

Food Innovation Program

Enabling Systems for Food Innovation

Updated as of 15 February 2024

- Enhancement of Competencies of Food Innovation Centers (FICs) on Bringing Products to Market, Operations Management, and Mechanisms for Sustainability
- New Processing and Packaging Technologies for Local Food Industries
- Processing Technologies for Sustainable Food Products

- 50M**
- Enhancement of FIC Competencies**
- FIC Concept to Launch Food Product Development Approach
 - Technical Support to FICs
 - Development of Competency on Thermal Validation
- New Processing and Packaging Technologies**
- Development of Low Heat- Low Humidity (LH2) Drying System
 - Thermal Processing of Selected Materials Using Agitated-Type Retorts

2021-2022

- Gated Approach on FIC Product Development
- Sustained support to Regional FICs
- Strengthened Thermal validation capabilities
- LH2 Drying System developed and adopted by industry partner

POSSIBLE SOLUTIONS

50M

Enhancement of FIC Competencies

- Technical Support to FICs

New Processing and Packaging Technologies

- Test Application of Air Classification Technology

Processing Technologies for Sustainable Food Products (i.e. Plant-based Food, Alternative Proteins, Sweeteners)

- Extrusion technologies (Dry, High Moisture, Thermal)
- Biomass and Precision Fermentation
- Cell-based food processing technology for meat, fish, and egg alternatives
- 3D Printing for Meat and Fish Alternatives for Food Service

2023-2024

- Established FIC Sustainability Plan
- Improved thermally processed products using agitated-type retort

50M

New Processing and Packaging Technologies

- Nutrition-sensitive food processing technologies (e.g. Freeze Concentration for calamansi, coconut water, and other juices; Optimum Extraction and Dehydration Technologies for local spices; pulsed electric fields; isochoric freezing)
- Smart Packaging Solutions (e.g. Self-heating mechanism for ready-to-eat food, freshness indicators for local food products)

Processing Technologies for Sustainable Food Products (i.e. Plant-based Food, Alternative Proteins, Sweeteners)

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- Biomass and Precision Fermentation
- Cell-based food processing technology for meat, fish, and egg alternatives
- 3D Printing for Meat and Fish Alternatives for Food Service

2025-2026

- Tested Air Classification Technology for proteins, starches, and fibers in mung bean as food ingredients
- Built local capabilities on processing technologies for sustainable food products from local food sources

MILESTONES

Sector Challenges

- Continued dependence on imported raw materials
- Need for improvement or innovation in local technology
- Ability to consistently deliver the required level of quality and food safety

50M

New Processing and Packaging Technologies

- Nutrition-sensitive food processing technologies (e.g. Freeze Concentration for calamansi, coconut water, and other juices; Optimum Extraction and Dehydration Technologies for local spices; pulsed electric fields; isochoric freezing)
- Smart Packaging Solutions (Ethical Evaluation of Packaging Materials, Sustainable Packaging, Packaging materials for algae and seaweeds)

Processing Technologies for Sustainable Food Products (i.e. Plant-based Food, Alternative Proteins, Sweeteners)

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- Biomass and Precision Fermentation
- Cell-based food processing technology for meat, fish, and egg alternatives
- 3D Printing for Meat and Fish Alternatives for Food Service

2027-2028

- Built local capabilities on nutrition-sensitive food processing technologies on local food products
- Locally developed smart packaging systems
- Developed sustainable food products from local food sources

VISION

Sustainable and globally competitive food products with FICs as the leading S&T Food Innovation Hubs

DIFFERENTIATION

Industry specific strategies to foster innovation and address the S&T requirements of the Philippine Food Sector

Legend

New/
Ongoing

Done

Targeted



Food Innovation Program

Innovative Food Products

Legend

New/ Ongoing	Done	Targeted
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Updated as of 15 February 2024

- Development of Intermediate Food Products
- Sustainable and Healthier Alternative Food Products Using Local Sources
- Valorization of Food Processing Industry By-Products for Food Applications as Ingredients/Additives

POSSIBLE SOLUTIONS

- 30M**
Sustainable and Healthier Alternative Food Products Using Local Sources
- Development of Innovative Food Products from Colored Philippine Tubers and Root Crops
 - Retort Foods as Food Ration for Men in Uniform during Combat and High Risk Operations
 - Process and Product Optimization of Black Garlic used as Noodle Flavor Enhancer

