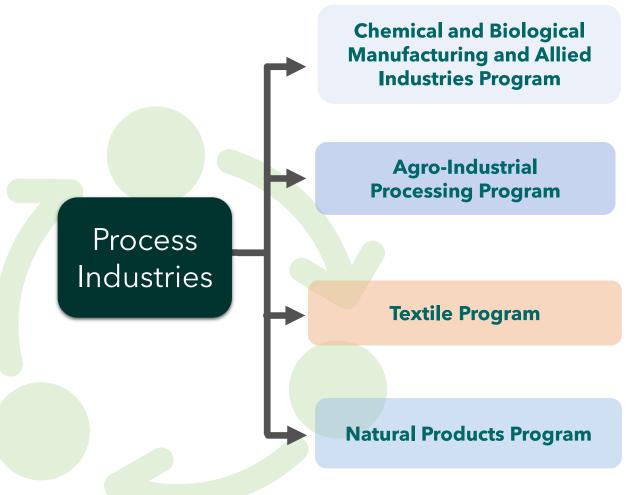
PROCESS SECTOR



chemicals (basic, specialty), chemical preparations, predominantly chemical processes, sensors, chemical and biological reference materials and standards, related technologies

commodity-based products

fibers, filaments, yarn intermediates, yarns, fabrics, and end-user products, including wearable textiles

Primary and secondary metabolites, bioactives, extracts

The process industries are those industries where the primary production processes are either continuous, or occur on a batch of materials that is indistinguishable

PROCESS SECTOR: Agro-Industrial Processing Program (Cacao & Sugarcane)

Overall Strategies:

Human Resource

- Training for sensory analysis for cacao and cocoa products
- Training on technical services for product development and refining technologies

R&D Technologies

- Development of cost-effective technologies for shelf-stable beverages from tablea, cacao pod husk as food ingredient and biofertilizer, natural colorant from cocoa shell
- Technologies for use of sugarcane extract in as ingredient in food supplement and personal care products
- Development of fermentation technology for small scale producers of cacao
- Development of blockchain-based system for cacao
- Design of isotope-based methods to determine geographical origin of cacao
- Enhancement/improvement of refining technologies for intermediate products for cacao

Facilities/Services

 Establishment of Sensory lab for Cacao and cocoa products

S&T Policies

 Policy Recommendation to promote use of handbook of sensory protocol for cacao and cocoa products

18.9 M

- Developing the Capability of Micro and Small-Scale Processors in the Manufacture of Quality Food Products from Philippine Cocoa Beans
- Blockchain-Based System for Transparent Traceability of Halal-and-Tayeb Cacao Products (part of project of Food Sector)
- Waste to Wealth": Value-Adding Approaches to Transform Cacao (Theobroma cacao L.) Pod Husk Towards Economic Development
- Application of Natural Antioxidants Derived from Sugarcane for Food, Food Supplement, and Cosmetic Product Formulation
- Wet Processing Technology Through Microbial Fermentation for High Quality Chocolates

2021

- Capability building for sensory analysis for cacao and cocoa products
- Initial studies for cacao pod husk powder as food ingredient and biofertilizer

14.8 M

- Developing the Capability of Micro and Small-Scale Processors in the Manufacture of Quality Food
- Products from Philippine Cocoa Beans
 Blockchain-Based System for
 Transparent Traceability of Halal-and Tayeb Cacao Products (part of project of Food Sector)
- Application of Natural Antioxidants
 Derived from Sugarcane for Food, Food
 Supplement, and Cosmetic Product
 Formulation
- Waste to Wealth": Value-Adding Approaches to Transform Cacao (Theobroma cacao L.) Pod Husk Towards Economic Development
- Wet Processing Technology Through Microbial Fermentation for High Quality Chocolates
- Stable Isotope and Multi-Elemental Profiling of Coffee and Cacao Beans in the hilippines by IRMS and XRF for Origin Identification (part of Food Sector)

2022

- Operational sensory laboratory and technical services for cacao and cocoa products
- Handbook of Sensory Protocol and Technical Paper
- Shelf-stable beverages from tablea (RTD and concentrated)
- Lab-scale production of natural colorant from cocoa shell for food or nonfood use, and cocoa oil for food or nonfood use
- Cacao pod husk powder as food ingredient and biofertilizer
- Application of sugarcane extract in food, food supplement, and personal care products

41 M

- Wet Processing Technology Through Microbial Fermentation for High Quality Chocolates
- Stable Isotope and Multi-Elemental Profiling of Coffee and Cacao Beans in the hilippines by IRMS and XRF for Origin Identification (part of Food Sector)

Fermentation technology for

small scale producers for

Production of optimum

system for cacao

origin of cacao

Milestone

microbial consortium for

Isotope-based methods

established and ready for

to determine geographical

Developed blockchain-based

2023

cacao

cacao

20 M

Development of refining techniques and technologies for chocolate and intermediate products

25 M

Development of refining techniques and technologies for chocolate and intermediate products

Vision

A competitive industry (cacao and sugarcane) equipped with relevant technologies and innovative products

