosity plant-based products (viscosity < 2500 cP) for commercial pack, suitable for cold storage or ambient distribution, in a pilot-scale production environment. Through simulating tank flow using CFD technology, a grinding system module was developed. This system, combined with inline sensors for real-time viscosity and particle size predicting & monitoring, a correlation model between quality indicators and process parameters were established.This technology has been transferred to manufacturers, leading to the establishment of new factories and production lines. The estimated annual output is 3,000 tons of plant powder raw materials, supporting large-scale packaging for commercial use and international markets.

▲ High Efficiency Mixing System

Operations and Advancements of Bioresources

BCRC continues to comply with ISO 9001, ISO 17025 and ISO 17034, international standards and operates as a high-quality international bioresource bank that provides diverse bioresources, research technologies, and related services needed by all sectors. At the same time, BCRC expanded the diversity of biological resources and provided high quality repository services to support research as well as commercialisation capabilities domestically and internationally.

☆ Biological Resources Service Platform

BCRC has expanded its public accessible repository by adding 218 new materials, resulting in a total of 35,842 microbial strains, 14,138 animal and human cell lines, over 1.2 million gene clones, and 3,020 patented bioresources thet were all available for distribution. Additionally, the centre has supplied 4,000 batches of bioresources and successfully completed 1,741 cases of commissioned testing and microbial identification services in 2024. These efforts contribute significantly to the advancement of bioresource applications and promote developments in bio-economics. Additionally, the stringent international regulations governing the acquisition and distribution of biological resources have led to a rising demand for locally sourced strains in industry. BCRC has established a indigenous marine bacteria bank, with current houses 145 isolates, which encompassing 43 genera and 68 species. Information about source of isolation, strain characteristics, and applicability of domestic and foreign usage regulations were collected about these isolates.

☆ Frontier Technology of the Microbiome Service Platform

An advanced automatic single-cell sorting technique has been developed at BCRC/FIRDI. Using a combination of culturomics and the automatic single-cell sorting method, strains that produce short-chain fatty acids such as *Coprococcus*, *Eubacterium*, *Faecalibacterium*, and *Roseburia* have been successfully isolated. These tools are intended to be used in constructing a gut microbiome bank in the future. In the bioinformatics sector, denovo metagenomic assembly was implemented to accurately predict microbiome functions and enhance taxonomic assignment. The integration of machine learning algorithms for feature screening will further support the industry in developing microbiome-based therapeutic products.

☆ Microbial Resources for Protein Modification and Flavour Conversion

In recent years, FIRDI has invested in improving the texture and flavour of alternative food ingredients by microorganisms. The team has established a bioresource library of microorganisms with protein modification and flavour conversion properties, such as a butyrate-producing strain with milky and cheese aromas. The research studies aimed at the development of fermented dairy alternative foods and natural flavouring substance, and the protein-modified enzyme were applied to the production of plant-based fermented dairy products, such as plant yogurt, plant cheese, and microbial cheese-like flavouring substance. The team will continue to invest and upgrade the technologies for the industrial innovation application of microbial alternative food ingredients.

Development on Net-Zero Carbon Emissions

☆ Reducing and Reusing Food Industry Waste

Taiwan's food processing sector generates over one million tons of waste annually, including by-products such as okara (soybean pulp), coffee grounds, and tea leaves. Due to their high moisture content, these materials are difficult to store and manage, often led to environmental concerns. Advanced technologies like shockwave drying and odour control for okara have been implemented to enhance waste reduction processes. These innovations offer 1.8 to 2.4 times greater energy efficiency compared to conventional hot air drying, and successfully reduce moisture content from 63 ~ 78% to below 10%. Additionally, the "Taiwan Food Circular Economy Alliance" has been established to foster a collaborative ecosystem. By promoting information sharing and hosting cross-sector consensus-building forums, the alliance aims to accelerate the development and commercialisation of circular economy solutions within the food industry.

▲ The "Taiwan Food Circular Economy Promotion Alliance" was officially launched at the 2024 Taipei International Food Show. Director-General Ying-Ying Lai of the Resource Circulation Administration (RECA), Deputy Director General Dr. Bing-Huei Barry Yang of FIRDI (6th from the right), and representatives from member companies of the Alliance posed for a group photo.

02 Industrial Services

Assistance on Food Industry Upgrades

☆ Develop Innovative Products in Low-temperature Meat Processing Laboratory

A new low-temperature meat processing laboratory was established in 2024, ofwhich could serve as a technical platform for improving the quality and extending the preservation of refrigerated, frozen and room temperature prepared foods. This platform was also used to lead the industry in developing several innovative technologies, including refrigerated modified atmosphere boxed prepared foods, phosphate-free fish products, tofu skin products, smoked tuna products, high-efficiency heat-processed room temperature chicken essence products, and egg yolk lecithin products that met the clean label concept.

▲ Interaction with the industry members in the low-temperature meat processing laboratory.

☆ Digital Transformation and Value Recreation in the Fermentation Industry

FIRDI has assisted fermentation industry operators in transforming traditional experience-based production models into data-driven decision-making systems by implementing real-time monitoring and digital management technologies, integrated with data analytics and early warning mechanisms. This shift enhanced process stability and product quality. Additionally, by introducing automation modules for order processing and production workflows, the team has promoted supply chain digitisation and innovative management practices. This not only sets a benchmark for integrating modern technologies into traditional industries but also encourages small to medium-sized enterprises to participate in the transformation, thereby strengthening collaborative development across the industrial value chain.

☆ Carbon Zero Approach and Achievement for the Food Manufacturing Industry

FIRDI has established demonstration sites for low-carbon production models and green supply chain systems in the food manufacturing sector, continuously promoting the industry's transition toward sustainability, low-carbon operations, and intelligent development. This year, FIRDI completed GHG emissions diagnostics for 25 food factories, and developed customised carbon reduction pathways and smart manufacturing solutions tailored to each food category. Low-carbon know-how and practical case studies were also disseminated to 76 enterprises through consulying, wrokshop & courses. These efforts further resulted in 63 follow-up projects and assisted 15 companies in applying for government subsidies. In total, these initiatives achieved electricity savings of 1.36 million kWh and a reduction of 530 tCO_2e emissions.

Services on Food Quality Assurance

☆ Upgrading the Digital Food Safety Protection System

In recent years, FIRDI has developed a database of food safety protection technologies that help food enterprises enhance their self-management capabilities in hazard awareness and monitoring. This year, the team has continued in collecting information from public official websites in the U.S., Australia, the European Union, Singapore, and other countries, covering issues such as border rejections, recalls, non-compliance, and adulterations. Combined with import/export regulations, guidelines, food standards, journal literatures, and expert practical experiences from various countries, the team has compiled over 1,700 data entries and has established the industry-shared "Digital System 2.0." Additionally, the team has guided 8 companies in implementing internationally emerging environmental monitoring practices, preparing for U.S. FDA/customer site inspections, and/or utilising user-friendly data visualisation tools for improving efficiency in data analysis.

☆ Hygienic Management and Guidance for Refrigerated Vacuum-packed Foods

In 2024, the team has visited 40 vacuum-packed food manufacturers and provided guidance to enhance their understanding of the microbial risks associated with sealed packaging. The manufacturers also received training in temperature measurement for thermal processing and in techniques for analysing sterilisation intensity, thereby reinforcing the safety of products within the refrigerated vacuum-packaged food industry.

☆ Enhancing and Promoting the Management of Food-grade Detergents

To strengthen food hygiene and safety management capabilities within the food-grade detergent manufacturing industry, 3 explanatory sessions were held. These sessions covered topics such as the "Good Hygiene Practices for Food" and its draft amendments, which includes a newly added chapter specifically for food-grade detergent manufacturers, the introduction of a safety monitoring program, and labelling requirements. In addition, 21 businesses were guided in establishing management systems. Relevant international regulations and management frameworks were also collected and compiled to serve as references for policymaking.

