PHILIPPINE FIBER INDUSTRY
DEVELOPMENT AUTHORITY

THE PHILIPPINE ABACA INDUSTRY ROADMAP

2021 - 2025

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PREFACE

The Philippine Abaca Industry Roadmap 2021 – 2025 was developed to support the 8 paradigms of the Department of Agriculture Secretary in levelling up agriculture in the country. This Roadmap lays down the strategic direction *towards a sustainable and globally competitive Philippine abaca industry.*

The roadmap is divided into 11 chapters: 1. Introduction, 2. Industry Situationer, 3. Farm Income Analysis, 4. Supply/Value Chain Analysis, 5. Benchmarking Analysis, 6. Competitive Analysis, 7. Market Trends and Prospects, 8. SWOT Analysis, 9. Target Setting, 10. Strategies and Policies and 11. Implementation, Monitoring and Evaluation.

This detailed plan was made and designed to take you through the 5-year action programs and key result areas on production, processing, trade and market of the abaca industry. About P19.99B total investment is required for the implementation of this roadmap from 2021-2025 with a projected income of P53.20 billion from abaca fiber production alone.

To complete our strategy, this plan also contains the suggestions and recommendations of the industry stakeholders during its public consultation held last 20 April 2021.

We are thankful to all our stakeholders who actively participated and openly expressed their views and insights during the roadmap public consultation.

I would also like to express my appreciation to the PhilFIDA Technical Working Group who worked on this roadmap through their technical inputs and time devoted and to all the PhilFIDA staff and employees who have directly or indirectly assisted in the preparation of this roadmap.

Thank you very much.

KENNEDY T. COSTALES
Executive Director III

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EXECUTIVE SUMMARY

This roadmap sets the direction for the Philippine abaca industry. It encompasses industry analyses, benchmarking, and supply/value chain. This roadmap identified the potential areas intended for planting and treatment of diseases which are the two most important factors in abaca fiber production.

A broad range of private and public sector groups contributed to the production of this document which sets forth new policy, capacity, and capability priorities for the Philippine abaca industry.

Coordination and analysis of the inputs, organization of the workshops, and preparation of this document were carried out by PhilFIDA. Stakeholders' meetings and workshops were hosted and facilitated by PhilFIDA Regional Offices.

Where are we now?

Abaca, internationally known as Manila hemp, is endemic to the Philippines. The Philippines dominates the global abaca trade as the country supplies about 86.1 percent of the world's abaca fiber requirements and Ecuador and Costa Rica the remaining 13.7 percent and 0.2 percent, respectively, as of 2019.

In 2019, area planted to abaca was 155,455 hectares with an effective productive area of only 86,854 hectares with fiber output of 69,829 metric tons (MT).

The abaca farm structure is classified as a small farm which is owned and managed by individual farmers. It has an average area of 0.69 ha for every farmer. There are only few farms established and managed by cooperatives or associations with areas ranging from 10 to 100 hectares.

At present, abaca farming is concentrated at the Bicol Region, Visayas and Mindanao areas specifically on the Eastern part of the country as manifested with the top three regions. On the other hand, the three regions having the least land area in terms of abaca farming can be found within Luzon.

There are four (4) abaca pulp companies located in Albuera and Baybay, Leyte, Malinao, Albay and Balo-i, Lanao del Norte.

Almost one third of the abaca areas are found in the Bicol Region with 55,284 ha but only 30,010.94 ha were effective productive areas. This is almost comparable to the combined abaca areas of Eastern Visayas and Davao Region. Most of the abaca areas in Bicol are concentrated in the province of

Catanduanes, comprising more than 66 percent of the total area of the region. Catanduanes remained as the biggest abaca producing province contributing 30.9 percent of the total production, followed by Northern Samar with 8.3 percent and Davao Oriental with 8.1 percent as of 2019. Due to frequent typhoons in Bicol and Eastern Visayas, there are moves by some abaca manufacturers and investors to look for alternative areas to plant abaca.

Due to the recent occurrence of typhoons which resulted to severe damaged of the abaca areas in Bicol, Eastern Visayas and Eastern Mindanao. The most affected abaca damage area brought about by typhoon Rolly was in the province of Catanduanes which produces about one-third (1/3) of the country's abaca supply. This prompted PhilFIDA through the FY 2021 Php50 million Senate amendments and the DA-BAR funded project to spread the concentration of abaca plantation in other areas like in Cagayan Valley (100 ha), Nueva Vizcaya (100 ha), Aurora Province (100 ha), Oriental Mindoro (100 ha), Camarines Norte (100 ha), Aklan (100 ha), Negros Oriental (100 ha), Southern Leyte (100 ha), Zamboanga del Norte (100 ha), Zamboanga del Sur (100 ha), Misamis Oriental (200 ha), Bukidnon (300 ha), Davao Occidental (100 ha), South Cotabato (100 ha), North Cotabato (200 ha) and Agusan del Norte (200 ha).

The projected monthly production on the 21 new abaca expansion areas (100 ha each) is 22,500 to 30,000 kgs dry fiber all first-class quality. This is equivalent to a combined annual production of 5,670 to 7,560 MT or 45,350 to 60,480 bales starting on the 3rd year from planting for the next 40-50 years without replanting as long as the farmers follow the Good Agricultural Practices (GAP) on abaca.

Exports of abaca fiber and manufactures generated an average of US$119 million per year in the last ten years (2010-2019). Some US$100.4 million came from abaca manufactures such as pulp, cordage, fabrics/yarns and fibercrafts. The remaining US$18.6 million was from raw fiber exports.

Europe, specifically, the United Kingdom, is the premier destination of abaca fiber. In Asia, Japan is the leading buyer of abaca fiber.

Since 1991, local pulp mills had been importing abaca from Ecuador and Costa Rica. The pulp processors resorted to importation to address the deficiency in local supply of specific grades and to meet buyers' specifications.

On local benchmarking, a total of 1,000 abaca plants with 3.0 x 3.0 m are planted to a hectare and grows along with coconut, fruit trees and leguminous plants. The typical farm uses suckers, corms, tissue culture plantlets as planting materials. The GAP farm uses seeds, tissue culture plantlets, suckers,

and corms. Care and maintenance of the farm in typical farming is minimal compared to GAP farming which is properly managed.

Harvesting is done every six months for the typical farm and every three to four months for the GAP farm. The first harvest is done on 18-24 months after planting.

Local Benchmarking, Abaca Farming: Typical vs. Good Agricultural Practices (GAP) (Qualitative Parameters)

PARAMETERS	TYPICAL FARM	GAP	DIFFERENCE*
Planting Density (hills/ha)	Irregular distance 1,000 @ 3.0 x 3.0 m	1,600 @ 2.5 x 2.5 m distance	600
Plant Propagation Practice	Suckers/Corms @ Php15.00/pc.	TC plantlets @ Php 35.00/pc, Seed-derived @ Php 8.00/pc	(Php20.00/pc) Php7.00/pc
Quality of Planting Materials	Apparently healthy	Disease free and recommended varieties	
Fiber Extraction Method/Cost	Hand Stripping Cost Php 41.96 per kg of fiber	Spindle -stripping Cost Php 21.71 Decortication Cost Php 13.56 per kg of fiber	Spindle -stripping Cost Php 20.25 Decortication Cost Php 28.40
Dry Fiber Recovery per stalk	1-1.5% or 28-43% of 3.5% weight of stalk	3.5% (40% Spindle-stripped,60% Decorticated)	2.0 %
Fertilizer Application	No fertilization	3 times/year @ P1,500/bag	P13,500[a]/Year
Pest and Disease Control	Not conducted	2 times/year @ 1liter/app	P 1,000[b]/year
First Harvest	Year 2	Year 2	-
Harvesting Frequency @ Peak	2 times/year	3 to 4 times/year	twice as much
Fiber Quality and Tensile Strength	5th and 6th Class 11-32 kgf/g.m.	1st and 2nd Class 35-55 kgf/g.m.	Excellent and Good Quality
Fiber Price	Php 50.00-60.00	Php 90.00-120.00	Php 40.00-60.00

Harvesting Practice	Inconsistent (immature, over matured and spurious abaca fiber)	Uniform stripping	Commands a high price and stable market

* Difference refers to the advantage of GAP over typical indicated by a positive value or disadvantage as indicated by a negative value.

[a] Price of fertilizer @ Php 1,500/bag

[b] Price of insecticide @ Php 500/liter

Source of basic data: Actual farmer's field and Abaca Technoguide

The abaca varieties used in GAP (Tangongon), and typical (Abuab) farming have the characteristics of an average 3.5 percent fiber recovery on mechanized cleaning. On hand cleaned its 1.5 percent fiber recovery based on fair cleaning output. Farmers undertake primary processing, which involves the extraction of fiber from harvested tuxies. To extract the fibers, hand stripping is used by the typical farm and mechanized stripping for the GAP farm. Drying is done through sun and air.

Local Benchmarking, Abaca Farming: Typical vs. Good Agricultural Practices (Quantitative Parameters)

PARAMETERS*	TYPICAL FARM	GAP	DIFFERENCE
Average yield per ha/year (kg)	1,980	5,544	3,564
Peak yield per ha (kg)	2,400	6,720	4,320
Average establishment cost per ha	39,470	68,270	28,800
Average cash outflow per ha per year	136,798	264,700	127,902
Price per kg (farmer's selling price)	68	100	32
Average cash inflow per ha per year	152,266	537,408	385,142
Average net cash flow per ha per	15,468	272,708	257,240
Average Production cost per kg (Php/kg)	60.19	50.81	9.38
Payback period (years)	3.22	2.04	21.36
Internal Rate of Return (%)	46	209	163
Return on Investment (ROI)	11.31	103.02	91.71

*Years 1-10 are considered in the average values

Source of basic data: Actual farmer's field and Abaca Technoguide

On international benchmarking, Ecuador and Costa Rica are the only other commercial producers of abaca fiber aside from the Philippines based on Food and Agriculture Organization (FAO) data.

In 2019, the export price in US$ F.O.B. of Philippine abaca fiber averaged at 249.13 per bale compared to Ecuadorian abaca import price of US$351.46 F.O.B. per bale. In 2019, the export price in US$ F.O.B. of representative grades such as S2, I, G and JK were 286.31, 272.61, 263.07 and 225.68, respectively. This shows that Philippine abaca is competitively priced with the Ecuadorian abaca.

The country's exports of raw abaca fiber to the UK reached 5,303 metric tons (MT) in 2019, which represented 45 percent of the total exports for the year. The export price in US$ F.O.B. per kilogram to the UK market for grades S2, I and G are 2.37, 2.18, and 2.11, respectively, which indicates the price competitiveness of Philippine abaca in the said fiber grades. The Philippines has three (3) kinds of fiber cleanings with a total of 31 abaca fiber grades; of which 13 are for the hand-cleaned fibers; thirteen (13) are for the machine/spindle-cleaned fibers, and five (5) for decorticated fibers. In contrast, Ecuador has only five (5) fiber grades. This system of our fiber grading makes the Philippine abaca fiber more versatile in application. These include the traditional usage of cordage/rope and fibercrafts to more sophisticated industrial applications like specialty papers, textile and the biocomposites and nanocellulose. The different grades allow the specialty papermakers flexibility to produce different types of paper and other by-products with the desired quality.

According to Glatfelter, the world's biggest manufacturer of specialty paper, the quality of the Philippine abaca fibers is deteriorating compared to Ecuador and Costa Rica fibers. Pulp mills need to buy higher grade of abaca fiber to produce quality pulp. The Philippine government will solve this problem through strict enforcement of abaca grading standards and promoting good agricultural practices among farmers during harvesting, postharvest and trading activities.

Where do we want to go?

The stakeholders' consultations and workshops have set the vision, mission, goals, and targets for the industry.

The Vision:

A progressive Philippine abaca industry supplying the world's best quality fiber, meeting global demand for renewable, sustainable, and environment-friendly products to achieve the country's inclusive growth.

The Mission:

- Improve the socio-economic condition of farmers, create livelihood, and reduce poverty incidence through rural fiber-based enterprise development and business; and

- Maintain the country's status as the world's number one producer and supplier of quality abaca fibers.

Goals

- Produce sufficient quality abaca fiber to supply domestic and international markets;

- Establish rural livelihood and economic businesses that improve farming practices and land vegetation, rehabilitate the environment, and mitigate climate change;

- Establish disease free abaca plantations in all regions to provide sustainable fiber supply for pulp millers, cordage companies and rural enterprises;

- Set new direction and agenda for R & D to improve varieties, increase fiber production through mechanization, disease management, postharvest, processing and utilization towards production of fiber-based products and by-products for industrial, commercial, and other uses;

- Strengthen collaboration among industry stakeholders - international investors, local and national governments, farmer cooperatives/ associations, private sector, non-government organizations, academe, and corporations; and

- Promote an investment climate conducive for foreign and local direct investors for upstream and downstream processing.

Objectives

- To expand/rehabilitate a total of 67,100 hectares of abaca areas from 2021 to 2025;

- To mass produce planting materials through tissue culture, macropropagation, conventional method and seeds;

- To increase fiber production by 177,189 MT spread over a period of five (5) years.

- To adopt abaca tuxy buying scheme or abaca freefarmers social enterprise in the production of quality abaca fiber through cooperative and association approach;

- To introduce new technologies in abaca production and treatment of abaca diseases;

- To accredit private, government (LGUs), and commercial abaca nurseries and distribute healthy planting materials;

- To train LGUs and NGOs agricultural technicians and farmers on new and improved fiber production technologies;

- To upgrade and modernize/mechanize post-harvest equipment and facilities to improve efficiency and increase fiber production;

- To strictly implement abaca grading standards;

- To conduct R&D for the production of quality and disease-free planting materials, new technologies on plantation establishment, disease management, production of by-products of abaca fibers, and processing and utilization in partnership with universities, corporation, and private sectors; and

- Establish Monitoring and Evaluation Plan in partnership with abaca stakeholders, LGUs, NGOs and other groups.

In terms of targets, a total of 2,300 hectares in 2021, 25,000 hectares in 2022 and 2023, 12,500 in 2024 and 2,300 in 2025 will be planted to reach an estimated total abaca fiber demand of 195,000 MT in 2024 with an increase of 5% annually. By 2026, with the targeted farm expansion and rehabilitation of 67,100 hectares, an estimated abaca fiber production of 177,189 MT will be attained. A projected deficit of just about 17,811 MT will be obtained based on the projected demand. In 2020, a total of 4,877 Modified Abaca Stripping Knives (MASK) were distributed to address the degradation of fiber quality prior to the provision of Spindle stripping and Decorticating Machine targeted in 2021 to 2024.

Physical Targets for Abaca Expansion and Rehabilitation, 2021-2025 (in hectares)

REGIONS	2021	2022	2023	2024	2025	TOTAL
Region I, II & CAR	200	200	200	200	200	1,000
Region III, IVA & IVB	100	200	200	200	100	800

Region V	301	8,693	8,693	4,156	300	22,143
Region VI	163	1,387	1,387	693	164	3,794
Region VII	112	465	465	223	112	1,377
Region VIII	339	4,509	4,509	2,255	339	11,951
Region IX	233	1,183	1,183	591	233	3,423
Region X	166	634	634	317	166	1,917
Region XI and XII	420	5,248	5,248	2,624	420	13,960
Region XIII	266	2,481	2,481	1,241	266	6,735
TOTAL	**2,300**	**25,000**	**25,000**	**12,500**	**2,300**	**67,100**

Note: Yield assumption was based on the Cost and Return Analysis for GAP.

How do we get there?

Major Challenges and Strategies

Challenges	Strategies
Low Fiber Production	• Continuous treatment of disease infected abaca farms • Explore new pest management technologies and update the integrated pest management program for Abaca. • Rehabilitation, expansion, and intercropping of abaca. • Organize the farmers to form into cooperatives/ associations (minimum of 100 hectares of abaca areas). • Increase yield per hectare by optimizing planting density in current abaca areas. • Improve efficiency of postharvest equipment and facilities and increase level of mechanization. PhilFIDA, PhilMECH, PhilFIDA-accredited fabricators and SUCs will collaborate to fabricate machines and conduct researches

	to improve the performance of abaca fiber extraction machinery. • Ensure the availability of good and high yielding variety planting materials to support a reasonable increase in farm productivity of existing abaca hectarage. • Maximize plant density per hectare.
Unstable Source/Supply of Planting Materials	• 17-ha Mother Block Nursery planted with Tissue Culture planting materials as source of seedlings production = 2,000 seeds per one (1) matured stalk per mat x 1,600 mats/hectare x 17ha equivalent to 54.4 million planting materials.
Prevalence of Abaca Diseases such as Bunchy-top, Bract Mosaic and Mosaic.	• Continuous education/training program for farmers • Continuous eradication of infected abaca plants and replanting of disease-freed areas. • Promotion of efficient farm management by intensive and sustainable farmers' training on Good Agricultural Practice (GAP). Agricultural Training Institute (ATI) and Technical Education and Skills Development Authority (TESDA) will be tapped to support the trainings for farmers, LGU technicians and NGOs to improve their technical knowledge and skills on abaca farming. • Conduct exploration of new pest management technology to update the Integrated Pest Management Program for Abaca.
Poor Quality Fiber Produced	• Strictly enforce abaca fiber grading standards. • Educate farmers on proper fiber production practices. • Distribute standardized stripping knives. • Mechanize the fiber production process.

	• Organize farmers cooperatives/associations (minimum of 100 farmers and minimum of 100 ha or a ratio of 1 farmer :1 ha).
Insufficient Supply of Abaca Fiber	• Aggressive campaign to promote abaca farming. Encourage private sectors, farmers' association/cooperatives, and corporations to invest in abaca trading business and engage in farm service providers. • Active provision of technical assistance to industry players. • Establish processing centers (mechanized extraction, drying, classifying, baling and storage) near abaca farms and promote the production of quality fibers. • Mechanize the fiber production process. • Expand and Rehabilitate abaca farms.
Low Adoption of Technology	• Generate cost effective package of technology for fiber production, processing, and utilization. • Conduct of development projects on processing and utilization of fiber and fiber-based products. • Conduct of Research and Development on abaca. • Strengthen RD & E linkages. • Transfer of matured technologies. • Conduct Information /Awareness and Advocacy campaign.
Low Income of Abaca Farmers	• Introduce value adding activities through training on fiber processing and utilization. • Implement Abaca Tuxy Buying Special Project (ATBSP)/Abaca Freefarmers Social Enterprise (AFSE) • Abaca Intercropping with any suitable crop

Low Fiber Production. Majority of abaca farms are far from the farmer's residences and harvesting is only done 2 times a year in some areas. Average of 92 % of abaca fibers produced are hand-cleaned, 2% spindle-stripped and 6% decorticated as of 2019. Century-old harvesting devices and tools, and spindle machines are used during fiber extraction and needs to be improved to produce more quality fibers. The abaca fiber extraction needs to be mechanized and new technologies should be introduced.

Unstable Source/Supply of Planting Materials. Currently, the PhilFIDA can provide sufficient planting materials from the existing 17-hectare tissue culture mother-block nurseries and seven (7) seedbanks. These should be continuously maintained in order to sustain the source of available planting materials for the farmers.

Prevalence of Abaca Diseases such as Bunchy-top, Bract Mosaic and Mosaic. Five (5) year informal training on Abaca Good Agricultural Practices (GAP) for at least 124,063 farmers.

Low Fiber Quality. The quality of Philippine fiber has deteriorated over the past years because of "all-in buying" practice and also because of the existence of commercialized spurious abaca varieties.

Insufficient Supply of Abaca Fiber. Abaca production has to be increased in various ways specifically through opening of new abaca areas and by invigorating old and less productive farms and plantations.

New Strategies

- **The Abaca Tuxy Buying Special Project (ATBSP)/Abaca Freefarmers Social Enterprise (AFSE).** This scheme will ensure the survival of abaca which is indigenous to the Philippines. This aims to organize and empower most of the abaca farmers nationwide as a cooperative, produce their own abaca fibers as a group which will redound to better competitive price, quality and quantity and sell their harvest directly to Grading and Baling Establishments (GBEs), local processors or direct export.

  The traditional way of abaca fiber extraction/harvesting by the abaca farmers has twelve (12) stages. The project intends to lessen to only six (6) steps. These steps include topping, tumbling, tuxying, tuxy bundling, tuxy transporting/hauling and tuxy trading /selling -- thereby removing and easing the burden of the abaca farmers of the other six (6) activities and just let them continue producing all the abaca tuxies they want for the day before selling it to their cooperative that same day. This will surely increase abaca fiber production.

The fiber in the leftover or discarded leafsheaths after tuxying are extracted through the decorticating machine. This will increase further the abaca fiber production and the take home pay by three folds.

- Disease-free and seed-derived planting materials shall be distributed to interested stakeholders who are members of farmers' association or cooperative.

- Encourage more farmers, private sectors, NGOs, corporations, and big landowners to plant abaca in their areas identified under National Color-Coded Agricultural Guide Map launched by AMIA.

Project Management

The PhilFIDA under the management of the Executive Director (ED) and Deputy Executive Director (DED) will be the lead agency that shall implement the Philippine Abaca Industry Roadmap. The implementing units within PhilFIDA are the nine (9) regional offices, one (1) regional satellite office and five (5) technical divisions, assisted by two (2) support divisions.

The ED will be the prime mover that shall direct all operating units of the agency to perform the planned programs, projects and activities stipulated in the roadmap and agreed upon with the stakeholders during the various consultations. The ED shall report regularly to the DA Secretary the progress of implementation and accomplishments of the roadmap.

CHAPTER I

INTRODUCTION

A. Rationale

The pressing global realities of going natural driven by the emergent "green" economy sweeping across the globe are most conducive to the Philippine fiber industry. More industries are increasingly utilizing natural materials while other manufacturing companies are on the search for resources that could replace or at least blend with man-made fibers, glass fibers and other non-biodegradable materials to come up with "green" products. The conservation of forest resources protected by government legislations and sustainability compliance requirements led to the use of alternative sustainable natural fiber materials. This consciousness among industries worldwide especially from developed countries stems from their intense advocacy to protect and preserve the environment for the next generation and mitigate the adverse effect of climate change and global warming. This global scenario resulted in heightened consumers' awareness and demand for products made from sustainable, renewable, and environment-friendly resources, the very nature of natural fibers like abaca.

As the Philippines gears towards the attainment of inclusive growth through poverty eradication, the country's fiber industry can certainly be an immense contributor as it has high multiplier effect on job generation in both rural and urban communities. A wider mass-based manpower is needed from fiber production to semi-processing and manufacturing and in each stage of trading from the fiber and product sources to the mainstream and special markets, domestically and internationally. Men, women, and out-of-school youths have been provided economic and social benefits by the fiber industry that, currently, the industry sustains about 1.5 million Filipinos who are directly and indirectly dependent on it for a living. Moreover, the high value addition through abaca fiber conversion into industrial products is the country's best option not only for poverty eradication but also to the attainment of peace and order in the countryside. Economic activities in the target communities could likewise be hastened as rural families could generate more income through upcycling of extraction and plantation wastes into fertilizer, pesticides, disinfectant, bio-fuel and wellness products, definitely the driving forces for achieving inclusive growth.

The Philippines has more than 30 fibercrops, some of which are produced in commercial quantities with diverse applications which entail great economic importance. These fibers include abaca, banana, piña, silk, salago, sisal, maguey, buri, buntal, raffia, cotton, and coir. Abaca which is being grown in the Philippines for centuries is the most important among the commercially produced fibers in the country in terms of hectarage, production and contribution to the nation's economy. Abaca is endemic to the Philippines and has, for centuries, been synonymous to the Philippines because it is known worldwide as Manila hemp. The Philippines dominates the global abaca trade as the country supplies an average of 85.4 percent of the world's abaca fiber requirements with Ecuador and Costa Rica the remaining 14.4 percent and 0.2 percent, respectively, from 2010-2019. A total of 155,455 hectares was devoted to abaca with production reaching 69,829 MT from an effective area of 86,854 hectares. (PhilFIDA, 2019)

Although the bulk of the country's abaca fiber production is processed locally, most of these processed products, particularly abaca pulp (78.6%), cordage/rope (4.9%), and fibercraft/fabrics (0.9%), fabrics and yarns (0.7%) raw fiber (14.9%) are exported abroad. About 97.0% of the total abaca production in the country is exported which generated an equivalent of more than Php8 billion revenue in 2019. Being a dollar earner, the rapid developments in technology and product innovations happening worldwide are realities that the Philippine abaca industry is challenged to meet not only to maintain its global presence but to also strengthen its dominant position further in the international abaca trade. Along this context, there is an urgent need to align the existing programs and projects on Philippine abaca industry to the AmBisyon Natin 2040 and Philippine Development Plan 2017-2022 (PDP) and consistent with the United Nations Sustainable Development Goals with special focus on eradicating extreme poverty and hunger; promoting gender equality and empowering women; ensuring environmental protection and sustainability; and creating a global partnership for development.

B. Objectives

The general objective of this project is to develop an industry Roadmap that will set new and proactive direction for a stronger and more dynamic Philippine abaca industry responsive to global realities and challenges. Specifically, this roadmap aims to:

1. Present an industry analysis covering farm structure, industry performance (2021-2025) and policies;

2. Present new approaches, direction, and policy such as technologies for farm production, seedling production, treatment of diseases and processing of fibers for new uses;

3. Conduct benchmarking analysis;

4. Analyze the supply/value chain from input supply, production up to final sale of raw fibers;

5. Present the competitive analysis focusing on price differences and technical advantage of Philippine abaca over Ecuadorian abaca and other natural fiber;

6. Conduct SWOT analysis;

7. Craft an industry vision, mission, goals, objectives, strategies, action plan and the required budget; and

8. Determine the development programs and budgetary requirements, public and private initiatives (for possible local and global partnership for development and local/foreign direct investments).

C. Data Sources and Methodology

1. **Data Sources**

The crafting of this roadmap was based on the prescribed format, data and information provided by the PhilFIDA, High Value Crops Program of the Department of Agriculture and consultants from the University of Asia and the Pacific. The data for this expository study were gathered from both primary and secondary sources. The new administration made revisions to update the data.

Most of the information provided in this roadmap were obtained from the fiber statistics data of the Philippine Fiber Industry Development Authority (PhilFIDA) and Philippine Statistics Authority (PSA). Information particularly on production and baling were collected from traders and grading and baling establishment (GBEs)through the Data Monitoring System (DMS) of the agency.

Inputs were also collected from the local fiber processors/manufacturers and fiber exporters. The 2009 National Abaca Survey of Areas Planted to Abaca, a report by the Extension Services Division of the then Fiber Industry Development Authority (FIDA), also served as an important primary source for this paper. Various industry reports and publications from the internet were used as secondary sources of data. These include:

a. Report on the Conference on Sustainable Development, Rio De Janeiro, Brazil by the United Nations (June 2012);
b. Opportunities in Natural Composites by Lucintel (March 2011);
c. Renewables 2010 Global Status Report by the Renewable Energy Policy Network for the 21st Century;
d. As Ethanol Booms, Critics Warn of Environmental Effect by Erica Gies (2010);
e. American Energy: The Renewable Path to Energy Security by the Center for American Progress; and
f. Other reports on Kafus Bio- Composites, World Draping Organic, New Dimension to Organic Clothing,—Present Directives for Product Development, World Fiber Forecast 2030 and articles/publications from the Food and Agricultural Organization (FAO) of the United Nations and the International Documentation Center on Abaca of the University of the Philippines at Los Baños.

Inputs were also gathered from various industry stakeholders during consultation meetings and workshops organized by the PhilFIDA. A "Public Consultation on the Abaca Industry Roadmap" was conducted through video conferencing (Microsoft Teams) on April 20, 2021. This meeting was participated in by farmers, GBEs/exporters, traders, processors/manufacturers, members of the academe and representatives from the national government agencies (NGAs), non-government organizations (NGOs) and other private companies. From 2016 to 2019 additional inputs were also collected from the report on the Cross-Visit of Abaca Farms in Iloilo done by PhilFIDA Regional Office VIII, stakeholders fora in all regions and the management conferences. Likewise, various consultations were undertaken on Abaca Tuxy Buying Special Project (ATBSP) in the major abaca producing provinces like Catanduanes, Davao Oriental, Northern Samar, Leyte, Marawi City, Cagayan de Oro City and Butuan City, among others.

Major industry players like farmers/producers, traders, private sectors, processors and representatives from the academe, research institutions, NGOs, local government units (LGUs) and concerned government agencies attended the meetings and workshops. Views, insights, recommendations and commitments in the finalization and implementation of the programs/activities

in this Roadmap were solicited from the different participants during the workshops and fora.

Analysis of data for all the chapters in this roadmap were done using the available statistics. These data were explained using graphs and figures.

2. Area Coverage

This roadmap focused on abaca producing regions nationwide.

3. Analytics

This roadmap covered industry situationer, supply value chain analysis, local benchmarking, competitive analysis, market analysis, SWOT analysis, strategy settings, target planning and new policies for adaption of technologies to improve the industry.

Industry Situationer. This covers the assessment of the abaca industry structure and performance. The abaca industry situationer consisted of the abaca farm structure and size, performance (covering production area and yield, trade (both exports and imports), production technology, local consumption, and prices.

Supply/Value Chain Analysis. The supply/value chain analysis discussed the supply chain segments and players. It includes input supply, farm production, primary processing, trade, and final sale including the logistics between each process. Similarly, it analyzes the cost build up along the supply chain, including margins. It also dealt with the factors supporting growth of the industry particularly key and main industries, programs, production support and institutions. Finally, it identified the key constraints to value chain stability and sustainability.

Benchmarking analysis. This portion compares the typical and PNS-GAP in abaca fiber production. The analysis utilized both the quantitative and qualitative measures. Qualitative analysis includes the planting density, plant propagation or cultural management practices, disease management, fiber extraction method and trading. On the other hand, quantitative analysis includes the average yield per hectare, income, payback period and Internal Rate of Return (IRR).

Competitive Analysis. The price competitiveness of the abaca industry was analyzed as a highly exportable product. Analysis includes the export price, domestic wholesale price and export price ratio.

Market Trends and Prospects. The market trends and prospects determine the growing global interests and acceptability of the natural fiber products emphasizing its role in the green economy. It includes discussion on

the potentials and markets of pulp and paper, composites for automotive, construction and other purposes, textile, new product innovation and an important component for sustainability certification of green products.

SWOT Analysis. This presented the industry's advantages as strength and opportunities and the constraints as the weaknesses and threats identified according to the supply chain segments.

Target Setting. This portion includes the vision, mission, objectives, and targets (area, income, and job generation).

Strategies and Policies. This covers the critical key result areas which have to be addressed along the supply chain to enable the industry to meet the targets as indicated in this roadmap.

4. Limitation

Abaca fiber is a raw material being used for industrial products such as pulp and paper, cordage, fibercraft, nanocellulose and many others. The value chain analysis covers only raw fiber or primary processing, market linkage and promotion.

CHAPTER II

INDUSTRY SITUATIONER

A. Abaca Farm Structure and Size

The abaca farm structure in the Philippines is classified as a small farm which is owned and managed by individual farmer. It has an average area of 0.69 ha for every farmer. There are only few abaca farms being established and managed by cooperatives or associations.

Statistics shows that total farm area as of December 2019 dedicated for abaca farming in our country is almost 155,455 hectares with an effective area of 86,854 hectares. The ratio of the total land area for abaca planting over the total land area of the country reveals that only a small portion of the country's land area is utilized for growing abaca because abaca farms are concentrated in the mountain and hinterland areas.

The region with the highest expansion potential is DAVAO Region. Although, record shows that DAVAO Region only ranks third in 2019 at 14.6 percent fiber production or 22,750 hectares in terms of the current land area, it has the highest potential for expansion at 3.78 percent of the total national land area with 5,832 hectares capable of being expanded and converted into abaca areas. When this land area is fully converted to abaca farming, this will make the total area for the DAVAO Region to some 28,581 hectares, which is slightly higher compared to the combined and current land areas of Eastern Visayas. Corollary to this is the potential area for expansion in the SOCCSKARGEN Region placed at 2,536 hectares, which when added to the current area planted with abaca, it would total to 12,419 hectares. Once fully tapped and developed, the combined abaca areas for the DAVAO and SOCCSKARGEN Regions will total to 41,000 hectares.

Region V or the Bicol Region has a total land area of 55,284 hectares in 2019. This land area is comparable to combined abaca areas of Regions Caraga, Davao, SOCCSKSARGEN and Western Visayas. Most of the areas planted with abaca in Bicol Region are heavily concentrated in Catanduanes comprising 66 percent of the total area for the region. Second to Bicol Region is Eastern Visayas with a total land area of 28,038 hectares dedicated to growing abaca.

In 2013, Glatfelter, the biggest producer of abaca pulp and paper in the world, was already looking for alternative sites for planting of abaca as its main supplier, Catanduanes, is always visited by typhoon. Glatfelter was recommending Panay to be developed because of its quality fiber. The target

expansion areas are concentrated mainly in less-typhoon visited provinces where abaca is suitable.

At present, abaca farming is concentrated at the Bicol Region, Visayas and Mindanao areas specifically on the Eastern part of the country as manifested with the top three regions. On the other hand, the three regions having the least land area in terms of abaca farming can be found within Luzon.

There are four (4) abaca pulp companies located in Albuera and Baybay, Leyte, Malinao, Albay and Balo-i, Lanao del Norte.

Due to the recent occurrence of typhoons it resulted to severe damage of the abaca areas in Bicol, Eastern Visayas and Eastern Mindanao. The most affected abaca damage area brought about by typhoon Rolly was in the province of Catanduanes which produces one-third (1/3) of the country's abaca supply. This prompted PhilFIDA through the FY 2021 Php50 million Senate amendments and the DA-BAR funded project to spread the concentration of abaca plantation in other areas like in Cagayan Valley (100 ha), Nueva Vizcaya (100 ha), Aurora Province (100 ha), Oriental Mindoro (100 ha), Camarines Norte (100 ha), Aklan (100 ha), Negros Oriental (100 ha), Southern Leyte (100 ha), Zamboanga del Norte (100 ha), Zamboanga del Sur (100 ha), Misamis Oriental (200 ha), Bukidnon (300 ha), Davao Occidental (100 ha), South Cotabato (100 ha), North Cotabato (200 ha) and Agusan del Norte (200 ha).

The projected monthly production on the 21 new abaca expansion areas (100 ha each) is 22,500 to 30,000 kgs dry fiber all first-class quality. This is equivalent to a combined annual production of 5,670 to 7,560 MT or 45,350 to 60,480 bales starting on the 3rd year from planting for the next 40-50 years without replanting as long as the farmers follow the Good Agricultural Practices (GAP) on abaca.

In terms of tenurial status of abaca farmers, 63 percent of the total abaca farmer population own their respective farms and another 13 percent obtained the land they are currently tilling from ancestral domains and timberlands. Some ten thousand farmers or 9 percent of the population are tenants of their respective farms and the rest are Administrator, Land Transfer, and Informal Settlers (15 percent).

Data revealed that only 13 percent of the abaca farmers use fertilizer in growing abaca. Majority of the farmers or 87 percent do not apply fertilizer at all, and they depend only on the available soil nutrients. To those farmers who apply fertilizer, 11 percent use organic fertilizer while 2 percent use the inorganic ones.

Noting for a fact that farming is one of the major livelihoods in the Philippines, land areas for abaca farming are most, if not all, are being shared with some other crops. Record shows that a combination of banana and coconut are the most common crops together with abaca comprising of 44 percent of the area. This can be logically traced since these crops are grown in almost the same condition with abaca thus farmers obtain other alternative sources of income from these. Next to the combination of banana and coconut, dominantly banana comes as the second most common crop occupying 16 percent of the area. Only 2 percent of the abaca farms with root crops. (2009 National Survey of Areas Planted to Abaca). **PhilFIDA does not recommend growing banana with abaca.**

Two of the most significant demographics that measure productivity of farms are the frequency of harvest and weeding. The frequency of harvest determines the annual farm productivity while the frequency of weeding indicates the conscious effort on the part of the farmers to clean their respective farms to avoid infestation of diseases and thus, result to higher yield. Both annual harvest and weeding frequencies show that in general, abaca farmers harvest and weed their respective farms once to twice a year.

As part of the normal farming process, the specific market to which the abaca farmers sell their abaca fiber is also determined. Study reveals that 85 percent of farmers sell their fibers in barangay and town traders, 12 percent to fibercraft makers, two (2) percent sell their produce to GBEs and less than one (1) percent to abaca pulp and cordage processors.

B. Performance

1. Production, Area and Yield

From 2010-2019, production of abaca fiber averaged at 67,545 MT, increasing by 2.2% every year. The slump in fiber output due to weakened market demand as a consequence of the worldwide financial crisis in 2009 continued in the succeeding year with an aggregate production of 57,223 MT In 2011, however, the fiber output recovered with a total of 73,274 MT, a significant increase of 28.1% compared to 2010 level. During the ten-year period, abaca fiber production was recorded at its lowest in 2013 with only 55,958 MT while the highest was in 2018 with 76,259 MT. The substantial drop in 2013 production (13.7% against 2012) was attributed to the devastating typhoons Yolanda and Pablo that hit Leyte, Samar, Panay provinces and Mindanao. After its peak production in 2018, abaca fiber output again decreased in 2019 by 8.4% to 69,829 MT. This is caused by the cut in fiber production due to strict enforcement of quality standards, midterm election, the 4P's grant, ponzi scheme earning and the Build Build Build Project of the government.

Fiber production performance in 2010 to 2019 was like a seesaw going up and down, however, it still registered an annual average growth of 2.2%. The continuous/active effort done by PhilFIDA in the opening of new abaca areas and rehabilitation of diseased abaca farms resulted to the increasing trend.

Figure 1. Abaca Fiber Production (in MT), 2010-2019

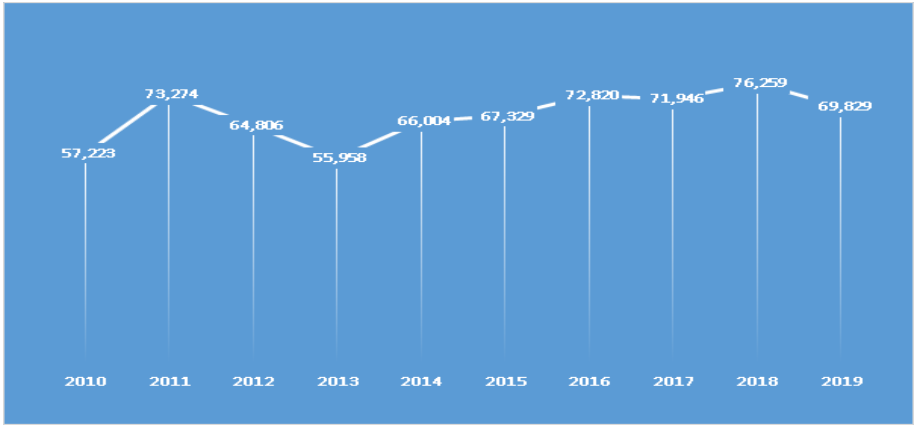
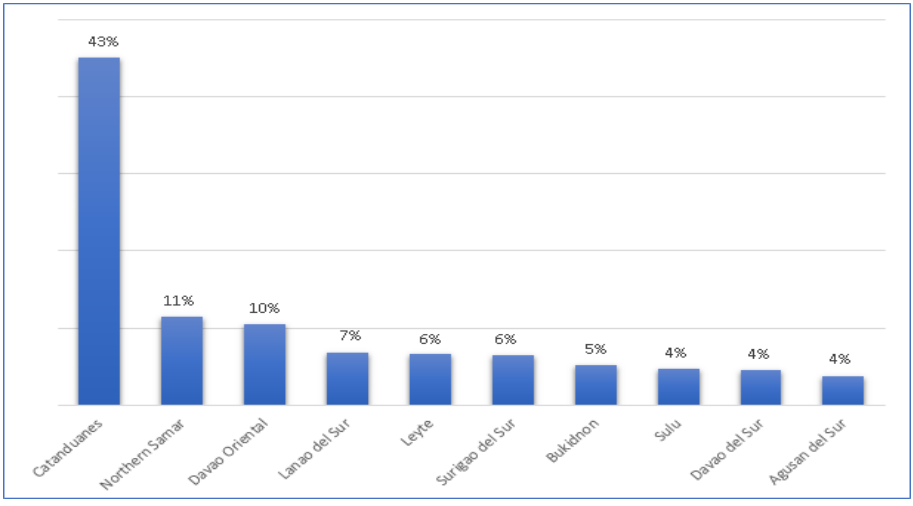


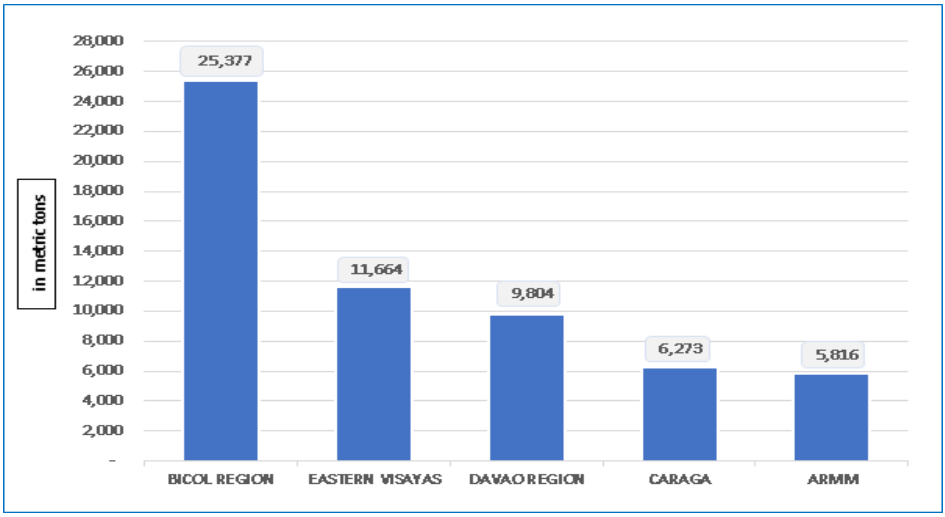
Figure 2. Top Abaca Producing Provinces (% share), 2010-2019



Catanduanes continued to be the leading abaca producing province from 2010-2019 with an average fiber output of 22,548 MT per year. This was followed by Northern Samar and Davao Oriental with 5,720 MT and 5,258 MT, respectively. The other provinces which entered the top five (5) during the ten-year period are Lanao del Sur and Leyte.