2024

 Capability building for developing refining technologies for cacao Refining techniques and technologies (i.e. use of ball mill, stone mill) for various chocolate types (fine, dark, etc.) and other intermediate and related products fit for the company scale of production

Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
 Production and R&D Staff from the cacao and sugarcane Industries, and related
- Production and R&D Staff from the cacao and sugarcane industries, and related industries equipped with training and new knowledge on latest technologies and QA protocols

R&D Technologies

- Technologies for production of shelf-stable beverages from tablea, cacao pod husk as food ingredient and biofertilizer, natural colorant production from cocoa shell
- Technologies for using sugarcane extract as ingredient in food supplement and personal care products
- Fermentation technology for small scale producers of cacao
- Blockchain-based system for cacao
- Isotope-based methods to determine geographical origin of cacao
- Refining technologies for intermediate products for cacao

2025

Facilities / Services

• Sensory lab for Cacao and cocoa products near production sites

S&T Policies

Policy to Promote use of handbook of sensory protocol for cacao and cocoa products

PROCESS SECTOR: Agro-Industrial Processing Program (Cacao & Sugarcane)

Overall Strategies: Human Resource

 Training for extraction, refinement of compounds such as pectins, fibers, and other valuable compounds from cacao pod husks and other parts of the fruit and tree.

R&D Technologies

- Development of cost-effective technologies for pectin and fiber extraction and processing
- Technologies for personal care products development using valuable compounds from wastes of cacao

S&T Policies

 Policy Recommendation as input to standards development of compounds such as pectin, fibers, etc.

30 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao
 Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2027

- Preliiminary processing for pectin, fibers and other valuable compounds
- Initial formulation of personal care products and conduct of preliminary tests

Milestone

35 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2028

- Verified process for extraction and/or purification of pectin, fibers and other valuable compounds
- Personal care products tested

Overall Outcomes

Vision

(cacao and

A competitive industry

sugarcane) equipped with

relevant technologies and

innovative products

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D Staff from the cacao industries, and related industries equipped with training and new knowledge on latest technologies and QA protocols

R&D Technologies

- Technologies for valuable compounds such as pectin, fiber extraction, refinement and processing
- Technologies for development of personal care products using valuable compounds from wastes of cacao

S&T Policies

 Policy Recommendation as input to standards development of compounds such as pectin, fiber, etc.

35 M

- Extraction and processing of Pectin from Cacao Pod Husk
- Development of Cacao Pod Husk Leather
- Development of Personal Care Products from Waste Products of Cacao

2026 ·

Capability
building for
extraction
processes and
techniques

PROCESS SECTOR: Natural Products Program

55.4M

Colorimetric and Performance

Produced in Various NatDyes

Scale-up Production, Stability

and Other Applications of

Natural Colorants for

Extraction of Oil and

Valorization of Agri-food

Polyphenols from Green

Grown Arabica Coffee

Technology Intervention to

Provide an Alternative Market

sambac) as Raw Material for

· Green Oil and Phytochemicals

2021

Upscale production of natural dyes

Lab-scale production of iasmine oil

Lab-scale production of oils from

cashew nut and nut shell

for Sampaguita (Jasminum

Jasmine Oil Production

from Cashew

Waste: Ultrasound-assisted

Cherry Rejects of Cordillera

Cosmetics

Standardization of NatDyes

Hubs in the Philippines

Overall Strategies: Human Resource

 Training for technologies on extraction, grading, purification, stabilization and application studies for naturally derived products such as colorants, oils. ingredients, etc.

R&D Technologies

- Development and improvement of eco-friendly and cost-effective technologies for extraction, production and stabilization of naturally derived products such as colorants, oils, ingredients, etc.
- Application studies for naturally derived products
- Development of standardized protocol in the collection. processing and evaluation of dyestuff and dyed products.

Facilities/Services

 Establishment of R&D Lab for plant oils' extraction and characterization in the regions

S&T Policies

• Policy Recommendation to promote use of naturally derived products

- Colorimetric and Performance Standardization of NatDyes Produced in Various NatDves Hubs in the Philippines
- Scale-up Production, Stability and Other Applications of Natural Colorants for Cosmetics
- · Valorization of Agri-food Waste: Ultrasound-assisted Extraction of Oil and Polyphenols from Green Cherry Rejects of Cordillera Grown Arabica Coffee
- Technology Intervention to Provide an Alternative Market for Sampaguita (Jasminum sambac) as Raw Material for Jasmine Oil Production
- · Green Oil and Phytochemicals from Cashew
- . Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Physico-chemical Characterization and Product Development from Essential Oils of Mindanao Ferns and Seed-bearing Plants



2022

- · Grading and Evaluation/Certification protocol for indigo
- · Nat Dyes powder testing protocol
- · Characterized lab-scale extracted coffee cherry extracts
- · Lab-scale production of components and application studies using oils and components for food, cosmetic and personal care products