Promotions on the Food Industry Innovations

☆ To Assist Technology-upgrading in Local Area

FIRDI has stationed in Southern Taiwan Innovation & Research Park, MOEA and Chiayi Industry Innovation & Research Centre, MOEA (CIIC). Besides as a research unit, FIRDI has been continuously working on the promotion of CIIC. This year, the capabilities of 4 resident organisations within the CIIC were integrated to jointly develop and establish the software and hardware engineering technologies required for a plant-based beverage supply chain, and building up the whole plant milling platform technology to assist related industries producing differentiated and qualified products. These has led to an increasing of the output value for 1.6 billion NTD. Based on these innovative business model and the accumulated local revitalisation benefits, the CIIC receives annual visits from domestic and international representatives from industries, governments, academia, and researches. The sites have became a key example of industrial innovation in the region.

▲ Economic Development Bureau, Kaohsiung City led the former SBIR participants visited CIIC seeking for technical cooperation.

▲ Dr. Bing-Huei Barry Yang, Deputy Director General of FIRDI (left) introduced CIIC to Minister Jyh-Huei Kuo, MOEA (right) and Mayor Ming-Hui Huang of Chiayi City(middle).

☆ Fun Food Taiwan Selection is Set to Enter a New Era

Since 2020, FIRDI has collaborated with the Industrial Development Administration (IDA, formerly known as the Industrial Development Bureau) of the MOEA and domestic food associations to promote the "FUN FOOD TAIWAN" initiative. Focusing on "providing a stage through selection, telling stories through case studies, marketing Taiwan through highlights, and elevating the industry through coaching," the initiative guides Taiwan's food industry to create and showcase new values aligned with global trends. This year's selection saw an enthusiastic response, achieving record highs in both the number of participating companies and registered products.

A total of 103 products were selected for the Fun Food Taiwan Award, with 18 products receiving Gold, Silver, or Special Prizes. In alignment with international trends, the first phase of the selection program (2020–2024) focused on three core values: CLEAN VALUE, DESIGN EXPERIENCE, and CONVENIENT SUSTAINABILITY. Starting from 2025, the second phase (2025–2029) will transition to EVOLUTION, DECARBONIZATION, and EXPERIENCE, continuing to spotlight the innovative excellence of Taiwan's food industry and to demonstrate its dynamic progress with the times.

☆ Driving the Advancement of Baking Aesthetics

In 2024, FIRDI launched a transformation and value-added consultation program for the baking industry, aiming to build aesthetic foundations and competitive advantages in product creation and consumption experience design. The first cohort included JONGYEE, O-NONGS FOODS, DELI FOOD, Yuan Feng Food, and KAOnZOU's CAKEHOUSE. A results exhibition titled "Five Senses Experience: Food, Fun, and Popular Science" was held at the Taipei Songshan Cultural and Creative Park, fully showcasing the innovation and diversity of Taiwan's baking industry.

☆ Promotion of "Taiwan's Agricultural Shelf-stable Food" in Food Markets

FIRDI has been commissioned by the Agriculture and Food Agency to assist in organising the selection program for shelf-stable food products made with domestic produced agricultural ingredients since 2021. In 2024, the focus has been placed on utilising domestic grown grains for the developments in small-packaged ambient or frozen ready-to-eat meals. These products were designed to be easily reheated, thereby providing consumers with convenient, diverse, and flavourful options for household food reserves. A total of 10 products from 9 selected enterprises were carefully reviewed and selected. Efforts were made to facilitate market entry through various distribution channels, including physical retail stores, highway service areas, E-commerce platforms, and emerging group-buying communities, in order to expand consumer access to healthy and palatable food reserve options, while also enhancing the visibility and utilisation of domestic agricultural products.

▲ Deputy Director-General Chao-Hsing Huang of the MOA (centre) and Director General Dr. Chii-Cherng Liao of FIRDI (right) at the press conference for the ready-to-eat meals made with domestically grown grains.

☆ Expanding the Impact of Elder-friendly Foods

FIRDI has led the development, evaluation, and promotion of Elder-friendly foods in Taiwan since 2016. The team has established the Eatender trademark, a national symbol for Elder-friendly food products, and published standardised texture classification guidelines to assist businesses in creating products suitable for populations in needs. The team has been continued in driving and expanding the development and industrial adoption of Elder-friendly food products in 2024. To date, a total of 958 products from 228 companies have been recognised through the Eatender product evaluation program, and among these 739 products from 199 companies have applied the Eatender label on their packages, achieving a cumulative market value of 1.7 billion NTD. The team has also conducted 18 Elder-friendly meal co-creation workshops, engaging and supporting over 100 companies in designing suitable food solutions. The team has partnered with 27 e-commerce platforms, launching dedicated Eatender sections and collaborated with 67 Carrefour hypermarkets across Taiwan creating in-store Eatender displays. In addition, the team has hosted matchmaking events for retails and distribution channels, and worked alongside Green Care Stations to extend care services to nearly 3,000 senior households in remote areas.

▼ Group photo from the "2024 Eatender Awards Ceremony" held by FIRDI at 2024 Taipei International Food Show. Deputy Minister Chao-Chin Huang (centre) and Director Hung-Hsi Lee of the MOA (3rd from left), Director General Dr. Chii-Cherng Liao of FIRDI (3rd from left), representatives of the Taiwan Association of Retired Persons, representatives from Taipei 777 Association of Retired Persons and award-winning companies.

Services on the food Industrial Analyses and Knowledges

With the support of government projects, FIRDI continues to gather and analyse global and domestic food market trends in real-time, monitoring and interpreting the dynamics of key and emerging food industry chains as well as shifts in food lifestyles. FIRDI acts as a vital think tank for both governmental bodies and industry stakeholders.

☆ Analysing Trends and Emerging Issues to Lead Industrial Development

ITIS team in FIRDI has published the "**Global Food Industry Trends - FIRDI ITIS Perspectives**" every January, since 2017. The "**Global Food Services Trends - FIRDI ITIS Perspectives**" has been published every March, since 2023, ofwhich, serving as important strategic references for Taiwan's food and beverage industries. In 2024, FIRDI identified 6 major global food industry trends: Trial and Error – Accelerated Systemic Shifts, Affordable Luxury – Challenging Demand Imagination, Match Scenario – Integrated into Daily Life, Science Magic – Demonstrating Magical Powers, Lower-Carbon Diet – Expanding Scope, and AI & Cobots -MACHINE COLLABORATION – Advancing Synergy. FIRDI also actively engaged with various sectors at the Taiwan Association for Food Science and Technology Annual Meeting to explore future developments in the context of the global transformation of the food ecosystem driven by ESG and AI integration.

☆ Publishing the Food Industry Yearbook and Food Industry Monthly Digest

The FIRDI ITIS team annually compiles the **Taiwan Food Industry Yearbook**, featuring global food industry trends and mapping 18 major segments of Taiwan's food sector. **The Food Industry Monthly Digest** serves as an important platform for information exchange and industry communication. Special reports published in 2024 include: the diversified applications of mushrooms, food extrusion technology, AI applications in the food industry, control of tea aroma development, value-added applications of yeast, food biomass recycling, and ready-to-drink beverage technology applications. Additionally, special features addressed the ecosystem of elder-friendly foods, labor-saving efficient robots, and the pet foods consumer economy, offering deep insights into emerging focal points.

☆ Analysing the Development and Consumption Trends of the Agricultural and Food Industry

Through a national survey on changes in food consumption behaviour, "**100 Must-Know Stats About Food and Consumer Behaviour in Taiwan**" are compiled to assist agricultural and food companies in formulating business strategies. At the same time, the team conduc ted in-depth behavioural quantitative and qualitative research on dairy products, meat products, elder-friendly foods, pet foods, etc. to analyse consumers' behaviours. At the same time, the team has studied the carcass grading systems and pricing mechanisms of various countries, the development of key meat companies, changes in the dairy market and the diversified application of raw milk/fresh milk. The team has visited Japan and Italy, in 2024, for the analyses of the development in cheese and propose local fresh cheese development strategies and measures.