- 30M**
Valorization of Food Processing Industry By-Products for Food Applications as Ingredients/Additives
- Shrimp production by-products (extracts, chitosan)
 - Alternative flours and starches for food industrial use (mango, banana, coconut)
 - Lycopene from tomato processing by-products as food ingredients/additives
 - Food fibers (Banana, bamboo, etc.)
 - Plant protein concentrates
 - Fruit bioactives and polysaccharides (mangosteen, pineapple, bignay) as food ingredients/additives

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 - Food fibers (Banana, bamboo, etc.)
 - Plant protein concentrates
 - Fruit bioactives and polysaccharides (mangosteen, pineapple, bignay) as food ingredients/additives
- Product Development using advanced technologies**
- Space food using local commodities

- 85M**
- Development of Innovative Food Products from Colored Philippine Tubers and Root Crops
 - Retort Foods as Food Ration for Men in Uniform during Combat and High-Risk Operations
 - Process and Product Optimization of Black Garlic used as Noodle Flavor Enhancer
 - Black-Chin Tilapia for the Development of Surimi-Based Products Processing

2021-2022

- **Innovative Food Products Developed**
 - Ingredients from colored tubers and root crops
 - Surimi-based products from black chin tilapia
- **Innovative Products and Improved Processes Adopted by Industry Partners**
 - Collagen & Gelatin products, Fish Oil, Proteins, and Hydrolysates from fish processing by-products
 - Dextran & High Fructose syrup

2023-2024

- **Innovative Food Products Developed**
 - Ingredients from colored tubers and root crops
 - Black garlic products as flavor enhancer
- **Products and Processes Adopted by Industry Partners**
 - Ready-to-eat retort food as food ration for men in uniform

MILESTONES



2025-2026

- **Innovative Food Products Developed**
 - Extracts and chitosan from shrimp by-products
 - Mango, banana, and coconut flours and starches for food industrial use
 - Lycopene from tomato processing by-products as food ingredients/additives
 - Food fibers (Banana, bamboo, etc.)
 - Plant protein concentrates
 - Fruit bioactives and polysaccharides (mangosteen, pineapple, bignay) as food ingredients/additives
- **Innovative Products and Improved Processes Adopted by Industry Partners**
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Sector Challenges

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DIFFERENTIATION

Industry specific strategies to foster innovation and address the S&T requirements of the Philippine Food Sector

VISION

Sustainable and globally competitive food products with FICs as the leading S&T Food Innovation Hubs



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE COUNCIL FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT

OneDOST4U



Food Innovation Program

Specific Industry or Regional Concerns

Updated as of 15 February 2024

Legend



- Process Improvement for Local Food Industries
- Collaborative Research and Development to Leverage Philippine Economy (CRADLE)

85M

CRADLE

- Development and Quality of Soysage using Okara
- Extension of Shelf-Life of Rice Meal in Microwaveable Container
- Production of Dietary Fiber using Sugarcane Bagasse from Raw Sugar Manufacturing
- Valorization of carabao's milk produced in Western Visayas for the 'new normal'
- Reworking of Processed Meat Using a Combined Acidification-Heat Treatment Process
- Valorization of Mature Coconut Water through Beverage Development
- Packaging Technology Developed for Frozen Durian using Locally Produced Packaging Materials
- Development of Fermented Food Products from Mature Coconut Water and Coconut Skim Milk By-products from VCO Processing

2021-2022

- **Improved Products/Processes adopted by industry partner**
 - Rice Meal in Microwaveable Containers
 - Low value egg sanitation protocols
 - Spray dried egg white powder

POSSIBLE SOLUTIONS

120M

Product/Process Improvement for Local Food Industries

- NICER Salt Project 3: Artisan Salt Technology Innovation and Preservation Project
- NICER Salt Project 4: Value-Adding of Sea Salt and Utilization of its Byproducts