- · Colorimetric and Performance Standardization of NatDyes Produced in Various NatDves Hubs in the Philippines
- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- Extraction, Characterization, and Standardization of Rubber Seed Oil for Application and Formulation in Cosmetics
- Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Physico-chemical Characterization and Product Development various industry applications from Essential Oils of Mindanao Ferns and Seed-bearing Plants
- Green Oil and Phytochemicals from
- Development of Natural Dyes from Novel sources

70M

- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- · Extraction, Characterization, and Standardization of Rubber Seed Oil for Application and Formulation in Cosmetics
- · Comparative GC-MS Profiling of wild and propagated seed-bearing plants and essential oil products
- Development of Natural Dves from Novel source
- Valorization of Various Wastes for extraction of natural compounds for

40M

- Comparison of Ultrasound and Conventional Extraction Methods on the Yield of Anthocyanin Pigments from Roselle and Cooked Ubi Peels
- Development of Natural Dyes from Novel sources
- Valorization of Various Wastes for extraction of natural compounds for various industry applications

Vision

A competitive industry equipped with relevant technologies and innovative products



- · Advanced extraction techniques or methods for extraction of natural dves for food applications
- Technology for natural dyes extraction from novel sources
- Technology for natural compounds extraction from wastes

2023

- Application studies using natural dyes for personal care and cosmetics
- Technology for oil extraction from cashew nut, shell and purification of components
- Technology for extract-ion of rubber seed oil
- Technology for extraction of Mindanao plant
- Conventional technology for extraction of natural dyes for food applications

2024

- · Application studies using rubberseed oil and mindanao plant oils for cosmetics
- Ultrasound technology for extraction of natural dyes for food applications
- Preliminary process for extraction of natural dyes from novel sources and natural compounds from wastes

Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D staff equipped from the Natural Products Industry and related industries (Cosmetics, Food, Personal Care) equipped with training and new knowledge on latest technologies

- products such as colorants, oils, ingredients, etc.
- Technologies for use of naturally derived products in various applications

Facilities / Services

R&D Center for plant oils' extraction and characterization in the regions near sources

• Policy Recommendation to promote use of naturally derived products such as the standardized protocol in the collection, processing and evaluation of dyestuff and dyed products.

R&D Technologies

• Technologies for extraction, production, grading and stabilization of naturally derived

PROCESS SECTOR: Natural Products Program

Overall Strategies: Human Resource

 Training for technologies on extraction, grading, purification, stabilization and application studies for naturally derived products such as colorants, oils, ingredients, etc.

R&D Technologies

- Development and improvement of eco-friendly and cost-effective technologies for extraction, production and stabilization of naturally derived products such as colorants, oils, ingredients, etc.
- Application studies for naturally derived products
- Development of standardized protocol in the collection, processing and evaluation of dyestuff and dyed products.

Facilities/Services

 Establishment of Testing services for active components and other testing needs of personal care, cosmetics and pharmaceutical industries

S&T Policies

 Policy Recommendation to promote use of naturally derived products

165M

- Development of Natural Dyes from Novel sources
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Valorization of Various Wastes for extraction of natural compounds for various industry applications
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products

2026

135M

- Extraction, Characterization, and Standardization of Natural Dyes for Pharmaceutical applications
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Extraction, Characterization of Natural polymers as binders, bulking agents and disintegrants for tablets
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products



- Technology for natural dyes production from novel sources
- Capability building for testing active components
- Capability building for extraction and downstream processing of hydrocolloids, natural polymers for modified drug release and natural compounds

- Lab-scale production of hydrocolloids, natural polymers for modified drug release and natural compounds
- Preliminary extraction process for natural dyes, binders, bulking agends and disintegrants for pharmaceutical applications
- Preliminary service provision for 1st set of tests for active components

115M

- Extraction, Characterization, and Standardization of Natural Dyes for Pharmaceutical applications
- Extraction, Characterization of Natural hydrocolloids for food applications
- Extraction, Characterization of Natural hydrocolloids for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for personal care applications
- Extraction, Characterization of Natural polymers for modified drug release in vivo for pharmaceutical applications
- Extraction, Characterization of Natural polymers as binders, bulking agents and disintegrants for tablets
- Establishment of Testing Services for Active components in Personal Care and Pharmaceutical products
 - Upgrading of Testing Services to support Personal Care and Cosmetics Industry

2028

- Technology for production and application of hydrocolloids, natural polymers for modified drug release
- Service provision for 2nd set of tests for active components
- Capability building for new testing services for personal care and cosmetics industry
- Lab-scale production and safety tests conducted for binders
 Overall Outcomes

Human Resource

- Competent and trained S&T personnel on new technologies identified
- Production and R&D staff equipped from the Natural Products Industry and related industries (Cosmetics, Food, Personal Care) equipped with training and new knowledge on latest technologies

R&D Technologie

- Technologies for extraction, production, grading and stabilization of naturally derived products such as dyes, colorants, oils, hydrocolloids, bulking agents, binders, disintegrants, and other ingredients
- Technologies for use of naturally derived products in various applications

Facilities / Services

 Testing services for active components and other testing needs of personal care, cosmetics and pharmaceutical industries

S&T Policie

• Policy Recommendation to promote use of naturally derived products

Vision

A competitive industry equipped with relevant technologies and innovative products