☆ Strengthen the Presentation of Industry Information and Consumer Communication

By introducing business intelligence (BI) tools to develop and deepen thematic visual interactive dashboards, which included consumer behaviour by demographic group, product prices and specifications, quail egg production and sales, vegetable processing maps, pet food registration information, pork and dairy trade information, etc. To organise the "**In Search of Pork Offal Treasures - Recipe and Short Story Submission Event**", in the meanwhile, to collect expert articles and award-winning works, the team compiled a special book "**In Search of Pork Offal Treasures: A Feast of Flavours and Stories** ". Sensory tasting technology was introduced to select dairy flavour, sweetness and taste as the key factors in the design of fresh milk flavour cards, so as to help consumers understand the flavour characteristics of domestic fresh milk. The team also regularly update and maintain the "Food Vision" platform, hold live sharing sessions, and provide value-added services.

☆ Research and Services in Food Labelling Regulations

FIRDI has established a specialised Food Labelling Team to expand professional services in the area of food labelling regulations since 2019. In 2024, the team has continued to operate the "Food Labelling Consultation Service Platform" and provided a range of services, including regulatory consultations on Taiwan's food labelling laws, informational briefings, and analyses of international standards. Drawing upon accumulated research and consultation experiences, the team has developed concrete policy recommendations. These services have been widely recognised and well received. Over the past year, the team was invited by various municipal governments to conduct 10 sessions on food labelling regulations and was commissioned by the Taipei City Government to provide professional guidance on food labelling compliance.

03 Food Inspections and Safety Evaluations

The Analysis Research and Service Centre (ARSC) of FIRDI is an accredited laboratory of ISO 17025 in food testing, which also provides inspection services that comply with the requirements of international standards. ARSC is certified by the TFDA, MOHW in the scope of 578 testing items in foods, 10 testing items in traditional Chinese medicines and 4 testing items in cosmetics and TAF in the scope of 560 testing items.

Expansion of the Service Capacities

☆ Expansion of the Service Capacities

In 2024, the test of cocoa butter, cocoa mass (fat-free), crude fat, and fatty acid esters in chocolate, as well as moisture content in honey were established in response to tightened governmental regulations in specification limits. In response to industry demands, additional tests were introduced, including functional components such as β-hydroxy β-methylbutyrate (HMB), 5-deoxy-L-arabinose, food allergen testing for ingredients such as hazelnuts, plant-based components such as walnuts, and microbiological analyses including coliform detection in drinking water using membrane filtration and total plate count using the multiple dilution method. Moreover, testing items for food additive specification verification have been expanded to include calcium citrate, L-carnitine, and ethyl p-hydroxybenzoate, thereby enhancing the comprehensiveness of food additive specification testing. Additionally, in response to the Fisheries Agency's requirement to monitor starch content in commercially available aquatic products, a customised method for starch quantification in such products was developed and successfully accredited by TAF.

☆ Expansion and Maintenance of the Food Nutrient Composition Database

To assist the MOHW in building the "**Food Nutrient Composition Database**", the team has established a systematic classification for Taiwan's local ingredients, including 102 nutritional information in 18 categories, and constructed an online query system for the "**Food Nutrient Composition Database**". This year, the team has added nutrient composition data for indigenous ingredients further broaden the scope of application and enhance intelligent online search capabilities. The database serves as a valuable information resource for policy implementation, such as the MOHW's "**Food Nutrition Labeling System**" and the MOA's "**Novel School Lunch Innovation Promotion Program**". It also supports research on the dietary habits, nutritional characteristics, and health correlations of the Taiwanese population, such as the development of nutritional information systems for meals for the elderly.

▲ ARSC service team

☆ Expansion of Proficiency Testing Schemes

Proficiency testing schemes held by ARSC, FIRDI in 2024 include "Hydrogen peroxide in foods", " Pesticide residuals in vegetables", "Malachite Green, Crystal Violet and their Metabolites in foods", "β-Agonists in foods", "Sweeteners in food" and "*Salmonella* in foods". The test results were statistically analysed, refer to ISO 13528:2022. In addition, proficiency testing schemes in microbiological analysis are held to assist food manufacturers on the improvement of quality control capabilities and to respond to the need of food industry for the application of accreditations.

▲ Microbiological and biotechnological analysis laboratory.

Improvement in the Analytical Technology and Abilities

☆ Improving the Food Additives Test Methods Database

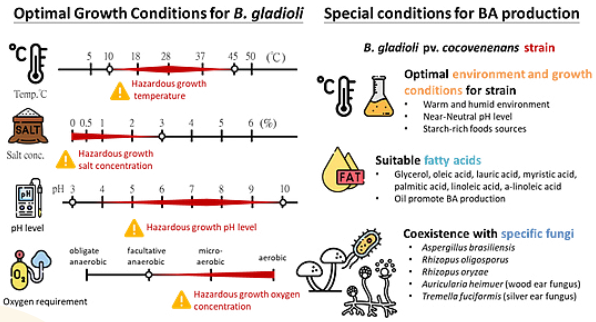
FIRDI assists the MOHW with the improvement of food additive testing methods in practical feasibility and effectiveness. Testing methods for flavours such as quinine and berberine in beverages were developed in 2024 to fill the gaps for testing methods of food additives or non-permitted additives that have established specifications. In addition, the specification compliance test items of calcium L-threonate, hydrogen peroxide and ascorbic acid, which do not have specification test methods, were studied, and the specification test methods of identification in xanthan gum and pyrrolidone carboxylic acid of L-sodium glutamate were revised. The current specification test methods were evaluated and revised to ensure the feasibility of the methods.

▲ Improvement and refinement of inspection technology.

Risk Analyses on Food Poisoning

☆ Research and Analysis of *Burkholderia gladioli* and Bongkrekic Acid

BCRC assisted the TFDA in investigating the distribution of *Burkholderia gladioli* pv. *cocovenenans* and bongkrekic acid in Taiwan's food chain. A total of 88 food samples and 45 environmental samples were tested, and none were found to contain *B. gladioli* pv. *cocovenenans* nor bongkrekic acid. The pathogen growth inhibited under temperatures below 10° C or above 45° C, salt concentrations above 3%, pH levels below 3 or above 10, and anaerobic environments. Additionally, it produces higher levels of bongkrekic acid when co-cultivated with specific fungi or under conditions rich in lipids. Furthermore, the team has developed "**Guidelines for Risk Management and Control of *Burkholderia gladioli* pathovar *cocovenenans* and Bongkrekic Acid**" along with an educational short video. These resources are available for reference by the catering industry and the general public to help mitigate the risks of contamination and associated hazards.



▲ Research and analysis of *Burkholderia gladioli* and bongkrekic Acid.

04 Certification Services

FIRDI has provided several types of certification services including Second-Level Food Quality Management Certification, GMP for Health Supplements Certification, CAS Taiwan Premium Agricultural Products Certification, TQF-Total Quality Food Certification, ISO 22000 Certification, SQF Certification, and various other certification services. Numerous businesses have successfully obtained certification and expanded into international markets. Except for Second-Level Food Quality Management Certification and GMP for Health Supplements Certification, which are regulated by the TFDA, all other voluntary certification services comply with ISO 17021, ISO 17065, and ISO 22003 requirements are accredited by TAF. The SQF international certification program continues to be recognised by JAS-ANZ in Australia, establishing recognition as an internationally accredited certification body.

Delivering Professional Certification Services

☆ Promotion of Multiple Governmental Certification Management Systems

A total of 317 manufacturers have obtained certification under the TFDA's GHP (including GMP for Health Supplements). Certification services for premium alcoholic beverages cover 60 production lines, while 217 sessions have been conducted to assist businesses in ensuring plant facilities meet safety and hygiene standards while maintaining smooth production line operations. The CAS certification system has been implemented for 8 categories, including rice, fermented foods, fresh-cut vegetables, seafood, frozen foods, refrigerated prepared foods, ready-to-eat meals, and snack foods. Compliance audits have been conducted for 51 producers of CAS-certified products, along with random inspections.

☆ Enhancement of Certification Services

FIRDI is continuously recognised as an SQFI-approved certification body, enables the food industry to align with quality assurance systems alongside with international enterprises and access global markets. A total of 15 manufacturers have successfully obtained certification under SQF Edition 9.0. Other certification services include TQF, ISO 22000, and HACCP, which strengthen raw material traceability, process risk monitoring, regulatory compliance awareness, and self-management capabilities were also available as requested. A total of 106 manufacturers have been certified under TQF (edition 2023) in categories such as beverages, oils and fats, dairy products, soy sauce, frozen desserts, processed soybean food, canned foods, condiments, alcoholic beverages, functional foods, and additives. Additionally, 29 manufacturers have obtained ISO 22000 certification, while 14 have been certified under HACCP.