CRADLE

- Development of Fermented Food Products from Mature Coconut Water and Coconut Skim Milk By-products from VCO Processing
- Berry-Blends: Innovative Fruit Products from Acai Berry, Cranberry, Mulberry, Pomegranate, Dragon Fruit, Guyabano and Calamansi
- Bench-scale Monolaurin Production for Food Application
- Banana Peel Wastes From Agro-industrial Processing As Alternative Flour And Dietary Fiber Source
- Retort Pouch Packaging Technology in the Development of Shelf Stable Ready to Eat Adlai Products
- Valorization of Post-Processing By-Products Generated from Industrial Scale Production of Peanut Butter

2023-2024

- **Improved Products/Processes adopted by industry partner**
 - Soysage from okara
 - Dietary fiber from sugarcane bagasse
 - Beverages from mature coconut water
 - Carabao's milk powder
 - Reworked processed meat
 - Frozen durian packaging technology

MILESTONES

50M

Product/Process Improvement for Local Food Industries

- NICER Salt Project 3: Artisan Salt Technology Innovation and Preservation Project
- NICER Salt Project 4: Value-Adding of Sea Salt and Utilization of its Byproducts

CRADLE

- Oleoresins, Essential Oils, and Dry Spices as Food Ingredients
- Community-level integrated food processing systems

2025-2026

- **Improved Products/Processes adopted by industry partner**
 - Artisan salt and value-added salt products
 - Fermented food products from mature coconut water and coconut skim milk by-products
 - Juice, jellies, and freeze-dried berry blends
 - Monolaurin from VCO processing
 - Alternative flour and dietary fiber from banana peel waste
 - Ready-to-eat adlai products
 - Peanut oil and peanut pressed meal flour from peanut butter by-products

Sector Challenges

- Continued dependence on imported raw materials
- Need for improvement or innovation in local technology
- Ability to consistently deliver the required level of quality and food safety

50M

Product/Process Improvement for Local Food Industries

CRADLE

- Oleoresins, Essential Oils, and Dry Spices as Food Ingredients
- Community-level integrated food processing systems



2027-2028

- **Improved Products/Processes adopted by industry partner**
 - Food ingredients from oleoresins, essential oils, and dry spices
 - Community-level integrated food processing systems

VISION

Sustainable and globally competitive food products with FICs as the leading S&T Food Innovation Hubs

DIFFERENTIATION

Industry specific strategies to foster innovation and address the S&T requirements of the Philippine Food Sector



List of Projects – Food Innovation

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
Enabling Systems for Food Innovation									
N/A	Development of Competency on Establishment and Validation of Adequate Processes for Thermally Processed Food	-	-	-	-	-	-	-	Completed
Low Heat, Low Humidity Drying	Development of Low Heat and Low Humidity (LH)2 Drying System for DOST Malnutrition Reduction Program (DOST-MRP) Facilities	-	-	-	-	-	-	-	Completed
Thermal Processing	Thermal Processing of Selected Materials Using Agitated-Type Retorts	3,823	-						Ongoing
N/A	Technical Support for DOST Regional Food Innovation Centers	25,327	-	-	-	-	-	-	Ongoing
N/A	Development of FIC Competency in Moving New Products from Concept to Market Launch	3,430	-	-	-	-	-	-	Ongoing
Air Classification	Test Application of Air Classification Technology for Plant Proteins, Starches and Fibers from Philippine Mung Bean as Food Ingredients	-	14,339	4,569	1,736	-	-	-	Ongoing



List of Projects – Food Innovation

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
Innovative Food Products		2022	2023	2024	2025	2026	2027	2028	
Thermal Processing	From Pest to Valued Commodity: Black-Chin Tilapia (Sarotherodon melanotheron) for the Development of Surimi-Based Products Processing	-	-	-	-	-	-	-	Completed
Solvent Extraction	Development of Chitosan Film from Sardine Fish Scales	-	-	-	-	-	-	-	Completed
Spray Drying	Development of Innovative Food Products from Colored Philippine Tubers and Root Crops through the UPLB-DOST Food Innovation Center	2,600	-	-	-	-	-	-	Ongoing
Thermal Processing	Development and Field Testing of Retort Foods as Food Ration for Men in Uniform during Combat and High Risk Operations	4,698	-	-	-	-	-	-	Completed
Spray Drying Thermal Processing	Process and Product Optimization of Black Garlic used as Noodle Flavor Enhancer	-	-	-	-	-	-	-	Completed