In 2019, the top five (5) provinces that contributed largely in abaca fiber production are Catanduanes, Northern Samar, Davao Oriental, Surigao del Sur and Lanao del Sur.

Figure 3. Top Abaca Producing Regions (in MT), 2010-2019



The top five (5) abaca producing regions are Bicol, Eastern Visayas, Davao Region, Caraga and ARMM.

The implementation of abaca plantation expansion program "Development of New Agri-Business Lands" in 2005 encouraged farmers to open new abaca plantations. From 2010 to 2016, the gross area planted to abaca continued to increase, however, in 2017, the hectarage diminished by 14.7% against 2016, or from 180,302 hectares to 153,754 hectares. The total abaca area further reduced to 141,614 hectares in 2018 but again increased in 2019 by 9.8%, to155,455 hectares. Gross area includes effective productive areas and non-productive areas (sporadic).

Figure 4. Area Planted to Abaca (in ha), 2010-2019

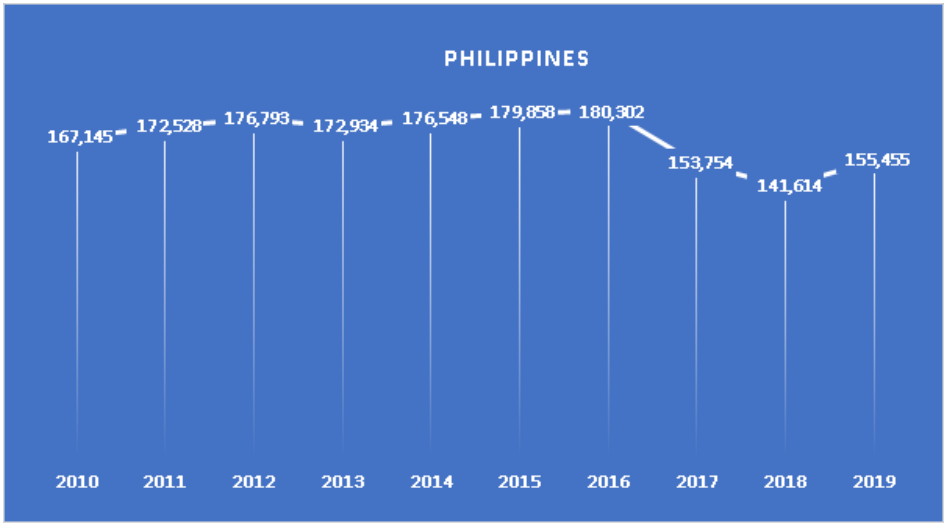
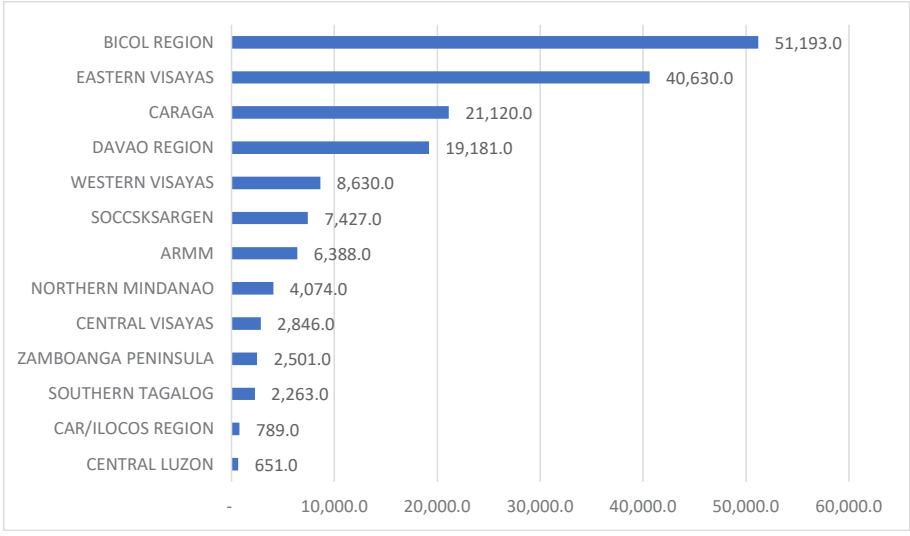


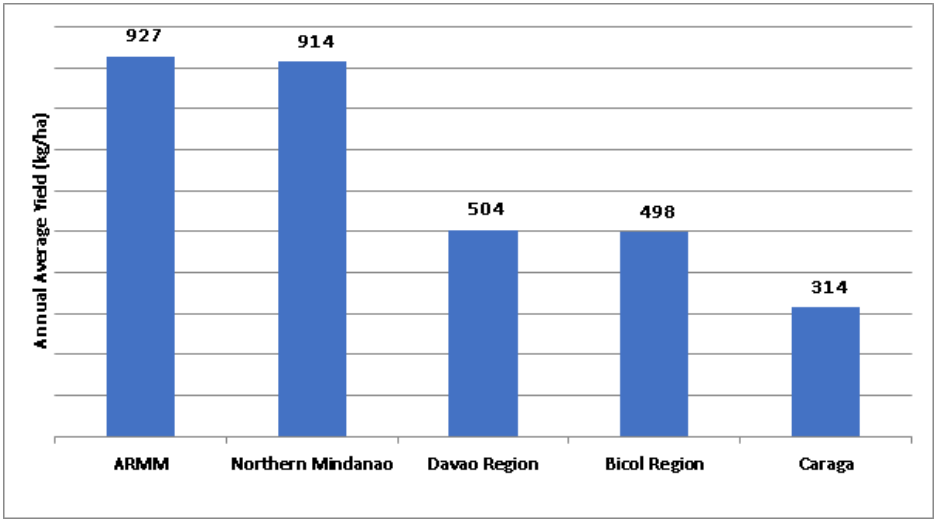
Figure 5. Regional Distribution of Abaca Farms, 2010-2019



In terms of regional distribution of abaca farms, the Bicol Region has the largest area with an annual average of 51,193 hectares or 30.5% of the total abaca areas nationwide. About 66.4% of the total abaca areas in the Bicol Region is concentrated in Catanduanes.

Second to Bicol Region is Eastern Visayas with a total abaca area of 40,630 hectares or 24.2 % dedicated to growing abaca. Caraga and Davao Regions ranked third and fourth with areas of 21,120 hectares (12.6%) and 19,181 hectares (11.4 %), respectively.

Figure 6a. Top Regions in Terms of Yield, 2010-2019



The ARMM ranked highest in terms of annual average yield for the period 2010 to 2019 with 927 kgs per hectare. Northern Mindanao quickly followed with 914 kgs while Davao, Bicol, Caraga Regions recorded 504 kgs, 498 kgs and 314 kgs, respectively.

While Bicol Region was the highest producing region for the past ten years, its yield per hectare is lower compared to Northern Mindanao, ARMM and Davao Region.

Figure 6b shows that as of 2019, Bicol Region has the largest effective area of 33,509 hectares followed by Eastern Visayas with 14,206 hectares and Davao Region with 13,093 hectares. Central Luzon has the smallest effective area of 60 hectares.

Figure 6b. Effective Area per Region (in ha), 2019

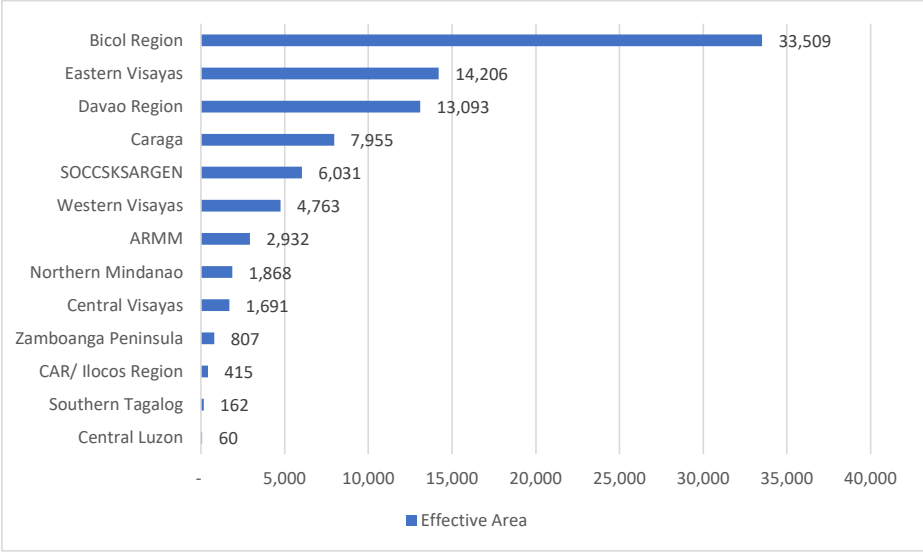
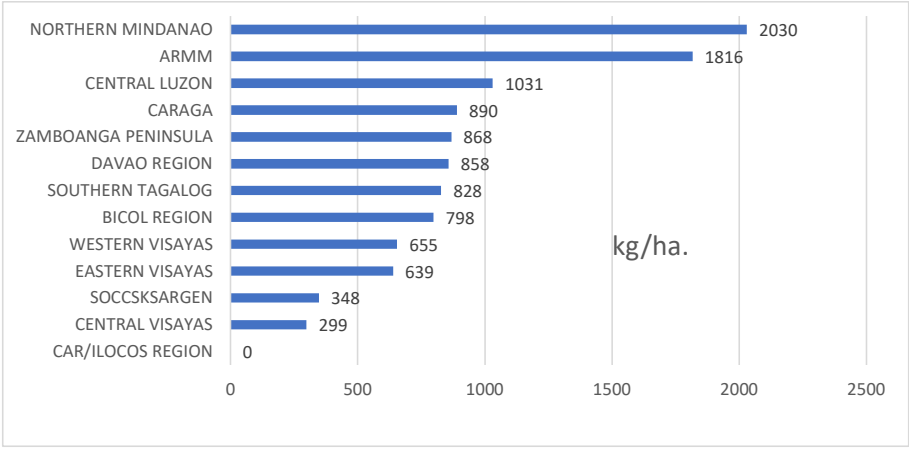


Figure 6c shows that Northern Mindanao remains the highest producing region in terms of yield for the year 2019 with 2,030.1 kilograms per hectare followed by BARMM with 1,816.3 kilograms per hectare and Central Luzon with 1,030.5 kilograms per hectare.

Figure 6c. Abaca Fiber Yield per Region, 2019 (Based of Effective Area)



2. Prices

The price of abaca fiber depends on the manner of extraction, whether hand-stripped, spindle-stripped and decorticated based on fiber grade and cleaning.

Table 1. Abaca Fiber Classification and Grades

	Fiber Grades
Excellent	EF, S-EF, S2, S-S2, S3, and S-S3
Good	I, S-I, G, S-G, H, and S-H
Fair	JK, S-JK, M1, and S-M1
Residual	Y1, S-Y1, Y2, S-Y2, O, S-O, T, S-T, WS, and S-WS
Decorticated Fibers	AD1, AD2, AD3, AD4, and ADR

As a traded commodity, the price of abaca fiber is also dependent on market forces. The 10-year period showed upswing on abaca prices due to shortage of fiber supply in the market. This was attributed to inadequate farm production, rampant infestation of diseases in abaca farms and inefficient post-harvest machineries and facilities. Grades EF and S2 command a higher price among abaca buyers.

Figure 7. Weighted Average Export Prices of Hand-Stripped Abaca by Grade, 2010-2019 (in F.O.B. US$/BALE)

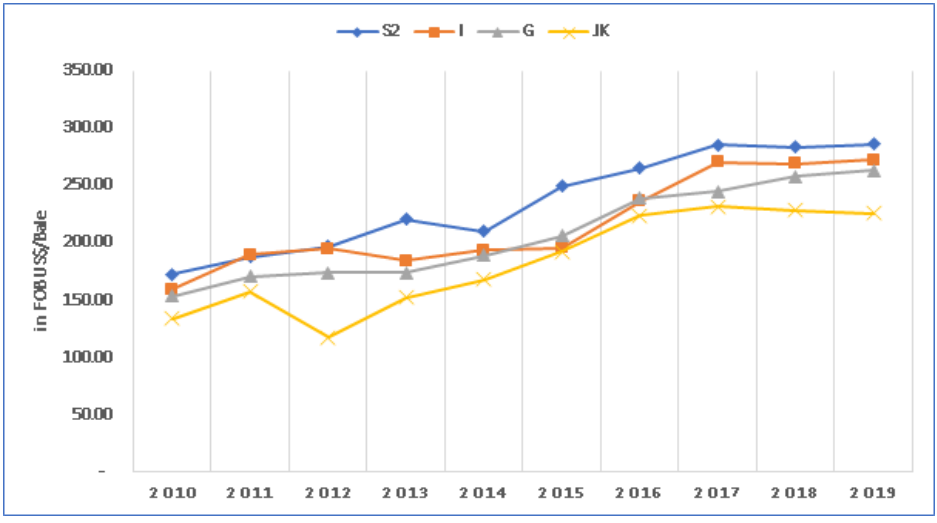
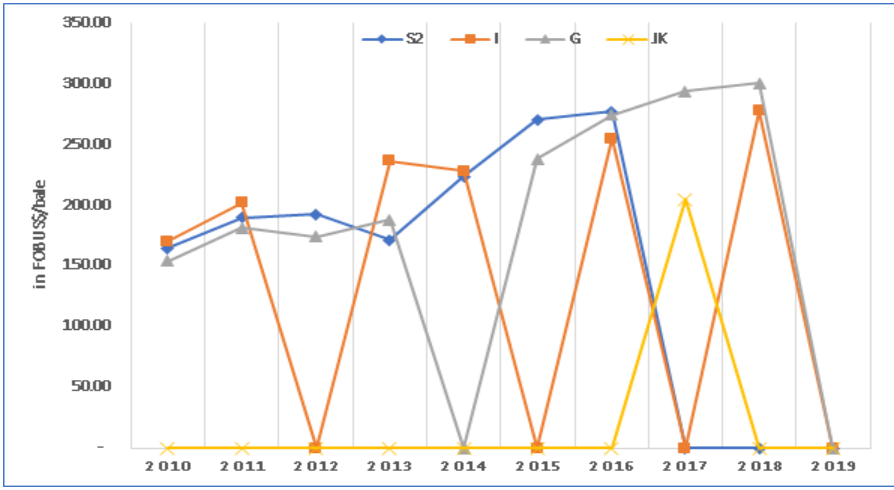


Figure 8. Weighted Average Export Prices of Spindle-Stripped Abaca by Grade, 2010-2019 (in F.O.B. US$/BALE)

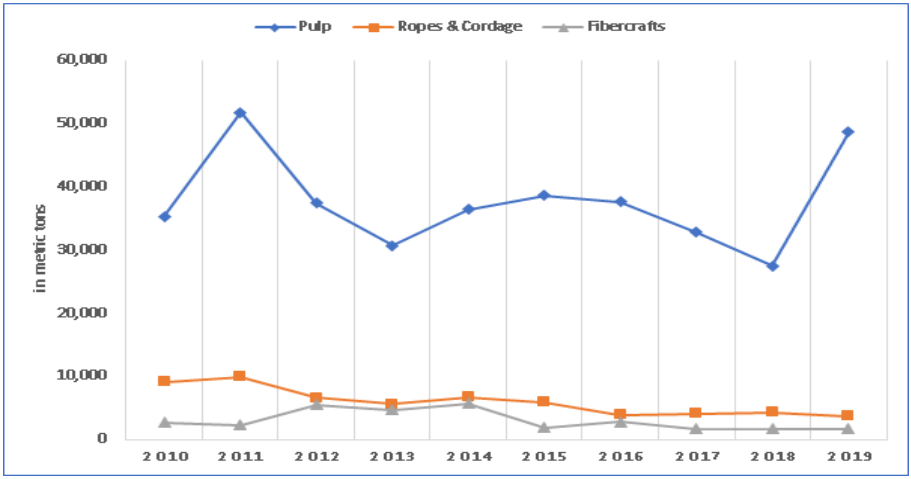


3. Local Consumption

Domestic processors used an average of 46,696 MT or 69.1 percent of the country's average yearly production of abaca fiber during the past decade (2010-2019). Despite the erratic trend in local utilization by some sectors, total domestic consumption grew at an annual average of 1.5 percent in 2010-2019. Abaca fiber is being processed locally into pulp, cordage and various fibercraft products.

The pulp sector consistently remained as the growth area of the abaca industry utilizing an average of 37,671 MT or 80.7 percent of the annual average local consumption, increasing at a rate of 3.6 percent per annum. The pulp millers' utilization level is highly dependent on the demand for pulp by the specialty paper manufacturers abroad as abaca pulp is the raw material used in meat and sausage casings, tea/coffee bags, k-cups, cigarette paper, currency paper and others. Processing of pulp into specialty papers is done in Europe, the US, Japan, and China as there is no available processing facility in the country.

Figure 9. Domestic Consumption of Abaca, 2010-2019



The cordage sector, on the other hand, consumed an average of 5,975 MT of abaca fiber per annum or about 12.8 percent of the yearly average usage of domestic manufacturers. Utilization decreased by 9.6 percent per year from 2010 to 2019. Cordage and allied products have continuously been facing stiff competition from synthetics and other cheaper natural materials.

Fiber utilization of fibercraft processors who are mostly cottage-based, exhibited a decreasing trend of 5.0 percent and consuming an average of 3,050 MT or 6.5 percent of the annual average domestic consumption. These figures, however, may not reflect the actual situation in the fibercraft industry, as purchases of other fibercraft makers were in loose form and therefore, difficult to monitor. Unlike the other sectors, the fibercraft processors are numerous, not well-organized and are scattered throughout the country.

In 2019, domestic consumption of abaca fiber enormously increased by 61.1 percent compared to the 2018 level. This was due to the big leap in the utilization of pulp millers which accounted for 76.9 percent of the total domestic consumption for the year. The total consumption of the pulp sector for 2019 reached 48,631 MT which is higher than the 10-year average total consumption of 46,696 MT.

4. Trade

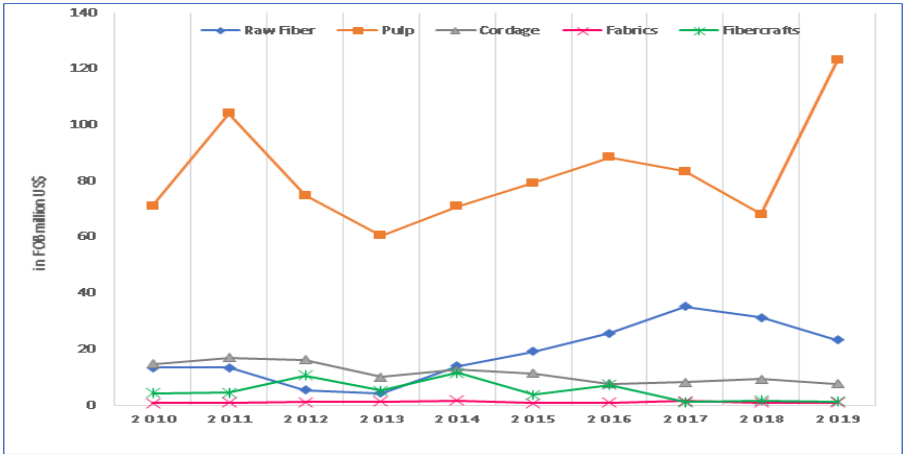
Exports

For the past ten years, the Philippines generated an average of US$119 million per year from the exports of abaca fiber and manufactures. About 84.4 percent of the export earnings or an average of US$100 million came from abaca manufactures such as pulp, cordage, fabrics/yarns and fibercrafts. The

remaining 15.6 percent was from raw fiber exports with yearly average earnings of US$18.6 million.

Pulp continued to lead in terms of export revenues among the abaca manufactures. Earnings from pulp averaged US$82.5 million equivalent to 69.3 percent share of the total average export earnings during the period. Meanwhile, cordage and fibercrafts generated an average of US$11.5 million (9.7%) and US$5.2 million (4.4%) per year, respectively. Fabrics/yarns, on the other hand, accounted for US$1.2 million or 1.0 percent of the yearly average. In 2019, total export earnings from abaca fiber and manufactures reached US$156.6 million registering a huge 40.3 percent growth over the previous year.

Figure 10. Export Earnings from Abaca Fiber and Manufactures, 2010-2019



Abaca Fiber

Exports of abaca fiber averaged 11,052 MT per annum from 2010 to 2019 with minimal growth of 0.4 percent per annum. In 2013, raw fiber exports suffered a major slump recording only 3,345 MT. The following years, however, showed vast improvements as fiber exports started to increase in 2014 with its volume almost reaching the 2011 level at 9,792 MT. The highest volume of abaca fiber exports during the period was in 2017 with 18,243 MT. In the succeeding years (2018 and 2019), however, the quantity of exports was again on the downtrend. Exports in 2019 was only 11,748 MT, lesser by 27.2 percent and 35.6 percent against 2018 and 2017, correspondingly.

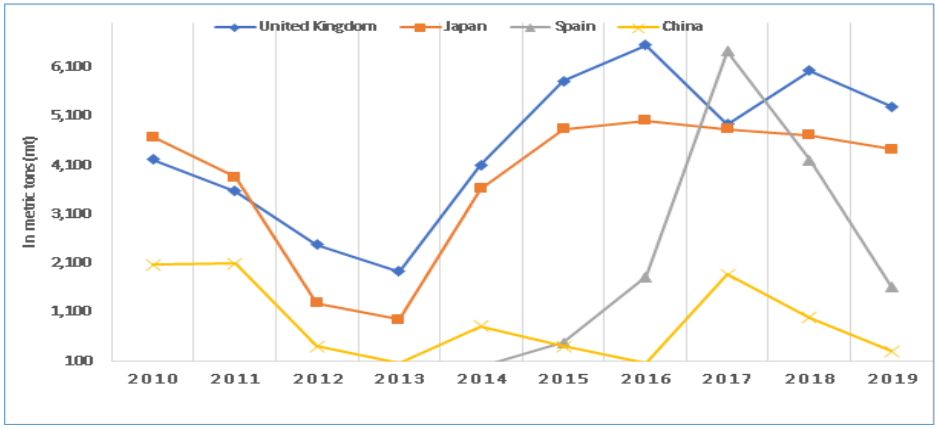
Europe, specifically UK and Spain, is the premier destination of abaca fiber. On the average, UK absorbed 4,497 MT or 40.7 percent while Spain purchased 1,457 MT or 13.2 percent during the last ten years. Fiber exports to the UK rose yearly by 2.6 percent from 2010-2019 while Spain registered an annual growth of 35.7 percent since it started importing abaca fiber in 2015.

The Asian market is the second most important destination of abaca fiber, with Japan as the leading buyer. Japan continued to influence abaca trade in the region accounting for the biggest market of 3,829 MT or 34.6 percent of the ten-year average exports. Japan imports, however, exhibited a negative growth of 0.6 percent during the period 2010-2019. Its purchases started to drop in 2011 to only 3,867 MT and further dipped to 1,297 MT and 960 MT in 2012 and 2013 due to the continuing effects of the financial downturn following the global economic recession in 2009. In 2014, fiber exports to Japan exponentially improved gaining a 277 percent increase to 3,625 MT compared to the previous year and further increased in the following years. Highest export volume to Japan was 5,010 MT recorded in 2016.

China is also an important market consistently buying abaca fiber from 2010 to 2019 with 913 MT yearly average. Its share accounted for 8.3 percent of the overall trade and is presently the second biggest Asian market for Philippine abaca fiber. China uses the fiber in the manufacture of tea bag, capacitor paper and fibercrafts.

On the other hand, India and Indonesia are also regular buyers of abaca fiber although the shares were very minimal at less than one percent each. In 2019, there was no recorded shipment of abaca fiber in India due to the restrictions imposed by their government banning the entry of the fiber. This was allegedly due to the result of the Indian Pest Risk Analysis (PRA) that identified *Ralstonia solanacearum* race 2 (Moko disease) as quarantine pest, which is actually a pest of *Musa species* or banana plants and planting materials (rhizomes, suckers). Abaca fiber is used as raw material in the manufacture of cordage and fibercrafts in these countries.

Figure 11. Export of Abaca Fiber by Destination, 2010-2019



The US market is a former destination for abaca fiber, but its biggest abaca pulp mill ceased to operate in 2004 to concentrate in the UK and was also seriously hit by recession in 2009 which led to its non-importation of abaca fiber from the Philippines in the succeeding years.

Abaca Pulp

Abaca pulp is exported mainly in Europe, Asia, and North America. From 2010-2019, pulp exports averaged 21,719 MT registering a 3.3 percent annual growth.

Europe is the most important destination for Philippine abaca pulp since it is home to a number of specialty paper manufacturers. Both UK and Germany had its market share of 31 percent each during the 10-year period, with average volume of 6,827 MT and 6,739 MT, respectively. France is also a consistent buyer with yearly average imports of 1,310 MT or 6 percent share to the total annual average exports.

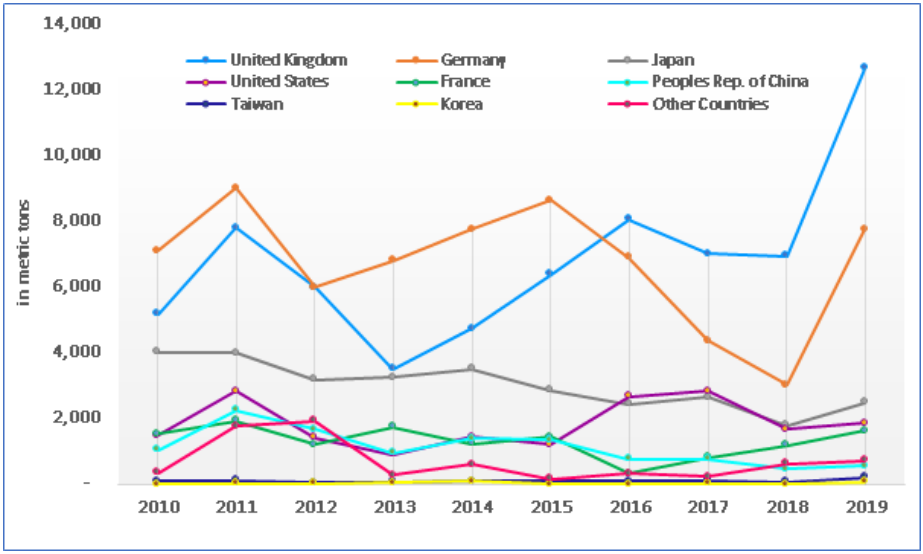
In 2019, exports of abaca pulp to Europe were 22,453 MT accounting for 80 percent of the total, with 12,652 MT or 45 percent absorbed by the UK.

Japan is the leading destination among Asian countries with purchases averaging at 3,023 MT yearly or 14 percent of the total pulp exports. Aside from the Japanese yen, abaca is processed into capacitor paper, insulation paper, tea bag, masking tape, stencil paper, filter oil absorbent paper and other specialty paper products.

Likewise, China and Taiwan constantly imported abaca pulp during the last ten years. Their shares though were fairly minimal at 5.2 percent and 0.5 percent, respectively. Taiwan's imports from 2010-2019 was increasing yearly by an average of 9.7 percent but China's purchases were on a downtrend diminishing by 6.6 percent annually. The Republic of Korea also has its share in the Asian market but in small quantities only.

Abaca pulp exports to the US averaged 1,838 MT or a share of 8.5 percent to the annual average during the 10-year period. Abaca is currently utilized in the manufacture of cigarette filters of the Winston and Marlboro Lights cigarettes, among others.

Figure 12. Export of Abaca Pulp by Destination, 2010-2019



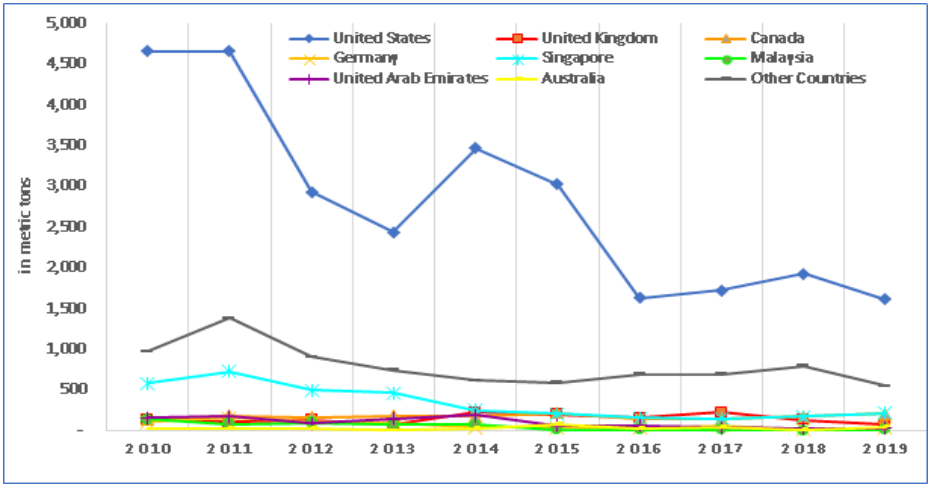
Abaca Cordage and Allied Products

From 2010 through 2019, exports of abaca cordage and allied products such as ropes, cables and twines averaged 4,728 MT per year. Shipments were decreasing at 9.6 percent annually. The stiff competition posed by cordage products made of synthetics and other cheaper natural materials continued to affect the country's abaca cordage industry.

The US absorbed the bulk of the exports accounting for 62.2 percent, or an average of 2,942 MT. Singapore, Canada, UK, UAE, Germany, Malaysia, and Australia consistently remained as important markets for Philippine cordage.

Cordage exports was at its lowest in 2019 with only 2,795 MT total shipment to export destinations, a significant drop of 14.9 percent over the previous year's volume of 3,285 MT.

Figure 13. Export of Abaca Cordage and Allied Products by Destination, 2010-2019



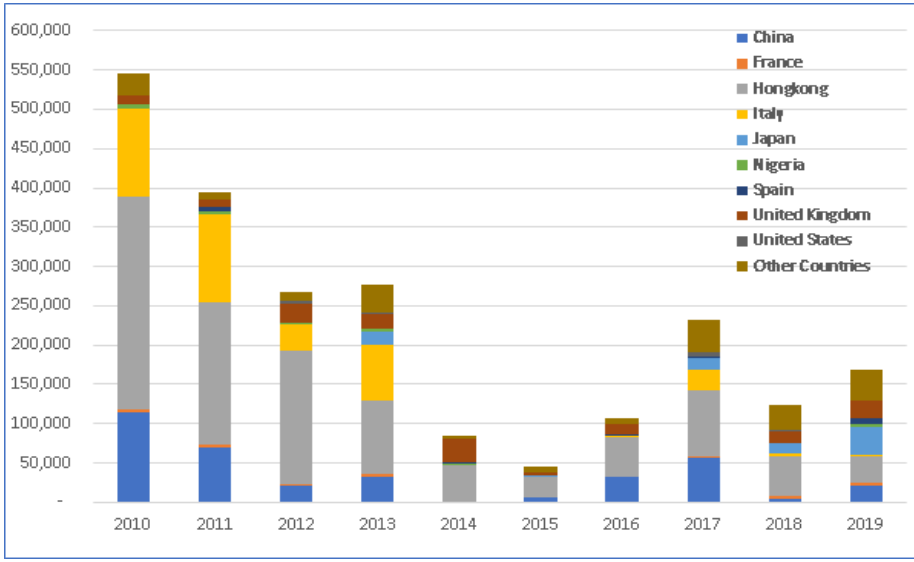
Abaca Fabrics

Exports of abaca fabrics recorded an annual average of 224,589 square meters (sq. m.) in the last ten years but on a downtrend at a yearly rate of 12.2 percent. Hongkong, Italy and China, the major buyers of abaca fabrics, registered significant reductions in their imports at an annual rate of 20.8 percent, 35.7 percent, and 17.5 percent, respectively.

Hong Kong was the biggest market, importing an average of 100,680 sq. m. per year or 44.8 percent of the overall average. It was followed by Italy with average purchases of 36,211 sq. m. or 16.1 percent of the total. China ranked third with an annual average of 35,615 sq. m. equivalent to 15.9 percent share. Abaca fabric exports was lowest in 2015 at 44,616 sq. m. while the highest recorded during the period was in 2010 with a total of 545,113 sq. m. The major slump experienced in 2014 and 2015 was immediately offset in the subsequent year with an enormous 140.8 percent increase. Export quantity again dipped in 2018 by 46.6 percent but shortly recovered in 2019 with 36.2 percent increase.

Other regular buyers were the UK, Japan, France, Spain, and the US with corresponding imports averaging 14,725 sq. m., 8,136 sq. m., 2,543 sq. m., 2,040 sq. m. and 1,437 sq. m. per year. Nigeria's importation had been noticeably regular from 2010 to 2014 but no exports were recorded in the following years (2015-2018). In 2019, however, Nigeria again purchased a total of 3,725 sq. m. Its yearly average imports were 1,874 sq. m. On the other hand, purchases of other trading partners were intermittent during the last ten years.

Figure 14. Exports of Abaca Fabrics by Destination (in sq. m.), 2010-2019



Generally, the demand for abaca fabrics and other fiber-based products is largely dictated by fads and fashion. However, other consumers patronize natural-based materials not only due to their unique appeal but also due to environmental considerations.

Imports

Since 1991, local pulp manufacturers had been importing abaca fiber from Ecuador except in 2005. The pulp processors resorted to importation to address the deficiency in local supply of specific grades and meet pulp buyers' specifications. In 2012, Philippine imports of abaca fiber was at its lowest which fell by 4.8 percent against the 10-year period average to only 95 MT valued at US$93,597. Fiber imports was at its peak in 2017 with 5,218 MT valued at US$ 13.1 million. Volume of imports in 2019 was very close to the 2017 level at 5,214 MT.

Figure 15. Quantity of Imports of Abaca Fiber (in MT), 2010-2019

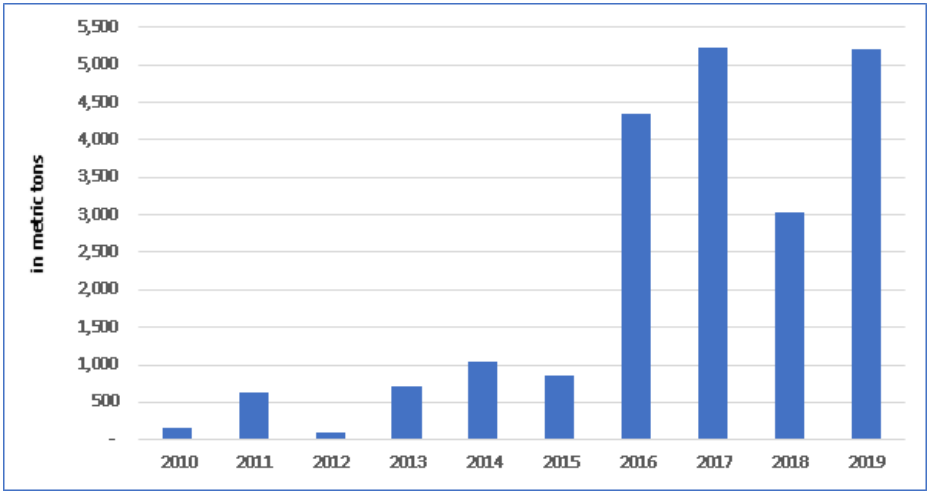
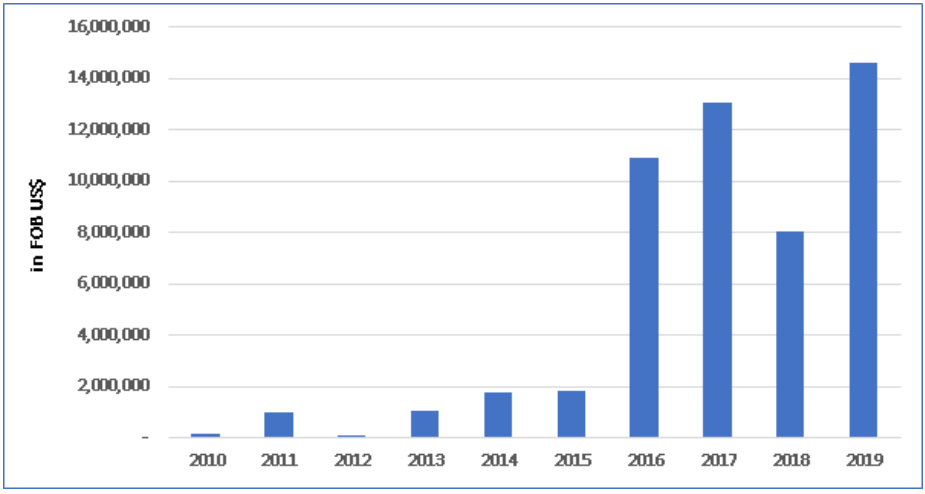


Figure 16. Value of Imports of Abaca Fiber (in FOB US$), 2010-2019



CHAPTER III

FARM INCOME ANALYSIS

Cash flows are compared between typical and GAP farming at every step of production of abaca fiber. Typical farming requires less farmer intervention and material inputs than GAP farming. The data for typical farm was based on abaca farm in Bicol Region planted with Abuab variety. The data for GAP farm was based on Maguindanao variety planted in Davao.

A. Production Costs

Establishment cost is Php39,470 for the typical and Php 68,270 for the GAP farm including 10 percent allowance for mortality of planting materials. The planting densities are at 1,600 hills per hectare both for typical and GAP. An average labor and material cost of Php128,481 and Php3,705 for typical farming and Php 222,028 and Php 25,933 for GAP farming, respectively will be incurred. Additionally, logistics amounting to Php 4,612 and Php 16,740 for typical farm and GAP farm, respectively.

Total maintenance cost is Php8,805 for the typical farm and Php 41,331 for the GAP farm. On the typical farming, weeding and under brushing are done only once during harvesting of abaca. No fertilizer application and pest control are being performed by the farmer. While on the GAP farming, weeding and under brushing are done three times a year. Pesticide/insecticide application at the rate of one liter per hectare is done twice a year to prevent the occurrence of pest and diseases. Three bags of ammonium sulfate and complete fertilizer are being applied three times a year.

Average harvesting cost per year for typical farming is Php122,893 while GAP farming has an average harvesting cost of Php208,770. At the farm level, only primary processing is undertaken. This involves the extraction of fiber from the harvested tuxies. The two methods of extraction being used are hand stripping for typical farming and mechanized stripping for GAP farming. Drying is done through sun and air.

The abaca tuxies' dry fiber recovery of 1.0 and 1.5 percent is obtained using zero (0) serration hand-cleaned stripping knife and spindle stripping machine, respectively. On the other hand, a fiber recovery of 2.0 percent or more is attained using decorticating machine for the discarded leafsheaths being utilized under GAP farming.

B. Returns

Average yield during the productive years (1-10 years) of 1,980 and 5,544 kilogram per hectare are produced from typical and GAP farming showing a 3,564kg difference favoring the latter practice. The abaca fiber is being sold to trader processors/exporters at an average price of Php68.00 per kg for the typical while Php100.00 per kg for the GAP farm (price range Php90.00-120.00). An average of Php152,266.00 gross income is gained from typical farming while Php537,408.00 is gained from GAP farming. There is a difference of Php365,437.00 in favor of GAP farming. After deducting the expenses, typical farming gained an average annual net income of Php15,468.00 per hectare compared to Php272,708.00 in GAP farming. There is a noticeable difference of Php257,240.00 between the two farming practices.

The internal rates of return for the typical and GAP farms are 46 and 209 percent, respectively. Payback period for the typical farm is 3.22 years compared to 2.04 years for the GAP farm. GAP farming is the better practice.

Table 2. Abaca: Summary of Farm Cash Flows, Philippines, 2020

PARAMETERS*	TYPICAL FARM	GAP	DIFFERENCE
Average yield per ha (kg)	1,980	5,544	3,564
Peak yield per ha (kg)	2,400	6,720	4,320
Average establishment cost per ha	39,470	68,270	28,800
Average cash outflow per ha	136,798	264,700	127,902
Average Price per kg (farmer's	68	100	32
Average cash inflow per ha	152,266	537,408	385,142
Average net cash flow per ha per	15,468	272,708	257,240
Average Area in hectare to get preferred net income of Php 125,772 (poverty threshold, 2018)	8.13	0.46	7.67
Average Prod'n cost per kg	60.19	50.81	9.38
Payback period (years)	3.22	2.04	1.18
IRR (percent)	46	209	163

Note: Establishment cost refers to Year 1 costs; the average cash outflow, average yield, average cash inflow, and average net cash flow are based on average cash flow values from Years 2-10, the productive years
Source: Actual interview with the trader and farmer, Data from abaca farm record keeping project. Please refer to Annexes 12 and 13 for details.

CHAPTER IV

SUPPLY/VALUE CHAIN ANALYSIS

This chapter discusses the supply/value chain of abaca fiber in typical and good farms. The value chain involves the processes of production, marketing, and sale of abaca fiber in both farms. The supply/value chain for these two types of farms will be differentiated through the technology being applied by the farmers, particularly in fiber production, in order to efficiently address market demand. The sequence of abaca business activities from the provision of inputs to primary production, transformation, and marketing, up to the final sale; the players, key institutions and support industries involved in all the processes; and the costs, value added and margins prevailing in the abaca fiber industry will be presented in this chapter.

A. Supply Chain Segments and Players

The segments along the supply chain are identified by players and their main functions.

A.1. Inputs Supply

Planting Materials. Abaca planting materials come from PhilFIDA nurseries/seedbanks/tissue culture laboratories, farmer-owned accredited nurseries, and private sector-owned tissue culture laboratories.

Tools and Equipment. Tools and equipment such as bolo, rake, spade, power sprayer, grass cutter and others will be supplied from the accredited dealers of farm tools and machinery equipment, hardware stores and agricultural supply stores in the locality.

Fertilizers and Pesticides. This will be procured from the agricultural supply dealers and stores in the locality.

A.2. Farm Production

Farmers cultivate land, fertilize, maintain, and harvest abaca stalks for primary processing of producing abaca fiber. It involves farm activities such as area selection, land preparation (underbrushing, digging of holes, and layouting), planting, farm management (weeding, pest and disease control, fertilization and trimming of dry leaves) and harvesting (topping of leaves, tumbling, hauling, and piling).