☆ Expansion of Greenhouse Gas Verification Services

On 12th of August, 2024, the accreditation was obtained from TAF, atwhich the team has been recognised as a greenhouse gas verification body, that could offer professional and reliable GHG verification services for the food industry. Verification has been completed for 2 cases, with ongoing efforts to obtain qualification for greenhouse gas and carbon footprint verification under the Ministry of Environment's(MOE) programs.

Promoting Safety Management Systems

☆ Promoting the Traceability Management System of Agricultural Primary Production Farms and Primary Processing Plant for Aquatic Products

This year, continued guidance has been provided to agricultural and aquatic product businesses in establishing primary processing facilities to enhance product hygiene, safety, and stable production and sales. A total of 56 agricultural processing facilities and 12 aquatic product processing facilities have been registered across Taiwan. Additionally, 40 traceability audits and hygiene inspections have been conducted for traceable aquatic product producers, along with over 300 labelling reviews and product tests. Further efforts include HACCP assessments for aquatic product processing plants and evaluations of the EU-bound aquatic product management system were conducted. Nearly 60 sessions of related audits, evaluations, and training programs have been conducted, as a consequence, a report on the "**Development of an Export Aquatic Product Management System with Third-Party Certification**" has been completed.

☆ Promoting the Packaging and Distribution Management System for Ttraceable Agricultural Products

Efforts have continued this year to enhance and refine the traceability system from a comprehensive supply chain perspective. Educational training sessions, briefing meetings, and stakeholder discussions have been conducted to encourage industrial adoptions. On-site assessments have been carried out for 57 businesses that were interested in this certification, ofwhich 19 cases have been successfully certified for their traceability in repackaging, distribution, and processing.

☆ Promotion of HACCP Hygiene Evaluations in the Catering Industry and Prevention of High-Risk Foodborne Illnesses

Since 2009, the government has encouraged catering businesses to implement the HACCP concept into cooking processes for the establishment of food safety control systems. This year, 79 hygiene evaluations, inspections, and preliminary assessments have been conducted. Additionally, a draft revision of the application guidelines of the "**Food Safety Control System and Hygiene Evaluations for the Catering Industry**" has been completed, incorporating a preliminary assessment program to increase participation in HACCP hygiene evaluations. In response to multiple large-scale foodborne illness outbreaks in 2023, high-risk foods have been identified as the core focus for prevention efforts, as a consequence, "**Criteria for identifying high-risk foods**" have been established, along with a guideline manual for "**the Prevention of Foodborne Illnesses related to High-risk Foods**" in the catering industry.

05 Industrial Talent Training

FIRDI has been the largest food industry professional training institution in Taiwan for over half a century. In 2015, the FIRDI Academy was established aiming at providing cross-disciplinary innovative courses, cultivating diverse talents, and inject new energy into the food industry. In recent years, FIRDI Academy has implemented the Taiwan Talent Quality-management System (TTQS) and was awarded a gold medal in 2023, while continuously optimising the online platform. Furthermore, the academy also offers e-learning platform services such as digital course uploading for other collaborating centres.

The Academy has also become an international SQFI training centre and provides international training courses. Furthermore, the Academy integrated the curriculum with occupational competency and offered Integrated Competency and Application (iCAP) courses accredited by the Workforce Development Agency, Ministry of Labor, and conduct professional talent competency assessments following the Industry Professional Assessment System (iPAS). Through cross-disciplinary collaboration and the promotion of diversified programs, FIRDI aims to cultivate a pool of talents in the food and biotechnology fields, strengthen the competitiveness of Taiwan's food industry, and help the domestic food industry in achieving global success.

Continuing Enhancement of Personalised Training Services

FIRDI has established a multifunctional online platform which allows individuals and corporations to effectively plan and manage their learning. This year, the number of individual members has increased by 1,714, and the number of corporate members has reached 260 companies. The platform also offers competency assessment-related functions to comprehensively support attendees' training and certification needs. Additionally, attendees can use the in-built search and filtering functions of the platform to quickly locate courses that meet their needs based on fields (such as food safety, food manufacturing, etc.), course formats (in-person, live streaming, digital, hybrid), subsidy programs, user categories, keywords, and date ranges.

Integrating Training Programs with Competency Assessment Services

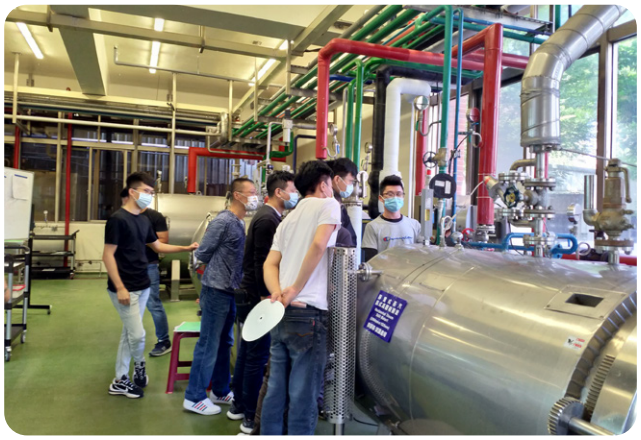
The Academy has comprehensively upgraded our Training Programs and Competency Assessment Integration Services this year, integrating professional training courses with competency assessments into a cohesive training program. This enables attendees of training programs to enhance their practical skills and obtain further valuable professional certifications effectively. A specifically tailored "Learning Map" for exam candidates of the Competency Assessment Services was introduced, centred on core aspects of competency assessment topics. This allows candidates to arrange related training programs systematically, as well as improving their understanding of exam content and pass rates. Continuing education courses for renewal were also provided to professionals with existing certifications, by helping attendees meet renewal requirements through further education while updating their professional knowledge at the same time. This year, a grand total of 2,538 candidates registered for the exam. Among them, 1,094 candidates took the online exam. Ultimately, 353 candidates met the Competency Assessment certification requirements.

Developing Diversified Professional Training Programs

By integrating professional expertise in accordance with industrial needs through the utilisation of ADDIE(Analyse, Design, Develop, Implement, and Evaluate) model for systematic course design, FIRDI has been able to offers programs covering a wide range of topics, including new product development and R&D management, smart manufacturing, net-zero carbon emissions, digital transformation, food safety and risk management, food processing technology, elder-friendly food, and food fermentation biotechnology. The programs feature innovative and diverse formats, combining in-person instruction, hands-on exercises, digital media, live streaming, and hybrid learning, balancing theory and practical application to meet diversified learning needs. This year, the Academy alongside other collaborating centres have conducted a grand total of 221 training sessions with 9,158 attendees, and provided in-house training for 480 employees.

▲ Microbial Inspection of Food.

▲ Dried fruit and jam processing.



▲ Retort Operation.

▲ Can Seamer Operation.

06 Special Reports

Participation in the Inaugural Healthy Ageing Tech Show

This year, FIRDI participated in the inaugural Healthy Ageing Tech Show, organised by the Institute for Biotechnology and Medicine Industry (IBMI). The event brought together stakeholders from various sectors to focus on the needs and business opportunities that will arise as Taiwan approaches becoming a super-aged society in 2025. FIRDI showcased the outcomes of relevant projects executed under the MOEA and MOA, engaging in close interaction and exchanges with companies that are part of the elder-friendly foods ecosystem. FIRDI was responsible for organising the Department of Industrial Technology (DoIT), MOEA pavilion, where FIRDI integrated the research and development results from various affiliated institutes. The pavilion comprehensively presented innovative technologies developed under technology projects—from texture design and nutritional planning to convenient and intelligent meal preparation—illustrating a new blueprint for the elderly food ecosystem. Additionally, in alignment with MOA's "Green Care" theme, FIRDI displayed the outcomes of outreach initiatives in rural areas through elder-friendly foods. Dietitians utilised the elder-friendly foods made by Eatender to design a daily meal plan tailored to the dietary needs of senior adults; they held tasting sessions and demonstrated how the food can be prepared and purchased, receiving an enthusiastic response.