List of Projects – Food Innovation

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
Specific Industry or Regional Concerns									
Thermal Processing	Reworking of Processed Meat Using a Combined Acidification-Heat Treatment Process	-	-	-	-	-	-	-	Completed
Thermal Processing	Valorization of Mature Coconut Water through Beverage Development	1,437	-	-	-	-	-	-	Completed
Heat Treatment	Development and Quality of Soysage using Okara	2,968	-	-	-	-	-	-	Completed
Spray Drying	Valorization of Carabao's Milk Produced in Western Visayas for the 'New Normal'	-	-	-	-	-	-	-	Completed
Thermal Processing	Extension of Shelf-Life of Rice Meal in Microwaveable Container	854	-	-	-	-	-	-	Completed
Drying	Production of Dietary Fiber using Sugarcane Bagasse from Raw Sugar Manufacturing	-	-	-	-	-	-	-	Completed
Spray Drying	Development of Chicken Egg White Powder and Granules from Low Value Edible Shell Eggs	-	-	-	-	-	-	-	Completed



List of Projects – Food Innovation

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
Specific Industry or Regional Concerns									
High Barrier Packaging	Pilot Testing of Packaging Technology Developed for Frozen Durian using Locally Produced Packaging Materials	2,113	-	-	-	-	-	-	Ongoing
Fermentation	Development of Fermented Food Products from Mature Coconut Water and Coconut Skim Milk By-products from VCO Processing	2,090	1,509	-	-				Ongoing
Thermal Processing	Berry-Blends: Innovative Fruit Products from Acai Berry, Cranberry, Mulberry, Pomegranate, Dragon Fruit, Guyabano and Calamansi	-	2,971	1,999	-				Ongoing
Molecular Distillation	Bench-scale Monolaurin Production for Food Application	-	3,969	1,029	-				New
Drying	Utilization Of Banana Peel Wastes From Agro-industrial Processing As Alternative Flour And Dietary Fiber Source And Its Applications	-	3,379	1,588	-				New
Thermal Processing	Application of Retort Pouch Packaging Technology in the Development of Shelf Stable Ready to Eat Adlai Products (Coix-lacryma-jobi L.)	-	-	3,028	1,966				New
Vacuum Drying, Extraction	Valorization of Post-Processing By-Products Generated from Industrial Scale Production of Peanut Butter	-	2,370	902	-				New
Drying	NICER Salt Project 3: Artisan Salt Technology Innovation and Preservation Project	-	7,939	5,088	-				New
Drying	NICER Salt Project 4: Value-Adding of Sea Salt and Utilization of its Byproducts	-	7,998	2,698	-				New

Food Innovation Program 2023

Target Projects: 8
Target Budget: Php 75 M

New: 6
Total Budget: Php 41.9 M
(RTE Adlai, Banana Peel, Monolaurin, Peanut Byproduct, NICER Asin P3 and P4)

On-going: 9
(Berry blends, Food Ration, Fermented food, Tubers, Durian, Black garlic, Tech Support, Air classification, Agitated retort)

Completed: 4
(Thermally, Rice Meal, Sugarcane Bagasse, Reworking)



Roadmap Assessment

OVERALL ASSESSMENT

HIGHLIGHTS

- 28 projects implemented 2018-2023: 6 Enabling Systems, 11 Innovative Food Products, 11 Specific Industry or Regional Concerns
- Patents/IP: 202 filed for FIC products
 - Products: 32 new products launched
 - Partnerships: 36 licensing agreements
 - People Services: 49 on Tech Valuation and Profitability, 37 on TNA Process

CHALLENGES

- Lack of new researchers
- Proposals not passing evaluation criteria
- Changes in project leader

RECOMMENDATIONS / WAY FORWARD

- Strengthen partnerships in order to determine strategic priorities focusing on key technologies instead of products
- Encourage new researchers to submit proposals and implement projects. Promote the PCIEERD Human Resource Development Program for appropriate competency building.
- Continued promotion of technologies and services through science communication activities such as webinars and forum, including policy recommendations in cooperation with regulatory bodies such as the DA and the FDA
- Technology diffusion including deployment of manuals or processing modules that can be done through PCIEERD technology transfer programs
- Results of impact assessment study on the DOST-developed food processing equipment and the sustainability studies of the FICs to be used in planning for future strategies