A.3. Primary Processing

This process includes extraction of abaca fiber from the stalks (tuxying, spindle stripping or decorticating) drying of fibers and bundling. This will be done by the farmers, skilled strippers, and laborers. Hand hagutan tools will be used for manual extraction while spindle-stripping machine and decorticating machine for mechanized extraction process. These will be all procured from accredited fabricators in the locality.

A.4. Trade

Trading is done directly in the farm or local barangay, municipal/town, and provincial traders/buyers. Traders buy dried abaca fiber from the farmers at semi-classified basis (not yet segregated according to grade). In the case of cooperatives/ associations, they sell directly to the processors or Grading and Baling Establishments (GBEs). Activities involved in this segment are consolidating, hauling, grading and classification, baling and transporting. Traders, GBEs, warehouse and transport firms are among the players involved in this segment.

A.5. Market

This involved the buying/selling of classified and graded abaca fibers for local processing into pulp, cordage, raw classified fiber, and other fiber-based end products. Players involved are raw fiber exporters and local processors.

A.6. Logistics

Logistics covers services for the transport of graded and baled abaca fibers to end-users, processors, and exporters.

The processes and players in the value chain map for good farms are totally different from the typical farms. There are some crucial factors that are added/changed in some segments enumerated in the value chain map. For GAP compliant farms, farmers will use suckers or corms and seeds as planting materials as part of their inputs, their production activities will involve the application of organic or inorganic fertilizers and farmers observe good agricultural practices in improving their farms with regards to growth and treating diseases. Also, in the primary processing, fibers will be stripped using spindle stripping machine. Accredited fiber extraction machine fabricators will be one of the important players in the value chain map for GAP compliant farms. With these crucial factors, farmers will have a modern system of farming that will greatly increase the volume of abaca fiber production.

Figure 17. Typical Farm: Value Chain Map of Abaca (Processes and Players)

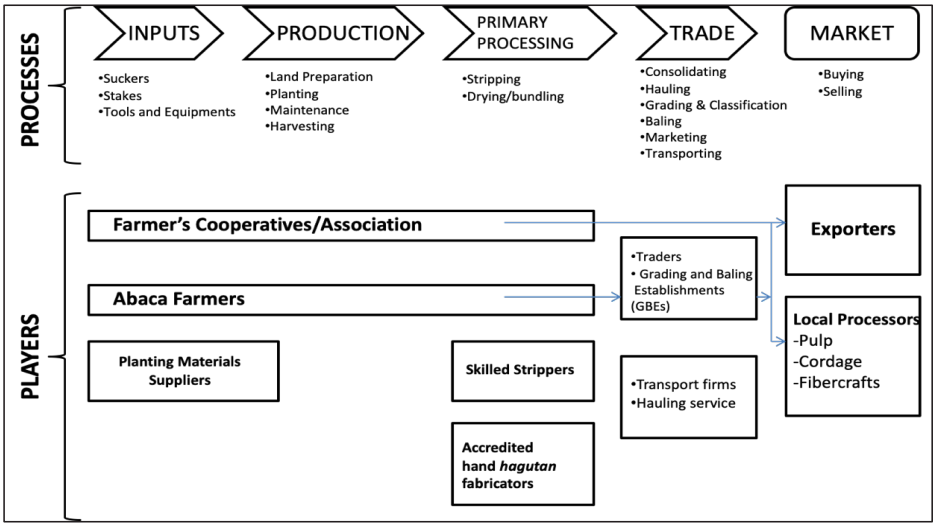
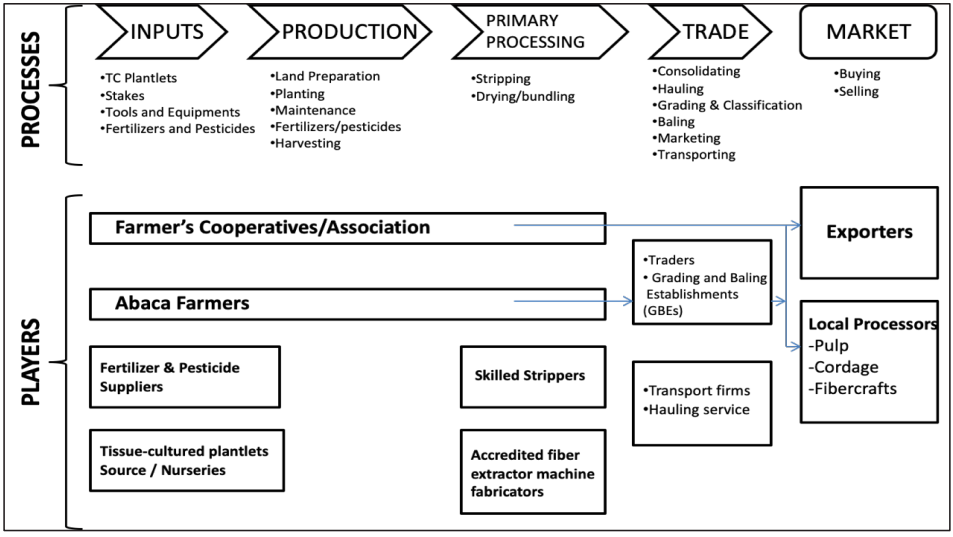


Figure 18. GAP Farm: Value Chain Map of Abaca (Processes and Players)



Industry Players

The abaca industry is made up of six major groups of industry players: farmers, strippers, classifiers, traders, fiber exporters and processors/ manufacturers.

Farmers

As of 2019, there are about 126,508 abaca farmers cultivating a total effective area of 86,854 hectares or an average of 0.69 hectare per farmer.

Strippers

Strippers extract the fibers, either by hand or mechanical means. Included in the stripping work are tumbling of stalks, tuxying and drying of fibers. The strippers are paid on a pre-determined system wherein they receive 50, 60 or 70 percent share of the harvest depending on the practice agreed upon and depending on the region. In 2014, some farmers or farmer groups bought or availed decorticating and spindle machines from the government, NGOs, and pulp manufacturers.

Classifiers

Classifiers sort, hank and grade the fiber based on the standards set by the government. They are trained and licensed by the PhilFIDA.

Traders

Trading of abaca fiber is done at different levels depending on the location of the farmers and where the accumulation of fiber is done. Hence, there are traders in the sitio, barangay, town, city, province, and region. In each level, the pricing system includes mark-up attributable to the service provided by the traders.

Traders are classified depending on the volume of fibers being traded. A Class A trader sells 75,000 to 1,000,000 kg of fiber per year; Class B trader, 50,000 but not more than 74,999 kg per year; Class C trader, 25,000 but not more than 49,999 kg per year and Class D trader, 24,999 kg and below a year.

As of 2019, there are about 872 licensed traders and 10 licensed trader-exporters.

Fiber Exporters

The fiber exporters, also known as grading and baling establishments (GBEs), operate in major abaca-producing regions and usually maintain liaison offices in Metro Manila. It is in this sector where abaca fiber, whether for local

or foreign consumption, are graded and baled, using high density presses, into 125 kgs of 100 cm x 55 cm x 60 cm bales per specific fiber grade. There are twenty (20) licensed grading and baling establishments operating in the country as of 2019.

Processors/Manufacturers/Pulp Millers

As of 2019, four (4) abaca pulp companies are expanding operations in the country: one in Albay, two in Leyte and one in Lanao del Norte. The companies have well-established international market networks for their pulp.

Cordage Manufacturers

There are currently seven (7) cordage firms operating in the various parts of the country: two in Metro Manila, Cebu, one in Laguna, Albay and Davao. They use abaca fiber as the principal raw material for rope, cordage, and twine manufacturing. Blending with other natural fibers like maguey is done depending on the specifications of the buyers.

Fibercraft Processors

The fibercraft sector, which includes manufacturers of handmade paper, rugs and carpet and handloom weavers, is primarily a cottage-based industry. Operating mostly in the countryside, the sector is a major source of livelihood especially among women and out-of-school youths. Several of these manufacturers, particularly Klowil Agricultural Enterprise Multi-Purpose Cooperative based in Surallah, South Cotabato. Tagum Agricultural Development Company Inc., based in Panabo City, Davao del Norte have successfully established their markets abroad especially with their unique, functional, and creative designs.

The handloom weaving sector produces abaca fabrics being utilized as raw material for making novelty and household items, as décor and wrapping material as well as for high fashion wear and accessories. Some abaca weaves are blended with metallic threads or polyester while others have printed, striped and ethnic designs to suit the varying needs of the market. The industry is mainly found in Bicol, Western Visayas, Eastern Visayas, Central Visayas and in Southern Mindanao, wherein particularly in the latter, indigenous people are actively engaged in T'nalak, Inab'l, Mabal Tabih and Dagmay weaving. Production of new product lines for fashion wear, accessories and specialty/novelty items is mostly based in Metro Manila.

In 2019, about 150 licensed fibercraft processors have been recorded who used abaca as their raw material for their processing activities.

Other Processors

Other processors include manufacturers of machine-woven carpet, dartboard pads, soap, and lotion (enzymes from abaca extract) as well as the makers of furniture who are now using fiber.

B. Costs, Value Added and Margins

The cost builds up from inputs, production, processing up to exporting of abaca is summarized in Table 3 and 4. Average values for the peak productive years (year 4-10) are considered. Value-added and profit margins were calculated for both farming practices. No inputs were further added during the fourth up to tenth production year for a typical farm therefore entailing no input supply cost in its supply value chain. The farmer's value-added margin is computed by adding the cost of labor, processing, land lease and profit margin for typical and GAP alike. Delivery cost of fiber from farm gate to trader was included in the total farmer's cost while the cost of delivery from trader to importer was charged to the trader.

Figure 19a. Typical Farm: Value Addition for Abaca (Fiber Production)

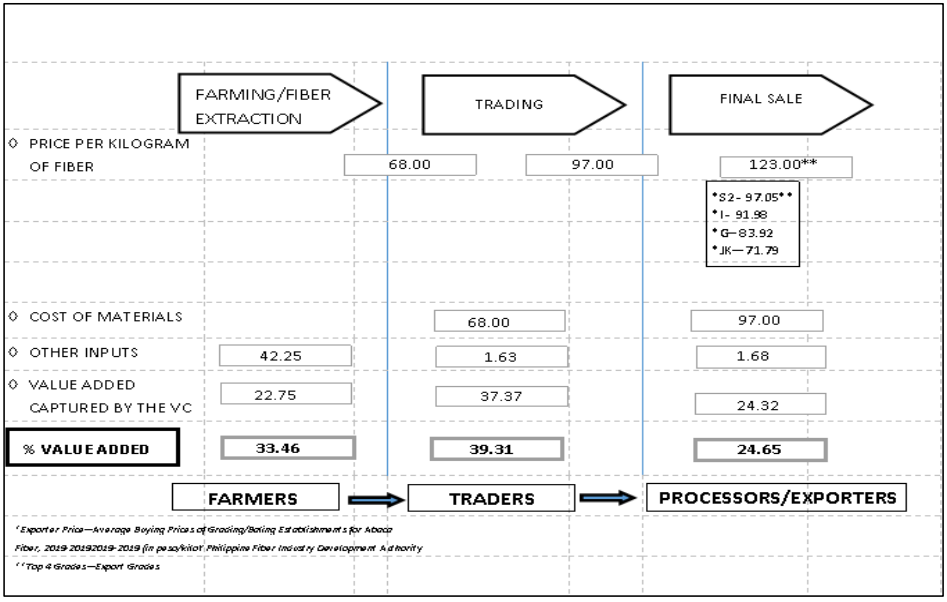


Figure 19b. Typical Farm: Value Chain (Php/kg fiber) of Abaca

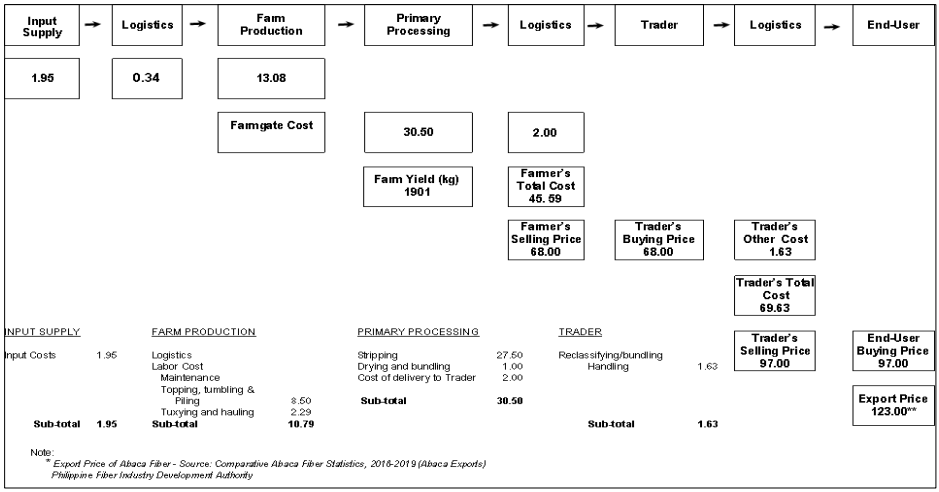


Figure 20a. GAP Farm: Value Addition for Abaca (Fiber Production)

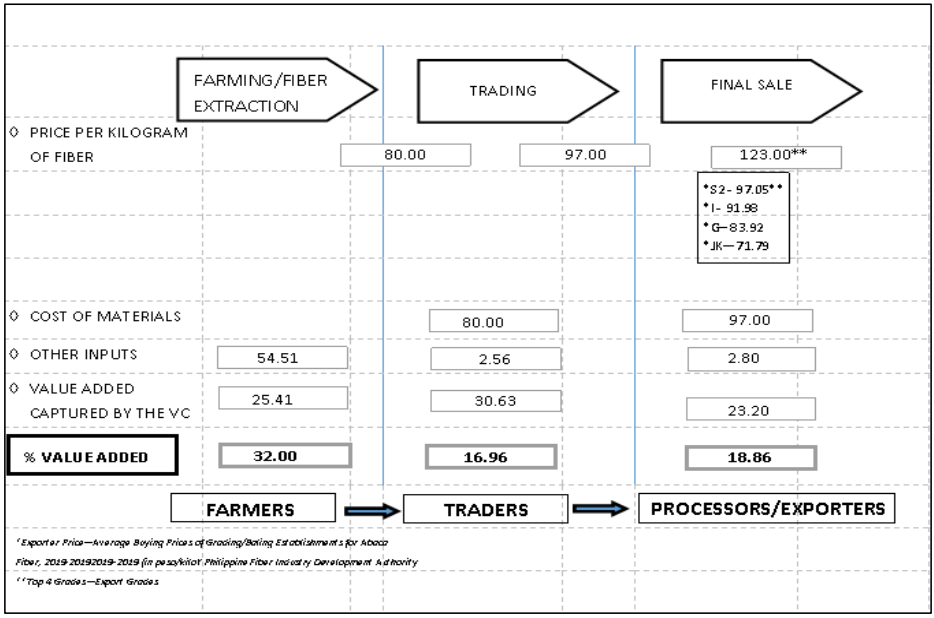


Figure 20b. GAP Farm: Value Chain (Php/kg fiber) of Abaca

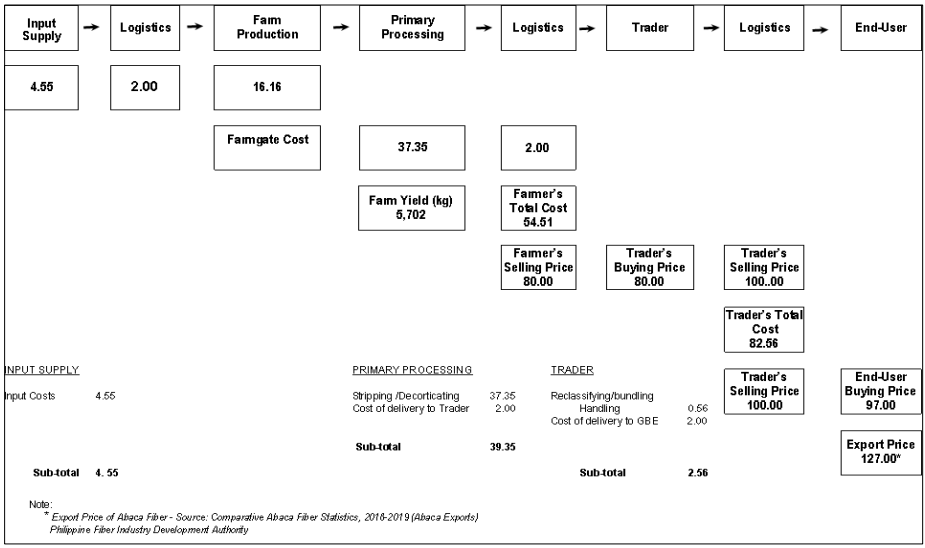


Table 3. Cost Structure, Value-Added and Margin for Each Segment of Abaca Value Chain - Philippines (Typical Farm)

CHAIN MODE	COST	P/kg	VALUE ADDED	P/kg	PROFIT MARGIN	P/kg
Input Supply	Cost of inputs					
	planting materials	0.69				
	stakes	0.17				
	farm tools	1.09				
	= Total cost of inputs	**1.95**				
Logistics	Cost of delivery of inputs to farm	0.34				
Farm Production	Cost of farm production					
	Labor cost					
	farm establishment	0.34				
	maintenance	10.45				
	= Total production cost	**10.79**				
Primary Processing					Farmgate selling price	**68.00**
	Stripping/Harvesting				farm production cost	13.09
					inputs/logistices	2.29
					cost of farm labor	10.80
	= Total primary processing co	**30.50**			processing cost	32.50
						45.59
					= Profit Margin	**22.41**
					%Value Added	32.96
Logistics						
	Cost of delivery of fiber from farmgate to trader	**2.00**				
		32.50				
Note: year 5 was considered in the computation of value added						

CHAIN MODE	COST	P/kg	VALUE ADDED	P/kg	PROFIT MARGIN	P/kg
Trading	Reclassifying/bundling/handling	0.63			Traders Buying Price	68.00
					reclassifying/bundling/har	0.63
	Cost of delivery of fiber from	1.00			delivery cost	1.00
Logistics	trader to exporter/market				Total Cost	69.63
	= Total trader's cost	1.63			Traders Selling Price	97.00
					= Value Added	27.37
					% Value Added	39.31
Exporter/Market	Classifying/Sorting	0.63			Exporter's buying price	97.00
	Baling	1.05			classifying/sorting	0.63
					baling	1.05
	= Total exporter's cost	**1.68**			Total Cost	98.68
					Exporter's selling price	**123.00**
					= Value Added	24.32
					% Value Added	**24.65**
Note: year 5 was considered in the computation of value added						

Table 4. Cost Structure, Value-Added and Margin for Each Segment of Abaca Value Chain - Philippines (GAP)

CHAIN MODE	COST	P/kg	VALUE ADDED	P/kg	PROFIT MARGIN	P/kg
Input Supply	Cost of inputs					
	planting materials	1.95				
	stakes	0.48				
	farm tools	2.12				
	= Total cost of inputs	**4.55**				
Logistics	Cost of delivery of inputs to farm	2.00				
Farm Production	Cost of farm production					
	Labor cost					
	farm establishment	6.55				
	maintenance	2.06				
	= Total production cost	**10.61**				
Primary Processing					Farmgate selling price	**68.00**
	Stripping/Harvesting				farm production cost	
					inputs/logistics	4.55
					cost of farm labor	8.61
	= Total primary processing co	**37.35**			processing cost	39.35
						52.51
					= Profit Margin	**15.49**
					%Value Added	22.78
Logistics						
	Cost of delivery of fiber from farmgate to trader	**2.00**				
Note: year 5 was considered in the computation of value added						

CHAIN MODE	COST	P/kg	VALUE ADDED	P/kg	PROFIT MARGIN	P/kg
Trading	Reclassifying/bundling/handling	0.63			Traders Buying Price	80.00
					reclassifying/bundling/har	0.56
	Cost of delivery of fiber from	2.00			delivery cost	2.00
Logistics	trader to exporter/market				Total Cost	82.56
	= Total trader's cost	2.63			Traders Selling Price	100.00
					= Value Added	17.44
					% Value Added	21.12
Exporter/Market						
	Classifying/Sorting	0.63			Exporter's buying price	100.00
	Baling	1.05			classifying/sorting	0.63
					baling	1.05
	= Total exporter's cost	**1.68**			Total Cost	101.68
					Exporter's selling price	**127.00**
					= Value Added	25.32
					% Value Added	**24.90**
Note: year 5 was considered in the computation of value added						

C. Support Industries

All abaca production projects, and fiber marketing activities will be effectively accomplished through the support of big industries involved in the abaca business like the Association of Abaca Pulp Millers, Inc., a major processor, and exporter. These support industries contribute in productively carrying out the chain of abaca business activities starting from the making, marketing and up to the sale of abaca fibers. Support industries in the abaca production level also involve suppliers of organic fertilizers manufacturers of stripping machines and fabricators of manual stripping devices and other abaca extraction tools. The marketing and sale of abaca fibers are executed through the support of available transportation and communication systems in every abaca producing region. These include transport firms, hauling services and telecommunications and internet networks that would capably link the producers and end users of abaca fibers. These support industries are necessary business partners to ensure the success of the delivery of fibers to all local and foreign buyers of abaca.

D. Key Institutions and Programs

Various institutions will serve as important partners of the agency in the implementation of the programs enumerated in this Roadmap. These institutions will aid PhilFIDA in carrying out the targeted activities for all industry stakeholders, especially the farmers. The agency will continue to have close partnership with concerned local government units (LGUs) and non-government organizations (NGOs), private sectors and private companies in all abaca producing regions. These groups will provide support in the implementation of projects in the regions especially in the mobilization of farmers and in the provision of planting materials, land for the establishment of abaca nurseries and other fiber production facilities. Cooperatives are also considered key partners of the agency. Farmers who become part of a certain cooperative are made more efficient in marketing their fibers and in demanding higher price for their commodity. Established cooperatives can eliminate middlemen since organized farmers can directly sell their accumulated produce to potential buyers. Cooperatives also extend financial assistance to individual farmers and make aids and provisions more accessible to their members. Funding Institutions are strategic partners in helping farmers to increase their income and in creating more livelihood opportunities for them. Some of the important financial institutions are the Philippine Crop Insurance Corporation (PCIC), Land Bank of the Philippines, Development Bank of the Philippines (DBP) and agencies and programs under the Department of Agriculture (DA) that provide financial support to farmers which include the Agricultural Competitiveness Enhancement Fund (ACEF), Agricultural Credit Policy Council (ACPC), High Value Crops Development Program (HVCDP) and the Philippine Rural Development Program (PRDP). The DA Agribusiness and Marketing Assistance Service (AMAS) will serve as the industry's marketing and promotional arm while the DA's regional field units

(RFUs) and Local Government Units will play a crucial role in supporting all abaca fiber production projects in assisting the PhilFIDA since they will be in charge of all the extension activities and will be directly providing technical assistance to farmers in the field. State Universities and Colleges (SUCs) will also be essential partners in performing extension work and especially in conducting research on sustainable abaca production techniques, product development for health/wellness and industrial use for aeronautics and space development.

More collaborative undertakings will be done with other key government agencies like the Bureau of Plant Industry (BPI), Department of Science and Technology (DOST), Department of Environment and Natural Resources (DENR), Department of Agrarian Reform (DAR), Department of Trade and Industry (DTI) and its export marketing arm, the Export Marketing Bureau (EMB).

Table 5. Key Institutions of the Abaca Industry

Key Institution	Abaca-Related Functions/Objectives
Department of Agriculture (DA) and AMAS	To help promote the production, processing, marketing, and distribution of high value crops such as abaca. It also provides funds for special projects.
DA Regional Field Units	To provide assistance and finding support in the implementation of various agricultural policies and programs related to the production, processing, marketing, and distribution of high value crops such as abaca.
Local Government Units (LGUs)	To take charge of all the extension activities and will be directly providing technical assistance to farmers in the field. Some LGU provide counterpart funds for nursery establishment and abaca planting.
Non-government Organizations (NGOs)	To provide funding support in the implementation of programs and projects in the regions especially in the mobilization of farmers, provision of land for the establishment of abaca nurseries and other fiber production facilities.
Credit cooperatives and other government financial institutions (LBP, ACEF, ACPC, & HVCDP)	To provide financial support to farmers and help them increase their income, support marketing and construction of access roads to mountainous areas and in creating more livelihood opportunities.

State Universities and Colleges (SUCs) and Department of Science and Technology (DOST)	To help in performing extension work and especially in conducting research on sustainable abaca production techniques.
Department of Environment and Natural Resources (DENR) and Department of Agrarian Reform (DAR)	To help in the expansion of abaca farm on areas covered by the National Convergence Initiative (NCI) Programs and National Greening Program.
Department of Trade and Industry (DTI) and CITEM	To oversee the implementation of abaca agreements between the Philippines and other countries and to also act as the marketing and promotional arm of the abaca industry.
Bureau of Plant Industry	Provides assistance in the regulation of quality standards for the abaca industry.
Philippine Statistics Authority, Bureau of Customs	Provide foreign trade and export statistics.

CHAPTER V

BENCHMARKING ANALYSIS

This chapter covers global and local benchmarking and compares the performance of typical and modern farming using qualitative and quantitative parameters. The qualitative parameter mainly describes farm practices instead of cropping system, planting materials, pests and disease control and fiber extraction method. The quantitative analysis focused on measurable aspects such as density of planting, input usage and financial indicators.

A. Global Benchmarking

A.1. Philippine Abaca vs. Ecuadorian

Abaca reportedly thrives in Ecuador, Costa Rica, Indonesia and other countries, the origin of which could be traced to the Philippines by indexing through finger printing. Nevertheless, records from the Food and Agriculture Organization (FAO) of the United Nations (UN) showed that Ecuador is the only other commercial producer of abaca fiber aside from the Philippines. In their report, about 85.7 percent of the world demand for abaca fiber was supplied by the Philippines while approximately 14.3 percent came from Ecuador (2017 data).

In the same FAO Report, the average export price of representative grades (S2, G and JK) of Philippine abaca ranged from US$266 per bale to US$310 per bale (of 125 kg, f.o.b. Manila port) compared to Ecuadorian abaca (all grades) at US$331 per bale (2018 average import price). This shows that Philippine abaca is competitively priced with the Ecuadorian abaca (Table 5).

Notwithstanding the slightly higher price, the Philippines' share to the global abaca trade continued to improve. From an average 85.2 percent share in the previous years, its contribution increased to 85.7 percent in 2017 per FAO Report. Consumers around the world continue to patronize locally produced abaca primarily because of the reliability of Philippine supply due to sustained substantial fiber production owing to the expansion of abaca plantation. Although abaca farming in the Philippines is generally for income augmentation only, and farmers usually prioritize cultivating and harvesting these other agricultural crops than abaca, farmers will nevertheless respond to the needs of the market. This was evidenced by the increased production of abaca to an all-time high of 76,259 MT in 2018 due to the bullish market following the intensified demand. While abaca cultivation in Ecuador is of plantation type, its production has not gone beyond 12,000 MT per year since it started producing abaca. This level is expected to slow down as some plantation owners are gradually shifting to African palms. In fact, its production fell to 8,144 MT in 2018, the lowest output during the ten-year period (2010-

2019). Ecuador's production, however, recovered in the following year (2019) reaching to 10,496 MT. *(Furukawa Plantation)*

Table 6. Abaca: Prices of Representative Grades, 2010-2018

	PHILIPPINES Hand-cleaned non-Davao			Indicator Price 2/	
	f.o.b. Manila Port USD per 125 Kg. Bale			f.o.b USD/Bale	c.i.f USD/Tonne
	S2	G	JK		
2018 Average	**309.7**	**282.8**	**266.3**	**282.4**	**2,459.3**
January	307.0	291.0	266.0	284.7	2,477.3
February	307.0	281.0	267.0	285.0	2,480.0
March	309.0	282.0	267.0	286.0	2,488.0
April	309.0	282.0	267.0	286.0	2,488.0
May	309.0	282.0	267.0	286.0	2,488.0
June	309.0	282.0	267.0	286.0	2,488.0
July	309.0	282.0	267.0	286.0	2,488.0
August	309.0	282.0	267.0	286.0	2,488.0
September	312.0	285.0	267.0	288.0	2,504.0
October	312.0	285.0	267.0	288.0	2,504.0
November	312.0	285.0	263.0	286.7	2,493.3
December	312.0	285.0	263.0	286.7	2,493.3

2/ - C.i.f. equivalent in USD/tonne of the indicator price which, as of 1.1.1982, has been expressed in USD/bale

Another important edge of Philippine abaca is that of having several different grades. The Philippines has three (3) kinds of abaca cleaning, eight (8) regular grades and five (5) residual grades on both hand and spindle stripped cleanings and four (4) regular grades and one (1) residual grade cleanings on decorticated fiber, a total of thirty-one grades compared to only five (5) of Ecuador making Philippine abaca more versatile in applications. Philippine abaca has a wide range of utilization from the traditional cordage/rope and fibercrafts to more sophisticated industrial applications like specialty non-woven papers, textile, composites and nanocellulose. The availability of the different grades of the Philippine abaca allows the specialty papermakers flexibility enabling them to produce different types of paper specifications with the desired quality. Ecuadorian abaca, on the other hand, with only five grades, does not have the full spectrum of the quality of abaca the specialty paper manufacturers need. Each particular end-product requires different quality of raw material and because of its fewer grades, only limited products can be manufactured out of Ecuadorian abaca.

On another issue relating to indicative price arrangement for Philippine abaca set by the Inter-governmental Group on Hard Fibres (IGGHF) of the FAO in 2018, the monthly average export prices of G and JK still falls within the indicator price however, price of S2 averaged higher. The indicator price of the representative grades of Philippine abaca in 2018 was US$ 286.3 per bale (FAO Report) which is within the indicative price arrangement ranging from US$ 266.3 to US$ 309.7 per bale. The same FAO Report recorded that the monthly 2018 indicator price of the three representative grades ranged from US$ 263 to a high of US$ 312 per bale.

The IGHF, composed of representatives from both the fiber-producing and consuming countries, regularly meets to set and review the indicative price arrangement for abaca. The objectives of the indicative price arrangement when first conceived in 1968 were to raise ruling market prices above a minimum level and to reduce abaca price fluctuations. FAO further cited that it was agreed that indicative prices should not be so high as to defend inefficient producers nor should they be so high as to encourage research into synthetic substitutes; conversely, they should not be so low as to discourage efficient producers and the range chosen should be reasonably wide.

A.2. Philippine Abaca vs. Other Natural Fibers (Jute and Sisal)

The closest competitors of abaca particularly in pulp and cordage applications, the present major markets for abaca, are jute and sisal. Jute is primarily produced in Bangladesh and India while sisal originates from African and Latin American countries as well as from China. The major producing countries of sisal are Brazil, China, Tanzania, and Kenya. Based on the 2018 FAO Report, the average export prices per ton of the two grades of jute namely, BWC and BWD, from Bangladesh were US$ 797.5 for BWD to US$ 848.3 for BWC. On the other hand, the export price of the three representative grades of sisal averaged US$1,383 to US$1,988 per ton. The three grades indicated in the FAO Report are East African EL, East African UG and Brazil Bahia 3DB with East African EL priced the highest and Brazil Bahia 3DB as the lowest. Following this price scenario, Philippine abaca is not competitive with jute and sisal (Tables 6 & 7).

Admittedly, the price of abaca is much higher than other natural fibers like jute and sisal and is actually the envy of other fiber producers as acknowledged during the Eight International Conference of the European Industrial Hemp Association (EIHA) held in 2011 in Wesseling, Germany. The biggest advantage, however, of abaca over its competitors is its superior qualities. Quality considerations play a predominant role in the choice of fiber for the major specialty end-uses and technical properties provided by abaca outweigh price advantages of other natural fibers.

Table 7. Representative Monthly Export Prices of Jute Fiber, 2018

		Bangladesh Export Prices	
2017/2018		**BWC**	**BWD**
2017	July	680.0	640.0
	August	700.0	660.0
	September	670.0	630.0
	October	710.0	670.0
	November	750.0	700.0
	December	770.0	710.0
2018	January	780.0	730.0
	February	790.0	740.0
	March	770.0	720.0
	April	790.0	740.0
	May	860.0	810.0
	June	870.0	820.0

Bangladesh BWD and BWC f.o.b. Chittagong-Chalna, at sight until Dec. 96, from January 1997 f.o.b. Mongla and from 2006 f.o.b. Bangladesh Port

Table 8. Representative Monthly Export Prices of Sisal Fiber, 2018

Sisal Prices of Representative Grades, 2018 (USD per tonne f.o.b.)

	East African		Brazil
	3L	**UG**	**3DB**
Year Average	**1,988**	**1,725**	**1,383**
January	2,025	1,775	1,525
February	2,000	1,750	1,525
March	1,975	1,725	1,500
April	1,975	1,700	1,475
May	1,975	1,725	1,425
June	1,975	1,700	1,375
July	1,975	1,700	1,350
August	1,975	1,700	1,300
September	1,975	1,700	1,300
October	2,000	1,725	1,300
November	2,000	1,750	1,275
December	2,000	1,750	1,250

In the pulp and specialty paper industry, abaca is the most sought after and is actually the principal raw material because of its desirable qualities which meet the requirements in the manufacture of specialty paper products.

Most specialty papers require high porosity and excellent tear, bursting and tensile strength, all of which abaca can impart. Specifically, in the production of meat/sausage casings and coffee/tea bags there are very stringent specifications on strength, elongation and formation required to ensure correct performance on automatic filling machines that these casings must be made entirely of abaca. Furthermore, sisal, the closest competitor of abaca in specialty paper manufacturing, has shorter and thinner cells, and, therefore, produces paper with lower tensile strength than abaca-based paper of the same weight per area. Sisal likewise gives rise to knots which makes it unsuitable for the production of very thin papers and, therefore, cannot replace abaca in uses like meat/sausage casings. These casings and coffee/tea bags are the two major markets for abaca pulp.

For cordage application where high tensile strength is of prime consideration, abaca is also an excellent choice over other natural fibers because it is considered as the strongest among the plant fibers. Abaca has the best reputation for strength and tenacity and is technically three times stronger than cotton and two times stronger than sisal. Abaca is far more resistant to saltwater decomposition than most of the vegetable fibers, making it the most suitable for rope and cordage manufacture. According to historical accounts, since the 1820s when sample of abaca fiber was brought to the United States by an American lieutenant of, the U.S. Navy, abaca became well known as one of the strongest materials for marine cordage because of its superior tensile strength and proven durability under water.

B. Local Benchmarking (Typical vs. GAP Farming)

B.1. Qualitative Parameters

A typical farm uses suckers and seed-derived while the GAP farm uses tissue culture, seed derived, corms and suckers as planting materials. If planting materials come from private sources a cost ranges from P15.00 to P35.00 depending on the kind of planting material for the GAP farm.

A total of 1,600 abaca plants with a distance of 2.5m x 2.5m are being planted to one hectare on both farming practices - typical and GAP farming. Care and maintenance of the plantation in typical farming is very minimal compared to GAP farming. A total of P22,734 difference was realized in the fertilizer application, weeding, under-brushing, and pest diseases control in which all expenses were incurred in GAP farming.

The harvesting period is less frequent at twice a year at six months interval for typical farming compared to good farming which adopted the four times harvesting period at three months interval. First harvest was done on the second (2nd) year after planting for both practices.

Both abaca varieties used in GAP farm (Tangongon) and typical farming (Abuab) have the characteristics of 1.5 percent fiber recovery per matured tumbled stalks. At the farm level, only primary processing was undertaken. This involves the extraction of fiber for harvested tuxies. The two methods of extracting the fibers were used, hand stripping for typical and mechanized stripping for GAP farm. Drying is done through sun and air.

Average yield of 1,980kg and 5,544kg per hectare were produced from typical and GAP farming showing a 3,564kg difference in favor of the latter practice. The produced fibers were sold to trader processors/exporters at an average price of P68.00 per kilo for the typical farming while an average price of Php100.00 per kilo for the GAP farming. An average cash inflow of Php152,266 was gained from typical farming while P537,408 was gained from GAP farming. There was a difference of Php385,142 favoring GAP farming. After deducting the expenses incurred in typical farming at Php136,798, the average net income of Php15,468 per hectare was obtained which was lower compared to Php272,708 with GAP farming spending Php264,700 per hectare on the average. A significant difference of Php257,240 between the two farming practices was realized.

Payback period for typical farm is 3.22 years compared to 2.04 years for GAP farm. The internal rates of return (IRR) for the typical and GAP farming are 46 and 209 percent respectively which shows that GAP farming is the better practice.

Table 9. Local Benchmarking, Abaca Farming: Typical vs. Good Agricultural Practices (GAP) (Qualitative Parameters)

PARAMETERS	TYPICAL FARM	GAP	DIFFERENCE
Planting Density (hills/ha)	Irregular distance	1,600 @ 2.5 x 2.5 m distance	600
Plant Propagation Practice	Suckers/Corms @ P15/pc.	TC plantlets @ P25/pc, Seed-derived	(P10/pc)
Quality of Planting Materials	Apparently healthy	Disease free and recommended varieties	
Fiber Extraction Method	Hand Stripping Cost Php 41.96 per kg of fiber	Decortication Cost Php 13.56 per kg of fiber	Spindle -stripping Cost Php 21.71 Decortication Cost Php 28.40
Dry Fiber Recovery per stalk	1-1.5% or 28-43% of 3.5% weight of stalk	3.5% (40% Spindle-stripped,60% Decorticated)	2.0 %
Fertilizer	No fertilization	3 times/year @	P13,500[a]/Year

Pest and Disease Control	Not conducted	2 times/year @ 1liter/app	P 1,000[b]/year
First Harvest	Year 2	Year 2	-
Harvesting Frequency @ peak	2 times/year	3 to 4 times/year	twice as much
Fiber Quality and Tensile Strength	5th and 6th Class 11-32 kgf/g.m.	1st and 2nd Class 35-55 kgf/g.m.	Excellent and Good Quality
Fiber Price	Php 50-60	Php 90-120	Php 40-60
Harvesting Practice	Inconsistent (immature, over matured and spurious abaca fiber)	Uniform stripping	Commands a high price and stable market

[a] Price of fertilizer @ Php 1,500/bag
[b] Price of insecticide @ Php 500/liter
Source of basic data: Actual farmer's field and Abaca Technoguide

Local Benchmarking, Abaca Farming: Typical vs. Good (Quantitative Parameters) (in Php per ha unless otherwise specified)

PARAMETERS*	TYPICAL FARM	GAP	DIFFERENCE
Average yield per ha (kg)	1,980	5,544	3,564
Peak yield per ha (kg)	2,400	6,720	4,320
Average establishment cost per ha	39,470	68,270	28,800
Average cash outflow per ha	136,798	264,700	127,902
Average Price per kg (farm gate price) selling price)	68	100	32
Average cash inflow per ha per	152,266	537,408	385,142
Average net cash flow per ha per Year	15,468	272,708	257,240
Average Area in hectare to get preferred net income of Php 125,772 (poverty threshold, 2018)	8.13	0.46	7.67
Average Prod'n cost per kg (Php/kg)	60.19	50.81	9.38
Payback period (years)	3.22	2.04	21.36
IRR (percent)	46	209	163

*Years 1-10 are considered in the average values
Source of basic data: Actual farmer's field and Abaca Technoguide

CHAPTER VI

COMPETITIVE ANALYSIS

Price competitiveness

Abaca produces highly exportable product that includes raw fiber, pulp, ropes, and cordage, fibercrafts, biocomposites and nanocellulose materials.

Table 10 presents the price competitiveness of abaca raw fiber at different grades with respect to UK as a major exporter. In 2019, exports of raw abaca fiber to UK reached 5,303 valued at US$ 11,391,990 (FOB) which represented 45 percent of the total exports of raw abaca fibers.

Domestic Wholesale Price

The domestic wholesale price per kilogram of grades S2, I, G in 2019 are Php96.96, Php90.80, and Php80.57, respectively. It should be noted that for the same year, traders bought abaca fibers from the farmers at All-in Grade at Php67.61 per kilogram.

Table 10. Abaca Fiber Competitiveness under Export Trade, Scenario Philippines in United Kingdom, 2019

ABACA RAW FIBER	Grade S2	Grade I	Grade G
Export Price, F.O.B. USD/kilogram	2.37	2.18	2.11
x Foreign Exchange Rate (PhP/USD)	51.7958	51.7958	51.7958
= Export Price in PhP	122.76	112.91	109.29
minus Port handling, hauling cost & margin (PhP)	14.84	15.82	13.96
= Derived wholesale price (or Export Parity Price), in PhP	107.92	97.09	95.33
= Domestic wholesale price at Manila* (PhP)	96.96	90.80	80.57
Export Parity Price/Domestic Wholesale Price (PhP)	1.11	1.07	1.18

Competitiveness exists if the ratio of the derived wholesale price (or export parity price) to the domestic wholesale price is greater than one
***GBE Buying price of selected grades**

Price Competitiveness of Abaca

Based on the 2019 exportation of grade S2 abaca raw fibers to UK which stood at 5,303 MT valued at US$ 11,391,990 (FOB), the corresponding export price per kg to UK was US$2.37 (S2) which is equivalent to Php122.76 at an exchange rate of Php51.7958 = US$1. Deducting the cost of port handling and margin which is computed at Php14.84 per kg, the derived wholesale price of grade S2 abaca raw fibers to UK was Php107.92. Meanwhile, the domestic wholesale price or the GBE buying price for grade S2 fibers in 2019 was Php96.96 per kg. It should be noted that for the same year, traders bought abaca fibers from the farmers at all-in grade at Php67.61 per kg.

The export parity price to domestic wholesale price ratio was calculated to determine price competitiveness. The computed ratio of UK market for grade S2 was greater than one at 1.11 which would indicate price competitiveness.

The results for grades I and G, the other grades exported to the UK, are the same with export parity price ratio of 1.07 and 1.18, respectively indicating price competitiveness in all fiber grades.