Collaborating with Taiwan External Trade Development Council (TAITRA) to Showcase Taiwan's Food Technology to the World

At the FOOD TAIPEI 2024, FIRDI spearheaded the establishment of Future Food Zone, which was built around 3 core themes: low-carbon ingredients, smart technology–enabled precision, and circular sustainability. The zone highlighted the potential of future foods in a diverse range of applications. In addition to forward-looking innovations in plant proteins, microbial ingredients, and precision manufacturing technologies, FIRDI invited companies such as Xuyu Biotech Co., Ltd., Xin Dong Wang Baker, ifm electronic Ltd., and King's Ground Biotech Co., Ltd. to demonstrate Taiwan's capacity for innovation and advances in food technology jointly. Furthermore, FIRDI co-hosted the Food Innovation Forum with the TAITRA. The forum focused on 4 key drivers of development: trends, technology, startups, and competitiveness, exploring trends in future food development and technological innovation, while highlighting Taiwan's robust capabilities and visionary outlook in the food tech domain.

▲ At the opening of the DoIT pavilion, attendees included Minister Jyh-Huei Kuo of Economic Affairs (from left), Minister Yen-Nun Huang of Digital Affairs, Chief Convener Jong-Chin Shen of the Healthy Ageing Tech Show, Deputy Secretary-General Chih-Wei Ho of the Office of the President, Minister Cheng-Wen Wu of the Science and Technology Council, IBMI Chairman Jin-Pyng Wang, President Ching-Te Lai, President Wen-Hsiung Liu of the Industrial Technology Research Institute (ITRI), President Yung-Hsiang Lai of the Metal Industries Research & Development Centre, Director General Dr. Chii-Cherng Liao of FIRDI, President Kuei-Chi Lee of the Taiwan Textile Research Institute, and Deputy Director-General Chung-Pin Chou of DoIT of the MOEA.

Industry Integration in Developing Amniotic Fluid Stem Cell Technology for Regenerative Medical Applications

By supporting U-Neuron Biomedical Inc. in Progressively Commercialising its Research and Development Achievements, U-Neuron Biomedical Inc. has maintained close collaboration with FIRDI since its establishment. In 2019, the company moved into the GTP Laboratory at the BCRC, and in 2023, it passed Phase I clinical trials for amniotic fluid stem cells conducted under the TFDA. U-Neuron Biomedical Inc. is currently the only company in Taiwan specialising in regenerative medicine with amniotic fluid stem cells as its core product. FIRDI also assisted the company in optimising the production conditions of its culture media and launched the development of deer amniotic fluid stem cells and exosome-based skincare products. In 2024, the company was approved to move into the Hsinchu Biomedical Science Park, where it plans to build a facility and expand its business. At the same time, it successfully transitioned from the Pioneer Stock Board to the Emerging Stock Board, igniting an investment boom in regenerative medicine.

Establishing Hygiene and Safety Management Standards and an Overall Foundation for the Domestic Pet Food Industry

This year, FIRDI has implemented a project commissioned by the Council of Agriculture's Animal Protection Section. Effort has been made to research, plan, and promote topics such as standards and regulations for pet food factories in Taiwan, product nutrition and quality management, the training of pet nutritionists, and the development of distinctive and diversified features in Taiwan's pet food industry. The key areas include the following: (1) Formulate standards for the establishment of pet food factories and develop good hygiene and safety regulations; (2) Establish hygiene and safety management guidelines for domestically produced pet food; (3) Design a pet food nutrition curriculum, plan training programmes for pet nutritionists, and compile a nutritional guide for dogs and cats; (4) Explore the application of livestock by-products and palatability analysis in pet food development; (5) Systematically build a information foundation for the development of the pet food industry; (6) Organise forums and create a blueprint for the development of Taiwan's pet food industry.

07 International Exchanges and Cooperation

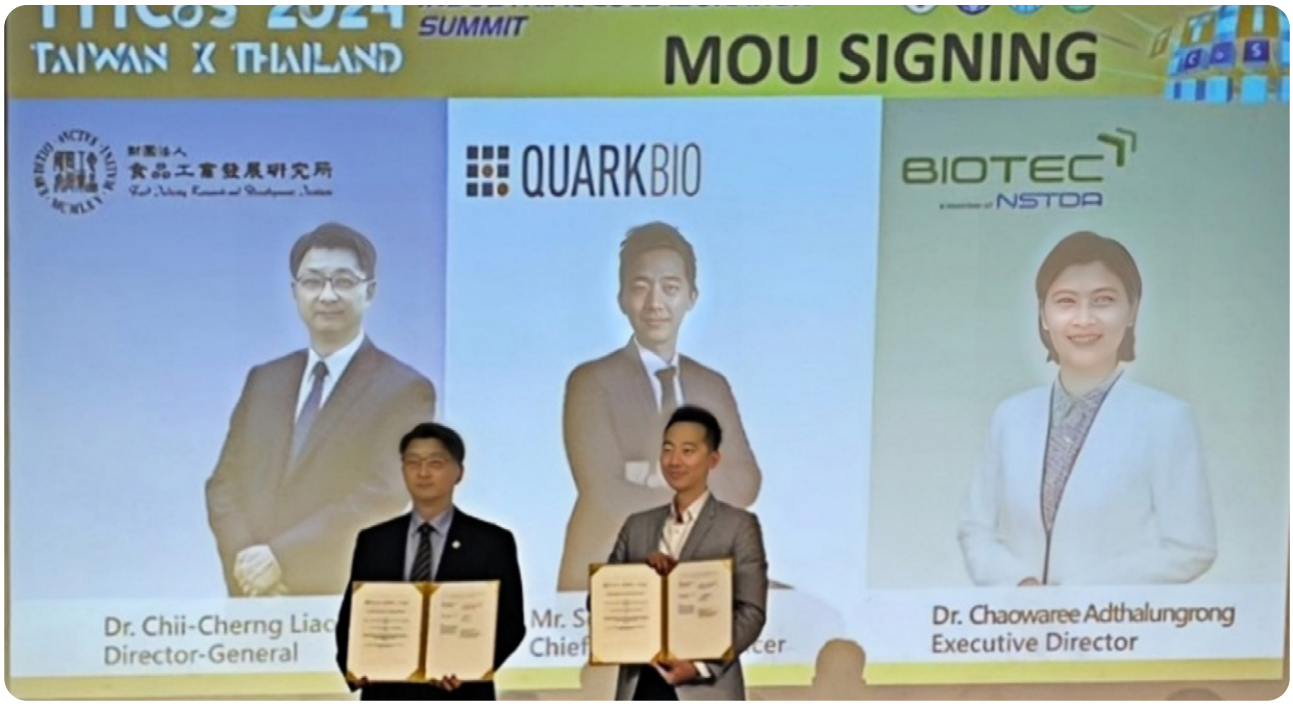
Establishment of the International Cooperation Office

To meet the needs of international cooperation and exchange manoeuvres, the International Cooperation Promotion Office was established this year under the Director Office. It was dedicated to managing and promoting international collaboration across FIRDI's various professional domains. In the initial phase, the focus was on talent cultivation, database development, and mechanism establishment. In terms of talent cultivation, young staff were selected to participate in the operation of the office, attend international organisation meetings, conduct short-term work visits, or build networks to enhance capabilities in international cooperation. In terms of database development, 3 databases for contacts, projects, and overseas exchanges were developed to serve as a foundation for the continued advancement and expansion of international collaboration. In terms of mechanism establishment, 3 expert groups that focused on opportunity exploration, technology scouting, and strategic planning were formed to strengthen the planning, review, and assessment of international technology cooperation projects and to enhance FIRDI's capacity to connect with domestic and international partners. By far, FIRDI promoted multiple international cooperation projects with partners including the Westerdijk Fungal Biodiversity Institute (WFBI) in Netherlands, the BIOTEC in Thailand, ainia in Spain, and the NBRC of NITE in Japan. Additionally, efforts are underway to host an APEC symposium in Taiwan in 2026.