CHAPTER VII

MARKET TRENDS AND PROSPECTS

The growing global interest and acceptability for "green" products open urgent and endless opportunities for natural fibers as these are alternative resources that can be utilized for a wide range of applications especially for the pulp and paper industry, in the composite market, textile and even in lifestyle products and other industries. The emergent green economy is creating a global demand of an estimated three million metric tons of natural fibers and in support to this, various international industry report revealed the following trends and prospects which favor the Philippine fiber industry:

A. PULP AND PAPER

A report on the United Nations Conference on Sustainable Development indicated that Kimberly Clark, the biggest consumer of wood fiber for tissue paper production, is one of the 24 major companies that committed to sustainable development and commits transition of 50 percent of its wood fiber consumption from natural forests to alternate natural fiber sources. The report further stated that in 2011, the company used nearly 750,000 MT of primary wood fiber for the manufacture of billions of its toilet paper and is now exploring alternative sources of fiber for its products. This presents an entry point for the Philippine natural fibers especially for abaca considering that it has a high tensile strength characteristic that manufacturers require in the production of tissue papers.

Tea and coffee filters

In Barcelona, Spain, a newly established specialty paper manufacturing company, Terranova Papers, is into the production of various types of tea bags for high-speed tea bag machines and coffee pods, pads and capsule grades made of abaca fiber. The company's representatives have been to the Philippines to evaluate the abaca fiber supply chain to ensure sustainability of the right grade, quality, and quantity of Philippine abaca fiber. Likewise, negotiations with prospective suppliers are ongoing.

In the Philippines, Newtech Pulp Inc., the biggest abaca pulp mill, will increase its demand for abaca fiber to produce an additional four metric tons of abaca pulp. At present, the company's yearly production is 14,000 metric tons which, following the additional requirement of its specialty paper manufacturing partner based in Germany, plans to expand its output to 18,000

metric tons. Translated to fiber, demand for abaca fiber will expand to 8,000 metric tons per annum.

B. COMPOSITES FOR AUTOMOTIVE AND CONSTRUCTION

A report on Lucintel Brief: Opportunities in Natural Fiber Composites, about 20 to 25 kgs of natural fibers are indicated to be used as automotive component substrates in each of the 60 to 70 billion vehicles being produced globally each year. Even if 5 to 10 kgs will be used per vehicle, this would mean a requirement of 265,000 to 530,000 MT of natural fibers offering possibilities for our natural fibers. The Lucintel Brief further indicated that the total global natural fiber composite market is expected to grow to US$531.1 million in 2017 with an 11 percent compounded annual growth rate over the next five years. The natural fiber composites are currently utilized in automotive (door panels, seat backs, headliners, dash boards, trunk liners, spare wheel pan cover), electrical and electronics (mobile phone cases, laptop cases), sporting goods (tennis racket, bicycle frames, snowboards), construction (door panels, decking, railing, window frames), furniture and other products like cosmetic packaging (lipstick casing), funeral urns, etc. The automotive industry is expected to remain the largest market through 2017.

Currently, Daimler-Chrysler is using abaca fiber for the spare wheel pan cover for all models of their A- and B-class passenger cars and the yearly consumption for this purpose, according to its External Affairs and Public Policy Director, amounts to approximately 100 to 150 metric tons of abaca fiber. General Motors is another prospective market for natural fibers as part of its commitment during the United Nations Conference on Sustainable Development.

According to the Lucintel Brief, demand for natural fiber composites is expected to be high in automotive and construction applications due to awareness towards "green" products and increasing acceptability; reduction of global warming effect; need for lightweight materials; greater emphasis on sustainability, biodegradability, and recyclability; lower price; and governmental support (tax credits are given on renewable resources).

Europe is the largest region for automotive applications and is expected to remain strong with the passage of the End-of-Life-Vehicle (ELV) Regulation. Car manufacturing companies in the European Union are expected to use natural fibers as material for their car parts in compliance with the ELV Regulation. The said Regulation requires them to design and make their car components easier to recycle and safer to dispose of at the end of life of every vehicle.

Asia is emerging as a big market for natural fiber composites due to the rapidly increasing demand particularly from China and India. Auto parts manufacturing companies based in the ASEAN specifically, in Malaysia,

Indonesia and Thailand could be the target markets for Philippine natural fibers as these countries have flourishing car manufacturing industries and considering their proximity to the Philippines, the world's dominant supplier of abaca.

Based on the report of the United Nations, the construction industry worldwide is moving to use natural fibers for a range of products including light structural walls, insulation materials, floor and wall coverings, and roofing. Accordingly, North America is the largest region for building and construction applications.

C. COMPOSITES FOR OTHER PURPOSES

Based on the report of Kafus Bio-Composites, there is now an emerging natural fiber mat-making facility in Europe and North America having development programs with auto parts makers. This opens limitless possibilities for bast and leaf fibers as the present directives are toward the use of these fibers as replacement for wood and glass fibers. Across these continents, the mats being processed are made of 100 percent natural fibers or combined/reinforced (mostly 50-50) with polypropylene or other materials. A company, AS Technologies, which installed three mat-making lines in Belgium and another one in the United States uses kenaf, flax, sisal, and abaca in making mat that is 100 percent natural fiber or blended with polypropylene in a 50/50 ratio. These mats are suitable for compression molding or thermoforming for applications for car parts like headliners, trunk liners and door-panel inserts.

Abaca for Nanocomposites

Nanotronics Inc. is a company in the Philippines pioneering in the production of cellulose nanocrystal (NCC) made from indigenous crops which includes abaca. Nanotronics started in 2017 when DOST-PCIEERD funded its start-up and in less than a year, had set-up an advanced pilot production facility and produced basic and advanced form of NCC. Nanotronics Inc. provides production materials and technical support services for the electronics, semiconductor, packaging, coating, and automotive, medical, and additive manufacturing (3D printing) industries in the Philippines. Its core competency is in advanced and nanocomposite polymer and 3D printing technologies.

Abaca is one of the components of their products, Emtex and Filmet. Emtex is a nanoscale polymer that offers superior strength enhancement, when added to a biodegradable polymer matrix minimizes pollution during end-of life unlike petroleum-based polymers. Due to its biocompatibility, Emtex is highly suitable to many different medical applications. Filmet is a nanoscale polymer with excellent mechanical, electrical and thermomechanical properties. It is used as an agent to develop flame retardant/resistant material.

Its biodegradable and biocompatible properties open it to many medical application opportunities while its antibacterial property makes it suitable for new application like coating or paint. With increased demand for NCC Emtex/Filmet, the need for high grade abaca fibers is inevitable.

D. TEXTILE

Various international reports on the textile industry indicated that the new trend gaining in the fashion industry is 'ethical clothing" combined with "green marketing". This provides a guiding principle among manufacturers to put premium on environmental and social concerns in their production practices. With this, manufacturers would have to go for sustainable fabrics made of natural fibers while at the same time supporting sustainable livelihoods, among others. While not all textile manufacturers will embrace this for now or in the very near future, production efforts for this kind of clothing materials are now in the drawing board and consumers' awareness and interests have been generated.

Furthermore, according to the World Draping Organic report, in the present day, there are several organic products available in the market ranging from organic food to organic clothes. The demand and supply for organic products has shown an upward trend in recent years, suggesting the strong interest of global markets and farmers in choosing to grow organic crops for textile industry. In another report from the New Dimension to Organic Clothing, likewise, revealed that there is a surge in the demand for organic clothing owing to fashion designers choosing more environment friendly fabrics on the ramp and retailers promoting such products. Organic clothes and apparels have now entered the mainstream, consumer-driven fashion. Natural fibers especially abaca can be easily considered organic because their production in the Philippines does not involve application of chemicals or if there is any due to disease, only green labels are being used at the farm level.

Abaca is among the natural fibers not traditionally known as textile fiber but is now being utilized in the textile industry. According to Mr. Mathew Lazaro, President and Chief Executive Officer of Asia Textile Mills Inc. (Asiatex) located in Calamba City, Laguna, abaca fiber can be used for weaving abaca denim fabrics because it is very strong and has very porous property making it not only versatile but also very durable, breathable, and very comfortable to use. This abaca-based denim, composed of 40 percent abaca and 60 percent recycled polyester, is so uniquely "Pinoy" considering that abaca is the only truly Filipino fiber. The abaca denims are initially being exported to Japan.

Asiatex Abaca Denim

Aside for denims, Asiatex has also developed fabrics made of 10 percent to 40 percent abaca that can be used for everyday wear such as shirts and blouses. Asiatex is continuing its research to make the fabrics anti-microbial and to develop a "stay cool and fresh" textile before commercial production. The company plans to use the stretch denim into fashionable jackets, skirts, vests, etc. and to produce abaca yarns for knitted fabrics like cardigans and socks. Among these is the Asiatex Abaca Fabric (AAF) which is suitable for top wear such as blouse or barong/shirting material. Moreover, the fabric is proven to have extraordinary properties. Test results show that the abaca is more durable than any other natural fiber and is considered to be an eco-friendly material. It is likewise important to note that it has a higher grade of porosity, meaning it is more breathable and it emits heat instantaneously. Such remarkable properties actually put the abaca fabric in line with performance textiles.

The AAF is a result of extensive research and development by Asia Textile Mills, Inc. and two dedicated Japanese technicians who have been finding other uses for the Philippine abaca fiber. The ultimate goal of the project was to provide additional business and income to the Filipino abaca farmers. However, through the textile transformation process or better known as the TEXTILE CHAIN (i.e., transforming fiber to yarns, yarns to fabrics, fabrics to garments, coupled with designing and accessorizing), the project is also realized to be a source of job generation. Farmers and those involved in the Textile Chain are benefitted. Thus, the development of the AAF is actually just a bonus considering the livelihood it brings to the ordinary Filipino.

Asiatex Abaca Fabrics

While Asiatex is doing the installation of their spinning mill facilities, they have been identifying several abaca suppliers who have interestingly given certain fiber grades (qualities) which they have tested. They considered it interesting since they believe that it will further improve the quality and production efficiency of the final material. Production of various abaca blended yarns using the grades is in their pipeline and they will continue experimenting on fiber treatments in order to attain a 100% abaca fabric material which will be very similar to cotton and silk fabrics. In fact, they foresee a direction of using our natural fiber to produce protective, medical and fashion textiles as they move towards sustainable manufacturing concepts. For their plans. The AAF has passed all fabric durability and fastness tests and it also holds the RA 9242 Compliance Certificate issued by the Philippine Textile Research Institute. Asiatex will need 15 metric tons of abaca fiber annually.

In order to boost the utilization of Philippine natural fibers in textiles, Republic Act No. 9242 otherwise known as "An Act Prescribing the Use of the Philippine Tropical Fabrics for Uniform of Public Officials and Employees and for Other Purposes" will also be amended. The essence of the law is to strengthen the demand for our natural fibers, specifically abaca, silk, pineapple, and banana fibers and with its full implementation, additional requirement per year for abaca fiber is around 101 metric tons.

E. NEW PRODUCT INNOVATIONS

Product development leads toward exploring ways to integrate product innovations with affirmative and proactive action directly incorporating socio-economic and environmental issues.

Concepts and designs involved in product development are shaped by the integration of environmental management systems specifically Life Cycle Analysis (LCA) interventions to produce environmentally sound, renewable, and sustainable materials. According to a report on the Present Directives for Product Development, the leading contenders for replacement for wood and glass fibers are bast and leaf fibers which include abaca.

In home furnishings, results of the survey sponsored by the American Home Furnishings Alliance revealed that there is growing demand among U.S population for home furnishings made of environment-friendly materials and US consumers are willing to pay up to 10 percent more for furniture made from "green" materials. More than half of the consumers surveyed are currently taking steps to make their homes more environment friendly from furniture to upholstery fabrics and foam. The survey further revealed that buying environmentally-friendly home products ranked in the top three most important

practices in US households, after conserving energy and recycling. The World Fiber Forecast 2030 pointed out that carpet usage will increase, and its industry will dominate the market for home interiors. These indicate greater awareness and acceptance among consumers to patronize eco-friendly products.

F. OTHER PRODUCTS

Health and wellness products like bath soap and lotion as well as organic fertilizer, pesticide and disinfectant can be made from enzymes/sap/extract from extraction wastes and other plantation wastes. The upcycling of these agricultural wastes gives economic importance among farm families as these could provide supplemental income for them while at the same time solving their problem on waste management and disposal.

Abaca As Liquid Fertilizer

The latest industrial technologies have also been making way into the commercial production of organic fertilizer from abaca enzymes in the Philippines, the first and only abaca-based fertilizer and natural insect repellant in the world. Agricultural studies show that GO-PUREGANIC is economical, being highly concentrated so that one liter is good for one hectare of rice field per cropping. GO-PUREGANIC is manufactured by Essensa Naturalle, headed by its president Mrs. Joy Alcasabas, a company that manufactures and distributes organic, non-toxic, all-natural products in different categories. It is a concentrated liquid fertilizer which contains abaca enzyme that acts a soil conditioner that rapidly stabilize the soil pH (measure of acidity or alkalinity) to ensure maximum nutrient absorption and enhance the growth of rice plants. It is an organic liquid fertilizer that can use for several crops rich in nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, boron, manganese, copper, and other beneficial micronutrients. The product is registered with the Philippine Fertilizer and Pesticide Authority under FPA Reg No. 1-1LP-3015 in July 2012. It is also a liquid fertilizer with full organic supplements extracted from abaca plants fortified with abaca enzymes formulated in the Philippines that helps in plant growth and yield performance.

GoPureganic by Essensa Naturalle

Abaca for Health and Wellness

Green products are now in vogue and almost everywhere. This way of living can also be seen in the cosmetic that we use. Take for example the Abaka revitalizing soap from the Abaca Republic Company. Abaka Revitalizing Organic Soap is formulated from all-natural ingredients and unique extracts from the exotic organic Abaca plant. The company promises that regular usage of this soap that contains a therapeutic formula will gradually regenerate, moisturize and soften the skin. This is an effective treatment for acne, eczema, and psoriasis. The rich silky lather will deodorize, cleanse and refresh without leaving a greasy feeling. Abaka Revitalizing Organic Soap is used and tested by skin care specialist, spas, and diverse high-end users in Asia, Europe, and North America for over 10 years.

Abaca Republic Company

Carexherb Coconutri Cosmetica Corp.

On the other hand, other players in the cosmetics industry are now formulating abaca into soap, shampoo, conditioner, moisturizing cream, lotion, and scrub because of the enzyme of abaca. According to studies, the enzyme further revitalizes and strengthens the skin. The new uses of abaca benefit the Philippines. The other countries producing abaca include Ecuador, Equatorial New Guinea, Costa Rica, and Indonesia.

The Philippine Suppliers Company Trade Data for Import-Exports reported in 2018, that ten (10) transactions were undertaken by Carexherb Coconutri Cosmetica Corporation. It is a family-owned corporation headed by Agnes Car, its CEO, which is registered with FDA-LTO under Cosmetic Manufacturing. The company is a Philippine supplier of herbal products for health and wellness under HS Code 33 and HS Code 34 which includes soap, organic surface-active ingredients, washing, etc. and essential oils and resinoids, perfumery, cosmetic or toilet preparations, respectively. Said products are mixed with abaca extracts and virgin coconut oil (VCO) including other plant-based extracts.

Another company, the Abaca Skin Origins Philippines also produce handcrafted abaca soaps after completing their efforts in research and development including its packaging preparations and labeling. Having partnered with local communities for sustainable source, the products were presented to CITEM and showcased in Manila Fame in 2019.

Abaca Skin Origins Philippines

Likewise, abaca extracts are now utilized for pet care products. A non-toxic, biodegradable, and hypoallergenic abaca soap was produced for all types of dogs and cat breeds and can also be used on newborns, puppies, and kittens under 4 months of age. The Papi Pure Abaca Extract Triple Anti-Bacterial Dog & Cat Herbal Soap is safe and poses no danger if licked or ingested during application. The pure abaca extract soap with virgin coconut oil is a triple antibacterial solution that prevent fungal infection from wounds. It is also blended with eucalyptus oil, tea tree oil and lavender oil for a shiny and odorless coat that also prevents dandruff.

Papi Pure Abaca Extract Triple Anti-Bacterial Dog & Cat Herbal Soap

Abaca for Use in Personal Protection During Pandemic

Abaca fiber is rapidly gaining popularity as governments and private sectors all around the world scamper to produce more reusable and safe medical garments for healthcare professionals. As reported by Anastacio Calonzo of Bloomberg Green; Culture and Design published on July 29, 2020, sales of disposable face masks are set to give rise more than 200-fold worldwide this year to $166 billion, according to a United Nations trade article, citing consultant Grand View Research. It was also mentioned in the report that an abaca exporter Firat Kabasalli stated that "even though the plant fiber is more expensive to produce than plastic alternatives, manufacturers of protective health gear from China, India and Vietnam have placed new orders for the fiber over the past months, prompting Philippine fiber factories to double their output". The article also mentioned that "people see this pandemic lasting for some time, so even small companies are trying to make protective equipment which require our fiber and we are getting a lot of inquiries from new clients abroad." as stated by Kabasakalii, General Manager of Dragon Vision Trading.

PhilFIDA reported that, for the half-decade, the abaca industry helped boost the country's economy from its export earnings and Ahlstrom Munksjö is one of the biggest importers of abaca from the Philippines. This company is known for manufacturing fiber-based material applications such as filters, medical fabrics, life science materials and diagnostics, wall coverings and sheets for food packaging. Recently, from the company's smart fiber-based solution, Ahlstrom- announces the launch of TrustShield™ Biological, a personal protective apparel medical fabric designed to shield against hazardous pathogens. TrustShield™ fabrics are laser resistant, protect against chemical permeation, and are highly absorbent with high strength and sturdy which can be easily converted into medical grade gowns or drapes.

TrustShield™ Biological by Ahlstrom Munksjö

Disposable face masks are life-saving necessity for medical providers working with COVID-19 patients. However, medical-grade face masks and other personal protective equipment (PPE) are almost always made from plastic-derived materials, which are not biodegradable. To ease this predicament, a group from Northern Mindanao has introduced a potentially-medical-grade, single-use face mask made from a biodegradable material: abaca leaf fibers, a plant similar to the banana tree. The Department of Environment and Natural Resources (DENR)- Region X partnered with Salay Handmade Paper Industries Inc., for the production of an eco-friendly face mask made from abaca fiber to be given away to the frontliners.

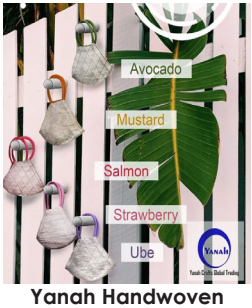
Abaca Facemasks by Salay Handmade Paper Industries Inc.

In view of this, the Department of Science and Technology (DOST)-Region X through its Regional Standards and Testing Laboratories (RSTL) conducted the following tests: a. Microscopy b. Water Drop Test c. Laboratory-Modified Water Drop Test - Spray Test (AATCC TM22). A preliminary study by the said agency showed abaca paper to be more water resistant than a commercial N-95 mask, and to have pore sizes within the U.S. Centers for Disease Control and Prevention's recommended range to filter hazardous particles. In addition, results from the simple laboratory-modified water drop test experiment showed the abaca-made mask absorbed 3 to 5 percent while the N-95 mask absorbed 46 percent. Also, the surgical face mask absorbed 0.17 percent of the total volume of water dispensed. The Philippine-made

reusable face masks for public use are more recommended especially now that more places are easing restrictions of the community quarantine to allow the economy to recover.

Catanduanes-based business Tandu.ph is among the many brands that are now manufacturing abaca-made face masks, not only to let everyone know the island's prime produce's protection capabilities, but also to help its people make a living while the pandemic is ongoing. Also, Abaca-Seda (Silkworm) Facemasks in the Visayas produced by Yanah Crafts Global Trading, is a hand-tailored face mask made of handwoven abaca seda fabric, a mixture of abaca fabric and silk. The B'laan Beaded Handwoven Face Masks are made by fantastic beaders and dreamweavers from Polomolok, South Cotabato. The B'laan face masks are created using 3-ply mercerized cotton/handwoven abaca fabric intricately beaded with B'laan symbols.

Catanduanes Abaca Face Masks



Yanah Handwoven Face Masks

B'laan Beaded Handwoven Face

CHAPTER VIII

SWOT ANALYSIS

This chapter presents the industry's advantages as strengths and opportunities and the constraints as weaknesses and threats identified according to the supply chain segment.

On Input Supply

On input supply, the strength of the industry lies on the available technologies and facilities related to fiber production, extraction, postharvest and fiber utilization. There are several government agencies, SUCs and research institutions involved in abaca R&D including planting materials production and distribution. PhilFIDA, operates and maintains five (5) tissue culture laboratories, four (4) diagnostic laboratories, an immunology and molecular biology laboratory (IMBL), seven (7) experiment stations and a fiber processing and utilization laboratory in carrying out its R&D activities in the upstream, mid-stream and downstream levels. In addition, to fast track the production of abaca planting materials, the Agency embarks on the establishment of a total 17 hectares abaca mother block nurseries in strategic locations in all the abaca producing regions to serve as sources of abaca seeds. The Agency also works closely with the Local Government Units (LGUs) and some farmer–cooperators for the establishment and maintenance of abaca nurseries. The University of the Philippines thru its Los Baños and Diliman Campuses is engaged in abaca science & technology (S&T) on crop improvement, biotechnology, and product utilization. Likewise, the National Abaca Research Center of the Visayas State University (VSU-NARC) conducts researches on abaca in the areas of crop breeding, crop production, pest management, engineering, among others. Moreover, these research institutions are supported with research grants from government organizations like the DA-BAR, DA-BPO and DOST-PCAARRD.

Private nurseries are also thriving as the business of producing and selling abaca seedling is proving profitable. In connection to this, the DA Department Circular No. 1 was approved in 2016 to set the guidelines in the accreditation of abaca plant nurseries. This, however, needs amendment to cover also seeds and seed-derived planting materials in addition to the currently approved tissue-culture-derived plantlets and suckers and seedpieces. In 2017, the National Seed Industry Council (NSIC) approved the registration of the traditional varieties Abuab, Inosa and Tangongon.

The high cost of labor, utilities, farm inputs like fertilizers and pesticides, farm implements such as stripping devices poses as weakness of inputs to production. There are however available technologies on the use of on-farm wastes for composts making which could be an alternative to expensive commercial fertilizers.

The limited access to credit is also a weakness. The stringent documentary bank requirements compel farmers to resort to local informal lenders who provide easy access to loans at exorbitant interest rates. Government financial institutions that offer agricultural loans are the Landbank of the Philippines (LBP) and DA-Agricultural Credit, Policy Council (ACPC). In addition, the Philippine Crop Insurance Corporation (PCIC) provides insurance to abaca farms damaged by natural calamities and pest and disease infestation as well as to agri-related facilities.

On Production

As of 2019, the total abaca production effective area is 86,854 hectares located in the hilly lands and mountains of Bicol (Catanduanes, Sorsogon, Albay, Camarines Sur); Visayas (Leyte, Southern Leyte, Northern Samar, Samar, Aklan); Mindanao (Davao Oriental, Davao Occidental, Surigao del Sur, Sulu, Lanao del Sur, Bukidnon). Potential areas for abaca are in Aurora, Palawan, Quirino, Camarines Norte, Biliran Island, Negros Oriental, South Cotabato, North Cotabato, Sarangani, Davao de Oro, Sultan Kudarat, Surigao del Norte and Agusan del Norte and all other provinces that are under types II, III and IV climates. Efforts to meet the market requirements for seal of sustainability of product for tea bags had been initiated by PhilFIDA in partnership with two abaca exporters.

One of the major problems of the industry is the presence of virus diseases, namely: bunchy top, mosaic, and bract mosaic. In spite of government efforts to eradicate these diseases, there is still disease prevalence because not all farmers have the initiative and willingness to control the disease even at the initial/minimal stage of infection. This is because farmers treat abaca only as a tertiary crop; they do not regularly maintain their farm but would only visit and harvest abaca whenever they need cash. Other concerns include the Pojada System or indiscriminate harvesting at a contracted price, Umbak or Bakbak deliberate harvesting, the plant and forget attitude of the farmers, and the insufficient funding for the continuous education and training of the farmers. Furthermore, the implementation of the Comprehensive Agrarian Reform Program (CARP) limits ownership of landholdings; abaca, being a plantation crop is profitable when cultivated in vast tract of lands.

In response to the growing demand for abaca, the private manufacturing companies like the Newtech Pulp, Inc. are now establishing an abaca nursery for the distribution of planting materials in Lanao del Norte and the neighboring provinces.

Recognition of Corporate Social Responsibility (CSR) is also gaining popularity among private companies through abaca production related projects and activities, directly involving people occupying areas adjacent to their company's scope of operation, i.e. the Conrado and Ladislawa Alcantara Foundation, Inc. (CLAFI), which spearheads in engaging the services of other NGOs and NGAs in providing assistance to three (3) groups at Barangay Kablacan, Maasim, Sarangani Province; namely the Datal Basak Organic Farmer's Association. The conduct of a Climate Smart Field School (CSFS) is ongoing in the area and just recently four (4) units Abaca Spindle Stripping Machines (ASSM) were turned over to the three farmers' associations.

Other two (2) big named agricultural companies in Davao Region have recently started in engaging on abaca production. One of these is the Tagum Agricultural Development Corporation (TADECO), who is keen to develop 200 ha abaca farm at their Nest Farm and the other one is the Kennemer Foods, Incorporated (KFI), who is targeting five (5) million seed-derived abaca planting materials for distribution to farmers in Regions IX, X, XI and XIII.

Like other crops abaca is also affected by climate change specifically prolonged drought and strong typhoons that has adverse effect on fiber production. Likewise, the peace and order situation especially in Mindanao and some parts of Bicol and Eastern Visayas where insurgents are present poses threat to fiber production and limits abaca trading.

On Processing

The superior quality of abaca fibers in terms of strength and porosity makes it suitable raw materials for a diverse application especially for new emerging products. Abaca, being a natural fiber also offers zero-waste utilization. Stripping wastes can be converted into fertilizers and bioethanol. The extracts from the sap can also be utilized for wellness products.

The major problem in the processing and manufacturing sector such as the pulp mills and the cordage group are the high cost of investment in the equipment/machineries and utilities.

On Trade

There is an existing fiber quality standard that is acceptable to both the domestic and international markets. In addition, the industry has stable domestic and global markets. At present, the domestic markets include four pulp companies, seven cordage companies, hundreds of handloom weavers, fibercraft and furniture makers, 20 GBEs, 872 local traders and 10 trader-exporters. The major foreign markets for pulp, raw fibers and manufactures include UK, Germany, France, Spain, USA, Italy, Canada, Japan, China, UAE, and South Africa. An opportunity to take advantage for the abaca industry is the implementation of R.A. 9242 otherwise known as an "Act Prescribing the Use of the Philippine Tropical Fabrics for Uniform of Public Officials and Employees and for Other Purposes". Its full implementation would entail additional requirement of 101 MT per year of abaca fibers. The law also emphasized on the use of Philippine tropical fibers such as pineapple fibers, banana fibers and silk to produce the Philippine Tropical Fabrics (PTF) with 5% to 20% fiber content. However, due to the limited existence of an integrated textile manufacturers that will undertake the processes of degumming, spinning, weaving, and finishing, the law was partially implemented with the participation of Asia textile Mills and Weavers Textile Mills. The Asia Textile Mills produced fabrics with 10% abaca blended with polyester while Weavers Textile Mills focused on the production of fabrics with 5% pineapple fiber blended with cotton and polyester availed of by limited government offices. The Inter-Agency Committee composed of government and private sectors is trying to propose amendments on some provisions in the Law for its full implementation to address the present issues that confront the textile industry sector.

The increasing global awareness on green economy augurs well for the abaca industry; abaca, being a natural fiber can be used to an array of emergent applications such as panel boards of automobiles and yachts; woven denims and in wellness products.

As the lead agency, PhilFIDA works closely with the farmers and the private sector to ensure strong linkages among the players in the supply chain. Regular stakeholders meeting with the farmers and private sector are being conducted by PhilFIDA.

As a natural fiber, abaca competes with other hard fibers such as sisal, kenaf and other bast fibers that are cheaper in the global market.

Cross-cutting

Abaca as an agro-industrial industry has both forward- and backward-linkages that promote a multiplier effect in terms of job generation in all segments of the value chain. With respect to the backward linkage, direct and indirect employment in the inputs segment would include suppliers of farm inputs and implements, abaca planting material propagators and their respective suppliers of laboratory chemicals and supplies. In the mainstream farming, there is the family labor and contract labor for harvesters, strippers, and haulers. At the GBEs, workforce include tip cutters/sorters, classifiers, haulers aside from the indirect employees of the facility such as the security and janitorial and office staff. There are also people involved in the trading from the farm to the local traders to the GBEs then to the local processors or to the exporters.

For the forward linkage that is composed of the processors and manufacturers, employment opportunities are open to machine operators and plant maintenance. Meanwhile, the community-based livelihood industries such as the weavers and handicraft makers also provide employment to the women-folk and out-of-school youth in the rural areas.

Supply Chain Segment	Advantages	Constraints	Advantages	Constraints
	STRENGTHS	**WEAKNESSES**	**OPPORTUNITIES**	**THREATS**
INPUT SUPPLY	- Available new and improved technologies particularly on planting materials including seed derived. - Growing interest by the private sector to engage in the business of selling planting materials. - Available technology on composting for organic fertilizer production.	- High cost of labor, farm inputs, machineries, and utilities - The presence of Musa species in the field other than abaca with inferior fiber quality could be inadvertently gathered and used to multiply abaca planting materials. - Limited access to credit	- LBP is reviewing its policy to support abaca establishment. PRDP and other agencies provided grants in production and trading - The growing interest to open, expand and rehabilitate abaca farms requires voluminous abaca planting materials and this augurs well for engaging into the business of commercial production and	- Insufficient funding from the government.

			selling of abaca planting materials - The anticipated increase in abaca farmers and areas coupled with the thrust towards farm mechanization would boost demand for farm tools, implements devices and machinery and this augurs well for fabricators.	
PRODUCTION	- Existing and potential areas for Abaca (coconut areas, falcata, fruit bearing trees, rubber, and other companion shade trees)	- Farmers treat abaca as tertiary crop - Prevalence of pests and diseases - CARP limits land Ownership	- Growing need for plantation type approach to production - Introduce new approach in treatment of pest and diseases	- Climate change - Emerging diseases infecting abaca - Peace and order situation - Limited movement

		- Lack of transparency that leads to the uneven, non-uniform and unestablished Sharing scheme on fiber production.	- Increasing social consciousness for CSR by some private companies - DAR support projects for abaca in suitable areas - Advocacy of the current administration to make ancestral land productive which abaca thrives well in the areas. - Executive Order 70 - National Task Force to End Local Communist Armed Conflict (NTF- ELCAC)	caused by pandemic situation due to infectious diseases. - Denuded hills and mountains resulting to lack of shade trees needed by abaca for good growth - Existing DENR policies on the use of forest land for abaca

			- Balik Probinsya, Bagong Pag-Asa (B2P2) Program	
PROCESSING	- Availability of pulp mills and cordage manufacturers	- High cost of investment	- Superior quality of abaca fiber - Offers zero-waste	- Use of chemicals in processing of fibers in the factories.
TRADE	- Existing fiber quality standards - Stable domestic and global markets - Strong linkage between and among industry players	- Poor farm to market roads, far and crossing rivers - Lack of collective marketing System - Abaca is not well promoted in the lowland areas.	- Increasing awareness on green economy - The world's demand for biodegradable products is a window of opportunity for increased abaca fiber demand with a favorable and stable price. - Emerging new markets - R.A. 9242: "Act Prescribing the Use of the	- Emergent substitute fibers for abaca - Imported fibers are cheaper compared to local fibers which hindered promotion of Philippine fibers. - Major local players investing in Ecuador and Indonesia

			Philippine Tropical Fabrics for Uniform of Public Officials and Employees and for Other Purposes"	
CROSS-CUTTING	- High multiplier effect on job generation	- Abandonment of abaca farms by young farmers	- Responsive to promoting gender equality & women empowerment	

CHAPTER IX

TARGET SETTING (WHERE DO WE WANT TO GO?)

A. Mission, Vision, Goals and Objectives

Based on the stakeholders' consultations and workshops, the vision, mission, goals, and objectives of the Philippine abaca industry are as follows:

The Vision:

A progressive Philippine abaca industry supplying the world's best quality fiber, meeting global demand for renewable, sustainable, and environment-friendly products to achieve the country's inclusive growth.

The Mission:

- Improve the socio-economic condition of farmers, create livelihood, and reduce poverty incidence through rural fiber-based enterprise development and business; and

- Maintain the country's status as the world's number one producer and supplier of quality abaca fibers.

Goals

- Produce sufficient quality abaca fiber to supply domestic and international markets;

- Establish rural livelihood and economic businesses that improve farming practices and land vegetation, rehabilitate the environment, and mitigate climate change;

- Establish disease free abaca plantations in all regions to provide sustainable fiber supply for pulp millers, cordage companies and rural enterprises;

- Set new direction and agenda for R & D to improve varieties, increase fiber production, disease treatment, postharvest, processing, tensile strengths, and utilization towards production of fiber by-products for industrial, commercial, and other uses;

- Strengthen collaboration among industry stakeholders - international investors, local and national governments, farmer cooperatives/ associations, private sectors, non-government organizations, academe, and corporations; and

- Promote an investment climate conducive for foreign and local direct investors for upstream and downstream processing.

Objectives

- To expand/rehabilitate a total of 67,100 hectares of abaca areas from 2021 to 2025;

- To mass produce planting materials through tissue culture, macropropagation, conventional method and seeds;

- To increase fiber production by 177,189 MT spread over a period of five (5) years;

- To adopt abaca tuxy buying scheme/ abaca freefarmers social enterprise in the production of quality abaca fiber through cooperative approach;

- To introduce new technologies in abaca production and treatment of abaca diseases;

- To accredit private, government (LGUs), and commercial abaca nurseries and distribute healthy planting materials;

- To train LGUs and NGOs agricultural technicians and farmers on new and improved fiber production technologies;

- To upgrade and modernize/mechanize postharvest equipment and facilities to improve efficiency and increase fiber production;

- To strictly implement abaca grading standards;

- To conduct R&D for the production of quality and disease-free planting materials, new technologies on plantation establishment, treatment of diseases, production of by-products of abaca fibers, and processing and utilization in partnership with universities, corporation and private sectors;

- Establish Monitoring and Evaluation Plan in partnership with abaca stakeholders, LGU, NGOs and other groups; and

- To strengthen information campaign about abaca production.

B. Targets

The demand for abaca fiber both in the local and international market is increasing exponentially because of the shifting in preference for natural rather than synthetic fiber materials. The utilization of natural fibers has also diversified from food packaging, textiles, furniture, stuffing material, electronics, composites, nanocellulose and many more.

To remain as the world top supplier of abaca, production has to be increased in various ways specifically through opening of new abaca areas and by invigorating old and less productive farms and plantations. There is also a need to manage the spread of diseases which has become more prevalent in different abaca locations in the country.

Area Targets

In order to increase area planted to abaca, four major activities are targeted to be achieved. These are (1) use seeds as planting materials in addition to suckers, corms, and tissue culture, (2) opening of new abaca areas from identified suitable agricultural lands especially coconut areas and conversion of idle and unproductive lands, (3) rehabilitation of abaca areas, and (4) treatment of disease infected areas.

Result from the dialogues and output of various stakeholders' consultative meetings conducted by the authority showed that a deficit of at least 125,000 MT abaca fibers annually was recorded based on the 2019 fiber production of 69,829 MT. Deficit will be addressed through the implementation of several interventions such as consolidated areas rehabilitation and expansion. Total target areas to be rehabilitated is 16,600 hectares and area for expansion is 47,500 hectares until 2024 or a total area planted to abaca of about 154,427 hectares in 2025. The huge increase in abaca plantation area is aimed to accommodate the demands on abaca fiber especially the pulp sector.

To cater the increasing demand for abaca fibers, vast hectare of abaca farms which were freed from abaca diseases, old and less productive abaca farms, are targeted to be rehabilitated nationwide. A total of 5,000 hectares annually from 2022 to 2024 are targeted to be rehabilitated. Further, disease management activities will likewise be conducted.

Table 11. Physical Targets for Abaca Expansion and Rehabilitation, 2021-2025 (in ha)

REGIONS	2021	2022	2023	2024	2025	TOTAL
Region I, II & CAR	200	200	200	200	200	1,000
Region III, IVA & IVB	100	200	200	200	100	800
Region V	301	8,693	8,693	4,156	300	22,143
Region VI	163	1,387	1,387	693	164	3,794
Region VII	112	465	465	223	112	1,377
Region VIII	339	4,509	4,509	2,255	339	11,951
Region IX	233	1,183	1,183	591	233	3,423
Region X	166	634	634	317	166	1,917
Region XI and XII	420	5,248	5,248	2,624	420	13,960
Region XIII	266	2,481	2,481	1,241	266	6,735
TOTAL	**2,300**	**25,000**	**25,000**	**12,500**	**2,300**	**67,100**

Note: Yield assumption was based on the Cost and Return Analysis for GAP.

Production Targets

The targeted hectarages for abaca farm establishment/expansion and rehabilitation are estimated to produce around 75,349 MT in 2022 and 77,189 MT in 2023. Significant increase in production will be achieved from 2024 to 2026 with 127,189 MT, 177,189 MT and 202,189 MT, respectively.

Extensive abaca expansion and rehabilitation efforts will be undertaken from 2022 - 2024 to meet the targeted 154,427 effective abaca areas by 2024. Major areas for expansion and rehabilitation activities will be conducted in Regions V, VIII and XI. For the targeted expansion and rehabilitation areas, a total of 107.36 million planting materials will be distributed nationwide to be sourced out from the established 17hectares mother block nursery. In 2026, a total of 202,189 MT of fibers is expected to be produced from the existing, expansion and rehabilitated abaca areas.

Table 12. Physical Targets for Abaca Production (2021 - 2025)

INDICATORS	2021	2022	2023	2024	2025	TOTAL
Abaca Areas (ha)	91,927	116,927	141,927	154,427	154,427	
New Area Planted. (ha)	1,500	20,000	20,000	7,500	1,500	50,500
Area Rehabilitated (ha)	800	5,000	5,000	5,000	800	16,600
Number of PM Required (in million)	3.68	40.00	40.00	20.00		107.36
Areas with Agricultural Inputs	1,820	50,000	75,000	100,000	154,427	
Abaca Disease Mgt. Project (ha.)	3,000	5,000	5,000	5,000	5,000	25,500
ATBSP Center (no.)	1	14	14	246	246	
Modified Abaca Stripping Knives (MASK) (no.)	-	5,000	5,000	5,000	5,000	20,000
Fiber Production (MT)	73,509	75,349	77,189	127,189	177,189	
Total Value in Million Peso*	7,350	7,534	7,718	12,718	17,718	

Note: * Price used is fixed to Php100.00 consistent to the price used in the cost and return analysis for GAP.

Income Targets

A farmer needs an average of 4.14 hectares using the typical farming practice and 1 hectare with good farming to get the preferred net income of Php125,772.00 (poverty threshold, 2018). A gap of almost 3 hectares between the two farming practices was realized.

Job Generation

In terms of job generation, a typical abaca farm can generate 0.5 job per hectare on the first year or during the establishment of the farm. It can then generate 0.64 job per hectare on its second year, wherein replanting occurs, and 0.61 job per hectare for minimal harvesting activities on the third year. At least 1.17 jobs per hectare will be generated from the fourth until the tenth year of abaca production. An average of 1.05 jobs per hectare is expected to be generated for a 10-year period of abaca fiber production in a typical farm.

GAP abaca farms can generate one job per hectare during the first year of farm establishment. It will be decreased to 0.76 job per hectare on the second year since replanting and farm maintenance require less labor. Needed jobs will then be increased to 4.21 per hectare on the third year for extensive harvesting. A total of 5.62 jobs per hectare will be generated from the fourth until the tenth year of abaca production. In these years, an average of 4.93 workers will be employed in which full abaca fiber production is obtained and the maximum number of jobs is generated. These will be achieved mainly because farmers will utilize fertilizers and pesticides and will perform good agricultural practices in maintaining their GAP farms.

Table 13. Labor Requirements in a Hectares Abaca Farming

Activities	Man-Days (MD) Required							
	Year 1		Year 2		Year 3		Year 4 - onwards	
	Typical Farm	Good Farm	Typical Farm	Good Farm	Typical Farm	Good Farm	Typical Farm	Good Farm
Farm Establishment								
Land Preparation								
- Underbrushing & cutting of unnecessary trees	10	30						
- Burning and filing of debris	2	8						
Planting								
- Layouting and staking	5	5						
- Distribution of seedpieces, digging of holes & planting	20	20						
Maintenance								
- Underbrushing, ringweeding & removal of dry leaves	5	15	5	15	5	15	5	15
- Replanting	3	3	3	3				
- Application of fertilizer and pesticides		10		10		10		10
Harvesting, Extraction, Drying & Bundling								
- Topping of leaves			2	2	2	4	4	6
- Tumbling and piling			4	4	4	8	8	12
- Tuxying and hauling			18	18	18	36	36	54
- Stripping			24	14	24	302	48	403
- Drying and Bundling			2	2	2	4	4	6
TOTAL	**45**	**91**	**58**	**68**	**55**	**379**	**105**	**506**
Jobs Generated	**0.50**	**1.01**	**0.64**	**0.76**	**0.61**	**4.21**	**1.17**	**5.62**

Note: Job Generation was computed based on the given formula from NEDA, 90 MD = 1 job.

Source: Based on actual farmer's field and Abaca Technoguide

CHAPTER X

STRATEGIES AND POLICIES (HOW DO WE GET THERE?)

Aggressive information campaign shall be conducted among LGUs and farmers' group on identified areas suitable for abaca through fora/consultative meetings on the potential income, production and processing technologies, product development and success stories. Active participation of PhilFIDA technical personnel (especially PFOs) in the preparation of Commodity Investment Plans shall be encouraged. Showcasing of programs/projects that are technically feasible and economically viable shall be done.

In the event of limited available resources for the implementation of programs and projects, prioritization must be done according to the programs'/projects' impact on the attainment of the roadmap goal. According to priority, these are: 1. mechanization (in collaboration with PhilMECH and other agencies); 2. expansion/rehabilitation of abaca farms with production and distribution of planting materials; 3. abaca disease management project; 4. research and development; and 5. strict implementation of Philippine National Standards (PNS) for Abaca and Regulatory Laws.

Programs and projects will be implemented with the following considerations to mitigate the effects of climate change: a) promote planting of abaca in areas that are less prone to typhoons and drought but are suitable for abaca production; b) adaption of climate-smart field school in the conduct of farmers training; c) information dissemination of suggested planting calendar; d) adaption of typhoon-resilient structural design in the implementation of infrastructure project; and e) assist and encourage farmers to enlist their abaca plantation/areas in Registry System for Basic Sectors in Agriculture (RSBSA) of their respective LGUs and to have their farms insured with Philippine Crop Insurance Corporation (PCIC).

There are a number of critical key results areas which have to be addressed to enable the industry to meet the targets.

A. On Input Supply

- Adequate supply of disease free and high yielding abaca planting materials

In support to the opening of new abaca areas as well as rehabilitation of old, typhoon-damaged, and disease-freed farms, disease-free planting materials of recommended abaca varieties will be made available to farmers. Abaca planting materials derived from the different methods of propagation such as seed-derived, seedpieces, corms and suckers will be sourced from the

seedbanks, mother block nurseries and farmer-cooperator nurseries of PhilFIDA as well as in accredited/monitored and accredited nurseries of LGUs, private sectors, corporation, NGOs, and farmers associations. To ensure survivability, seed-derived planting materials to be distributed should be three months old and above from bagging or at least one foot in height. Tissue culture laboratories of SUCs (UPLB, VSU, NORSU, LSU, UEP, CSU), national government (PhilFIDA) and private companies will be tapped for the supply of abaca plantlets. Complementary facilities like diagnostic laboratories and immunology laboratories shall likewise be operated to assist in testing planting materials for freeness of viruses.

The active involvement of the LGUs in planting material production and distribution for the benefit of their farmer-constituents as mandated by the Local Government Code shall be enlisted particularly in the establishment of local nurseries. In line with this, LGU MAOs and agricultural technicians will be trained on hardening of abaca plantlets and nursery establishment. In addition, screenhouses for hardening abaca plantlets shall be distributed to LGUs.

Accreditation of tissue culture laboratories, and nurseries as reliable producers of abaca planting materials by BPI-PQS will also be promoted.

Meanwhile, dynamic research undertaking will be pursued to develop, innovate, and improve technologies on abaca propagation antiserum production, virus detection techniques and diagnostic kits to achieve greater efficiency and effectiveness in the production of disease-free abaca planting materials.

- Introduction of new improved abaca varieties

To address the problem on virus diseases the development and introduction of new abaca varieties possessing resistance to virus diseases shall be pursued through conventional breeding and modern biotechnology. Ongoing researches at UP Diliman, UP Los Baños and PhilFIDA are in molecular biology to gain deeper understanding about the abaca as a sound basis for crop improvement in terms of desirable fiber traits, disease resistance and climate resiliency. Studies on the molecular biology of important insect vector and virus pathogens of abaca diseases will likewise be explored in the future.

Presently, PhilFIDA is conducting multilocational trial of abaca of traditional abaca varieties to identify recommended abaca varieties particularly in Mindoro, Panay Island and Zamboanga Peninsula and for subsequent NSIC registration in addition to the currently registered Abuab, Inosa and Tangongon.

Crucial to abaca crop improvement is the availability of rich and diverse plant genetic resources and considering the country is the center of origin and diversity of abaca. Abaca genebanking will be actively pursued to enrich the present collection, systematically characterize & evaluate the accessions, and properly document them. In addition, all types of applicable germplasm conservation methods will be explored. PhilFIDA is maintaining field genebanks & *in vitro* collection in its experiment stations and tissue culture laboratories in Bicol, Leyte, and Davao City while UPLB and VSU-NARC have their own field genebank and *in vitro* collection as well. Recently, the UN-FAO had concluded its agrobiodiversity project in Lake Sebu, South Cotabato and documented the indigenous knowledge system and practices of the T'boli tribe in abaca farming and introduced to the tribe abaca characterization of their native/local varieties, Ex *situ* conservation and multiplication by macropropagation technique and nursery establishment

Furthermore, establishment and upgrading of R&D facilities coupled with the development of human capital will be promoted to strengthen R&D capability.

B. On Farm Production

- Available production technologies for improved fiber yield, higher farm productivity and increased farm income

Dynamic research for the generation and dissemination of abaca production technologies that are climate-smart and resilient with the end view of improving fiber yield, enhancing farm productivity, and increasing farm income shall be pursued especially in the areas of abaca-based sloping agriculture, farming systems, pest & disease management, bio-control agents, organic fertilizer application as well as indigenous knowledge, among others.

- Abaca farm consolidation and corporative approach

In relation to the directives from the Department of Agriculture - Farmers Fisherfolks Clustering and Consolidation (F2C2) to consolidate the development of agricultural lands, PhilFIDA will promote and adopt a different approach and strategy in implementing programs, projects, and activities (PPAs) for abaca production. The Abaca Tuxy Buying Special Project (ATBSP) Business Model/Abaca Freefarmers Social Enterprise (AFSE) where the real Value-Chain Analysis (VCA) comes in. The ATBSP will increase the earnings of the farmers per working day by at least double to maximum of quadruple. Its approach is extreme, radical, unconventional, out-of-the-box and revolutionary but it is the only way to attain the inclusive growth and development of the industry stakeholders most specially the farmers.

The Abaca Tuxy Buying Special Project (ATBSP)/Abaca Freefarmers Social Enterprise (AFSE) business model have the following basic principles and approaches:

a. Organize all our individual farmers into cooperative/registered group members with a minimum of 100 members per cooperative/registered groups which is equivalent to about 100 hectares or more per cooperative/registered groups;

b. Establishment of new abaca plantation with a minimum contiguous area of 100 hectares within a 5-kilometer radius.

c. Assist cooperative/registered groups in acquiring loans from LBP, DBP, ACPC, ACEF, etc.;

d. Assist in identifying local direct partners for seed or working capital;

e. Invest in the establishment and development of processing center with common service facilities and infrastructures such as stripping and decorticating machines, bodega/warehouse building, drying facilities, baling, logistic equipment, office, bunkhouse, and trading area;

f. Hire qualified corporate management professionals from the private sector who knows the commodity and the trade who lives within the locality/province and by also hiring blue-collar jobs to operate the facilities thereby generating employment in the provinces. Their salaries will be sourced from the gross earnings of the cooperative/registered groups;

g. Educate and train the abaca farmers; and

h. Compete with the traders and middlemen and sell directly to the processors

- Eradication of disease infected plants

A lot of abaca farms are infected with bunchy top, abaca mosaic and abaca bract mosaic. The causal viruses of these diseases are transmitted by aphids. Infected abaca plants stay stunted thus no fiber can be harvested. The disease incidence ranges from 5-30 percent. Eastern Visayas is the hardest hit with 20-30 percent rate. To control the rapid spread of the disease, PhilFIDA (then FIDA) has implemented the "Abaca Disease Management Project "(ADMP) starting in 2009 in coordination with the concerned Local Government Units. The objective is to bring down the disease incidence to less than five percent, a level that is manageable by farmers to control by rouging. The eradication process makes use of green label insecticide spray to control

the vector and by puncturing glyphosate-soaked bamboo sticks into infected plants. Monitoring of the effectiveness of the treatment is conducted to provide information as bases for decision for retreatment if needed or to account for disease-freed abaca farms and consider for rehabilitation/ replanting.

- Trainings

Enhance technical training will be conducted regularly. Training of Trainers, Climate-Smart Field School, Machine Operation and Maintenance, Livelihood Development and Social Research will be strengthened to cover majority of the stakeholders. Coordination and collaboration with the TESDA will be undertaken in the development of training modules and training regulations prior to the accreditation of the different competencies in the industry.

- Information, Education and Communication (IEC) including investment opportunities and business model

The adoption of what is latest in production technologies is essential in increasing quantity and improving quality of fiber produce. The capability building starts with the field personnel of PhilFIDA who will in turn train LGU Agricultural Extension Worker (AEW) and farmer leaders who will share their knowledge to the abaca farmers to capacitate their knowledge and skills in improving production. The continued updating of farmers and other stakeholders on the technologies will be supported by the distribution of IEC materials including investment opportunities and business model, radio broadcasts and through on-line access such as social media, web portal, audio, and video channels, among others.

- On Fiber Quality Competitiveness

Maintained abaca fiber quality competitiveness in local and foreign market through adoption of good agricultural practices (GAP) in all abaca plantation, industry mechanization to produce high quality grade fibers, and strict enforcement of quality standards and trade regulations.

Continued formulation of appropriate policies and programs to ensure consistency of high-quality abaca fiber in any market situation, even in the challenges of law of supply and demand. Consistent best quality raw material produces the best product, and the best product are the ones patronized by consumers.

C. On Processing

- Establishment of Fiber Stripping Center & Abaca Drying Shed as Common Service Facilities (CSF) and Distribution of Modified Abaca Stripping Knives (MASK)

The volume of production of abaca fiber is dependent on the processing techniques done manually using the traditional stripping knives or mechanically through the use of fiber extraction machines. Based on 2020 fiber statistics, the present level of mechanization computed as percent (8.92%) machine-extracted fiber with a total of 37,780 bales or 4,723 MT from the total annual production of 423,699 bales or 52,962 MT.

To increase the volume of fiber production, the Roadmap shall establish 521 abaca processing centers from Abaca Tuxy Buying Special Project/Abaca Freefarmers Social Enterprise (ATBSP/AFSE) which will require a budget of Php 13.025 billion and with a provision of 384 units of stripping machines and 384 units of decorticating machines which will require a total budget of Php195.15 million. Establishment of 521 units of AFSE will cater 83.37% of the targeted area for expansion and rehabilitation or 52,100 hectares. An additional 3,840 hectares will be catered by the provided set of stripping and decorticating machines. In 2025, at least 42.14% of the fiber extraction process will be mechanized and fibers produced are all excellent quality.

Moreover, a total of 20,000 pieces of Modified Abaca Stripping Knives (MASK) will be distributed to farmers through LGUs from 2021-2025 which will require a total amount of Php100 million. The MASK will be fabricated using AISI 1045/1050 steel subjected to heat treatment to attain 45-50 Rockwell Hardness C (HRC) of the knives to avoid modification of serrations by the strippers. This will address the production of uniform quality fibers of about 16.11% of the total effective area of production in 2025.

It is expected that at least 40% of the total target AFSE will be funded by the LGUs, non-government organizations, Cooperatives and other People Organizations who became interested on the business model to be piloted in Caramoran, Catanduanes.

The National Fibercrop Survey and Mapping Project (NFSMP) will start in 2021 to update fibercrop data gathered during the survey conducted in 2009. Information to be gathered will be used in the identification of potential areas for AFSE center in the existing abaca farms. Likewise, validation of coconut areas outside the declared protected areas should be undertaken for abaca intercropping and rehabilitation project.

Table 14. Interventions in the Mechanization of Fiber Extraction Process, 2021-2025

	2021		2022		2023		2024		2025		Total	
	Target	Budget ('000)	Target	Budget ('000)	Target	Budget ('000)	Target	Budget ('000)	Target	Budget ('000)	Target	Budget ('000)
Abaca Processing Center from ATBSP/AFSE	1	25,000	14	350,000	14	350,000	246	6,150,000	246	6,150,000	521	13,025,000
Provision of Stripping Machines			96	24,389.38	96	24,389.38	96	24,389.38	96	24,389.38	384	97,557.50
Provision of Decorticating Machines			96	24,389.38	96	24,389.38	96	24,389.38	96	24,389.38	384	97,557.50
Modified Abaca Stripping Knives			5,000	25,000	5,000	25,000	5,000	25,000	5,000	25,000	20,000	100,000

- Researches on Fiber Processing/Extraction (Primary Processing)

Different extraction machines for abaca fiber are available with varying output capacities but improvements of these machines have to be undertaken to meet the current demand and technological changes. A prototype unit of PhilFIDA Three-Series Spindle Stripping Machine run by a single 12 Hp diesel engine was developed in 2016 and is currently operating in Matling Multi-Purpose Cooperative at Brgy. Matalin, Malabang, Lanao Del Sur. The three-series spindle stripping machine produces 230 to 260 kg of abaca fiber per day which contributes to the total abaca fiber production of the province. Though the machine is effective in producing desirable output in six-hour operation, the power engine can still be fully maximized through incorporation of additional units of spindle stripping machines. Likewise, changes have to be incorporated to give emphasis on the power source, safety of the workers and a compact set-up of the machine has to be designed to be accommodated in the abaca processing centers to be established from abaca tuxy buying special project. An improved version and 3 operational units are targeted to be developed and its performance evaluation for the period 2022 -2025 with Php 5 million budget.

Further researches are to be undertaken for processing into twine and knotted (tinagak) fibers for weaving. The need for machine on tinagak making should be addressed to ease the burden of knotting the fibers needed for weaving abaca fabrics and for handicraft making. These researches also include twining devices which need upgrading including the automated weaving machines developed by a private sector for weaving communities that need to be operationalized for the intended beneficiaries. The procurement of electrically operated handloom weaving machines intended

for those requesting the said units is also in the pipeline and the total fund allocation needed to conduct these researches is Php12.83 million.

Recent findings showed that decorticated fibers extracted from left-over abaca tuxy leafsheaths can still be processed into pulp and other applications. Since the abaca processing centers will be producing voluminous left-over leafsheaths, the existing Tandem Multi-fiber Decorticating Machine (with two units decorticating machines run by single 12 Hp diesel engine) used in pineapple fiber production, will be improved. The machine will be adapted to effectively produce abaca fiber through decortication process and maximize the power of engine in its full capacity. Two units of improved and adapted model are to be developed and evaluated in 2022 -2024 with a total budget of Php1.1 million.

A total of nine (9) research studies will be conducted on the development and improvement of fiber machineries with the purpose to increase fiber production, produce good quality fibers and increase farmers income with a total amount of 6.8 million. On the other hand, the research and development support facilities located at the Regional Experiment Stations and Seedbanks are important in the conduct of research in the station and to have good output for the benefit of fiber industry.

The activities to be undertaken to improve the research facilities are a.) perimeter fencing and road network amounting to Php32.3 million b.) construction of agricultural infrastructures and buildings amounting to Php38.5 million, and c.) procurement of agricultural machineries, equipment and trucks amounting to Php22.6 million.

- Researches on Fiber Utilization/Product Development

The agricultural innovation is essential to address environmental problems and future challenges. The researches adapted for implementing the five-year period include studies utilizing abaca extracts collected from stripping and decortication processes to be used in developing phytochemicals and in creating a medium as an adsorbent for organic pollutants. In addition, a research will also be undertaken on the extraction of celluloses and lignin from lignocellulosic biomass collected from solid plantation wastes as source of bioethanol using various chemical extraction processes. Development of the abaca cellulose acetate (ACA) which is also part of the innovative researches that is ongoing is focusing on the electrospun nanofiber to be used for water filtration membrane to trap bacteria and viruses. Likewise, fiber-based products such as abaca – reinforced composites making use of abaca residual grades blended with recycled polypropylene will also be developed as non-structural material suitable for the house interiors.

A group of academes namely Ateneo De Manila University (ADMU), De La Salle University (DLSU) and FEATI University in collaboration with DA-PhilFIDA and DOST-ITDI, is currently undertaking a research project entitled "Design and Fabrication of an Airframe for a Medium-Ranged, Short Take-Off and Landing (STOL) Unmanned Aerial Vehicle (UAV)". The study aimed to develop locally-made medium-ranged, short take-off and landing UAV airframe made from abaca fiber (sinamay) and carbon fiber as reinforcement for epoxy matrix bio-composites through vacuum assisted resin transfer molding (VARTM). This UAV is intended for disaster risk reduction and management funded by DOST. The project is intended to take off in collaboration with the Philippine Air force aimed to determine the disaster-prone areas in identified list of cities and municipalities. The UAV technology, which is to be completed within the duration of this roadmap, emphasized the potential of a local UAV manufacturing company who will make use of abaca as raw material.

There is also a need to explore the potential application of natural fiber for spacesuit manufacture. Thus, the De La Salle University, along with other universities, is working on a project regarding nanocomposite-plated abaca fabric with Electromagnetic Interference (EMI) and thermal resistance for spacesuit applications.

Before a product is to be developed and promoted, basic information on the morphological, physical, and chemical properties of different abaca varieties should be available. Likewise, confirmatory test on the properties of abaca fiber and pulp obtained from decorticated fibers extracted from regular and leftover leafsheaths will be undertaken to determine the quantity and quality of products to be produced. Thus, the DA-PhilFIDA through its Fiber Processing and Utilization Laboratory (FPUL) shall continuously conduct testing to update the fiber properties of existing commercial abaca varieties planted in the field and in PhilFIDA seedbanks/genebanks.

To assist the low-income families for their livelihood, a project activity on the development and packaging of technologies for the abaca-based products was also included in the Roadmap.

Except for the projects funded by DOST, the total allocation for the researches on secondary processing of fibers and product development is Php 44.50 million as enumerated in Table 15. The overall impact of these researches will create new opportunities and jobs for Filipino workers, more demand for our local natural fibers and additional income to our abaca fiber producers.

- Commercialization

The output of the research studies on fiber machineries such as spindle stripping machines and decorticating machines will be commercialized. The accredited fabricators of PhilFIDA will fabricate the fiber machineries and this will be distributed to LGUs.

- Conduct of Training of Trainers

Trainings of LGU technicians and farmers on pre-classification, grading, safe use, and maintenance of fiber extraction machines totaling to 905 trainings targeted by 2021-2025 shall be conducted, which will require a budget amounting to Php452.50 million.

D. On Trade

- Ensure conformity with the established government standards.

Awareness of the rules and regulations on abaca trading is the basic element to ensure conformity with established government standards. Thus, all regulatory personnel, farmers, abaca trading establishments employees, and other stakeholders involved in abaca trading and implementation of trading regulations shall undergo orientation and regular training on all fiber standards and trading regulations, such as Administrative Circular No. 12 series of 2020.

Build strong partnership with local government units (LGUs) to enact ordinances that will help the Agency to effectively implement and monitor compliance on abaca trading rules and regulations.

- Enforce and maintain a uniform and standard classification of abaca fibers per revised Administrative Circular No. 12 Series of 2020

Strict monitoring of different grading and baling establishments (GBEs), trader's warehouses and processor's establishments shall be done by the PhilFIDA Regulatory personnel. All regulatory processes and services shall be automated in accordance with RA 11032.

E. On Market

- Increased production of Philippine tropical fibers which includes abaca needed for the manufacture of the Philippine Tropical Fabrics

The law was implemented through the issuance of the Implementing Rules and Regulations (IRR) of the Republic Act 9242 stipulating the use of Philippine Tropical Fabrics or PTF with 5% fiber content of abaca, banana, pineapple and 15% silk for the uniforms of public officials and employees. The law is both significant and relevant as it will provide impetus for the growth of the Philippine tropical fabric industry and at the same time will contribute to the development of an environment-friendly agricultural and industrial sector. With the full implementation of the law, there will be increased demand for the tropical fibers which can be blended with cotton or polyester at an increasing rate of 5% on the initial year, followed by 10% to 20% fiber content in succeeding years. For just one set of uniform for each employee containing 20% indigenous fiber blend, the 1.4 million government employees in 2011as

per computation by the PTF Committee, assures the local industry an equivalent yearly fiber requirement of approximately 627 metric tons for abaca fibers for an 80:20 blended cotton-abaca yarn. This conversion of local fibers into yarns and finished products could provide revenues of Php126.5 million for pineapple, Php122.8 million for banana, and Php110.1 million for abaca fiber in processing alone. This is consistent with the current administration's efforts in upgrading farmer conditions and industrializing the regions. Jobs will be generated for the agricultural and industrial sectors, including the garments industry and fiber converters in the regions addressing industrial survival at the higher end and poverty at the lower end of the supply chain.

- Provision of weaving and fiber processing facilities to promote our very own Philippine Handwoven Fabrics

The PhilFIDA in coordination with the communities of weaving and fiber producers together with the local government units established 10 units of Weaving Centers in identified areas from 2016 to 2018. Subsequent establishment of 15 fiber processing centers for other fiber commodities which included cotton processing centers in the 2019 – 2020 targeted an increasing supply of handwoven fabrics blended with abaca, piña, cotton, and silk. With the establishment of the weaving and fiber processing facilities equipped with handlooms and other provisions needed by the weavers, the weaving industry will be able to cope up with the increasing demand for indigenous fabrics by the growing wear and apparel market. Although, the textile sector, which includes the handloom weaving communities, consumes only less than 1% of the total abaca fiber production, the impact of addressing the needs of the weavers is significant in providing their livelihood and at the same time important in preserving the country's cultural heritage which brings forth earnings from exported fabrics. To be able to continuously sustain the efforts of the government, technical and financial assistance for raw material supply will be provided to the beneficiaries for the duration of this roadmap.

- Skills enhancement and capability building of fiber processors and product converters

Transfer of developed technologies and continuous training on fiber processing for value adding are necessary to keep abreast with latest fashion trends. Traditional methods and designs for abaca fibercraft and converted products need upgrading to keep up with needs of the current market. Thus, developed technologies which includes innovative designs, new tools and devices for product conversion should be transferred and disseminated to intended beneficiaries. Although localized trainings in communities are to be undertaken, exchanges and sharing of techniques among regions or locality are encouraged to come-up with creative designs applicable for each community.

A National Livelihood Development Center on Fiber Processing and Utilization will be established to engage key resource persons capable of providing new knowledge to potential fiber processors. Modular/ critical tools will be used in empowering trainees in forming new ideas for new products in holistic approach by integrating theory and practice.

Table 15. Action Programs and KRAs for the Abaca Industry

Supply Chain	Key Result Area	Performance Indicators	Action Programs	Time Frame/Working Group	Particulars	Budget (Php'000)					
						2021	2022	2023	2024	2025	Total
PRODUCTION: To increase fiber production.											
	Expansion	Area established (ha) 2021 – 1,500 2022 – 20,000 2023 – 20,000 2024 – 7,500 2025 – 1,500	-Technical assistance in the opening of new abaca farms -Conduct of training on GAP on abaca production -Establishment of new abaca farms -Maintenance of new abaca farms - Monitoring of established abaca farms	2021 – 2025 PhilFIDA, LGUs, Cooperative/ Registered groups		75,000	1,000,000	1,000,000	375,000	75,000	
	Rehabilitation	Area treated (ha) 2021 – 800 2022 – 5,000 2023 – 5,000 2024 – 5,000 2025 – 800	-Technical assistance in the eradication of diseased abaca farms -Conduct of disease eradication -Monitoring of areas eradication -Rehabilitation of diseased-freed abaca farms	2021 – 2025 PhilFIDA, LGUs		6,000	250,000	250,000	250,000	40,000	
	Abaca Disease Mgt Project	Area treated (ha) 2021 – 3,000 2022 – 5,000 2023 – 5,000 2024 – 5,000 2025 – 0	- Technical assistance in the eradication of diseased abaca farms	2021 – 2025 PhilFIDA, LGUs		15,000	25,000	25,000	25,000		

			- Conduct of disease eradication - Monitoring of areas eradication - Rehabilitation of diseased-freed abaca farms								
	Capability building of technical personnel	No. of PhilFIDA field personnel capacitated	Training on Technology and Technical Assistance Processes for PhilFIDA Field personnel	2021 – 2025 PhilFIDA, LGUs, ATI, SUCs		3,200	100,000	500,000	200,000	20,000	
	Capability building of LGUs technicians and farmers	No. of LGUs field personnel and farmers capacitated	-Training on Technology and Technical Assistance Processes for LGUs Field personnel Training of Trainers on GAP for abaca production	2021 – 2025 PhilFIDA, LGUs, ATI, SUCs			90,550	481,100	181,100	16,220	
	Updated, informative and effective IEC materials	No. of IEC materials produced and distributed	Production and distribution of IEC materials	2021 – 2025 PhilFIDA, LGUs, ATI, SUCs, PTV		700	10,000	10,000	10,000	10,000	
Sub-Total						**99,900**	**1,475,550**	**2,266,100**	**1,041,100**	**161,220**	**5,043,870**
	Available production technologies for increased fiber yield, improved farm productivity and higher farm income										
	Generation and dissemination and cost-effective package of technology for fiber production	No. of researches conducted 2021 – 3 2022 – 3 (3) 2023 – (6) 2024 – (6) 2025 – (6)	Investment on R and D on abaca farming system, nutrient management, and pest & disease management			4,587	20,040	12,965	8,770	8,827	55,189
Sub-total						**4,587**	**20,040**	**12,965**	**8,770**	**8,827**	**55,189**
Total						**104,487**	**1,495,590**	**2,279,065**	**1,049,870**	**170,047**	**5,099,059**

INPUT SUPPLY: Improve quality and availability of planting materials										
	Adequate supply of disease-free and high yielding abaca planting materials									
	Establishment, Maintenance, and operationalization of facilities for the production of high yielding and disease-free abaca planting materials	No. of abaca plantlets, suckers and seedpieces produced for distribution 2021 – 334,464 2022 – 373,083 2023 – 428,208 2024 – 442, 822 2025 – 462,768 Total – 2,041,345	Investment in the establishment and operationalization of tissue culture laboratories, seedbank-cum-experiment stations, screen houses, nurseries, diagnostic laboratories, and immunology laboratory Abaca planting materials production and distribution	PhilFIDA, SUCs, LGUS, Farmers Associations		5,461	5,708	5,767	5,916	6,036	28,888
	Production and Distribution of seed-derived planting materials	No. of abaca seed-derived produced for distribution 2021 – 3,680,000 2022 – 40,000,000 2023 – 40,000,000 2024 – 20,000,000 2025 – 3,680,000 Total – 107,360,000	Maintenance of 17 hectares abaca mother block nursery Abaca seed-derived planting materials production and distribution	PhilFIDA, SUCs, LGUS, Farmers Associations		25,760	280,000	280,000	140,000	25,760	751,520
	Development of clonal propagation protocols for disease-free abaca planting materials	No. of researches conducted 2021 – 2 2022 – (2) 2023 – (2) 2024 – (2) 2025 – (2)	Investment on R & D for abaca propagation techniques and virus detection	PhilFIDA, DA-Biotech, PIU, DA-BAR, SUCs and DOST-PCAARRD		3,038	3,039	1,540	41	41	7,699

		Total – 2									
	Identification, development, and Introduction of abaca varieties that are high yielding and possessing other desirable traits	No. of crop improvement related researches conducted 2021 – 2 2022 – (2) 2023 – (2) 2024 – 1 (2) 2025 – (3) Total – 3	Investment on abaca R&D on crop improvement covering both conventional breeding and modern biotechnology to include genebanking, molecular biology, confined screening, and field trials of abaca; studies on insect- vectors, pathogens; as well as bioinformatics	PhilFIDA, DA-Biotech, PUI, DA-BAR, SUCs and DOST-PCAARRD		9,980	36,075	10,287	10,873	4,965	72,180
			Investment on establishment, maintenance & operation of R&D facilities including facility upgrading & human resource capacitating.	PhilFIDA, DA-Biotech, PUI, DA-BAR, SUCs and DOST-PCAARRD			167,861	3,450	3,600	5,800	180,711
			Investment on maintenance & operation of R&D facilities			7,014	9,147	7,289	7,389	7,548	38,387
	Production and distribution of biocontrol agents										
		No. of facility established & maintained 2022 – 1 2023 – (1)	Investment on establishment, maintenance & operation of Biocon multiplication facility	PhilFIDA, SUCs, LGUs, Funding agencies			1,200	500	500	500	2,700

		2024 – (1) 2025 – (1) No. of biocon agents produced, in boxes 2022 – 1,000 2023 – 2,000 2024 – 8,000 2025 – 8,000 Total – 19,000	including human resource capacitating.								
Total						**51,253**	**503,030**	**308,833**	**168,319**	**50,650**	**1,082,085**
FIBER PROCESSING AND UTILIZATION											
ON MARKET: To develop potential market through value-adding and product development											
Market, Value-adding, and Product Conversion											
	Establishment of Weaving and Processing Centers (WPC)/Monitoring and maintenance of existing abaca weaving & processing centers (WFPC)	5 WPC and 5 existing WPC Reg V, Reg VI, Reg VIII, Reg IX, Reg X	Coordination and monitoring of established facilities together with the concerned LGUs and Beneficiaries.	2022 – 2025 PhilFIDA-FUTD, LGUs and Beneficiaries			15,500	5,000	5,000	5,000	
	Fabrication and Performance evaluation of Five (5) Units Multi-Fiber Decorticating Machines with Single Diesel Engine for fuel efficiency and increased capacity	1 unit Prototype	Testing and evaluation of machine in San Vicente, Camarines Norte	2022 – 2024 PhilFIDA-FUTD, PhilFIDA Regional Office V and Fabricator			7,000	500	500	500	
	Skill Enhancement and capability building for fiber processors and product converters	FUTD – 10 TAD – 10		PhilFIDA, LGUs, Cooperatives or Associations		1,600	9,450	19,900	18,900	3,780	
Sub-total						1,600	31,950	25,400	24,400	9,280	92,630
Processing: Conduct of Researches on Fiber Properties and Product Development											
	Development of abaca non-woven	Prototypes and Smart Functional Non-woven	- Laboratory experiments/trials for	2023 – 2025 PhilFIDA-FUTD, Private sector				2,000	500	500	

	products from abaca fiber	materials for filters and reinforcements	non- woven products for prototyping - Laboratory experiments for material applications - Piloting/ Commercialization of developed products								
	Development and fabrication of abaca fiber-reinforced (thermoplastic) composite products	Prototypes and composites (non-structural materials)	Raw material preparation and formation of composite materials for specific products; Material testing and evaluation	2022 – 2024 PhilFIDA-FUTD, Private sector			1,000	500	500	500	
	Development Abaca – Carbon Reinforced Unmanned Aerial Vehicle (Drone) for Disaster Risk Management	Prototype units of 4-meter wing UAV	Fabrication of airframe reinforced with abaca-carbon fiber biocomposite; Assembly of the airframe and the control UAV control system and flying simulation control; trials at PAF Base	2018 – 2021 FEATI University Ateneo University PhilFIDA FUTD, DOST-ITDI	DOST funded						
	Development of Abaca-based Space Suit	1 development program	Formulation, laboratory experiment and piloting	2020 – De La Salle University Feati University PhilFIDA	DOST funded						
	Exploratory study on the utilization of abaca extraction wastes for ethanol production	1 study on the use of extraction wastes for ethanol production	Optimization /saccharification process using abaca extraction wastes; Characterization/ quantification of sugars abaca extraction wastes; Fermentation trials using different	2021 – 2025 PhilFIDA-FUTD (BAR, UPLB-Biotech, DOE)		300	3,000	5,000	5,000	5,000	

			microorganisms/ Evaluation of produced ethanol for transport fuel and energy								
	Identification of phytochemicals from stripping wastes extracts as antifungal agents against disease infecting abaca	Identified 3 phyto-chemicals with anti-microbial properties as biopesticide	Laboratory experiments/trials in the phytochemical composition of the extracts and applications	2021 – 2024 PhilFIDA-FUTD-BAR, Private sector		300	1,500	1,500	1,500		
	Utilization of Fiber Extraction Waste as Adsorbent of Organic pollutants and Decolorization of Bleaching effluents in Wastewater from Fiber Processing	1 study on developed adsorbent and decolorizer of bleaching effluents	Laboratory experiments/trials to produce abaca-based adsorbent	2023 – 2025 DA-PhilFIDA-FUTD				1,000	1,500	800	
	Updating and Determination of Physical, Chemical, and Morphological Properties of Different Abaca Varieties	50 abaca varieties	Physical testing, morphological and chemical analysis chemical	2021 – 2025		500	700	700	500	500	
	SEM Imaging with Elemental Analysis of Different Abaca Varieties	Photomicrographs and elemental analysis for 50 varieties	Scanning electron microscopy of cells of abaca varieties; Analysis of basic elements in abaca cells	2021 – 2025		250	250	250	250	250	
	Comparative study on fiber and pulp properties of decorticated abaca fiber extracted from regular and left over leafsheaths	Characterized properties of fiber & pulp from decorticated abaca fibers obtained from regular and left-over leafsheaths of selected varieties	Laboratory services on physical testing, morphological and chemical analysis of fibers and pulp	2021 – 2025 Continuing		500	500	500	500	500	
	Development of Abaca Cellulose	1 study on ACA and Electrospun	Laboratory testing and field experiments	2021 – 2024			500	500	800		

	Acetate and Applications	abaca-based materials									
	Development of value-adding technologies for abaca fiber-based products and transfer of developed technologies	10 Developed technologies for livelihood development program	Conduct of exploratory studies for utilization of abaca fibers for new products and technology transfer	2021 – 2025		600	800	800	800	800	
Sub-total						**2,450**	**8,250**	**12,750**	**11,850**	**8,850**	**44,150**
Processing: To develop and improve processing and utilization											
Conduct of Researches on Fiber Processing											
	Fabrication and Performance evaluation of Five (5) Series Spindle Stripping Machines with Single Diesel Engine for fuel efficiency and increased capacity	1 Prototype unit	Testing and evaluation of prototype machine in Malabang, Lanao del Sur;	2022 – 2023 PhilFIDA-FUTD, PhilFIDA Regional Office IX & fabricator				1,688	500	500	
	Fabrication and Performance evaluation of Five (5) Units Multi-Fiber Decorticating Machines with Single Diesel Engine for fuel efficiency and increased capacity	1 unit Prototype	Testing and evaluation of machine in San Vicente, Camarines Norte	2022 – 2024 PhilFIDA-FUTD PhilFIDA Regional Office V and Fabricator				1,200	500	500	
	Operationalization, Maintenance, Monitoring of Automated Loom Weaving Machine (ALWM)	Three (3) Units for the Operationalization, maintenance and monitoring; One (1) Unit for upgraded version for distribution	Operationalization, Maintenance and Monitoring of 3 units ALWM; Identification of beneficiaries LGUs; Procurement of upgraded unit distribution to beneficiary	2022 – 2025 PhilFIDA-FUTD in collaboration with JRD System, Inc., PhilFIDA Regional Offices and Beneficiaries			500	400	400	400	

	Performance trial and improvement of existing twining machine	1 existing model 2 improved models	Testing and evaluation of machine at PhilFIDA-FPUL and fibercraft areas	2022 – 2025 PhilFIDA-FUTD/ Regional Offices, End users			300	300	300	300	
	Improvement of Existing fiber cutting machine for processing and product development	1 improved models	Improvement Testing, Evaluation of improved unit	2022 – 2023 PhilFIDA-FUTD, Fabricator			500	250			
	Design and development of Knotting Machine for Tinagak Making	1 Prototype and 1 Final Model	Design, Fabrication, Testing and Evaluation of Prototype Unit	2023 – 2025 PhilFIDA-FUTD, Private Sector				1,000	500	300	
	Procurement of motorized hand looms for weaving centers	Three (3) units of commercial model	Procurement and distribution of motorized handlooms	2023 – 2025 PhilFIDA-FUTD, Fabricators				1,500	500	500	
Sub-total							**1,300**	**6,338**	**2,700**	**2,500**	**12,838**
On Processing: Primary Processing											
	Implementation of Abaca Tuxy Buying Special Project	521 units	Establishment of processing center in coordination with LGU	2021 – 2025 PhilFIDA, LGUs		25,000	250,000	250,000	6,250,000	6,250,000	
	Provision of Abaca Spindle Stripping Machine to be housed in stripping centers	384 units	Commercialization of safe and cost-efficient spindle stripping machine which passed the PNS PAES standards for fiber extractor machine	2022 – 2025 PhilFIDA, AMTEC LGUs			24,389.38	24,389.38	24,389.38	24,389.38	
	Provision of Deco machines to be housed in stripping centers	384 units	Commercialization of effective and cost-efficient deco machine with PNS PAES for fiber decorticator	2022 – 2025 PhilFIDA, AMTEC, LGUs			24,389.38	24,389.38	24,389.38	24,389.38	
	Provision of Modified Abaca Stripping Knife (MASK)	20,000 units	Identification of farmers beneficiaries with LGUs, fabrication of the device	2022 – 2025 PhilFIDA, LGUs			25,000	25,000	25,000	25,000	

			and distribution to beneficiaries								
	Provision of Processing Center	15 units	Establishment of processing center in coordination with LGU	2022 – 2025 PhilFIDA, LGUs			24,000	12,000	12,000	12,000	
	Provision of Fiber Extraction Shed for ASSM/Decorticating machines	78 units	Identification of Cooperatives with LGUs	2022 – 2025 PhilFIDA, LGUs			13,300	13,300	14,000	14,000	
	Provision of Drying Shed	78 units	Identification of Cooperatives	2022 – 2025			21,240	8,400	12,600	12,600	
	Development of fiber extraction machines to improve the quality and increase fiber production. - Portable spindle stripping machine with diesel engine - Semi - automatic spindle stripping machine (solar power)	2 units Prototype 2 units Final Model 3 units Prototype	Design and fabrication, testing and evaluation. Design and Fabrication of Prototype Units/Commercialization of the final model	2022 – 2025 PhilFIDA-IFED, LGUs, private sector (fabricators) 2022 – 2025 PhilFIDA- IFED, private sector (fabricator)			3,500	1,300	1,000	1,000	
		Perimeter fence Road Network	Land improvement	2022 – PhilFIDA -IFED Regional Offices I, IV, V, VI, IX, XI			18,300 14,000				
		Building and structures 31 units repair and upgrading of Tissue Culture Laboratory and Diagnostic Laboratory 1 unit Admin Bldg. and	Construction of agricultural infrastructures at the Regional Experiment Stations and Seedbanks	2022 – 2025 PhilFIDA-IFED Regional Offices I, IV, V, VI, VIII, IX, XI, XIII			32,255	2,100	2,100	2,100	

		Bunkhouse									
		Agricultural machineries and equipment	Procurement of tractors and hauling truck for the Regional Experiment Station and Seedbanks	Regional Offices I, V, VII, IX and XI			22,595				
		Irrigation system and well drilling	Procurement of sprinkler irrigation and well drilling for the Regional Experiment Station and Seedbanks	Regional Offices IV, V., VI VIII, IX and XI			20,900				
	Capacity building and manpower development	No. of trainings conferences/ workshops	Trainings/Conferences/ Forums/Conventions /Workshops	2021 – 2025 DA-BAFE, PhilFIDA-IFED		1,000	3,700	3,700	1,500	2,500	
Sub-total						**26,000**	**497,568.76**	**364,578.76**	**6,366,978.76**	**6,367,978.76**	**13,623,105.04**
Total						**30,050**	**539,068.76**	**409,066.76**	**6,405,928.76**	**6,388,608.76**	**13,772,723.04**
TRADE: To enhance fiber quality competitiveness											
Fiber Industry Regulation Services											
	1.Permit and License Issuance Licenses (Grading Baling Establishments (GBE), Buying Stations (BS), Trader- Exporters (TE), Local Traders (LT), Processors (P), Classifiers (C))	No. of licenses issued 2021 – 1,428 2022 – 1,594 2023 – 1,610 2024 – 1,626 2025 – 1,642	Inspection Issuance of Licenses	2021 – 2025 Grading Baling Establishments, Buying Stations, Trader- Exporters, Local Traders, Processors, Classifiers		433	465	470	475	480	2,323
	- Permit to transport Fiber (PTF)	No. of permit to transport fibers 2021 – 5,175 2022 – 5,539 2023 – 5,594 2024 – 5,649	Inspection	2021 – 2025 Grading Baling Establishments, Buying Stations, Trader- Exporters, Local Traders, Processors							

		2025 – 5,704									
	- Primary Certificates of Fiber inspection (PCFI) Certificate of Fiber Inspection (CFI)	No. of primary certificates of fiber inspection 2021 – 3,180 2022 – 3,305 2023 – 3,338 2024 – 3,371 2025 – 3,404 No. of certificates of fiber inspection 2022 – 487 2023 – 535 2024 – 588 2025 – 646	Certification Certification	2021 – 2025 GBE and Class A Traders 2022 – 2025 GBE and Class A Traders		2,535	2,560	2,586	2,612	2,638	12,931
Sub-total						**2,968**	**3,275**	**3,308**	**3,341**	**3,374**	**16,266**
	2. Monitoring - Inspection of sites, facilities, warehouses and equipment No. of Compliance and	Number of facilities inspected 2021 – 1,507 2022 – 1,654 2023 – 1,670 2024 – 1,686 2025 – 1,702 Compliance 2021 – 1,485 2022 – 1,654 2023 – 1,670 2024 – 1,686 2025 – 1,702	Inspection of facilities	Grading Baling Establishments, Buying Stations, Trader- Exporters, Local Traders, Processors		540	575	581	587	593	
	Conduct of check inspection of approved bales at GBEs	No. of check-inspection conducted	Inspection of approved bales at GBEs	2021 – 2025 Grading Baling Establishments & Class A Traders		1,268	1,405	1,419	1,433	1,447	6,972

		2021 – 36 2022 – 37 2023 – 38 2024 – 39 2025 – 40									
Sub-total						**1,808**	**1,980**	**2,000**	**2,020**	**2,040**	**9,848**
Total						**4,776**	**5,255**	**5,308**	**5,361**	**5,414**	**26,114**
	3. Enforcement No. of sites/ facilities/establishments inspected	No. of inspection reports issued 2021 – 1,428 2022 – 1,594 2023 – 1,610 2024 – 1,626 2025 – 1,642	Monitoring and Inspection of facilities	2021 – 2025 Grading Baling Establishments, Buying Stations, Trader- Exporters, Local Traders, Processors, Classifiers		433	465	470	475	480	
	- Number of products monitored and/or inspected with reports issued (inspected and approved bales)	Number of bales inspected/verified 2021 – 575,400 2022 – 547,010 2023 – 552,480 2024 – 557,950 2025 – 563,420	Inspection of approved bales	2021 – 2025 Traders, Exporters		1,690	1,870	1,889	1,908	1,927	
	- Fiber bales inspected	No. of inspection reports issued 2021 – 8,260 2022 – 9,958 2023 – 10,057 2024 – 10,156 2025 – 10,255	Monitoring and Inspection	2021 – 2025 Traders, Exporters							
Sub-Total						**2,123**	**2,335**	**2,359**	**2,383**	**2,407**	**11,607**
TOTAL						**6,899**	**7,590**	**7,667**	**7,744**	**7,821**	**37,721**

PhilFIDA - Philippine Fiber Industry Development Authority
DA-BAR - Bureau of Agricultural Research of the Department of Agriculture
DOST-PCAARRD - Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology
DA-Biotech PIU - Biotech Program Implementing Unit of the Department of Agriculture
BPI-PQS - Plant Quarantine Service of the Bureau of Plant Industry SUCs - State universities & colleges
LGUs - Local Government Units

F. Major Problems and Solutions with New Approaches

1. **Unstable Source/Supply of Planting Materials.** Currently, the PhilFIDA can provide sufficient planting materials from the existing 17-hectare tissue culture mother-block nurseries and seven (7) seedbanks. These should be continuously maintained in order to sustain the source of available planting materials for the farmers.