▲ Deputy Director General Dr. Bing-Huei Barry Yang of FIRDI (3rd from left), BCRC Director Sung-Yuan Hsieh (2nd from left), International Cooperation Office Director Yu-Fen Chen (2nd from right) visited Spain to discuss the details of a bilateral cooperation proposal with ainia Director Andres Pascual Vidal.

Promoting Taiwan–Thailand Precision Health Industry Collaboration

FIRDI facilitated the signing of a tripartite memorandum of cooperation between BIOTEC in Thailand, Quark Biosciences Taiwan, Inc., and FIRDI. The parties agreed to jointly promote collaboration in the preservation and management of microbial resources, applied research, regulatory science, and industry exchange between Taiwan and Thailand.



▲ FIRDI, Quark Biosciences Taiwan, Inc., and Thailand's BIOTEC signed a tripartite memorandum of understanding (MOU), with Director General Dr. Chii-Cherng Liao of FIRDI (1st from left), CEO Wei-Lin Huang, and Executive Director Chaowaree Adthalungrong jointly participating in the signing ceremony.

Expanding International Collaboration in Microbial Technology R&D

In July, 2024, FIRDI renewed its memorandum of cooperation and bilateral agreement with the NITE, Japan and its affiliated NBRC. The two parties will continue to collaborate and exchange in areas including the operation of biological resources, promotion of web-based resources, microbial identification, and quality assurance and risk assessment of biological databases. Additionally, FIRDI, in 2024, has integrated Taiwan's domestic academic and research resources to promote joint development with the internationally renowned fungal research institute in WFBI, Netherlands, on high-throughput chip detection technology for the clinical innovative application of invasive fungal identification.

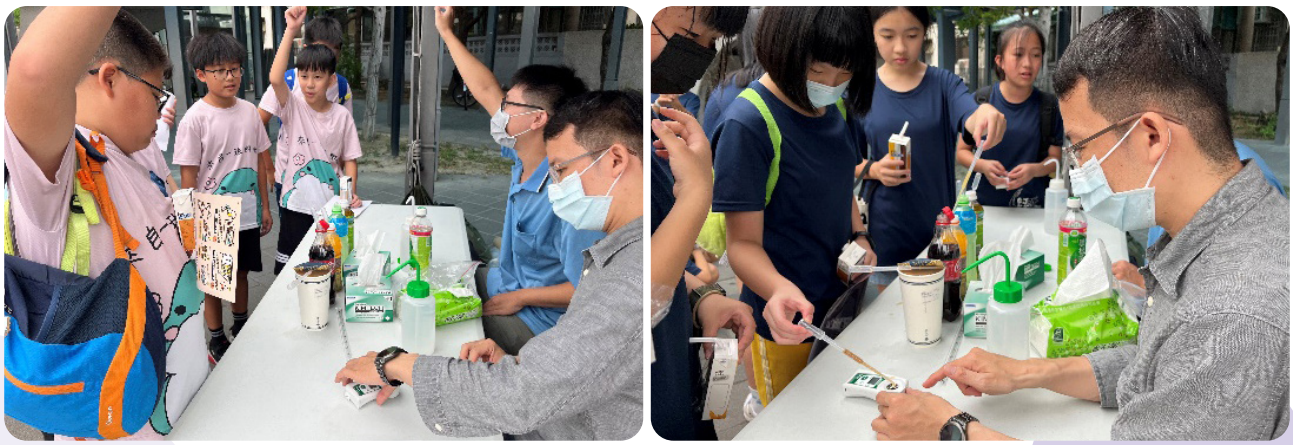
08 Community Caring

Sustainable Development of the Food Industry in Remote Regions and Outlying Islands

FIRDI assists food, biotechnology, and young agricultural enterprises in remote regions and outlying islands by providing effective problem-solving and quality enhancement services to support the development of local industry and to narrow the urban–rural gap in the food industry. This year, FIRDI guided oil producers in Sanwan, Maili, in improving their production processes, which enhanceed the quality of domestically pressed oils. FIRDI also assisted the Lien-Chiang County Government in locallising the production of liquor yeast in Matsu, integrating and optimising the local liquor industry chain. Additionally, FIRDI supported farmers in rural areas of Taiwan in establishing quality analysis methods and developing traceable radish cakes and rice bowl cakes, enabling consumers to enjoy delicious and safe food.

Popular Science Education on Food Knowledge

Through various events and exhibitions, FIRDI continuously promoted accurate food knowledge that balances nutritional intake and quality of life. Particularly, in collaboration with the National Science and Technology Council's 2024 Taiwan Science Train project, FIRDI held an activity titled "Canned Science for Your Brain" at the Hsin Chu train station. The activity transformed professional knowledge about canned food and aseptic beverage packaging processes and equipment technologies into easy-to-understand concepts through interactive games, allowing elementary and junior high school students to experience how science is applied in everyday life. The activity aimed to teach students about canned products and further involved science experiments on the sugar content of bubble tea and commercial beverages, fostering food safety and hygiene literacy from an early age.



▲ National Science and Technology Council's 2024 Taiwan Science Train activity — "Canned Science for Your Brain," students interacting with FIRDI staffs during experiments.

Awards and Acknowledgements in 2024

- 2024 Recognition of R&D Achievements by Corporations in Technology Projects: FIRDI's "Research Project on the Optimization of Equipment and Processes for Plant-Based Beverage Production" received the Outstanding Technology Project Award.

▲ 2024 Recognition of R&D Achievements by Corporations in Technology Projects:FIRDI's "Research Project on the Optimization of Equipment and Processes for Plant-Based Beverage Production" received the Outstanding Technology Project Award. Deputy Director General Dr. Bing-Huei Barry Yang of FIRDI represented the team to receive the award.

FIRDI participated in the 2024 TIE held in Taipei, where it presented 5 high-quality patented technologies in the domestic Invention Competition Area. All entries received the following awards:

- Platinum Award: Intelligent beverage preparation device.

▲ Platinum Award: Intelligent beverage preparation device. Technologist and Deputy Director Fong-Chi Liu (on the right) represented the team to receive the award.

- Silver Award and Corporate Special Award from TCI Co., Ltd.: A real-time method for monitoring antioxidant activity in enzyme drinks.

▲ Silver Award and Corporate Special Award from TCI Co., Ltd.: A real-time method for monitoring antioxidant activity in enzyme drinks. Associate Research Scientist Yi-Fang Hung represented the team to receive the award.

- Bronze Award: Method for manufacturing vegetarian products and adhesives.

▲ Bronze Award: Method for manufacturing vegetarian products and adhesives. Associate Research Scientist Tung-Sheng Hsiao represented the team to receive the award.

Director Meng-Chen Tsai of FIRDI's Product and Process Research Centre and Director Wei-Kuang Fu of FIRDI's Certification Service Centre were honoured with the Hsieh Cheng-Yuan Special Contribution Awards by the Mr. Hsieh Cheng-Yuan Food Technology Development Foundation. The award recognised the more than 30 years of dedicated service that they had at FIRDI. They led their teams in developing innovative food processing technologies for sustainable development and smart manufacturing, and their contributions to analytical techniques in food chemistry for preventing food safety incidents, thereby expanding the scope of FIRDI's certification operations. FIRDI's photosynthetic bacteria R&D support team was also awarded the Hsieh Chung-Pi Innovation Honour Award for its promising work in developing photosynthetic bacterial strains and promoting sustainable agriculture policies.

▲ Mr. Hsieh Cheng-Yuan Food Technology Development Foundation: FIRDI's photosynthetic bacteria R&D support team was awarded the Hsieh Chung-Pi Innovation Honour Award, Research Scientist Li-Ling Liao received the award on behalf of the team.

▲ Director Meng-Chen Tsai of FIRDI's Product and Process Research Centre was awarded the Hsieh Cheng-Yuan Special Contribution Awards.

FIRDI Recipients of the 2024 Taiwan Association for Food Science and Technology Awards: Senior Research Scientist and Director Wei-Kuang Fu received the Honorary Award for Food Business Management. Senior Research Scientist and Deputy Director Yen-Lin Chen received the Award for Academia–Industry Contributions in Food. Research Scientist Huan-Yu Lin received the Honorary Award for Food Technology R&D. Associate Technologist Mei-Ling Lu and Administrator Chiung-Yun Chen received the Award for Outstanding Food Promotion Service Personnel. These awards were presented at the annual members' meeting held at Fu-Jen Catholic University in New Taipei City.