   Solution 1: Use abaca seeds as planting materials in response to the needs of the clients. The Regional Directors, Division Chiefs, Researchers, Technicians and Extension workers were trained on seed propagation and nursery establishment. PhilFIDA Regional offices are now collecting seeds for nursery propagation and will give seeds to farmers and private sectors for their nurseries. A seed protocol was already developed.

   Solution 2. Increase number of nurseries per region that will be accredited by the Bureau of Plant Industry and PhilFIDA. Accredited nurseries shall be established in each municipality. Agriculture staff of LGUs and NGOs will be trained on seedling production and nursery management.

2. **Prevalence of Abaca Virus Diseases and other Emerging Diseases**

   Solution 1: Sustain Abaca Disease Management Project (ADMP).

   Solution 2: Conduct exploration of new pest management technology and establish an Integrated Pest Management Project for Abaca.

   Solution 3: Promote efficient farm management by intensive and sustainable farmers' training. Agricultural Training Institute (ATI) will be tapped to support the trainings for farmers and avail the integrated plan for publicly funded program for abaca, LGU technicians and NGOs to improve their technical knowledge and skills on abaca farming.

   Solution 4: Generate technologies to manage abaca virus diseases and other emerging diseases.

   Solution 5: Establish Pest Risk Identification and Management (PRIME) for Abaca for early detection and action to manage pest and disease outbreak.

3. **Low Farm and Fiber Production.** Majority of abaca farms are far from the farmer's residences and harvesting is only done 2 times a year in some areas. Traditional harvesting device and tools, spindle and decorticating machines are used during fiber extraction and needs to be improved to produce more quality fibers.

Solution 1: Increase yield by optimizing the plant population through observance of recommended planting distance in abaca areas.

Solution 2: Improve efficiency and fiber recovery of fiber extraction machines and equipment. The PhilFIDA, PhilMECH and SUCs will collaborate to fabricate machines and conduct researches to improve the performance of abaca fiber extraction machinery.

Solution 3: Provide disease free and high yielding variety of planting materials to support a reasonable increase in farm productivity of existing abaca hectarage.

Solution 4: Distribute spindle stripping and decorticating machines, knives and improved hand-stripping devices and conduct more researches on fiber processing/extraction.

4. **Low Fiber Quality.** According to foreign buyers, the quality of Philippine fiber has deteriorated compared to fibers from Ecuador and Puerto Rico.

   Solution 1. Promote the production of good quality abaca fiber through aggressive information campaign drive against pojada or indiscriminate harvesting, and mixing/adulteration with spurious fibers, use of non-standardized fiber extraction devices and machines, among others.

   Solution 2: Strict enforcement of abaca fiber grading standards.

5. **Insufficient Supply of Abaca Fiber**. Abaca production has to be increased in various ways specifically through opening of new abaca areas and by invigorating old and less productive farms and plantations.

   Solution 1: Establish abaca nurseries, model abaca farms, and widen production base through coconut plus abaca planting mix.

   Solution 2: Establish stripping facilities and drying facilities near abaca farms and mechanize (using spindle-stripping and decorticating machines) the fiber extraction. Encourage farmers organizations with huge abaca farms to establish extraction and postharvest facilities.

   Solution 3: Continuous proactive technical assistance to industry players by PhilFIDA. Regulate the harvesting of bacbac/umbak (dried outer leafsheaths) in coordination with the LGUs.

   Solution 4: Aggressive campaign for abaca farming. Encourage private sectors, farmers' associations/cooperatives, and corporations to invest in abaca trading business and engage in providing farm service. Assist farmers in obtaining funding support from financial institutions.

G. New Policies

PhilFIDA will introduce new directives and policies to increase fiber production, improve fiber quality, and strengthen partnership with all sectors of the industry.

- The Abaca Tuxy Buying Project/ Abaca Freefarmers Social Enterprise. This will ensure the survival of abaca which is indigenous to the Philippines. This project aims to organize and empower most of the abaca farmers nationwide as a cooperative/association, produce their own abaca fibers as a group which will redound to better competitive price, quality and quantity and sell their harvest directly to GBEs and local processors.

  The traditional way of abaca fiber extraction/harvesting by the abaca farmers has twelve (12) stages. The project intends to lessen it to only six (6) steps --Topping, Tumbling, Tuxying, Tuxy Bundling, Tuxy Transporting/Hauling and Tuxy Trading /Selling -- thereby removing and easing the burden of the abaca farmers of the other six (6) activities and just let them continue producing all the abaca tuxies they want for the day before selling it to their cooperative that same day. This will surely increase abaca fiber production.

  This will also strengthen the cooperativism and consolidated fiber extraction approach which is an effective tool in the implementation of government projects and interventions that is beneficial and advantageous to all members.

- Provide abaca planting materials that are free from symptoms of viral diseases based on the PhilFIDA protocol to interested individuals, groups, and other stakeholders.

- Encourage more farmers, private sectors, NGOs, corporations, and big landowners to plant abaca in their areas identified under National Color-Coded Agricultural Guide Map launched by Adaptation and Mitigation Initiative in Agriculture (AMIA).

- Intensify disease management that will revive and nurture abaca plants through improved approach on the prevention of diseases and soil nutrient management.

- Conduct indexing and surveillance on existing abaca farms and plantations with disease incidence.

- Establish a Disease-Free Abaca Farms or Plantations. In this roadmap, all abaca areas in the established farm or plantation infected with the disease shall be geotagged quarterly to effectively monitor the

progress of infection and provide immediate action under the Abaca Disease Management Project.

- Provide technical assistance to farmers and farmer groups in the availment of loans or grants for abaca development from financial institutions and other funding sources.

- Conduct research (PhilFIDA, PhilMech, PhilFIDA Accredited Fabricator, AMTEC, DA- BAR, and other industry players) to come-up with improved and efficient machineries that can sufficiently increase the production of quality fibers. Other researches mentioned in partnership with SUCs, private sectors need support from other government institutions.

- Promote the development/improvement/innovation and use of fiber extracting machines and devices that are efficient, energy-saving preferably eco-friendly engines and operator-friendly.

- Commercialize and distribute fiber extraction machinery, equipment, and tools and devices in collaboration with PhilFIDA Accredited Fabricators and government or non-government funding institutions.

- Continue to prioritize on strengthening the Agency's R&D capability in terms of facilities and human resource as well as conduct of dynamic researches geared towards improving crop productivity, diversified uses for value-added fiber-based products and thereby increasing farm income as well as augmenting household income.

- Take advantage of the vast potential of modern biotechnology to enhance the development of improved abaca variety that possesses desirable traits such as, disease resistant, climate resilient and high yielding with acceptable fiber properties.

- Exploit the immense application of digital technology to facilitate abaca pest and disease identification, monitoring and surveillance for an effective decision and management.

- Prioritize the activities of the collection, enrichment, characterization, documentation, and conservation via applicable methods of abaca genetic resources.

- Verify technologies for on-site/farm virus detection and integrated pest management including soil remediation to effectively manage abaca diseases.

- Establish Common Service Facilities (CSF) composed of fiber extraction, drying, classifying, weighing, baling, storage, fiber processing and weaving sections.

- Conduct training of farmers on Good Agricultural Practices (GAP), livelihood, operation, maintenance, and safe use of fiber machinery for production and postharvest, tuxy segregation for fiber pre-classification, fiber grading and classification.

- Develop Training Regulations (TR) for National Certificate for Competency, for abaca production technology in collaboration with Technical Education and Skills Development Authority (TESDA).

- Conduct massive information campaign using multimedia (radio and tv broadcast, animated movies, audio, podcast, videoclips/film clips, infographics, vlogging, Facebook/YouTube livestreaming) in collaboration with ATI, DA-AFID, PTV4 and RTV.

- Advocate for the observance of occupational safety and health practices in the Philippine Natural fiber Industry involving farmers, industry players including all concerned government workers.

- Develop and enhance occupational safety and health standards protocol in abaca fiber production, fiber machinery/tools/devices, fiber processing equipment, wearing of PPEs and preparation of training modules. Train farmers and other stakeholders in occupational safety and health prior to the implementation of standard protocol.

H. Required Investment and Projected Income

The total investments for the input supply, fiber production, fiber processing and utilization, fiber trade and quality regulation aspects of the abaca industry is estimated at Php19.99 billion from 2021-2025.

On the other hand, a projected income of Php53.20 billion or a positive percentage variance of 62.42 from abaca fiber production alone will be attained exclusive of other by-products like bioethanol, bio-pesticides, cellulose acetate, among others.

Table 16. Estimated Investment Cost, 2021-2025 (Php '000)

	2021	2022	2023	2024	2025	TOTAL
Fiber Production	104,487	1,495,590	2,279,065	1,049,870	170,047	**5,099,059**
Fiber Processing and Utilization	27,600	417,969	386,579	6,388,279	6,374,159	**13,594,585**
Research and Development	53,703	624,130	331,321	185,969	65,100	**1,260,223**
Fiber Trade and Quality Regulation	6,899	7,590	7,667	7,744	7,821	**37,721**
TOTAL	**192,689**	**2,545,279**	**3,004,632**	**7,631,862**	**6,617,127**	**19,991,588**

Investment amounting to Php 5.09 billion from 2021-2025 to increase fiber production consist of the following:

- ✓ Provision of technical assistance in the opening of new abaca farms and rehabilitation of diseased-freed abaca farms
- ✓ Conduct of training on GAP on abaca production.
- ✓ Establishment of new abaca farms
- ✓ Maintenance of new and rehabilitated abaca farms
- ✓ Monitoring of established abaca farms
- ✓ Abaca Disease Management Project
- ✓ Capability Building of Technical personnel
- ✓ Capability building of LGU technicians and farmers
- ✓ Production and distribution of IEC materials
- ✓ Production and Distribution of seed-derived planting materials
- ✓ Generation and dissemination and cost-effective package of technology for fiber production

Investment amounting to Php1.26 billion from 2021-2025 on the research and development to improve the quality, sustain the availability of clean planting materials and the conduct of research and development for fiber processing and product development include the following:

- ✓ Establishment, Maintenance, and operationalization of facilities for the production of high yielding and disease-free abaca planting materials
- ✓ Development of clonal propagation protocols for disease-free abaca planting materials
- ✓ Identification, development, and introduction of abaca varieties that are high yielding and possessing other desirable traits.
- ✓ Production and distribution of biocontrol agents
- ✓ Fabrication and Performance evaluation of five (5) Series Spindle Stripping Machines with Single Diesel Engine for fuel efficiency and increased capacity
- ✓ Fabrication and Performance evaluation of five (5) units Multi-Fiber Decorticating Machines with Single Diesel Engine for fuel efficiency and increased capacity
- ✓ Operationalization, maintenance, monitoring of Automated Loom Weaving Machine (ALWM)
- ✓ Performance trial and improvement of existing twining machine
- ✓ Improvement of existing fiber cutting machine for processing and product development.
- ✓ Design and development of Knotting Machine for Tinagak Making
- ✓ Procurement of motorized hand looms for weaving centers
- ✓ Development of abaca non-woven products from abaca fiber

- ✓ Development and fabrication of abaca fiber-reinforced (thermoplastic) composite products
- ✓ Development of Abaca-Carbon Reinforced Unmanned Aerial Vehicle (Drone) for Disaster Risk Management
- ✓ Development of Abaca-based Space Suit
- ✓ Development of fiber extraction machines
- ✓ Exploratory study on the utilization of abaca extraction wastes for ethanol production
- ✓ Identification of phytochemicals from stripping wastes extracts as antifungal agents against disease infecting abaca
- ✓ Utilization of Fiber Extraction Waste as adsorbent of organic pollutants and decolorization of bleaching effluents in wastewater from fiber processing
- ✓ Updating and Determination of physical, chemical, and morphological properties of different abaca varieties
- ✓ Scanning Electron Microscopy (SEM) imaging with elemental analysis of different abaca varieties
- ✓ Characterization of fiber and pulp properties of abaca for end-users
- ✓ development of abaca cellulose acetate and applications
- ✓ Development of value-adding technologies for abaca fiber-based products and transfer of developed technologies

Investment amounting to Php13.59 billion from 2021-2025 to develop new products, add value to fibercrop products thereby providing livelihood to the community and improve production techniques to generate income which consist of the following:

- ✓ Establishment of Weaving and Processing Centers (WPC)/ Monitoring and maintenance of existing abaca weaving & processing centers (WFPC)
- ✓ Establishment of National Fiber Processing and Utilization Center for Livelihood Programs
- ✓ Skill Enhancement and capability building for fiber processors and product converters
- ✓ Implementation of Abaca Tuxy Buying Special Project/Abaca Freefarmers Social Enterprise
- ✓ Provision of Abaca Spindle Stripping Machine (ASSM)
- ✓ Provision of Decorticating machines
- ✓ Provision of Modified Abaca Stripping Knives (MASK)
- ✓ Provision of Processing Center
- ✓ Provision of Fiber Extraction Shed for ASSM/Decorticating machines
- ✓ Provision of Drying Shed
- ✓ Capacity building and manpower development

Investment amounting to Php37.72 million from 2021-2025 to enhance fiber quality competitiveness through the following activities:

- ✓ Issuance of Primary Certificate of Fiber Inspection and Permit to Transport Fibers to traders, exporters and processors;
- ✓ Monitoring of sites and facilities of traders, exporters, buying stations and processors; and
- ✓ Enforcement of rules and regulations governing fiber quality standards and permits/licenses of participating establishments.

CHAPTER XI

IMPLEMENTATION, MONITORING AND EVALUATION

A. Implementation of the Roadmap

The Philippine Fiber Industry Development Authority (PhilFIDA) under the management of the Executive Director and a Deputy Executive Director is the lead agency in the implementation of the Abaca Fiber Industry Roadmap. The implementing units within PhilFIDA are nine (9) Regional Offices, one (1) Regional Satellite Office, and five (5) Technical Divisions assisted by two (2) Support Divisions as shown in Figure 21.

The Executive Director (ED) is the prime mover that shall direct all operating units of the agency to perform the innovative planned programs, project and activities stipulated in the roadmap and agreed upon with the stakeholders during the various consultations. The ED shall report to the Secretary of the Department of Agriculture and the Undersecretary for High Value Crops and Rural Credit (HVCRC) regularly the progress of the implementation and the accomplishment of the plans in the roadmap.

The Technical Divisions are composed of the following:

1. Research Division;
2. Technical Assistance Division;
3. Regulatory Division;
4. Fiber Utilization and Technology Division; and
5. Interim-Fiber Engineering Division

The technical division shall oversee the implementation of the various programs, projects, and activities (PPAs) of the Abaca Fiber Industry Roadmap. The regional offices shall implement the PPAs in coordination and cooperation with the various players and stakeholders of the country's fiber industry both in the public and private sectors of the economy.

The Support Divisions are composed of the following:

1. Administrative, Financial and Management Division; and
2. Planning Division.

The Regional Offices and their geographical coverage are composed of the following:

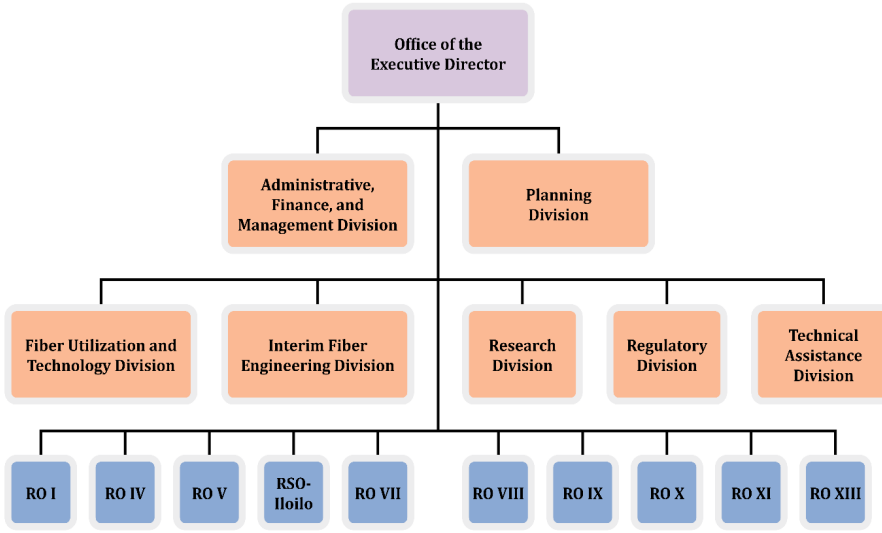
1. Regional Office I (covering Ilocos region, Cagayan Valley and Cordillera Autonomous Regions);
2. Regional Office IV (covering Central Luzon, CaLaBaRZon, MIMAROPA, and National Capital Region);

3. Regional Office V (covering Bicol region);
4. Regional Office VII (covering Central Visayas);
- Regional Satellite Office Iloilo (covering Western Visayas);
5. Regional Office VIII (covering for Eastern Visayas);
6. Regional Office IX (covering Zamboanga Peninsula and BARMM);
   For BARMM, the PhilFIDA RO IX will continue to provide technical assistance on fiber production and regulatory services to stakeholders while collaboration with the BARMM government is ongoing.
7. Regional Office X (covering Northern Mindanao);
8. Regional Office XI (covering Davao region and SOCCSKSARGEN); and
9. Regional Office XIII (covering Caraga region).

The Support Divisions are composed of the following:

1. Administrative, Financial and Management Division; and
2. Planning Division.

Figure 21. Fibercrop Roadmap Organogram



The collaborating agencies/institutions are the following:

1. National and Local Government

   1.1. Executive Branch

   a. Department of Agriculture (DA), its concerned bureaus and attached agencies such as Bureau of Plant Industry (BPI), Bureau of Agricultural Research (BAR), Bureau of Soils and Water Management(BSWM), Bureau of Agricultural and Fisheries

Standards (BAFS), Agricultural and Training Institute ATI), Philippine Center for Postharvest Development and Mechanization (PhilMech), Philippine Coconut Authority (PCA), Information and Communications Technology Service (ICTS), Philippine Crop Insurance Corporation (PCIC), National Irrigation Administration(NIA) , Philippine Council for Agriculture and Fisheries (PCAF) , Bureau of Agricultural and Fisheries Engineering (BAFE), among others.

b. Department of Agrarian Reform (DAR);
c. Department of Trade and Industry (DTI);
d. Department of Information and Communications Technology (DICT)
e. Department of Environment and Natural Resources (DENR)
f. Technical Education and Skills Development Authority (TESDA)
g. National Grid Corporation of the Philippines (NGCP)
h. Philippine Commission on Women
i. National Commission on Indigenous Peoples
j. Department of Science and Technology Councils and Research Development Institutes (RDIs)
k. University of the Philippines Los Baños - Institute of Plant Breeding, (UPLB-IPB);
l. University of the Philippines Diliman (UP Diliman);
m. National Convergence Initiative for Sustainable Rural Development (NCISRD);
n. National Abaca Research Center (NARC)-Visayas State University (VSU);
o. Local Government Units (LGUs);
p. Philippine Statistics Authority (PSA);
q. Cooperative Development Authority (CDA);
r. Agricultural Machinery Testing and Evaluation Center (AMTEC); and
s. Others (PDEA, NICA).

1.2 Legislative Branch

a. Senate
b. House of Representatives

1.3 Judicial Branch

a. Office of the Solicitor General (OSG)

2. Industry Mainstream Players

    a. Abaca farmers/fiber producers;
    b. Fiber Traders;
    c. Fiber Exporters;
    d. Grading and Baling Establishments (GBEs); and
    e. Fiber based product processors and manufacturers, namely, Cordage Manufacturers, Pulp Millers, Fibercraft Manufacturers, Fiber Weavers, Fiber Reinforced Composite Manufacturers, among others.

3. Public-Private Partnership/Entrepreneurs

    a. Tissue culture laboratories;
    b. Several international importers such as Glatfelter, Ahlstrom-Munksjo, Celesa, Toho Tokushu, etc.;
    c. Philippine Chamber of Handicraft Industries;
    d. JRD Systems Technology, Inc.;
    e. Torrex Development Corporation;
    f. Lynx Media Laboratories;
    g. Non-woven Fabrics Philippines, Inc.;
    h. College of Forestry and Natural Resources-UPLB;
    i. Several other clients (individual/organizations); and
    j. Farmer cooperatives and abaca private sector.

The private sector plays a critical role since it is the principal sustaining element of the fibercrop industry. The fibercrop farmers are the producers of the fibers together with their attendant workers such as the tumblers, tuxers, strippers, stripping machine operators, driers, and haulers. The barangay fiber traders purchase the fibers from the farmer producers then sells the same to municipal traders that in turn sells them to provincial traders or to trader exporters or to grading and baling establishments (GBEs). Some farmer organizations, both associations and cooperatives, that are able to consolidate fibers into economical volume sell their produce to the trader exporters or GBEs by themselves, thus competing effectively with the middlemen and obtaining higher returns on their produce.

The fiber processors that include pulp millers, makers of cordage and related products, handicraft makers, weavers, and users of by-products and other fibercrop derived substances like the enzymes, seed oil and bioethanol are the converters of the raw materials from fibercrops into value added goods. Processors shall be encouraged to organize themselves so that they can develop transactional strength and negotiating power. The pulp millers have an established organization called the Association of the Abaca Pulp Manufacturers Inc. (AAPMI) and the raw fiber exporters/Grading Baling Establishments have also an established organization called Philippine Fiber Exporters Association (PFEA).

B. Monitoring and Evaluation

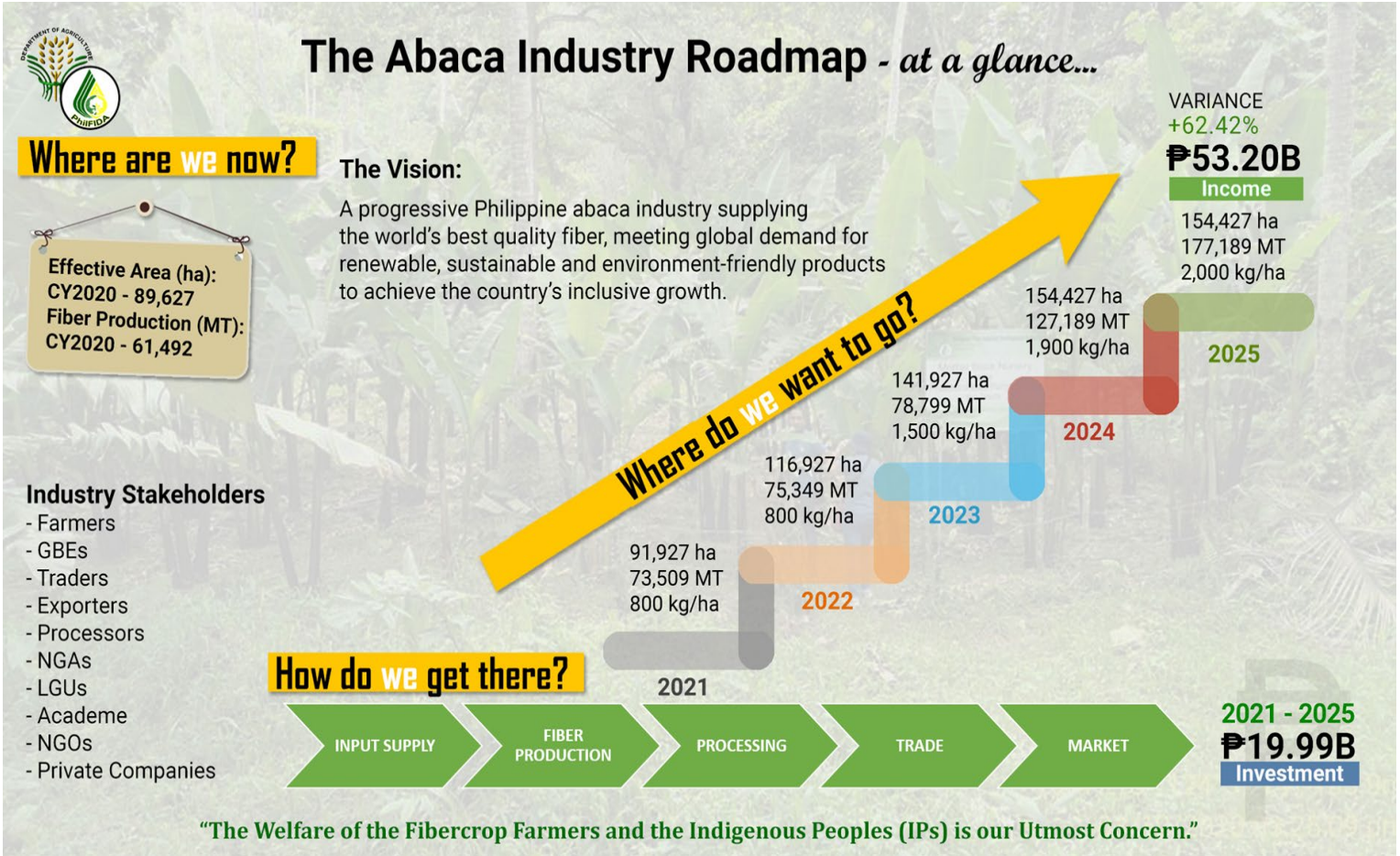
Strict monitoring of the Abaca Industry Roadmap shall be done.

The PhilFIDA Monitoring Team tasked to monitor the progress of the implementation of the roadmap shall be composed of the following:

1. Technical Review Committee/Focal Person on Abaca
2. Technical Working Group
3. Planning Division Monitoring Group
4. Administrative, Financial and Management Division Monitoring Group

The progress of the roadmap implementation will be reported to the Presidential Management Staff of the Office of the President, Department of Agriculture, Department of Budget, and Management, National Economic and Development Authority, Commission on Audit, and the National Banner Program Committee on High Value Crops- Fibercrops.

Impact assessment by external assessors shall be conducted three years after the implementation of the roadmap considering that the abaca starts commercial fiber production only after two years from planting.


The Abaca Industry Roadmap - at a glance...
Where are we now?
Effective Area (ha):
CY2020 - 89,627
Fiber Production (MT):
CY2020 - 61,492
The Vision:
A progressive Philippine abaca industry supplying the world's best quality fiber, meeting global demand for renewable, sustainable and environment-friendly products to achieve the country's inclusive growth.
Where do we want to go?
VARIANCE
+62.42%
₱53.20B
Income
2021
91,927 ha
73,509 MT
800 kg/ha
2022
116,927 ha
75,349 MT
800 kg/ha
2023
141,927 ha
78,799 MT
1,500 kg/ha
2024
154,427 ha
127,189 MT
1,900 kg/ha
2025
154,427 ha
177,189 MT
2,000 kg/ha
Industry Stakeholders
- Farmers
- GBEs
- Traders
- Exporters
- Processors
- NGAs
- LGUs
- Academe
- NGOs
- Private Companies
How do we get there?
INPUT SUPPLY
FIBER PRODUCTION
PROCESSING
TRADE
MARKET
2021 - 2025
₱19.99B
Investment
"The Welfare of the Fibercrop Farmers and the Indigenous Peoples (IPs) is our Utmost Concern."

ANNEXES

Annex 1. Definition of Terms

A	Abaca	Scientifically known as *Musa textilis* Nee, is a plant indigenous to the Philippines and is similar to banana in appearance except that the leaves are upright, pointed, narrower and more tapering than the leaves of the banana.
	Abaca Fiber	A filament extracted from the stalks of the abaca plant. It is internationally known as Manila Hemp which is used in the production of pulp for industrial use, cordage, fiber craft, and fabrics.
	Abaca Leafsheaths	The overlapping sheaths that form the stalk (pseudo stem) of the abaca plant where the fiber is obtained.
	Abaca Mosaic Disease	A disease caused by the sugarcane mosaic virus (SCMV-Ab) that belongs to the Potyviridae family. The virus can be transmitted mechanically and though vegetative propagules, as well as by aphid vectors.
	Agricultural Inputs	Any resources like planting materials, organic and inorganic fertilizers, water, and labor used for the primary production of abaca.
	Agrobiodiversity	Result of the interaction between the environment, genetic resources and management systems and practices used by culturally diverse peoples.
	All-in Buying	The practice of buying abaca fibers in a wholesale manner, where semi-classification or classification of fibers as to quality is not required.
B	Bale	Volume and manner of packing the fiber; usually weighs 125 kilograms and tightly wrapped and bound with cords or hoops measuring 100cm x 55cm x 60cm.
	Banana Bract Mosaic Disease	A disease caused by a virus that belongs to the family Potyviridae infecting both abaca and banana and can be transmitted mechanically and through a vector.
	Bast Fibers	A strong fiber obtained from the bark/skin of the plant.
	Benchmark	A point of reference against which things may be compared or assessed.
	Benchmarking Analysis	The process used in comparing the qualitative and quantitative parameters for typical and PNS-GAP in abaca fiber production.
	Biocomposites	A technological application that uses biological systems, living organisms or its derivatives to create or modify specific products or process for specific use.
	Bunchy-top Disease	A disease caused by abaca and banana bunchy top viruses that are transmitted by *Pentalonia nigronervosa* Coq. which causes the bunching appearance in abaca plants.

	Bundling	A manner of packing of dried abaca fibers into desired weight or volume.
	Buying Station	An establishment that buys and supplies fibers exclusively to its mother company.
C	Commodity	Refers to the abaca fiber being produced and traded.
	Composites	Is a material made from two or more different materials that, when combined, are stronger than those individual materials by themselves.
	Cordage	A traditional application for abaca in the form of cords or ropes, especially used in a ship's rigging.
	Corms	Rootstock, underground modified stem that contains nodes and internodes.
D	Decorticated Abaca Fiber	The type of abaca fiber extracted through decortication.
	Decorticating Machine	A type of machine that has rotating drum with steel blades used for fiber extraction.
	Decortication Method	A mechanized process of extracting abaca fiber where the abaca leafsheaths are scraped using a decorticating machine.
	Downstream Processing	Describes the series of operations required to take biological materials, such as cells, tissue culture fluid, or plant tissues, and derive from them a pure and homogeneous protein product.
E	Electrospinning	Use of electrical charge to induce drawing of very fine fibers from a liquid.
F	Fertilizer	Includes any substance –solid or liquid –or any nutrient element or elements –organic or inorganic –singly or in combination with other materials, applied directly to the soil, foliage, or plant for the purpose of promoting plant growth, increasing crop yield, or improving the quality of abaca plant.
	Fiber Classifier	Refers to a private person licensed by PhilFIDA to classify and grade Phil. commercial fibers with established standards.
	Farm	Any premise, establishment or immediate surroundings in which abaca is grown and harvested
G	Good Agricultural Practices (GAP)	Refers to practices that address environmental, economic, and social sustainability for on-farm processes, and which result in increased quantity of safe and quality food and non-food agricultural products and safety of workers.
	Genebanking	Refers to a system of collecting and conserving diverse genetic materials of abaca to include their characterization, evaluation, and documentation in order to identify potential sources of desirable traits that are important for breeding/crop improvement;

		preservation and conservation can be through in vitro, cryopreservation and field techniques.
	Grade	Refers to fiber quality as designated by an alphanumeric code generally described as normal and residual fiber.
	Grading	Classifying abaca fiber according to the standards set by the competent authority on the quality of abaca fiber.
	Grading Baling Establishment (GBE)	Firm engaged in buying, grading/baling, and selling commercial fibers for domestic and/or foreign consumption equipped with the required equipment, facilities, and manpower.
	Green Economy	an economy that aims at reducing environmental risks and ecological scarcities that aims for sustainable development without degrading the environment.
H	Hagutan	Local term for hand stripping device.
	Hand-Stripped	Fiber extracted through the use of manually operated stripping device.
	Hand Stripping Knife	A metal shaped-like bolo used for hand stripping which has zero, 24 or 18 serrations per inch.
I	Indigenous Fabrics	Refers to handwoven fabric or cloth made of abaca and other fibers like T'nalak, Dagmay, sinamay, pinukpok, etc.
	Industry Player/Stakeholder	Refers to the abaca farmers, GBEs, traders, exporters, processors, NGAs, LGUs, academe, NGOs, and other private companies.
J	Jute	A plant or fiber used to make burlap, hessian, or gunny cloth. The fibers are composed of the plant material cellulose and lignin.
L	Leaf fibers	Refers to hard fibers obtained from monocotyledonous leaves of plants such as pineapple, banana, abaca, sisal, maguey which contain lignin and plant cellulose.
	Leftover Leafsheaths	Refers to the portion of abaca leafsheaths discarded after the extraction of tuxies.
	Loose Fibers	Unclassified and ungraded fibers.
	Local Traders	Person or entity engaged in buying and selling of abaca fibers for domestic consumption.
M	Macropropagation	A method of rapid clonal propagation being carried out in a shed or in an open field wherein the corms' shoot tips have been removed as well as their lateral buds are exposed in order to induce the production of numerous shoots/suckers.
	Micropropagation	A rapid clonal propagation through shoot tip/meristem culture technique that is being carried out in a laboratory under aseptic condition.

	Moko Disease	A disease caused by the bacteria, *Ralstonia solanacearum* race 2 as quarantine pest, which is actually a pest of *Musa sp.* or banana plants and planting materials (rhizomes, suckers).
	Mother Block Nursery	Refers to the abaca nursery planted with tissue-cultured NSIC-registered variety of at least 1,600 hills planting density per hectare intended for seed production.
	Multilocational Trials	A common means of evaluating cultivars across several test sites that are set up following appropriate experimental design and measurements are repeatedly done for statistical comparisons.
N	Nanocellulose	A light solid material from cellulose fibrils having a dimension of 100nm or less with extremely high specific area, high porosity with excellent pore interconnectivity, lightweight, and high biodegradability
P	Planting Density	Number of standing crops per hectare.
	Pojada System	A practice of indiscriminate harvesting of abaca wherein all abaca plants, mature or young, are cut/tumbled down and stripped.
	Processor	Refers to companies/establishments that processes the abaca fiber into pulp, cordage and fibercraft.
	Plantation	Refers to an area planted to abaca which measures more than one (1) hectare.
R	Roadmap	Is a strategic plan that defines the goal or desired outcome and includes the major steps or milestones needed to reach it.
	Rehabilitated Abaca Areas	Areas with missing hills or with unproductive abaca plants that was replanted with new healthy plants to meet the standard planting density.
	Renewable Energy	Useful energy that is collected from renewable resources, which are naturally replenished on a human timescale, including carbon neutral sources like sunlight, wind, rain, tides, waves, and geothermal heat.
S	Seed-derived Planting Materials	Planting materials produced from the abaca seeds sourced preferably from mother block and other PhilFIDA-supervised/accredited nurseries.
	Sisal	Mexican agave with large fleshy leaves, cultivated for fiber production.
	Spindle-Stripping Method	Mechanized method of extracting the fiber where the tuxy is wound around tapered shaped spindle rotated by motor or engine.
	Spurious Fiber	Refers to any fiber which is of inferior quality and has no commercial value; coming from plants that are "not true abaca".

	Strippers	Person who extracts the fibers, either by hand or mechanical means. Included in the stripping works are topping of leaves, tumbling of stalks, tuxying, drying and bundling of fibers.
	Stripping	A method of extracting the fibers either by hand or mechanical process.
	Suckers	A shoot from the mother plant.
	Supply/Value Chain	Refers to the flow of processes of goods, i.e., abaca fibers, from production (farmers) to marketing (end-user).
	SWOT Analysis	A strategic planning technique that provides assessment tools, identifying core strengths, weaknesses, opportunities, and threats that leads to fact-based analysis, fresh perspectives, and new ideas.
T	Tag	Refers to the square and unstarched long cotton cloth tag to be placed in the abaca bale for regulatory purposes.
	Tensile Strength	The maximum strength to which a material can be subjected before it breaks. It is used using the tensile strength testing machine.
	Tinagak	Knotted abaca fibers used as raw material for weaving sinamay or abaca cloth.
	Tissue Culture Planting Materials	True to type plantlet developed in laboratories and transferred to nurseries for hardening.
	Topping	Cutting of leaves of stalks prior to tumbling.
	Trader-Exporter	Person or entity exporting approved bales bought from Class A traders or Grading Baling Establishments.
	Tumbling	Cutting of the abaca stalk at the base.
	Tuxy	Outer layer of abaca leafsheath which contains the abaca fiber.
	Tuxying	Process of extracting the outer layer of the leafsheath using tuxying knife where incisions are made between the outer and the rest of the layers of the leafsheath. The exposed bit of the outer layer is gripped and manually pulled to separate the entire length from the rest of the leafsheath to produce the tuxy.
	Typical Farming	Refers to the traditional practice of farmers in abaca production.
U	Umbac or Bacbac	Dried outer leaf sheaths.
	Underbrushing	Clearing of the shrubs and small trees forming the undergrowth an abaca plantation/area.
	Upcycling	Also known as recycling of waste materials to create new products to prevent the wastage of potentially useful materials.

	Upstream Processing	Comprises all measures for the preparation of fermentation. The process includes the proper storage of microorganisms, cell isolation and cultivation, the cultivation of the cells until the final harvest, as well as the cleaning and sterilization of the fermenter.

Annex 2. Annual Production of Abaca Fiber by Region, 2010-2019 (in MT)

ABACA FIBER PRODUCTION, BY REGION OF PRODUCTION, 2010-2019
(in metric tons)

Year	Philippines	CAR	Central Luzon	Southern Tagalog	Bicol Region	Western Visayas	Central Visayas	Eastern Visayas	Zamboanga Peninsula	Northern Mindanao	Davao Region	Soccsk-sargen	Caraga	ARMM
2010	57,223	0.5	65	69	21,061	1,513	531	14,094	508	2,359	6,952	1,280	4,754	4,036
2011	73,274	16	81	105	27,109	2,459	529	18,718	647	2,284	7,765	1,421	6,586	5,554
2012	64,806	2	53	133	22,246	2,355	700	15,472	656	3,180	8,615	1,380	4,524	5,490
2013	55,958	-	46	127	23,352	1,930	495	11,093	530	2,113	5,408	890	4,175	5,799
2014	66,004	-	62	138	27,886	1,636	462	10,380	642	3,205	8,417	1,610	5,945	5,621
2015	67,329	-	55	147	25,134	1,933	593	8,418	636	4,171	11,255	1,423	6,785	6,779
2016	72,820	-	34	122	28,686	2,925	578	10,042	567	3,579	12,217	1,924	6,274	5,872
2017	71,946	0.4	55	140	25,799	3,008	383	9,758	628	4,356	12,460	1,296	7,356	6,707
2018	76,259	-	78	131	25,768	3,228	298	9,588	627	5,180	13,729	1,503	9,147	6,982
2019	69,829	-	62	135	26,728	3,119	387	9,073	700	3,792	11,227	2,100	7,181	5,325
Average	67,545	2	59	125	25,377	2,411	496	11,664	614	3,422	9,805	1,483	6,273	5,817
% Share	100.0	0.00	0.1	0.2	37.6	3.6	0.7	17.3	0.9	5.1	14.5	2.2	9.3	8.6
Annual Growth Rate (%	2.2	-	(0.5)	7.7	2.7	8.4	(3.5)	(4.8)	3.6	5.4	5.5	5.7	4.7	3.1

Annex 3. Area Planted to Abaca by Region, 2010-2019 (in ha)

AREA PLANTED TO ABACA, BY REGION, 2010-2019
(in hectares)

Year	Philippines	CAR/ Ilocos	Central Luzon	Southern Tagalog	Bicol Region	Western Visayas	Central Visayas	Eastern Visayas	Zamboanga Peninsula	Northern Mindanao	Davao Region	Soccsk-sargen	Caraga	ARMM
2010	167,145	848	730	2,670	50,212	8,183	2,023	45,122	2,217	5,369	15,414	6,193	21,205	6,959
2011	172,528	862	853	2,885	51,884	8,463	2,078	45,708	2,397	5,761	15,699	6,337	22,470	7,131
2012	176,793	860	861	3,058	52,032	8,616	3,014	46,148	2,630	6,115	16,240	6,533	23,476	7,210
2013	172,934	774	827	3,129	52,214	8,728	3,041	46,367	2,819	2,694	16,444	6,683	23,653	5,561
2014	176,548	776	800	2,826	52,352	8,830	3,073	46,481	2,953	3,195	18,994	6,277	23,270	6,721
2015	179,858	775	809	2,880	52,493	8,927	3,045	46,680	3,117	3,323	21,204	6,327	23,372	6,906
2016	180,302	775	817	2,966	52,537	9,046	3,147	46,680	2,685	3,194	21,626	6,520	23,592	6,717
2017	153,754	775	353	1,321	50,653	8,381	3,257	27,305	2,390	3,449	20,939	9,709	19,470	5,752
2018	141,614	774	300	472	42,264	8,502	2,888	27,765	1,901	3,701	22,505	9,812	15,262	5,468
2019	155,455	675	156	422	55,284	8,624	2,894	28,038	1,898	3,943	22,750	9,883	15,430	5,458
Average	167,693	789	651	2,263	51,193	8,630	2,846	40,629	2,501	4,074	19,182	7,427	21,120	6,388
% Share	100.0	0.5	0.4	1.3	30.5	5.1	1.7	24.2	1.5	2.4	11.4	4.4	12.6	3.8
Annual Growth Rate (%	(0.8)	(2.5)	(15.8)	(10.5)	1.1	0.6	4.1	(5.1)	(1.7)	(3.4)	4.4	5.3	(3.5)	(2.7)

Annex 4. Annual Export Earnings from Abaca Fiber and Manufactures, 2010-2019 (in FOB US$)

EXPORT EARNINGS FROM ABACA FIBER AND MANUFACTURES, 2010-2019
(in F.O.B. US$)

Year	Total	Raw Fiber	Manufactures	Manufactures			
				Pulp	Cordage	Fabrics	Fibercrafts
2010	104,534,310	13,431,420	91,102,890	71,243,330	14,769,942	816,248	4,273,370
2011	140,113,595	13,428,641	126,684,954	104,140,707	16,957,861	988,925	4,597,461
2012	108,743,186	5,462,185	103,281,001	75,003,246	16,265,192	1,273,267	10,739,296
2013	81,994,806	4,445,441	77,549,365	60,689,408	10,178,728	1,430,558	5,250,671
2014	111,334,294	14,092,953	97,241,341	71,086,367	12,725,928	1,844,238	11,584,808
2015	114,792,629	19,260,652	95,531,977	79,437,172	11,436,702	867,238	3,790,865
2016	130,380,337	25,781,875	104,598,462	88,472,248	7,643,120	1,059,098	7,423,996
2017	129,773,248	35,235,318	94,537,930	83,531,476	8,211,086	1,592,571	1,202,797
2018	111,661,438	31,370,761	80,290,677	68,198,385	9,337,624	1,080,545	1,674,123
2019	156,618,557	23,414,011	133,204,546	123,103,588	7,647,863	1,068,182	1,384,913
Average	118,994,640	18,592,326	100,402,314	82,490,593	11,517,405	1,202,087	5,192,230
% Share	100.0	15.6	84.4	69.3	9.7	1.0	4.4
Annual Growth Rate (%)	4.6	6.4	4.3	6.3	(7.1)	3.0	(11.8)

Annex 5. Annual Exports of Abaca Fiber by Country of Destination, 2010-2019 (in MT)

EXPORTS OF ABACA FIBER, BY MAJOR COUNTRY OF DESTINATION, 2010-2019
(in metric tons)

Year	Total	DESTINATION							
		United Kingdom	Japan	Republic of Korea	India	Indonesia	Peoples Rep. of China	Spain	Other Countries
2010	11,293.1	4,216.2	4,680.0	12.1	174.8	20.6	2,068.1	-	121.3
2011	9,792.1	3,578.7	3,866.5	-	90.0	-	2,093.5	-	163.4
2012	4,456.2	2,477.0	1,296.5	-	56.0	82.8	406.3	-	137.6
2013	3,344.9	1,936.1	960.5	1.0	33.8	76.3	77.8	-	259.4
2014	9,762.8	4,107.5	3,625.0	-	125.0	83.8	825.4	-	996.1
2015	12,009.9	5,817.5	4,846.6	-	134.1	25.3	411.9	480.0	294.5
2016	13,724.9	6,551.9	5,009.6	-	113.0	54.9	69.9	1,824.3	101.3
2017	18,243.2	4,943.5	4,844.5	11.0	45.0	30.0	1,872.8	6,427.9	68.5
2018	16,144.0	6,039.0	4,723.0	1.0	45.0	16.0	996.0	4,210.0	114.0
2019	11,747.7	5,303.1	4,437.8	0.3	-	27.5	306.5	1,627.5	45.1
Average	11,051.9	4,497.1	3,829.0	2.5	81.7	41.7	912.8	1,457.0	230.1
% Share	113.2	40.7	34.6	nil	0.7	0.4	8.3	13.2	2.1
AGR (%)	0.4	2.6	(0.6)	-	(15.6)	(14.6)	(19.1)	35.7	(10.4)

Annex 6. Annual Exports of Abaca Pulp by Country of Destination, 2010-2019 (in MT)

EXPORTS OF ABACA PULP, BY MAJOR COUNTRY OF DESTINATION, 2010-2019
(in metric tons)

Year	Total	DESTINATION								
		Japan	Germany	United Kingdom	France	Republic of Korea	Taiwan	Peoples Rep. of China	United States	Other Countries
2010	20,879.0	4,024.9	7,116.8	5,175.8	1,542.6	16.2	95.4	1,045.3	1,498.0	364.0
2011	29,772.7	4,002.7	9,000.1	7,796.8	1,945.1	37.9	122.3	2,264.8	2,837.1	1,765.9
2012	21,524.8	3,179.2	6,001.4	5,992.2	1,221.9	37.3	51.2	1,686.1	1,413.9	1,941.6
2013	17,617.6	3,255.6	6,815.5	3,505.1	1,753.6	43.9	72.7	960.1	914.9	288.2
2014	20,915.7	3,521.7	7,755.8	4,750.7	1,240.9	95.0	91.6	1,406.2	1,436.7	617.1
2015	22,200.0	2,870.6	8,630.6	6,385.4	1,437.8	16.2	107.4	1,365.2	1,216.7	170.1
2016	21,635.3	2,433.3	6,907.0	8,060.1	340.7	-	104.2	781.4	2,667.4	341.2
2017	18,869.6	2,654.5	4,374.4	7,012.4	809.4	22.6	125.6	780.0	2,849.1	241.6
2018	15,807.4	1,793.2	3,032.8	6,940.3	1,187.9	-	70.4	477.6	1,679.6	625.6
2019	27,963.0	2,492.0	7,756.4	12,651.6	1,621.4	69.5	219.6	564.6	1,863.7	724.2
Average	21,718.5	3,022.8	6,739.1	6,827.0	1,310.1	33.9	106.0	1,133.9	1,837.7	708.0
% Share	100.0	13.9	31.0	31.4	6.0	0.2	0.5	5.2	8.5	3.3
AGR (%)	3.3	(5.2)	1.0	10.4	0.6	23.1	9.7	(6.6)	2.5	7.9

Annex 7. Annual Exports of Abaca Cordage & Allied Products by Country of Destination, 2010-2015 (in MT)

EXPORTS OF ABACA CORDAGE, BY MAJOR COUNTRY OF DESTINATION, 2010-2019
(in metric tons)

Year	Total	DESTINATION								
		United States	United Kingdom	Canada	Germany	Singapore	Malaysia	United Arab Emirates	Australia	Other Countries
2010	6,954.7	4,657.3	142.5	143.3	112.5	588.6	141.4	163.3	26.3	979.5
2011	7,524.3	4,661.7	109.4	185.1	160.2	731.1	86.0	177.4	27.8	1,385.6
2012	4,987.3	2,935.2	134.0	171.0	109.9	501.4	103.8	89.6	34.7	907.7
2013	4,240.3	2,443.2	79.6	181.7	100.3	462.5	70.4	150.3	7.4	744.9
2014	5,093.0	3,467.9	226.0	177.6	43.5	253.3	78.3	196.0	28.0	622.4
2015	4,458.5	3,028.5	201.9	218.3	41.0	211.0	13.6	70.0	83.2	591.0
2016	2,937.3	1,633.3	158.5	144.5	35.5	159.5	11.3	65.9	31.0	697.8
2017	3,108.0	1,722.1	231.1	139.1	63.0	152.1	17.6	43.2	46.5	693.3
2018	3,284.6	1,932.0	135.7	172.7	13.9	176.3	-	36.2	16.0	801.8
2019	2,795.1	1,617.6	75.1	210.1	30.0	218.2	13.4	29.3	48.4	553.0
Average	4,727.5	2,942.4	157.6	170.4	75.5	359.5	53.6	110.2	33.4	824.9
% Share	100.0	62.2	3.3	3.6	1.6	7.6	1.1	2.3	0.7	17.4
AGR (%)	(9.6)	(11.1)	(6.9)	4.3	(13.7)	(10.4)	(25.5)	(17.4)	7.0	(2.5)

Annex 8. Annual Exports of Abaca Fabrics by Country of Destination, 2010-2015 (in sq. m.)

EXPORTS OF ABACA FABRICS, BY MAJOR COUNTRY OF DESTINATION, 2010-2019
(In square meters)

Country of Destination	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
China	114,671	69,461	20,658	32,435	239	5,594	32,508	56,251	4,005	20,330	356,152
France	3,226	3,127	3,321	4,524	295	185	-	2,587	3,549	4,615	25,429
Hongkong	270,643	181,228	169,217	92,804	47,269	26,633	50,674	83,995	51,201	33,131	1,006,795
Italy	111,839	112,657	34,035	70,828	131	445	810	26,398	2,871	2,091	362,105
Japan	684	104	-	17,158	52	1,033	1,028	13,596	12,846	34,858	81,359
Nigeria	4,981	4,374	890	3,206	1,563	-	-	-	-	3,725	18,739
Spain	-	5,094	503	387	777	-	1,510	2,822	1,253	8,053	20,399
United Kingdom	11,732	8,274	24,003	17,900	30,557	4,614	12,998	438	14,899	21,834	147,249
United States	-	910	4,477	1,620	656	-	-	5,203	1,273	230	14,369
Other Countries	27,337	8,245	9,528	36,856	3,925	6,112	7,899	41,179	32,152	40,060	213,293
TOTAL	545,113	393,474	266,632	277,718	85,464	44,616	107,427	232,469	124,049	168,927	2,245,889

Annex 9. Annual Philippine Abaca Fiber Imports, 2010-2015

PHILIPPINE IMPORTS OF ABACA FIBER, 2010-2019
(Quantity in metric tons, Value in F.O.B. US$)

Year	Quantity	Value	F.O.B. Price (US$/kilo)
2009	240.6	431,343	1.79
2010	166.3	193,970	1.17
2011	631.3	1,031,372	1.63
2012	95.0	93,597	0.99
2013	718.3	1,078,342	1.50
2014	1,039.5	1,773,803	1.71
2015	858.1	1,861,468	2.17
2016	4,341.4	10,913,786	2.51
2017	5,217.8	13,082,199	2.51
2018	3,036.4	8,033,622	2.65
2019	5,214.3	14,637,066	2.81

Source: Philippine Statistics Authority (previously National Statistics Office)
based on the weighted average Pesos/US$ rate

Annex 10. Annual Domestic Consumption of Abaca Fiber by Sector, 2010-2019 (in MT)

DOMESTIC CONSUMPTION OF ABACA FIBER, 2010-2019
(in metric tons)

Year	Total	SECTOR		
		Pulp	Ropes & Cordage	Fibercrafts
2010	47,107	35,306	9,151	2,650
2011	63,972	51,779	9,900	2,293
2012	49,546	37,435	6,601	5,510
2013	40,865	30,639	5,579	4,647
2014	48,783	36,375	6,701	5,707
2015	46,383	38,608	5,866	1,909
2016	44,231	37,627	3,865	2,739
2017	38,578	32,817	4,089	1,672
2018	33,506	27,491	4,322	1,693
2019	53,967	48,631	3,678	1,678
Average	46,696	37,671	5,975	3,050
% Share	100.0	80.7	12.8	6.5
Annual Growth Rate (%)	1.5	3.6	(9.6)	(5.0)

Annex 11. Weighted Average Export Prices of Hand-Stripped Abaca Fiber by Grade, 2010-2019 (in F.O.B. US$/BALE)

WEIGHTED AVERAGE EXPORT PRICES OF ABACA FIBER, BY GRADE, 2010-2019
(In F.O.B. US$/bale)

HAND-STRIPPED

Year	S2	S3	I	G	H	JK	M1	Y*	OT**
2010	172.73	97.04	159.53	153.87	106.34	134.29	100.97	113.98	61.38
2011	188.02	154.93	189.70	170.55	144.36	157.43	125.95	138.96	120.43
2012	196.69	148.00	195.10	173.98	117.79	117.62	120.00	133.76	96.00
2013	220.54	141.21	184.69	174.14	135.20	152.42	-	149.50	64.29
2014	210.26	180.96	193.40	189.28	178.07	168.11	158.29	148.67	42.57
2015	249.48	199.60	195.67	206.09	199.34	192.49	162.42	171.65	66.25
2016	264.90	222.52	236.32	239.06	215.83	223.87	159.29	193.32	87.50
2017	285.67	231.37	270.71	244.62	-	231.54	-	196.01	35.29
2018	283.93	253.40	269.41	257.97	175.12	228.40	-	201.17	165.60
2019	286.31	254.40	272.61	263.07	164.58	225.68	-	199.23	134.54

Annex 12. Weighted Average Export Prices of Spindle-Stripped Abaca Fiber by Grade, 2010-2019 (in F.O.B. US$/BALE)

SPINDLE-STRIPPED

Year	S2	S3	I	G	H	JK	M1	Y*	OT**
2010	164.56	155.68	170.06	154.00	140.00	-	-	116.96	-
2011	189.87	161.33	202.04	181.50	151.00	-	-	138.50	-
2012	192.25	-	-	174.00	-	-	-	134.00	-
2013	171.23	166.87	236.26	188.17	-	-	-	-	-
2014	223.86	169.96	228.14	-	-	-	-	-	-
2015	270.12	195.00	-	238.12	-	-	-	-	-
2016	277.09	191.95	255.00	274.13	-	-	-	-	-
2017	-	232.00	-	293.71	-	204.70	-	-	-
2018	-	256.40	277.75	300.14	-	-	-	-	-
2019	-	237.00	-	-	-	-	-	-	-

** replaced Y1 & Y2 which were abolished*

*** replaced O & T which were abolished*

Annex 13. Attendance Sheet during the Virtual Public Consultation of the Abaca Industry Roadmap held on April 20, 2021

ID	Start time	Completion time	Email	N	Name2	Position/Designation	Region/Office/Organiza	Sex	Age Category	Do y	Are yc	Email Address	Contact Numbe
14	4/20/21 7:41:10	4/20/21 7:46:15	anonymous		Racquel C. Aquino	Planning Officer III	PhilFIDA-Central Office	Female	Adult (31 to 59 years old	No	No	rcaquino@philfida.da.gov.ph	09064060514
15	4/20/21 7:53:16	4/20/21 7:54:02	anonymous		John Michael C. Biccay	AO II	Philfida	Male	Youth (Below 31 years ol	No	No	jmbiccay@da.gov.ph	09464284319
16	4/20/21 7:57:23	4/20/21 8:00:14	anonymous		Emilie f. Geroy	Supervsing FDO	IV	Female	Adult (31 to 59 years old	No	No	fidancr@yahoo.com	09993368883
17	4/20/21 7:54:54	4/20/21 8:00:59	anonymous		GINA G. DE UNGRIA	Administrative Officer V	PhilFIDA- Regional Office	Female	Adult (31 to 59 years old	No	No		09260881441
18	4/20/21 8:03:25	4/20/21 8:05:05	anonymous		Samuel Jr. M. Nacino	Sr. FDO	PhilFIDA-Regional Office	Male	Adult (31 to 59 years old	No	No	smnacino@philfida.da.gov.ph	09175115427
19	4/20/21 8:01:13	4/20/21 8:06:07	anonymous		MARIO M. LLANES	Senior FDO	PhilFIDA - Regional Offic	Male	Senior Citizen (60 and Ak	No	No		09173419364
20	4/20/21 8:06:12	4/20/21 8:08:31	anonymous		ERNESTO L. ACERO, JR	ADMIN. AIDE II	PhilFIDA - Regional Offic	Male	Adult (31 to 59 years old	No	No		09475654367
21	4/20/21 8:07:32	4/20/21 8:08:40	anonymous		Wilardo O. Sinahon	Regional Director	8	Male	Senior Citizen (60 and Ak	No	No	wosinahon@philfida.da.gov.ph	09175353233
22	4/20/21 8:08:33	4/20/21 8:09:32	anonymous		RAMIL BRIZUELA	ADMIN. AIDE I	PhilFIDA - Regional Offic	Male	Adult (31 to 59 years old	No	No		09298735823
23	4/20/21 8:08:42	4/20/21 8:09:42	anonymous		Rosemarie C. Fevidal	OIC, Planning Unit	8	Female	Senior Citizen (60 and Ak	No	No	rcfevidal@philfida.da.gov.ph	09272650664
24	4/20/21 8:09:37	4/20/21 8:10:40	anonymous		JOFERSON R. CONCHA	COS - PROJECT ASSISTAN	PhilFIDA - Regional Offic	Male	Youth (Below 31 years ol	No	No		09973361862
25	4/20/21 8:10:43	4/20/21 8:11:36	anonymous		KIMBERLY P. CASTILLO	COS - PROJECT ASSISTAN	PhilFIDA - Regional Offic	Female	Youth (Below 31 years ol	No	No		09974384783
26	4/20/21 8:09:39	4/20/21 8:12:06	anonymous		JENNILYN P. AGUIRRE	FDO II	Regulatory Division- C.O.	Female	Youth (Below 31 years ol	No	No	jpaguirre@philfida.da.gov.ph	441-2048
27	4/20/21 8:11:39	4/20/21 8:12:48	anonymous		ZELLICA MAE C. BAUTIST	COS - PROJECT ASSISTAN	PhilFIDA - Regional Offic	Female	Youth (Below 31 years ol	No	No		09278264389
28	4/20/21 8:13:00	4/20/21 8:13:58	anonymous		AMILITA L. VERAGUAS	FDO I	PhilFIDA - Regional Offic	Female	Adult (31 to 59 years old	No	No		09068031387
29	4/20/21 8:13:16	4/20/21 8:14:31	anonymous		Ryan R. Fuentes	PO II	Region 10	Male	Youth (Below 31 years ol	No	No	rrfuentes@philfida.da.gov.ph	09563363514
30	4/20/21 8:14:35	4/20/21 8:15:34	anonymous		Eugene N. Galela	FDO II	Region 10	Male	Adult (31 to 59 years old	No	No	engalela@philfida.da.gov.ph	09555237096
31	4/20/21 8:15:02	4/20/21 8:16:26	anonymous		ROQUE S. PEPITO	Supervising FDO/ Officer	Region-X	Male	Adult (31 to 59 years old	No	No	rspepito@philfida.da.gov.ph	09778400301
32	4/20/21 8:14:00	4/20/21 8:16:41	anonymous		MARIA MAGDALENA C. E	Senior SRS	PhilFIDA - Regional Offic	Female	Senior Citizen (60 and Ak	No	No		09177710486
33	4/20/21 8:15:37	4/20/21 8:16:44	anonymous		Indora P. Catada	AO II	Region 10	Female	Adult (31 to 59 years old	No	No	ipcatada@philfida.da.gov.ph	09258201514
34	4/20/21 8:08:54	4/20/21 8:16:44	anonymous		Mary Glaine B. Valdez	Fiber Development Offic	PhilFIDA Regulatory Divis	Female	Youth (Below 31 years ol	No	No	mgvaldez@philfida.da.gov.ph	8441-2048
35	4/20/21 8:16:48	4/20/21 8:18:12	anonymous		Miraflor B. Cariton	AO I	Region 10	Female	Youth (Below 31 years ol	Yes	No	mbcariton@philfida.da.gov.ph	09758735192
36	4/20/21 8:16:59	4/20/21 8:18:48	anonymous		Ma Jocelyn I Maramag	Supvg FDO/OIC, Regulat	PhilFIDA, Central Office	Female	Senior Citizen (60 and Ak	No	No	regulatory@philfida.da.gov.ph	09287715661
37	4/20/21 8:17:50	4/20/21 8:18:48	anonymous		Joel B. Barquilla	Senior FDO	Regulatory Division	Male	Adult (31 to 59 years old	No	No	jbbarquilla@philfida.da.gov.ph	09298459564
38	4/20/21 8:18:20	4/20/21 8:19:55	anonymous		Nestor Q. Halasan	Sr. FDO	Region 10	Male	Senior Citizen (60 and Ak	No	No	nqhalasan@philfida.da.gov.ph	09275314393
39	4/20/21 8:16:36	4/20/21 8:20:10	anonymous		Percy S. Salugsugan	FDO II/PFO-Iligan City & I	Region 10	Female	Adult (31 to 59 years old	No	No	percysalugsugan@gmail.com	09177756290
40	4/20/21 8:18:16	4/20/21 8:20:19	anonymous		JANET ANN S. BAUTISTA	FDO I	PhilFIDA - Regional Offic	Female	Adult (31 to 59 years old	No	No		09186082944
41	4/20/21 8:20:07	4/20/21 8:21:14	anonymous		Jonahwel L. Quiachon	Engineer I	Region 10	Male	Adult (31 to 59 years old	No	No	jlquiachon@philfida.da.gov.ph	09976549078
42	4/20/21 8:21:17	4/20/21 8:22:31	anonymous		Rutilio M. Salinas	FDO II	Region 10	Male	Senior Citizen (60 and Ak	No	No	rmsalinas@philfida.da.gov.ph	0936733705
43	4/20/21 8:08:24	4/20/21 8:22:51	anonymous		Edna F. Bolalin	FDO II, PFO CamSur	PhilFida Region V	Female	Senior Citizen (60 and Ak	No	No	efbolalin@philfida.da.gov.ph	09293347508
44	4/20/21 8:23:18	4/20/21 8:24:10	anonymous		ORLANDO D. COCAL	OIC-TAD	TAD	Male	Adult (31 to 59 years old	No	No	odcocal@philfida.da.gov.ph	09190658380
45	4/20/21 8:24:44	4/20/21 8:25:35	anonymous		Margareth D. Inguito	Planning Officer I	PhilFIDA-Central Office	Female	Adult (31 to 59 years old	No	No		09167583834
46	4/20/21 8:25:38	4/20/21 8:27:10	anonymous		Jonathan M. Reabonanz	Engineer 2	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	jmreambonanza@philfida.da.gov.p	09190072542
47	4/20/21 8:27:24	4/20/21 8:30:10	anonymous		Evelina M. Romero	Planning Officer II/OIC, A	PhilFIDA Region VIII	Female	Adult (31 to 59 years old	No	No	emromero@philfida.da.gov.ph	09425596613
48	4/20/21 8:29:09	4/20/21 8:30:44	anonymous		MARIA AMOR G. CREENC	Statistician III / OIC, Plan	Central Office / Planning	Female	Adult (31 to 59 years old	No	No	macreencia@philfida.da.gov.ph	0917 6444 300
49	4/20/21 8:30:43	4/20/21 8:32:00	anonymous		Irene M. Saldaña	FDO II	PhilFIDA Regional Office	Female	Senior Citizen (60 and Ak	No	No	imsaldaña@philfida.da.gov.ph	09158512299
50	4/20/21 8:31:42	4/20/21 8:32:57	anonymous		Carla Mabalot	Accounting Clerk III / Acc	Central Office	Female	Youth (Below 31 years ol	No	No	carlaimabalot@gmail.com	09164176538
51	4/20/21 8:32:02	4/20/21 8:33:15	anonymous		Lolita R. Cotoner	FDO II / License	PhilFIDA Regional Office	Female	Senior Citizen (60 and Ak	No	No	lrcotoner@philfida.da.gov.ph	09202090449
52	4/20/21 8:33:18	4/20/21 8:34:09	anonymous		Elizabeth L. Arinto	FDO I	Philfida Regional Office 8	Female	Adult (31 to 59 years old	No	No	elarino@philfida.da.gov.ph	09394153027
53	4/20/21 8:33:01	4/20/21 8:34:10	anonymous		MANOLITO F. APALLA	SFDO/Head of Operatior	Region I	Male	Adult (31 to 59 years old	No	No	noli.apalla896@gmail.com	09305084155
54	4/20/21 8:32:19	4/20/21 8:34:52	anonymous		HENRY B. DEL CASTILLO	FDO I	VII	Male	Adult (31 to 59 years old	No	No	hbdelcastillo@philfida.da.gov.ph	09176119666
55	4/20/21 8:34:08	4/20/21 8:35:06	anonymous		Concepcion D. Jocson	Senior FDO	PhilFIDA - FUTD	Female	Adult (31 to 59 years old	No	No	ching_0904@yahoo.com	09234575639
56	4/20/21 8:34:12	4/20/21 8:35:15	anonymous		Alquin V. Uy	FDO I	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	alquinuy51@gmail.com	09051578056
57	4/20/21 8:35:20	4/20/21 8:36:20	anonymous		Ma. Christie T. Homeres	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	cthomeres@philfida.da.gov.ph	09452585751
58	4/20/21 8:33:32	4/20/21 8:36:43	anonymous		GRACE F. DEL CASTILLO	ADMINISTRATIVE OFFICE	REGIONAL OFFICE VII	Female	Adult (31 to 59 years old	No	No	gfdelcastillo@philfida.da.gov.ph	09164354030
59	4/20/21 8:24:00	4/20/21 8:36:53	anonymous		Karina Limocon	Planning Assistant	Central Office	Female	Youth (Below 31 years ol	No	No	ysalimocon@gmail.com	09278046872
60	4/20/21 8:36:09	4/20/21 8:37:10	anonymous		Jobelle Bonaobra	PEO I	PhilFIDA C.O.	Female	Youth (Below 31 years ol	No	No	mjbonaobra@philfida.da.gov.ph	09283992814
61	4/20/21 8:36:23	4/20/21 8:37:30	anonymous		Daisy Mae D. Apilar	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	ddapilar@philfida.da.gov.ph	09098734684
62	4/20/21 8:36:42	4/20/21 8:37:49	anonymous		Daisy Mae D. Apilar	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	ddapilar@philfida.da.gov.ph	09098734684
63	4/20/21 8:34:18	4/20/21 8:38:03	anonymous		Edel M. Dondonilla	Regional Director	Regional Office I	Male	Senior Citizen (60 and Ak	No	No	edelphilfida@yahoo.com	09399022471
64	4/20/21 8:37:57	4/20/21 8:40:23	anonymous		Rose Faith V. Alferez	Admin Aide III	Regional Office 8	Female	Adult (31 to 59 years old	No	No	rvalferez@philfida.da.gov.ph	09358367794
65	4/20/21 8:40:44	4/20/21 8:42:00	anonymous		Jonathan R. Ocayo	PO II	Regional Office I	Male	Adult (31 to 59 years old	No	No	jonathanocayo41@gmail.com	09613398716
66	4/20/21 8:40:00	4/20/21 8:42:10	anonymous		TATCHIN B. CALASIAO	FDO I	RO I	Male	Adult (31 to 59 years old	Yes	No	t.calasiao@yahoo.com	09637438647

67	4/20/21 8:42:17	4/20/21 8:43:13	anonymous	Morsem D. Tulabis	FDO I	Regional Office I	Male	Youth (Below 31 years ol	Yes	No	morsemtulabis@gmail.com	09075986550
68	4/20/21 8:40:44	4/20/21 8:43:14	anonymous	Andy O. Baco	FDO-I/Fiber Inspector	Region VII/PhilFIDA	Male	Adult (31 to 59 years old	No	No	aobaco@philfida.da.gov.ph	09754649336/0
69	4/20/21 8:42:38	4/20/21 8:44:27	anonymous	BENJIE A. RODRIGUEZ	ADMIN. AIDE III	Philfida Regional Office 8	Male	Adult (31 to 59 years old	No	No	barodriguez@philfida.da.gov.ph	09056926986
70	4/20/21 8:42:19	4/20/21 8:44:55	anonymous	LIONEL J. ABELLA	FDO-1/ PFO-Cebu	Region VII PhilFIDA	Male	Adult (31 to 59 years old	No	No	ljabella@philfida.da.gov.ph	09213727273
71	4/20/21 8:43:28	4/20/21 8:45:00	anonymous	ALAIZA G. SUGOT	FDO I	REGIONAL OFFICE I	Female	Adult (31 to 59 years old	Yes	No	alaizasugot@yahoo.com	09106400782
72	4/20/21 8:43:38	4/20/21 8:45:44	anonymous	FE G. DONATO	FDO II/tau -hEAD	REGION I	Female	Adult (31 to 59 years old	Yes	No	donato_fe@yahoo.com	09052460035
73	4/20/21 8:44:29	4/20/21 8:45:48	anonymous	Joseleo M. Nicolasora	FDO I	Philfida Regional Office 8	Male	Adult (31 to 59 years old	No	No	nicolasora_leo@hotmail.com	09066141606
74	4/20/21 8:42:38	4/20/21 8:46:00	anonymous	Mary Ann T. Resane	FDO I	PhilFIDA Region VII	Female	Adult (31 to 59 years old	No	No	mtresane@philfida.da.gov.ph	09122293349
75	4/20/21 8:43:18	4/20/21 8:46:04	anonymous	Kristelle Ahn C. Suner	Engineer I	PhilFIDA Regional Office	Female	Youth (Below 31 years ol	No	No	kcsuner@philfida.da.gov.ph	09358225429
76	4/20/21 8:44:30	4/20/21 8:46:15	anonymous	Gilbert V. Mayores, Jr.	FDO II	Region VI	Male	Adult (31 to 59 years old	No	No	fictionpulp40@yahoo.com	09171720943
77	4/20/21 8:43:56	4/20/21 8:46:22	anonymous	Mirasol M. Mayores	FDO I	PhilFIDA RO VII	Female	Adult (31 to 59 years old	No	No	mmmayores@philfida.da.gov.ph	09426672435
78	4/20/21 8:42:04	4/20/21 8:46:26	anonymous	SEIGFRED P. TULABIS	FDO II	Regional Office I	Male	Adult (31 to 59 years old	Yes	No	seigfredtulabis09@gmail.com	09203647109
79	4/20/21 8:43:59	4/20/21 8:46:36	anonymous	Irene Alvero	Administrative Aide IV /	RO VII	Female	Adult (31 to 59 years old	No	No	lfalvero@philfida.da.gov.ph	09326535387
80	4/20/21 8:45:23	4/20/21 8:46:55	anonymous	JOSE L. CATALLA	Chief Science Research S	PHILFIDA	Male	Adult (31 to 59 years old	No	No	jlcatalla@yahoo.com	09216258536
81	4/20/21 8:45:51	4/20/21 8:47:10	anonymous	John Ric Acompañado	FDO I	PhilFIDA Regional Office	Male	Youth (Below 31 years ol	No	No	jraccompanado@philfida.da.gov.p	09454256313
82	4/20/21 8:43:06	4/20/21 8:48:17	anonymous	Blesilia B. Fookson	Administrative Officer III	PhilFIDA Regional Office	Female	Senior Citizen (60 and Ab	No	No	mybless11@yahoo.com	09192906477
83	4/20/21 8:47:15	4/20/21 8:48:27	anonymous	Silvestre M. Sanico	Supervising FDO	PhilFIDA Regional Office	Male	Senior Citizen (60 and Ab	No	No	smsanico@philfida.da.gov.ph	09176244532
84	4/20/21 8:46:09	4/20/21 8:48:47	anonymous	Rosedina P. Corsino	Senior SRS/ Head, Resea	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	rpcorsino@philfida.da.gov.ph	09456219660
85	4/20/21 8:47:50	4/20/21 8:50:22	anonymous	Ramil B. Barcelona	Engineer III	FUTD	Male	Adult (31 to 59 years old	No	Yes	barcelonarb78@gmail.com	09477139123
86	4/20/21 8:48:50	4/20/21 8:50:31	anonymous	Nerissa P. Bartolini	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	npbartolini@philfida.da.gov.ph	09451181529
87	4/20/21 8:50:34	4/20/21 8:51:45	anonymous	Amor E. Anadia	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	aeanadia@philfida.da.gov.ph	09456219676
88	4/20/21 8:51:13	4/20/21 8:52:39	anonymous	Giovannie B. Marijuan	Clerk IV/HRMDS	PhilFIDA Central Office	Male	Youth (Below 31 years ol	No	No	gbmarijuan@philfidada.gov.ph	09457342273
89	4/20/21 8:51:50	4/20/21 8:52:57	anonymous	Premalin D. Meras	FDO I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	pdmeras@philfida.da.gov.ph	09168608587
90	4/20/21 8:49:37	4/20/21 8:53:23	anonymous	nolasco c.buscainofarm I	farm foreman	reg.1ion	Male	Adult (31 to 59 years old	No	No	N/A	09397645187
91	4/20/21 8:20:23	4/20/21 8:54:06	anonymous	ROLANDO N. AQUINO	SENIOR FDO	PhilFIDA Regional Office	Male	Senior Citizen (60 and Ab	No	No		09288764084
92	4/20/21 8:28:15	4/20/21 8:54:25	anonymous	Louise Kathleen R. Agito	Administrative Officer II	PhilFIDA Central Office	Female	Adult (31 to 59 years old	No	No	lkagito@philfida.da.gov.ph	n/a
93	4/20/21 8:53:08	4/20/21 8:54:39	anonymous	Isabelita G. Paa	SRS II	PhilFIDA Regional Office	Female	Senior Citizen (60 and Ab	No	No	igpaa@philfida.da.gov.ph	09264827138
94	4/20/21 8:54:48	4/20/21 8:56:11	anonymous	Michael O. Montalban	Research Aide	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	montalban978@gmail.com	09053480900
95	4/20/21 8:56:15	4/20/21 8:58:32	anonymous	Francisco F. Degenion Jr	JO-Laboratory Laborer	PhilFIDA Regional Office	Male	Youth (Below 31 years ol	No	No	degenionfrancisco@gmail.com	09551378533
96	4/20/21 8:57:17	4/20/21 8:58:35	anonymous	Clarissa T. Aquino	Admin. Officer V	Central Office	Female	Adult (31 to 59 years old	No	No	clarissaaquino@yahoo.com	09185765899
97	4/20/21 8:58:41	4/20/21 9:00:24	anonymous	Maria Kien E. Elmido	JO-Admin Aide II	PhilFIDA Regional Office	Female	Youth (Below 31 years ol	No	No	elmidomariakien@gmail.com	09161578563
98	4/20/21 9:00:34	4/20/21 9:01:48	anonymous	Maha Charish L. Palacios	Science Research Assista	Central Office	Female	Youth (Below 31 years ol	No	No	palacios.maha@gmail.com	09167048607
99	4/20/21 8:58:56	4/20/21 9:02:05	anonymous	Roxanne Sevilla	Science Research Techni	PhilFIDA-CO	Female	Youth (Below 31 years ol	No	No	roxsevilla_10@yahoo.com	09550995803
100	4/20/21 8:51:02	4/20/21 9:02:18	anonymous	Kate Anne T. Carta	Budgeting Assistant	PHILFIDA CO - AFMD/ Bu	Female	Youth (Below 31 years ol	No	No	kacarta@philfida.da.gov.ph	09486755165
101	4/20/21 9:03:30	4/20/21 9:05:22	anonymous	Benjamin S. Gomo	Acting Director II	PhilFIDA 7	Male	Adult (31 to 59 years old	No	No	bsgomo@philfida.da.gov.ph	09321492670
102	4/20/21 9:00:52	4/20/21 9:05:57	anonymous	Jessen C. Mandras	JO-Laboratory Laborer	PhilFIDA Regional Office	Female	Youth (Below 31 years ol	No	No	jessenmandras30@gmail.com	09533199441
103	4/20/21 9:06:02	4/20/21 9:07:19	anonymous	Josephine S. Pabia	JO-Laboratory Laborer	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	josephinepabia@gmail.com	09357352762
104	4/20/21 9:07:44	4/20/21 9:09:41	anonymous	PEPITO M. SORIANO III	ENGINEER II	FUTD	Male	Adult (31 to 59 years old	No	No	pmsoriano@philfida.gov.ph	09357910172
105	4/20/21 9:07:31	4/20/21 9:09:43	anonymous	Melissa F. Pasion	JO-Laboratory Laborer	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	melissapasion89@gmail.com	09975272369
106	4/20/21 9:08:50	4/20/21 9:10:41	anonymous	Mary Jean R. Paduganao	Fiber Development Offic	Region-X	Female	Youth (Below 31 years ol	No	No	mrpaduganao@philfida.da.gov.ph	09058550901
107	4/20/21 9:11:38	4/20/21 9:12:45	anonymous	Elvince T. Bernardo	Chemist II	FUTD	Male	Adult (31 to 59 years old	No	No	yahcku@gmail.com	09980149086
108	4/20/21 9:09:47	4/20/21 9:13:01	anonymous	Jaime A. Lleve	JO-Admin Aide I	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	jaimelleve@gmail.com	09675581463
109	4/20/21 9:13:05	4/20/21 9:15:31	anonymous	Cristian A. Amarante	JO-Nursery Laborer (Mot	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	amarantecristian87@gmail.com	09751492941
110	4/20/21 9:14:05	4/20/21 9:16:14	anonymous	Alan D. Alviola	Admen Aide I	Regional Office VII	Male	Adult (31 to 59 years old	No	No	adalviola@philfida.da.gov.ph	09226109007
111	4/20/21 9:15:34	4/20/21 9:18:09	anonymous	Anthony Harold P. Olita	JO-Nursery Laborer (TCL)	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	roldqueso@yahoo.com	090668235103
112	4/20/21 9:17:48	4/20/21 9:19:40	anonymous	Jubille Mae I. Cipriano	Fiber Development Offic	Philfida-FUTD	Female	Youth (Below 31 years ol	No	No	jubillecipriano@gmail.com	09565731496
113	4/20/21 9:18:12	4/20/21 9:19:44	anonymous	Romeo I. Prado	FDO I	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	riprado@philfida.da.gov.ph	09972784349
114	4/20/21 9:17:11	4/20/21 9:20:03	anonymous	Maria Isabel J. Rosit	Admin Aide II	Regional Office VII	Female	Youth (Below 31 years ol	No	No	mjrosit@philfida.da.gov.ph	09500191394
115	4/20/21 9:18:54	4/20/21 9:20:06	anonymous	Ma Crestina L Arpon	FDO I	PhilFIDA FUTD	Female	Youth (Below 31 years ol	No	No	mariacrestinaarpon@gmail.com	09174806103
116	4/20/21 9:18:52	4/20/21 9:20:49	anonymous	Myrna M. Nualla	FDO II	Central Office-PhilFIDA	Female	Senior Citizen (60 and Ab	No	No	maynualla@yahoo.com	09228011520
117	4/20/21 9:19:56	4/20/21 9:21:40	anonymous	Antonio C. Noble	Admin Aide II	PhilFIDA Regional Office	Male	Senior Citizen (60 and Ab	No	No	acnoble@philfida.da.gov.ph	09554559617
118	4/20/21 9:22:22	4/20/21 9:23:25	anonymous	Mark Kevin	Chemist III	PhilFIDA Central Office	Male	Youth (Below 31 years ol	No	No	kevin_sapida@yahoo.com	09997770871