Major Events in 2024

January

01/11

- FIRDI held the 2024 Global Food Industry Trends Presentation and Taiwan Industry Action Focus Forum.

01/24

- Director Lee Shwn-Jen and 3 delegates from the ICF and Assistive Technology Research Centre of National Yang Ming Chiao Tung University visited FIRDI to explore collaboration on elderly technology projects.

01/25

- FIRDI held the Taiwan–Thailand Co-creation of Microorganism for Functional Food Seminar.

01/26

- Dr. Wonnop Visessanguan, Director of BIOTEC and 2 delegates from Thailand, visited FIRDI to discuss cooperation proposals based on the MOU signed in 2023.

February

02/27

- As part of efforts to better respond to operational needs, the "Committee for International and Cross-Strait Cooperation Affairs" was renamed as the "International Cooperation Committee," under which the International Cooperation Promotion Office was established. A personnel list was announced, and effective immediately.

March

03/01

- In response to business needs, an additional Deputy Director General was appointed. At 1st of March, 2024, Senior Research Scientist Dr. Shiang-Tang Jane assumed the position of Deputy Director General while continuing to serve as Director of the Planning Office.
- FIRDI's trademark "Food Design Map" was registered successfully, with rights valid from 1st of March, 2024 to 28th of February, 2034.

03/05 ~ 03/08

- "FUN FOOD TAIWAN" team of FIRDI, along with award-winning companies from 2023, participated in the FOODEX JAPAN held at Tokyo Big Sight, highlighting the 3 core values of Taiwanese food: 1) clean and high-value, 2) thoughtful design for a pleasant dining experience, and 3) convenience and sustainability.

03/13

- FIRDI co-hosted the "2024 Global Dining Trends and Taiwan Food Service Upgrade Forum" in Taipei with ECOLAB TAIWAN

03/22

- The International Cooperation Office participated in the signing ceremony for the collaboration agreement and in the exchange meeting between Taiwan and Japan startups hosted by ITRI and Japan's Mizuho Bank.

03/22

- Director General Dr. Chii-Cherng Liao of FIRDI signed an MOU with Dean Yen-Hsuan Ni of the National Taiwan University College of Medicine and Chairman Sheng-Lin Tseng of Grape King Bio, jointly promoting the commercialisation of next-generation probiotics and postbiotics.

03/26

- FIRDI hosted the "2024 FIRDI R&D Achievements and Industry–Academia Collaboration Briefing Sessions" in Hsinchu and Chiayi on the 26th and 28th of March.

03/27

- FIRDI participated in the annual summit of the world's largest research organisation network, Research Institutes Network, organised by the MOEA, and was invited to present international cooperation achievements and take part in discussions.

May

05/01

- Due to operational requirements, the Food Engineering Research and Service Centre of FIRDI underwent organisational restructuring and a personnel reshuffle that came into effect from the 1st of May,2024.

05/15

- Dr. Hsin-Tang Lin, Professor Hui-Min Wang of National Chung Hsing University, and 22 faculties and students from Chulalongkorn University in Thailand visited FIRDI for the theme "Exploring and Decoding the Science of Safe and Delicious Food."

05/22

- Director of Industry Department Mr. Rifqi Ansari, of the Indonesian Economic and Trade Office to Taipei and distinguish delegate visited FIRDI for future cooperation.

05/23

- 12 Academic Visitors from King Mongkut's Institute of Technology Ladkrabang and Yuanpei University of Medical Technology visited FIRDI for an off-campus teaching tour.

June

06/05

- Director-General Hung-Hsi Lee of the Department of Agricultural Science and Technology, along with approximately 70 R&D management personnel from various agricultural research and extension stations, visited FIRDI.

06/06

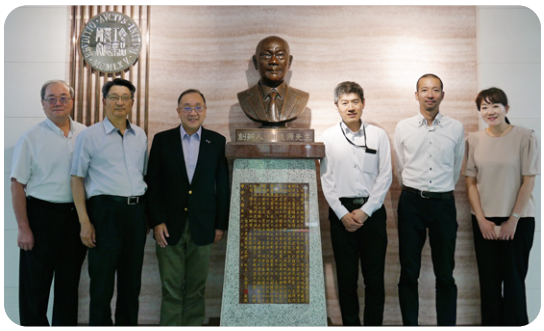
- Deputy Director-General Jui-Jung Chen of the Department of Agricultural Science and Technology, together with Section Chief Hui-Ju Hou and around 30 members of the Agri-Food Processing Technology Innovation and Industrialisation Team, visited FIRDI.

06/17

- Director Jia-Dong Yang of Taiwan Biodiversity Research Institute of MOA was invited to deliver a special lecture titled "A Discussion on Biodiversity Conservation".

06/24

- Executive Officer Takeshi Otaka of Sanyo Chemical Industries Ltd. in Japan, along with 3 delegates and 2 representatives from Synmax Biochemical Co., Ltd., visited FIRDI.



06/25

- As administrative requirements, Senior Administrator Mr. Chao-Ting Chang, Director of the Accounting Office, assumed the role of Director of the Administrative and Occupational Safety and Health Office, effective from the 1st of October, 2024.

06/26

- FIRDI participated in the Taipei International Food Show where it showcased its "Future Food Technology" and hosted the "Food for Future Forum". During the exhibition period (26th-29th, June), the 2024 Fun Food Taiwan Award winners were announced, and the awards ceremony and product showcase for the "Fun Food Taiwan Award" and "Fun Food Taiwan Trophy" were held.

06/26

- The Taiwan Food Circular Ecosphere Promotion Alliance, initiated by FIRDI under the guidance of the Resource Circulation Administration, MOE, was officially established

06/28

- Total of 10 delegates including President Hsi-Chi Lee of Thailand's Food and Drinks Public Company Ltd. and the Vice Chairman of the Thai Food Processors' Association visited FIRDI.

July

07/04

- Dyan Garneta Paramita Sari, Alvita Rassya Tritikaningtyas, and Fitrina Aprilyanti from the Food, Seafood, and Fisheries Industry Directorate of the Indonesian Ministry of Industry, along with representatives from Indonesian food and beverage equipment manufacturers and the Indonesian Food & Beverage Association, totalling 6 delegates, visited FIRDI.

07/05

- FIRDI adopted the Guidelines for Personnel Secondment and Part-Time Positions, which were implemented following approval by the Director General on the 4th of July.

07/12

- FIRDI co-hosted the 2024 Biotechnology Food Exploration Exchange Forum in Taipei with the U.S. Soybean Export Council.

07/23

- FIRDI participated in the BIO Asia–Taiwan Exhibition 2024, held at the Taipei Nan-Gang Exhibition Centre (23th and 27th of July).

07/26

- FIRDI established a pet food palatability testing laboratory.

07/30

- FIRDI hosted the "Southern Taiwan Innovation & Research Park of the MOEA –Tainan Technology Project Achievement Exhibition".

August

08/02

- FIRDI participated in the inaugural Healthy Ageing Tech Show. At the DoIT, MOEA Pavilion, FIRDI showcased the achievements of technology projects on elder-friendly foods. At MOA's Green Care Pavilion, it showcased "Eatender's elder-friendly foods". The event also featured the "2024 Heart-warming Connections, Joyful Meals – Holiday Season Giving" press event. (2nd-4th, August)

08/12

- FIRDI obtained TAF accreditation and became a qualified certification body for organisational-level voluntary greenhouse gas verification (ISO 14064-1).

08/20

- The 2024 Taiwan–Thailand Industrial Collaboration Summit (TTICoS). FIRDI and Thailand's National Food Institute (NFI) jointly organised the TTICoS and Smart Healthcare Forum at the ILLUME TAIPEI Hotel.

08/21

- Dr. Supawan Teerarat, Director of Thailand's NFI, and General Manager Chin-Chu Chen of Grape King Bio, along with 1 other delegate, visited FIRDI.

08/23

- A delegation of 13 people, led by Acting Director-General Putu Juli Ardika of the Ministry of Industry of Indonesia, and representatives from the Indonesian Economic and Trade Office to Taipei, including Mr. Rifqi Ansari, visited FIRDI.

08/23

- FIRDI participated in the Meet Greater South, held under the DoIT Deep Tech Pavilion of the DoIT, MOEA, on 23rd-24th, August. A video recap of the event was featured on the "Discovering Technology Treasures" webpage (28th of August).

08/30

- The 8+N Resource Circulation Alliance, organised by the Resource Circulation Administration of the MOE, was officially established. The Taiwan Food Circular Ecosphere Promotion Alliance, initiated and coordinated by FIRDI in June this year, also joined the 8+N Resource Circulation Alliance.

08/30

- FIRDI hosted the "Industry Exchange Forum on Food Technology and Consumer Trend & Public Sentiment Insights", bringing together FIRDI trend experts, food industry professionals, and big data specialists in public sentiment to jointly explore innovative visions for creating light luxury food experiences through technology.

September

09/01

- FIRDI Series – Bestselling Title: **Food Packaging**, revised and reissued.

09/06

- At the 2024 Strategic Conference for Heads of Technology Projects and Awards Ceremony for R&D Achievements by Corporations in Technology Projects, the "Optimisation of Equipment and Processes for Plant-Based Beverage Production" project received the Outstanding Project Award, accepted on behalf of Deputy Director General Dr. Bing-Huei Barry Yang of FIRDI.

09/16

- FIRDI held a press conference for the product launch of award-winning items from the selected ready-to-eat foods made with domestic grains.

09/26

- FIRDI hosted the Seminar on the Food Safety Challenges and Responses to Climate Change.

09/30

- FIRDI hosted the "Seminar on AI Applications for Value Addition in the Food Industry and Cybersecurity Risk Management."

October

10/07

- Section Chief Jian-fen Lin of the Resource Circulation Administration, MOE, Executive Yuan was invited to deliver a keynote speech titled: "Resource Circulation Strategies and Promotion – A Case Study on Biomass Circulation".

10/08

- FIRDI held "Baking Aesthetics Design Workshop Series – Part 1" on 8th and 15th of October.

10/16

- FIRDI, in collaboration with "Eatender--elder-friendly food" companies, participated in Carrefour's 2024 World Food Day Campaign involving a 5% donation of the turnover.

10/17

- FIRDI hosted the Seminar on Building a Food Safety Supply Chain through Smart Technology.

10/17

- FIRDI participated in the 2024 TIE, submitting 5 patents to the invention competition, all of which received awards.

10/21

- FIRDI invited Chairman Charles Huang of Circular Taiwan Network to deliver a keynote speech titled: "Circular Economy Issues in Agriculture and Food".

10/23

- FIRDI held the 2024 Achievements Presentation for the Smart Value-Added Promotion Project of the Food Industry Chain.

10/24

- FIRDI organised the Achievements Presentation for the "Exploring Digital Transformation in the Food Manufacturing Industry – Toward Shared Prosperity" Project.

10/30

- FIRDI hosted the "Baking Aesthetics & Fun Food Science" – Baking Industry Transformation and Value-Addition Counselling Outcomes Presentation at the Creative Space of Songshan Cultural and Creative Park in Taipei.

November

11/02

- FIRDI held the celebration for its 57th anniversary.

11/11

- FIRDI hosted the "New Opportunities for the Elderly: Creating Delicious Foods Together– 2024 Elder-Friendly Meal Development Seminar."

11/13

- FIRDI participated in the Southern Taiwan Biotechnology Exhibition at the International Convention Centre Tainan (13th-18th, November).

11/19

- Chairman Hsu of Chi Mei Inspection Tech Co., Ltd. and three distinguish guests visited FIRDI.

11/19

- FIRDI collaborated with the ECOLAB and hosted the International Forum on Quality and Control Upgrading for Fresh and Ready-to-Eat Food.

11/26

- A group of 30 science teachers from National Hsinchu Senior High School visited FIRDI.

11/29

- The 2024 Annual Meeting of the Taiwan Association for Food Science and Technology was held at Fu Jen Catholic University in New Taipei City, where FIRDI's award recipients were publicly recognised.

December

12/04

- FIRDI joined the International Association for Cereal Science and Technology. Secretary-General Ms. Veronika Haslinger and Director Jui-Chen Hsu of the Technical Service Section of the China Grain Products Research & Development Institute visited FIRDI.

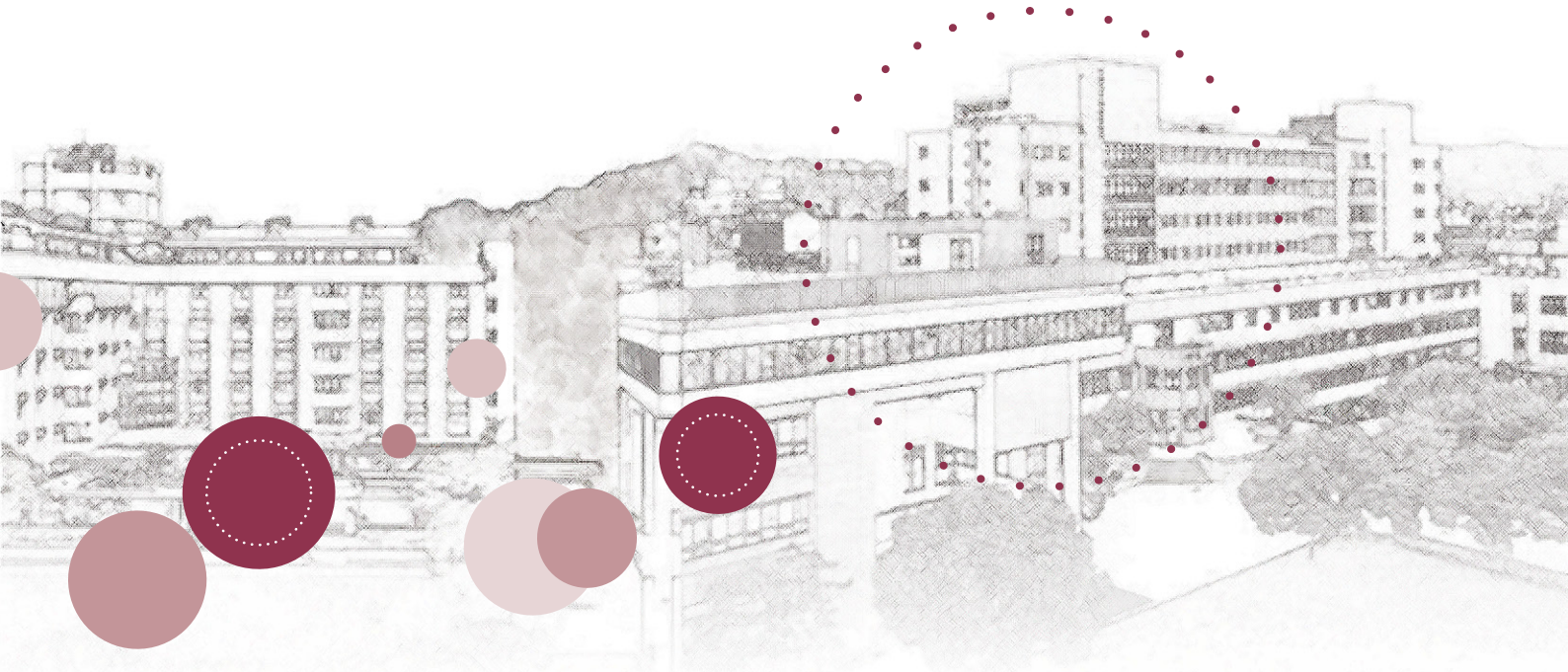
12/10

- The Chairman of the HaoShi Foundation led a delegation of 25 participants from its agri-food innovation accelerator team visited FIRDI.

12/11

- FIRDI held the 2024 Achievement Sharing Seminar on Texture-Modified Diets for the Elderlies.

財團法人
食品工業發展研究所
Food Industry Research and Development Institute



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FIRDI 2024