119	4/20/21 9:21:45	4/20/21 9:23:32	anonymous	Gerrymee Andy C. Patoli	JO-Nursery Laborer (See	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	gerrymeeandypatolilic@gmail.com	09268302737
120	4/20/21 9:23:45	4/20/21 9:24:31	anonymous	Gideon Rodelas	Statistician I	Central Office /Planning	Male	Youth (Below 31 years ol	No	No	grrodelas@philfida.da.gov.ph	09055980099
121	4/20/21 9:23:43	4/20/21 9:24:54	anonymous	Rodulfo C. Rapas Jr	JO-Nursery Laborer (Mot	PhilFIDA Regional Office	Male	Adult (31 to 59 years old	No	No	rodulforapasjr@gmail.com	09756420695
122	4/20/21 9:25:14	4/20/21 9:26:20	anonymous	Amy Grace E. Adato	JO-Laboratory Laborer	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	amygraceadato@gmail.com	09363170332
123	4/20/21 9:26:24	4/20/21 9:27:28	anonymous	Raffy A. Andriano	JO-Nursery Laborer (See	PhilFIDA Regional Office	Male	Youth (Below 31 years ol	No	No	yffaronairdna@gmail.com	09978466150
124	4/20/21 9:27:12	4/20/21 9:28:33	anonymous	Gemma B. Anonuevo	Project Evaluation Office	Planning Division	Female	Adult (31 to 59 years old	No	No	gbanonuevo@philfida.da.gov.ph	09177906202
125	4/20/21 9:25:56	4/20/21 9:28:41	anonymous	JOCELYN A. AGRA	Statistician II	PhilFIDA/Planning Divisic	Female	Adult (31 to 59 years old	No	No	jaagra@philfida.da.gov.ph	09192410156
126	4/20/21 9:27:30	4/20/21 9:28:42	anonymous	Joven G. Orana	JO-Nursery Laborer (See	PhilFIDA Regional Office	Male	Youth (Below 31 years ol	No	No	joven199723@gmail.com	09550757176
127	4/20/21 9:28:45	4/20/21 9:30:04	anonymous	Gerald M. Ramirez	JO-Nursery Laborer (See	PhilFIDA Regional Office	Male	Youth (Below 31 years ol	No	No	ramirezgerald773@gmail.com	09268791327
128	4/20/21 9:30:27	4/20/21 9:31:50	anonymous	John Paul Necesito	Accounting Clerk III/ AFN	Central Office	Male	Youth (Below 31 years ol	No	No	jaypinecesito@gmail.com	09205460581
129	4/20/21 9:25:45	4/20/21 9:32:12	anonymous	Clark B. Barquilla	Fiber Development Offic	NCR/PhilFIDA-CO/FUTD	Male	Adult (31 to 59 years old	No	No	barquillaclark@gmail.com	09103471764
130	4/20/21 9:30:17	4/20/21 9:33:27	anonymous	Cecilia M. Estrera	JO-Admin Aide I	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	rhinarains@gmail.com	09368221825
131	4/20/21 9:36:25	4/20/21 9:37:27	anonymous	MARY ANN G. NERIO	Planning Officer II	RSO VI	Female	Adult (31 to 59 years old	No	No	maryannnerio@yahoo.com	09335211685
132	4/20/21 9:37:45	4/20/21 9:38:44	anonymous	Anthony Borlaza	Administrative Officer II	Central Office	Male	Youth (Below 31 years ol	No	No	borlazaanthony@yahoo.com	09673151064
133	4/20/21 9:36:26	4/20/21 9:42:06	anonymous	Nemspat Joevenet T. De	FDO 1	PhilFIDA RSO VI	Male	Youth (Below 31 years ol	Yes	No	njdejuan@philfida.da.gov.ph	09090323080
134	4/20/21 9:41:56	4/20/21 9:42:30	anonymous	Jurdzon Palima	FDO I	PhilFIDA Region V	Male	Youth (Below 31 years ol	No	No	jurdzonp5@gmail.com	09152187015
135	4/20/21 9:41:02	4/20/21 9:42:39	anonymous	Tarcesio J. Nervar Jr	FDO 1/TAU Head	RSO VI	Male	Youth (Below 31 years ol	Yes	No	tnervar@gmail.com	09301706057
136	4/20/21 9:41:34	4/20/21 9:42:58	anonymous	Evelyn B. Cagasan	Supervising FDO/OIC, Ph	Region VI	Female	Adult (31 to 59 years old	No	No	evelyncagasan@gmail.com	09190082853
137	4/20/21 9:39:19	4/20/21 9:43:45	anonymous	NENA D. LOCSIN	PFO-NEGROS ORIENTAL	PHILFIDA, REGION VII	Female	Adult (31 to 59 years old	No	No	ndlocsin@philfida.da.gov.ph	2261928
138	4/20/21 9:42:26	4/20/21 9:43:59	anonymous	narlito celso e. ocayo	fdo 2, Regulatory unit	rso vi	Male	Adult (31 to 59 years old	No	No	tangkaddesecond@gmail.com	09234247073
139	4/20/21 9:42:54	4/20/21 9:44:03	anonymous	Gilbert Mayores	FDO II	REGION VII	Male	Adult (31 to 59 years old	No	No	fictionpulp40@yahoo.com	09171720943
140	4/20/21 9:42:08	4/20/21 9:44:24	anonymous	RICHARD C. TUMAMUT	PROVINCIAL FIBER OFFIC	REGION 9	Male	Adult (31 to 59 years old	No	No	rctumamut@philfida.da.gov.ph	09069261813
141	4/20/21 9:42:44	4/20/21 9:44:30	anonymous	Josephine j. Rapo	FDO I	RSO6	Female	Adult (31 to 59 years old	No	No	jo.rapo1230@yahoo.com	09167827243
142	4/20/21 9:42:58	4/20/21 9:44:32	anonymous	Zenarosa A. Andresio	FDO I/PICTU RXI	PHILFIDA Regional Office	Female	Adult (31 to 59 years old	No	No	zaandresio@philfida.da.gov.ph	09294736248
143	4/20/21 9:43:28	4/20/21 9:44:57	anonymous	Mylene Ocayo	FDO 1/ Acting Admin Off	RSO 6 Iloilo City	Female	Adult (31 to 59 years old	No	No	mlmocayo@gmail.com	09227025811
144	4/20/21 9:44:11	4/20/21 9:45:23	anonymous	Joseph Bernard	FDO 1-PFO NORTH COTA	Philippine Fiber Industry	Male	Adult (31 to 59 years old	No	No	pafin_jb@yahoo.com	09104218562
145	4/20/21 9:44:36	4/20/21 9:45:39	anonymous	Johvany C. Delarosa	FDO - 1 / PFO Agusan de	PhilFIDA Region XIII	Male	Adult (31 to 59 years old	No	No	jvdelarosa@philfida.da.gov.ph	09501467923
146	4/20/21 9:44:38	4/20/21 9:46:32	anonymous	Editha O. Garciano	Sr. FDO/In -charge Licen	Reg. XI	Female	Senior Citizen (60 and At	No	No	editha garciao@yahoo.com	09462309005/0
147	4/20/21 9:45:40	4/20/21 9:47:05	anonymous	ROWILL FORTICH	FDO-I	PHILFIDA-ZAMBOANGA S	Male	Adult (31 to 59 years old	No	No	rrfortich@philfida.da.gov.ph	09269409651
148	4/20/21 9:44:07	4/20/21 9:47:09	anonymous	Valentina P. Macahilo	FDO 1/PFO Capiz	PhilFIDA RSO VI	Female	Adult (31 to 59 years old	No	No	vpmacahilo@philfida.da.gov.ph	09214567449
149	4/20/21 9:45:41	4/20/21 9:47:36	anonymous	Mary Anne R. Molina	OIC Regional Director	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No		09175588522
150	4/20/21 9:47:23	4/20/21 9:49:09	anonymous	LUCILLE PAREDES	FDO I	PHILFIDA REGU;LATORY I	Female	Youth (Below 31 years ol	No	No	paredes.lucille@gmail.com	09753658905
151	4/20/21 9:47:33	4/20/21 9:49:36	anonymous	Lindelle	Fiber development office	Philfida aklan	Male	Youth (Below 31 years ol	No	No	Ydelev17@gmail.com	09207931717
152	4/20/21 9:48:09	4/20/21 9:50:34	anonymous	Ermario Acosta	FDO II	FUTD	Male	Adult (31 to 59 years old	No	No	acostaerwin@yahoo.com	09334429285
153	4/20/21 9:47:09	4/20/21 9:50:52	anonymous	ROCILO C. OMILA	ABACA TRADER	REGION VII	Male	Senior Citizen (60 and At	No	No	N/A	09063346633
154	4/20/21 9:49:53	4/20/21 9:51:04	anonymous	Lindelle r. Villorentr	Fiber Development office	Philfida RSO 6	Male	Youth (Below 31 years ol	No	No	ydelev17@gmail.com	09207931717
155	4/20/21 9:46:47	4/20/21 9:51:35	anonymous	FILINIO T. COSARE	SR. FDO/TAU Head	XI, Phil FIDA	Male	Adult (31 to 59 years old	No	Yes	ftcosare@philfida.da.gov.ph	09456108559
156	4/20/21 9:45:44	4/20/21 9:52:49	anonymous	Justiniano M. Orina Jr.	Sup. FDO	PhilFIDA Region XIII	Male	Senior Citizen (60 and At	Yes	No	jmorina@philfida.da.gov.ph	09177932424
157	4/20/21 9:51:44	4/20/21 9:53:50	anonymous	Renato A. Amistad	Sr. FDO/ Regulatory Unit	PhilFIDA XI	Male	Senior Citizen (60 and At	No	No	renatoamistad@yahoo.com	0939 918 1137
158	4/20/21 9:52:38	4/20/21 9:54:03	anonymous	JOSE DARY C. LOCSIN	FDO II	REGION VII	Male	Adult (31 to 59 years old	No	No	jclocsin@philfida.da.gov.ph	09754441595
159	4/20/21 9:54:13	4/20/21 9:55:48	anonymous	Gilbert O. Arobo	FDO I	PhilFIDA XI	Male	Adult (31 to 59 years old	No	No	gilbertarobo@yahoo.com	09294568203
160	4/20/21 9:52:52	4/20/21 9:55:57	anonymous	Phoebe Grace S. Casal	FDO I	PhilFIDA Region XIII	Female	Youth (Below 31 years ol	No	No	pgcasal@philfida.da.gov.ph	09973015117
161	4/20/21 9:56:01	4/20/21 9:57:03	anonymous	Louie Aaron L. Pontillo	Sup. FDO/ PFO Surigao d	PhilFIDA XIII	Male	Senior Citizen (60 and At	No	No	ertesorio@philfida.da.gov.ph	09985488123
162	4/20/21 9:55:38	4/20/21 9:57:14	anonymous	Analyn F. Celestial	Fiber Development Offic	Regional Office 5	Female	Youth (Below 31 years ol	Yes	No	analynfullentecelestial@gmail.com	09383393930
163	4/20/21 9:56:00	4/20/21 9:57:18	anonymous	Josephine P. Quiban	FDO II	PhilFIDA XI	Female	Senior Citizen (60 and At	No	No	joquiban.19@gmail.com	09182635836
164	4/20/21 9:55:04	4/20/21 9:57:25	anonymous	Remedios Vj. Abgona	Chief, FDO	FUTD	Female	Senior Citizen (60 and At	No	No	rvabgona@philfida.da.gov.ph/rvja	09328659164
165	4/20/21 9:57:12	4/20/21 9:58:08	anonymous	Exequiel R. Tesorio	Sup. FDO/ PFO Surigao d	Philfida XIII	Male	Senior Citizen (60 and At	No	No	ertesorio@philfida.da.gov.ph	09985488123
166	4/20/21 9:51:46	4/20/21 9:58:09	anonymous	Joyce r. Icabandi	Fiber development office	Philfida rso 6	Female	Youth (Below 31 years ol	No	No	requiola_joyce@yahoo.com	09123799018
167	4/20/21 9:58:36	4/20/21 10:00:44	anonymous	Nelia z. Rome	General Manager	LORRI ARC, Libacao, Akla	Female	Senior Citizen (60 and At	No	No	Romenelia86@gmail.com	09289649086
168	4/20/21 10:00:45	4/20/21 10:02:37	anonymous	Cristina A. Panganiban	Engineer II	PhilFIDA Central Office	Female	Adult (31 to 59 years old	No	No	cristy.panganiban@gmail.com	09282690970
169	4/20/21 9:58:12	4/20/21 10:04:06	anonymous	Louie Aaeon L. Pontillo	FDO II	PhilFIDA XIII	Male	Youth (Below 31 years ol	No	No	lapontillo@philfida.da.gov.ph	09070724692
170	4/20/21 10:04:09	4/20/21 10:05:01	anonymous	Wendilin P. Abuloc	FDO II	PhilFIDA XIII	Male	Adult (31 to 59 years old	No	No	wpabuloc@philfida.da.gov.ph	09103053453
171	4/20/21 10:04:19	4/20/21 10:05:16	anonymous	Milagros B. Laburada	Officer-In-Charge	Region XI	Female	Senior Citizen (60 and At	No	No	mblaburada@philfida.da.gov.ph	0908-5339388
172	4/20/21 10:05:03	4/20/21 10:05:53	anonymous	Alfritz L. Ceballos	FDO II	PhilFIDA XIII	Male	Adult (31 to 59 years old	No	No	aaceballos@philfida.da.gov.ph	09304518983

173	4/20/21 10:05:55	4/20/21 10:06:54	anonymous	Joel L. Portigo	AA V	PhilFIDA XIII	Male	Adult (31 to 59 years old	No	No	jmportigo@philfida.da.gov.ph	09510310213
174	4/20/21 10:05:04	4/20/21 10:06:57	anonymous	Anne Lim	VP for Admin and Opera	Ching Bee Trading Corpo	Female	Adult (31 to 59 years old	No	No	anne.lim@chingbee.com	09228201749
175	4/20/21 10:06:20	4/20/21 10:07:42	anonymous	emma balabis	SRS II	Central Office/PhilFIIDA	Female	Adult (31 to 59 years old	No	No	ezb7367@yahoo.com	+639228098533
176	4/20/21 10:06:03	4/20/21 10:09:08	anonymous	Ralph Aragon	Science Research Special	PhilFIDA Central Office	Male	Youth (Below 31 years ol	No	No	ralpharagon29@gmail.com	09615538762
177	4/20/21 10:06:37	4/20/21 10:09:41	anonymous	Analyn D. Bolivar	SuSRS/Head, Research U	RO XI/PhilFIDA	Female	Senior Citizen (60 and Al	No	No	adbolivar@philfida.da.gov.ph	09329677269
178	4/20/21 10:07:02	4/20/21 10:10:02	anonymous	Joy P. Soco	Planning Officer II	PhilFIDA XIII	Female	Adult (31 to 59 years old	No	No	jpsoco@philfida.da.gov.ph	09177292540
179	4/20/21 10:09:01	4/20/21 10:11:47	anonymous	Adrian T. Fernandez	FDO I / Fiber Inspector tr	PhilFIDA RO XI	Male	Adult (31 to 59 years old	No	No	atfernandez78@gmail.com	09484400081
180	4/20/21 10:07:49	4/20/21 10:13:24	anonymous	Caren D. Edra	Operations Officer	Ching Bee Trading Corpo	Female	Youth (Below 31 years ol	No	No	caren.edra@chingbee.com	09237493373
181	4/20/21 10:12:39	4/20/21 10:13:55	anonymous	Joel T. Alcoser	FDO II / Fiber Inspector	XI Davao	Male	Adult (31 to 59 years old	Yes	No	joelalcoser38@gmail.com	09389957679
182	4/20/21 10:14:05	4/20/21 10:16:23	anonymous	Aris C. Endaya	FDO I	PhilFIDA RO-XI	Male	Adult (31 to 59 years old	No	No	acendaya@philfida.da.gov.ph	09193311760
183	4/20/21 10:16:07	4/20/21 10:17:10	anonymous	CLAIRE T. OBLIMAR	ADMINISTRATIVE OFFICE	DA-PHILFIDA RO 13	Female	Youth (Below 31 years ol	No	No	ctoblimar@philfida.da.gov.ph	09073888922
184	4/20/21 10:16:37	4/20/21 10:19:12	anonymous	ALLAN M. LIBANO	FIBER DEVELOPMENT OF	RIEGIONAL OFFICE XI	Male	Adult (31 to 59 years old	No	No	amlibano@philfida.da.gov.ph	09388587197
185	4/20/21 10:21:46	4/20/21 10:24:19	anonymous	Virginia Agcopra	National Project Coordin	NCR/Agrobiodiversity Pr	Female	Senior Citizen (60 and Al	No	No	Virginia.Agcopra@fao.org	0927 463 6884
186	4/20/21 10:26:31	4/20/21 10:32:27	anonymous	marimar fernando	General manager	region6/libacao abaca pr	Female	Adult (31 to 59 years old	No	No	mharimar13@gmail.com	09668241484
187	4/20/21 10:09:43	4/20/21 10:33:05	anonymous	JENNY ANN DAVID OLAV	FIBER DEVELOPMENT OF	PHILFIDA V	Female	Adult (31 to 59 years old	No	No	jaolaviaga@philfida.da.gov.ph / je	09297141502
188	4/20/21 10:33:54	4/20/21 10:35:13	anonymous	Maria Dolores T. Enero	Planning Officer II	Region 11	Female	Senior Citizen (60 and Al	No	No	dollyenero@yahoo.com.ph	09328660408
189	4/20/21 10:37:26	4/20/21 10:38:58	anonymous	Claire A. Dacanay	SRS I/PICTU Focal Person	ROI/PhilFIDA Research C	Female	Adult (31 to 59 years old	No	No	cadacanay@philfida.da.gov.ph	09456219742
190	4/20/21 10:39:03	4/20/21 10:41:36	anonymous	Gloria A. Rosario	Engr II/Cotton Focal Pers	ROI/PhilFIDA Research C	Female	Adult (31 to 59 years old	No	No	garosario@philfida.da.gov.ph	09778526111
191	4/20/21 10:43:19	4/20/21 10:44:54	anonymous	JUREY CRIS E. PONIO	FDO I/OIC, Planning Unit	Region 9	Male	Youth (Below 31 years ol	No	No	princecris91@gmail.com	09518307223
192	4/20/21 10:43:11	4/20/21 10:45:01	anonymous	Vermando M. Aquino	Professor	NIMBB. University of the	Male	Senior Citizen (60 and Al	No	No	vmaquino@mbb.upd.edu.ph	8981-8616/18
193	4/20/21 10:55:44	4/20/21 10:59:35	anonymous	ALMERA G. SUGOT	AA V	REGIONAL OFFICE I	Female	Youth (Below 31 years ol	Yes	No	megansugot@gmail.com	09301895283
194	4/20/21 10:59:40	4/20/21 11:01:06	anonymous	ANGELICA TORIBIO	AA I	REGIONAL OFFICE I	Female	Youth (Below 31 years ol	Yes	No	toribioangelica22@gmail.com	09397261173
195	4/20/21 11:00:06	4/20/21 11:01:49	anonymous	LIZA G. GARALDE	AO V	Region 1	Female	Adult (31 to 59 years old	No	No	lizagaralde2004@yahoo.com	09062897083
196	4/20/21 11:01:08	4/20/21 11:02:39	anonymous	RIZAL B. BANTILOC	AA IV (DRIVER)	REGIONAL OFFICE I	Male	Youth (Below 31 years ol	Yes	No	rizalbayani1993@gmail.com	09103170663
197	4/20/21 11:06:02	4/20/21 11:07:21	anonymous	MARY ROSE FERRER	JOB ORDER	REGIONAL OFFICE I	Female	Youth (Below 31 years ol	No	No	maryroseferrer8@gmail.com	09123531598
198	4/20/21 11:07:42	4/20/21 11:10:30	anonymous	Ruel G. Bitoon	FDO 1 / Fiber Inspector	PhilFIDA Region VIII	Male	Adult (31 to 59 years old	No	No	rbgojoco@yahoo.com.ph	09350475871
199	4/20/21 11:06:30	4/20/21 11:10:33	anonymous	Oscar F. Abrantes Jr.	FDO-I (Fiber Inspector)	PhilFIDA RO 8	Male	Youth (Below 31 years ol	No	No	ozkieabrantes2017@gmail.com	09659973139
200	4/20/21 11:07:27	4/20/21 11:13:09	anonymous	Belinda S. Lagrama	FDO II/PFO	Region 8 /PhilFIDA	Female	Adult (31 to 59 years old	No	No	bslagrama@philfida.da.gov.ph	09193482833
201	4/20/21 11:11:34	4/20/21 11:13:15	anonymous	Melanie Larona	FDO I	PhilFIDA Region VIII	Female	Youth (Below 31 years ol	No	No	mglarona@philfida.da.gov.ph	09384863659
202	4/20/21 11:10:58	4/20/21 11:13:26	anonymous	Joseph S. Salas	Sr. FDO/Head Technical /	PhilFIDA RO VIII, Tacloba	Male	Adult (31 to 59 years old	No	No	jssalas@philfida.da.gov.ph	09063775495
203	4/20/21 11:12:25	4/20/21 11:13:53	anonymous	Evelyn B. Tablante	SRS II	DOST 8	Female	Adult (31 to 59 years old	No	No	ebtablante@region8.dost.gov.ph	09166656779
204	4/20/21 11:06:13	4/20/21 11:14:03	anonymous	MARITON FEMA S. TIRAN	FDO I	PHILFIDA RO 7	Female	Youth (Below 31 years ol	No	No	mftirambulo@philfida.da.gov.ph	09268321588
205	4/20/21 11:12:57	4/20/21 11:14:43	anonymous	John Paul Juego	Engineer I	PhilFIDA Region VIII	Male	Youth (Below 31 years ol	No	No	jpjuego11@gmail.com	09758185143
206	4/20/21 11:16:53	4/20/21 11:19:28	anonymous	Omar M. Espera	PO President	Region 8 (Tigbawan Reha	Male	Adult (31 to 59 years old	No	No	esperaomar718@gmail.com	09196786573
207	4/20/21 11:19:20	4/20/21 11:20:39	anonymous	Shiela R. Suaybaguio	FDO I	RO VII	Female	Adult (31 to 59 years old	No	No	shielasuaybaguio@yahoo.com	09205262955
208	4/20/21 11:18:28	4/20/21 11:21:17	anonymous	Feliciano L. Malaki, Jr.	Abaca Point Person	Province of Southern Ley	Male	Senior Citizen (60 and Al	No	No	flmalakijr@gmail.com	09173095900
209	4/20/21 11:19:52	4/20/21 11:21:35	anonymous	Perfecto S. Ramos	PO President	Region 8 (LAMDAG Inc.)	Male	Adult (31 to 59 years old	No	No		09206218146
210	4/20/21 11:20:05	4/20/21 11:22:11	anonymous	Sunny Z. Gregorio	Chairman	Sorsogon Bay Aquatic Fa	Male	Adult (31 to 59 years old	No	No		09466206763
211	4/20/21 11:19:14	4/20/21 11:22:22	anonymous	Elizabeth Secula	Auditor	MATRIHAFA	Female	Adult (31 to 59 years old	Yes	No	ubaub2021@gmail.com	09676651438
212	4/20/21 11:22:00	4/20/21 11:23:27	anonymous	Hector B. Cupat	FDO-I	PhilFIDA RO 8	Male	Adult (31 to 59 years old	No	No	hcupat89@gmail.com	09058718984
213	4/20/21 11:18:09	4/20/21 11:24:05	anonymous	Hermelito M. Malaran	FDO-I / PFO-Bohol	PhilFIDA - Bohol, Region	Male	Youth (Below 31 years ol	No	No	hmmalaran@philfida.da.gov.ph	09456219661
214	4/20/21 11:23:44	4/20/21 11:24:56	anonymous	Geralyn D. Entuna	FDO-I	PhilFIDA RO 8	Female	Adult (31 to 59 years old	No	No	gdentuna@yahoo.com	09175055646
215	4/20/21 11:23:53	4/20/21 11:27:58	anonymous	Robelyn T. Piamonte	Faculty and Director	National Abaca Research	Female	Adult (31 to 59 years old	No	No	rtpiamonte@vsu.edu.ph	09171546999
216	4/20/21 11:30:19	4/20/21 11:31:51	anonymous	Nic Oswald M. Borines	Instructor I	Caraga State University	Male	Youth (Below 31 years ol	No	No	nborines314@gmail.com	09057887449
217	4/20/21 11:30:36	4/20/21 11:33:34	anonymous	Rezel S. Borines	Instructor III	Caraga State University	Female	Youth (Below 31 years ol	No	No	rezelsagarino14@gmail.com	09503323962
218	4/20/21 11:33:16	4/20/21 11:35:05	anonymous	Elizabeth Parac	Associate Professor/Dea	Caraga State University	Female	Adult (31 to 59 years old	No	No	epparac@carsu.edu.ph	639175810193
219	4/20/21 11:38:55	4/20/21 11:39:58	anonymous	Lemuel Alagon	Special Technical Assista	DA-Office of the Underse	Male	Adult (31 to 59 years old	No	No		09171290228
220	4/20/21 11:37:53	4/20/21 11:40:27	anonymous	Renato L. Puaso Jr.	FDO I	PhilFIDA Region 8	Male	Adult (31 to 59 years old	No	No	puasorenato@yahoo.com	09207555084
221	4/20/21 11:40:33	4/20/21 11:42:00	anonymous	Ralph D. Bandal	SSRS	PhilFIDA Region 8	Male	Adult (31 to 59 years old	No	No		09452485469
222	4/20/21 11:42:06	4/20/21 11:44:01	anonymous	NONITO M. BAYRANTE JI	Abaca farmer	Region 8	Male	Adult (31 to 59 years old	No	No		09075030982
223	4/20/21 11:44:05	4/20/21 11:46:01	anonymous	LAURO B. BUENO	Abaca farmer/Associatio	Region 8	Male	Adult (31 to 59 years old	No	No		09165615284
224	4/20/21 11:46:06	4/20/21 11:47:06	anonymous	RODRIGO A. DUPAN	FDO II	PhilFIDA REGION 8	Male	Senior Citizen (60 and Al	No	No		09085183819
225	4/20/21 11:47:11	4/20/21 11:48:33	anonymous	ARIEL C. CINCO	FDO II	PhilFIDA Region 8	Male	Adult (31 to 59 years old	No	No		09069583128
226	4/20/21 12:00:11	4/20/21 12:01:58	anonymous	Luz O. Moreno	Professor	National Abaca Research	Female	Senior Citizen (60 and Al	No	No	lomoreno@vsu.edu.ph	09164239381
227	4/20/21 12:02:25	4/20/21 12:05:24	anonymous	Irma R. Rodis	Engineer Ii	NCR/PHILFIDA	Female	Adult (31 to 59 years old	No	No	marisidor.ms@gmail.com	09228138123
228	4/20/21 12:10:48	4/20/21 12:13:12	anonymous	Michael Z. Isagan	Owner	6	Male	Senior Citizen (60 and Al	No	No	mikeluzrelojisagan@yahoo.com	09275389441

229	4/20/21 12:25:23	4/20/21 12:26:39	anonymous	Analyn O. Rocacorba	Manager	JRR Buy and Sell of Abac	Female	Adult (31 to 59 years old	Yes	No	jrr.abaca@yahoo.com	09169766443
230	4/20/21 12:25:08	4/20/21 12:27:16	anonymous	Rose Antonette B. Mapa	Trade-Industry Developr	DTI- Region 5	Female	Adult (31 to 59 years old	No	No	roseantonettemapa@dti05.org	09613730766
231	4/20/21 12:25:46	4/20/21 12:27:22	anonymous	Erlyn Jane B. Garcia	Project Management Offi	DA Biotech Program Offi	Female	Youth (Below 31 years ol	No	No	erlynjanegarcia@gmail.com	09355906138
232	4/20/21 12:24:50	4/20/21 12:29:44	anonymous	Joven B. Gonzales	Secretary	Abaca Stakeholders' Ass	Male	Youth (Below 31 years ol	No	No	jovengonzales91@gmail.com	09515383147
233	4/20/21 12:29:02	4/20/21 12:30:40	anonymous	wellington flores	planning officer2	region 5	Male	Adult (31 to 59 years old	No	Yes	wellingtonflores@yahoo.com	09175165014
234	4/20/21 12:28:04	4/20/21 12:31:26	anonymous	Merly Candaza	Owner	Region 5	Female	Adult (31 to 59 years old	No	No	candazamerly811@gmail.com	09999902052
235	4/20/21 12:30:53	4/20/21 12:32:41	anonymous	Charo Ong	Operations Manager	Saint Luis CK Ong Genera	Female	Adult (31 to 59 years old	No	No	sckagritrading@gmail.com	09281845355
236	4/20/21 12:31:46	4/20/21 12:33:22	anonymous	JOMER V. EPONDO	Senior Administrative As	DA-Office of the Underse	Male	Adult (31 to 59 years old	No	No	usecg.dacentral@gmail.com	09165260446
237	4/20/21 12:38:36	4/20/21 12:39:50	anonymous	JOY P. SOCO	Planning Officer II/Planni	PHILFIDA RO-XIII	Female	Adult (31 to 59 years old	No	No	joysoco66@yahoo.com	09177292540
238	4/20/21 12:37:49	4/20/21 12:39:53	anonymous	Henry V. Dungganon	ADF-BRC Manager	Antique Development Fc	Male	Adult (31 to 59 years old	No	No	dungganonhenry68@gmail.com	09999224791
239	4/20/21 12:37:53	4/20/21 12:39:53	anonymous	Edgar R. Madrid	RTD for Research & Regu	DA-RFO V	Male	Senior Citizen (60 and Al	No	No	ed_rey_mad@yahoo.com	09285025357
240	4/20/21 12:38:08	4/20/21 12:40:38	anonymous	GENEROSO F. ZAQUITA	FDO 1	PHILFIDA R.O IV	Male	Adult (31 to 59 years old	No	No	generoso_zaquita@yahoo.com.sg	09552945710
241	4/20/21 12:39:14	4/20/21 12:41:16	anonymous	Analyn G. Torejas	FDO I	Region XI	Female	Adult (31 to 59 years old	No	No	agtorejas@philfida.da.gov.ph	09774181529
242	4/20/21 12:38:48	4/20/21 12:43:02	anonymous	EDGAR A. ABRIOL	FDO II/PFO-CAMARINES	REGION V/PhilFIDA	Male	Adult (31 to 59 years old	No	No	eaabriol@yahoo.com.ph	09776500542
243	4/20/21 12:41:23	4/20/21 12:43:40	anonymous	Josephine V. Alegata	FDO I	Region XI	Female	Adult (31 to 59 years old	No	No	jvalegata@philfida.da.gov.ph	09971094864
244	4/20/21 12:42:51	4/20/21 12:44:12	anonymous	Pelita R. San Juan	Project Evaluation Office	PhilFIDA CO	Female	Adult (31 to 59 years old	No	No	pelitzsj@yahoo.com	09997371997
245	4/20/21 12:43:10	4/20/21 12:44:31	anonymous	Edcelle M. Zabala	FDO II	PhilFIDA Central Office	Female	Youth (Below 31 years ol	No	No	emzabala@philfida.da.gov.ph	09452039810
246	4/20/21 12:42:44	4/20/21 12:44:54	anonymous	OKM Trading / Odilio U. /	Proprietor	Region 10	Male	Adult (31 to 59 years old	No	No	okmaquino@gmail.com / okmaqui	0917 105 7070
247	4/20/21 12:43:38	4/20/21 12:45:00	anonymous	James Mendoza	President	JRD Systems Technology	Male	Senior Citizen (60 and Al	No	No	jfm@jrdsystem.com	09088825133
248	4/20/21 12:43:48	4/20/21 12:46:52	anonymous	SHARON CLAIRE M. ARP(	ADMINISTRATIVE OFFICE	REGION XI	Female	Adult (31 to 59 years old	No	No	smarpon@philfida.da.gov.ph	09258220917
249	4/20/21 12:46:56	4/20/21 12:48:27	anonymous	EVA V. BERSAMIN	JOB ORDER	REGION XI	Female	Adult (31 to 59 years old	No	No	evbersamin@philfida.da.gov.ph	09300326322
250	4/20/21 12:48:22	4/20/21 12:51:18	anonymous	Mamerto D. Te	Trader	Region V	Male	Adult (31 to 59 years old	No	No	b.graces2021@gmail.com	09453572280
251	4/20/21 12:48:21	4/20/21 12:52:21	anonymous	Dr. Micah Ryan B. Ramel	Associate Professor, Coll	Nueva Vizcaya State Uni	Male	Adult (31 to 59 years old	Yes	No	micahryan_76@yahoo.com	09368091477
252	4/20/21 12:51:23	4/20/21 12:52:38	anonymous	Chalene N. Espena	FDO-I	Region V	Female	Adult (31 to 59 years old	No	No	cnespena@philfida.da.gov.ph	09487274942
253	4/20/21 12:43:16	4/20/21 12:54:09	anonymous	Alicia E. Calosa	Farmer	Region -V	Female	Senior Citizen (60 and Al	No	No		09352001280
254	4/20/21 12:49:09	4/20/21 12:54:18	anonymous	Kevin Frias	MAYA Intern	PhilFIDA - TAD	Male	Youth (Below 31 years ol	No	No	kevincarlosfrias@gmail.com	09159090911
255	4/20/21 12:54:13	4/20/21 12:55:38	anonymous	Salvador C. De Leon	Farmer	Region - V	Male	Senior Citizen (60 and Al	No	No		09366207158
256	4/20/21 12:55:41	4/20/21 12:57:00	anonymous	Joycee M. Asis	Farmer/Trader	Region - V	Female	Adult (31 to 59 years old	No	No		09354618559
257	4/20/21 12:55:47	4/20/21 12:57:40	anonymous	Lea M. Zacarias	FDO II	XI/TAU/PhilFIDA	Female	Adult (31 to 59 years old	No	No	philfida_davaosur2019@yahoo.co	09073671461
258	4/20/21 12:51:12	4/20/21 13:00:37	anonymous	Nilo Macampao Basino	FDO I	RO XI	Male	Adult (31 to 59 years old	Yes	No	nmbasino@philfida.da.gov.ph	09676917162
259	4/20/21 12:58:07	4/20/21 13:01:50	anonymous	DINA D. MORADO	ADMIN AIDE I/SECRETAR	RO XI/PhilFIDA	Female	Adult (31 to 59 years old	No	No	namified39@gmail.com	09619236757
260	4/20/21 13:00:47	4/20/21 13:03:07	anonymous	Arnel Ticao Ming	Agricultural Technologist	RO XI	Male	Adult (31 to 59 years old	Yes	No	nel_ming@yahoo.com	09753542049
261	4/20/21 13:02:32	4/20/21 13:04:33	anonymous	Jose V. Ensano	President	Abaca Stakeholders' Ass	Male	Senior Citizen (60 and Al	No	No	jensano@gmail.com	09461490250
262	4/20/21 13:03:11	4/20/21 13:05:07	anonymous	Stanley Robles Dariagan	Project Development Offi	RO XI	Male	Youth (Below 31 years ol	No	No	standariagan@gmail.com	09105467406
263	4/20/21 12:55:50	4/20/21 13:10:41	anonymous	Ailene A. Amador	FDO I- PFO Sarangani/Co	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	Yes	No	aaamador@philfida.da.gov.ph	09382989887
264	4/20/21 13:08:30	4/20/21 13:11:01	anonymous	Archie E. Asumbrado	Admin. Aide I	Region XI / PhilFIDA	Male	Adult (31 to 59 years old	No	No	archieasumbrado7@gmail.com	09356810585
265	4/20/21 13:11:01	4/20/21 13:14:10	anonymous	Maria Gina Q. Torbila	SRS2	Region XI/PhilFIDA	Female	Adult (31 to 59 years old	No	No	gynatorbila@yahoo.com	09053919117
266	4/20/21 13:11:26	4/20/21 13:14:22	anonymous	ROGELIO S. LIBED	AO III/DISBURSING OFFIC	REGIONAL OFFICE XI/ADI	Male	Adult (31 to 59 years old	No	No	rslibed@philfida.da.gov.ph	09328902888
267	4/20/21 13:14:15	4/20/21 13:16:42	anonymous	Hilarion SJ Adan	Admin Aide 1	Region XI/PhilFIDA	Male	Senior Citizen (60 and Al	No	No		09515722553
268	4/20/21 13:16:47	4/20/21 13:18:37	anonymous	Edgar G. Festin	FT	Region XI/PhilFIDA	Male	Senior Citizen (60 and Al	No	No		09633775843
269	4/20/21 13:18:40	4/20/21 13:20:39	anonymous	Pedro D. Mongado	Admin Aide2	Region XI/PhilFIDA	Male	Adult (31 to 59 years old	No	No		09386869278
270	4/20/21 13:20:43	4/20/21 13:22:12	anonymous	Nestor B. Genabe	Admin Aide 2	Region XI/PhilFIDA	Male	Senior Citizen (60 and Al	No	No		09351126729
271	4/20/21 13:21:26	4/20/21 13:24:48	anonymous	CHARITO J. QUINCO	ADMIN AIDE VI	REGIONAL OFFICE XI	Female	Adult (31 to 59 years old	No	No	chaquin715@gmail.com	09452506785
272	4/20/21 13:25:03	4/20/21 13:26:59	anonymous	Evelyn B. Tablante	SRS II	DOST VIII	Female	Adult (31 to 59 years old	No	No	ebtablante@region8.dost.gov.ph	09166656779
273	4/20/21 13:34:52	4/20/21 13:39:38	anonymous	Ralph D. Bandal/Lauro B	PFO/Chairman / Chairma	PhilFIDA 8/San Jose farm	Male	Adult (31 to 59 years old	No	No		09452485469
274	4/20/21 13:36:27	4/20/21 13:43:50	anonymous	ROGELIO B. CHAKITON	SENIOR SCIENCE RESEAR	REGIONAL OFFICE XI	Male	Senior Citizen (60 and Al	Yes	No	rogeliochakiton@gmail.com	09187210555
275	4/20/21 13:59:36	4/20/21 14:02:02	anonymous	Merlita Culla Barrientos	FDO II/PFO, Or. Mindoro	IV-B/ PhilFIDA RO 4	Female	Adult (31 to 59 years old	No	No	philfidaormin@gmail.com	0917-825-2021
276	4/20/21 14:01:13	4/20/21 14:03:17	anonymous	Charles Anthony M. Carl	Project Assistant I	PhilFIDA Region 4	Male	Youth (Below 31 years ol	No	No	charlesanthonycaringal@gmail.cor	09489517313
277	4/20/21 13:22:28	4/20/21 14:13:23	anonymous	Zabdiel L. Zacarias	SrSRS	Region XI/PhilFIDA	Male	Adult (31 to 59 years old	No	No	zabajah@yahoo.com	09752473106
278	4/20/21 14:38:26	4/20/21 14:40:12	anonymous	Rodulfo D. Casil III	Assistant manager	Elisa D. Casil Abaca and (	Male	Youth (Below 31 years ol	No	No	rodulfo.casil111@yahoo.com	09175195764
279	4/20/21 15:31:36	4/20/21 15:33:09	anonymous	Rosalia M. Perez	COS/Clerk III	Central office	Female	Adult (31 to 59 years old	No	Yes	rose.legaspi@yahoo.com	09665626107
280	4/20/21 17:16:55	4/20/21 17:17:51	anonymous	psymie madel ceballos	FDO II/ Fiber Inspector	PhilFIDA Regional Office	Female	Adult (31 to 59 years old	No	No		09100172734
281	4/20/21 17:17:59	4/20/21 17:19:15	anonymous	Marnelli F. Racsa	SRS II	PhilFIDA RO 13	Female	Adult (31 to 59 years old	No	No	mfracsa@philfida.da.gov.ph	09301868558
282	4/21/21 3:30:27	4/21/21 3:39:32	anonymous	Joseph Bernard A. Pafin	FDO 1/PFO North Cotab	PhilFIDA XI	Male	Adult (31 to 59 years old	No	No	pafin_jb@yahoo.com	09104218562

Annex 14. Suggestions/Comments from Participants During the Virtual Public Consultation on Abaca Industry Roadmap held on April 20, 2021, via Microsoft Teams

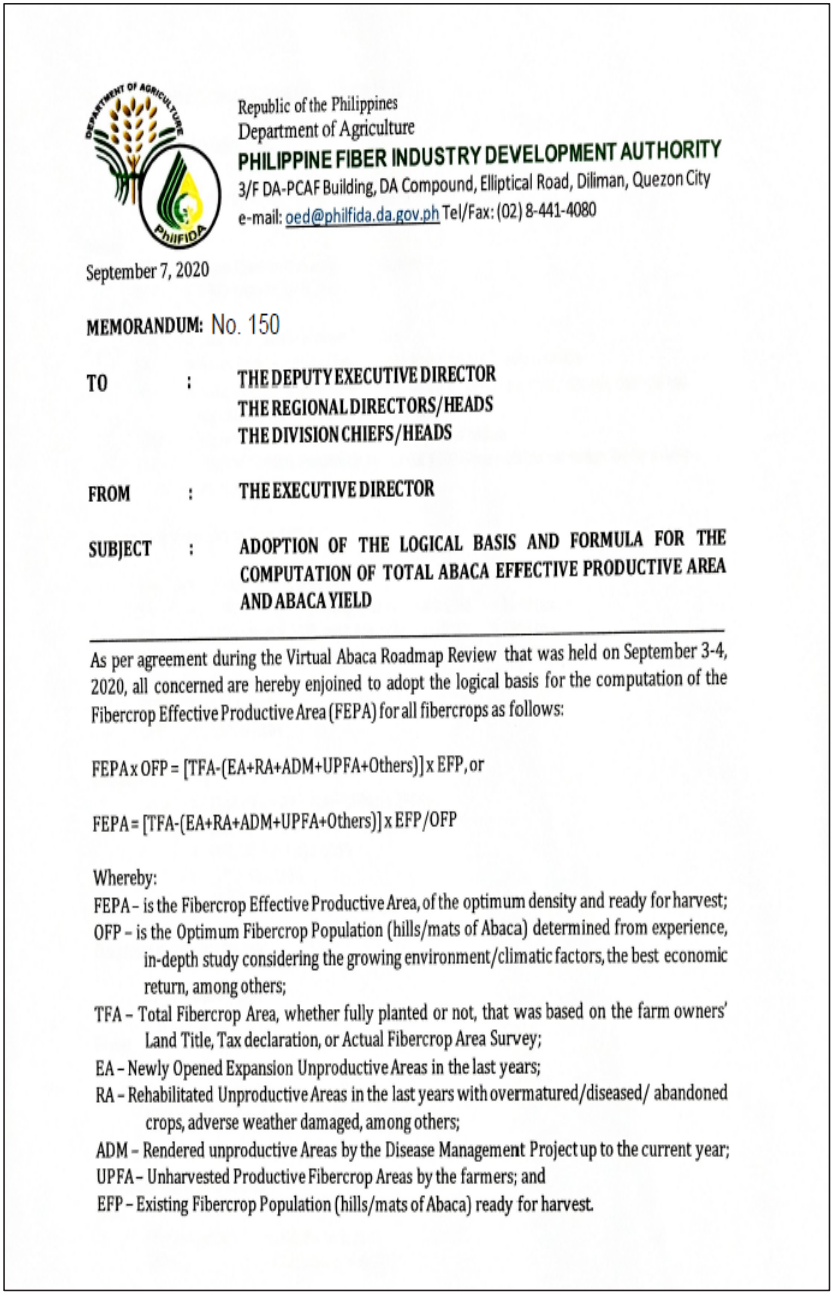
SUGGESTIONS/COMMENTS	ACTION TO BE TAKEN	Chapter/Page
To harmonize research activities among research agencies	PhilFIDA will lead the R&D in collaboration with other agencies.	Chap 11
Prioritization of programs for a high impact and progress in the abaca industry (Prioritize according to the available budget)	1. Mechanization (in collaboration with PhilMech and other agencies) 2. Expansion/Rehab with production/distribution of PMs 3. ADMP 4. R&D 5. Strict implementation of PNS Abaca Code of GAP and Trade Regulation	Chapter X-Page 78
To include abaca as a priority crop so that it will be included in the LGU commodity plan	1. Aggressive info campaign for LGUs and farmers' groups on identified areas suitable for abaca thru fora/consultative meetings on the potential income, production and processing technologies, product development and success stories 2. Active participation of PhilFIDA Technical personnel (especially PFOs) in the preparation of Commodity Investment Plans	Chapter X, Page 78

	3. Showcasing of programs/projects that are technically feasible and economically viable	
Focus on the farmers specially cooperatives/ associations rather than on LGUs. If they believe that they will gain good income from abaca production, they will push their LGUs to consider abaca as a priority crop.	Well taken and to be used as strategy for our campaign	
Creation of PhilFIDA BARMM as abaca contributed to the recovery of Lanao del Sur	Collaboration with the BARMM on the continuation of service provision to abaca farmers PhilFIDA Regional Office IX will continue providing technical assistance on production and regulatory services.	Chapter 11, Page 114
Increase efficiency in fiber production (at farmer's level thru decortication)	Already included in the Roadmap	Pages 83

Promotion of deco fiber to the end users.	Development of other uses/applications of decorticated fibers from leftover leafsheaths Conduct of research on the comparative study on fiber and pulp properties of decorticated abaca fiber extracted from regular and left over leafsheaths	Pages 85-86
Be prudent in the distribution of planting materials (PM)	To ensure survivability, distribute planting materials (PMs) which are not less than 3 months old after bagging or at least one (1) foot in height. PMs must be sourced only from PhilFIDA-supervised nurseries.	Chapter X, Page 80
Additional presence of PhilFIDA personnel in Catanduanes to advocate abaca under coconut projects	Validation of coconut areas for abaca intercropping	Chapter X, Page 84
Additional presence of PhilFIDA personnel in Zamboanga Peninsula and Bukidnon to monitor	Devise a system for online issuance of PTF (for licensed stake holders only)	Page 87

abaca production (i.e., harvesting, machines) in order to produce high quality fibers		
Streamlining of Abaca Fiber Grades	Already included in the roadmap	Chapter X
Preparedness/Strategies to mitigate effect of climate change	Promote planting of abaca in areas that are less prone to typhoons and drought but are suited for abaca production. Climate smart FFS (planting calendar) Info dissemination on planting schedule Structural design of facilities was adapted to natural calamities. Encourage farmers to enlist their abaca plantation/areas in RSBSA of their respective LGUs and to have their farms insured with PCIC.	Chapter X, Page 79

Annex 15. Adoption of the Logistical Basis and Formula for the Computation Total Abaca Effective Productive Area and Abaca Yield



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September 7, 2020

MEMORANDUM: No. 150

TO : **THE DEPUTY EXECUTIVE DIRECTOR**
THE REGIONAL DIRECTORS/HEADS
THE DIVISION CHIEFS/HEADS

FROM : **THE EXECUTIVE DIRECTOR**

SUBJECT : **ADOPTION OF THE LOGICAL BASIS AND FORMULA FOR THE COMPUTATION OF TOTAL ABACA EFFECTIVE PRODUCTIVE AREA AND ABACA YIELD**

As per agreement during the Virtual Abaca Roadmap Review that was held on September 3-4, 2020, all concerned are hereby enjoined to adopt the logical basis for the computation of the Fibercrop Effective Productive Area (FEPA) for all fibercrops as follows:

FEPA x OFP = [TFA-(EA+RA+ADM+UPFA+Others)] x EFP, or

FEPA = [TFA-(EA+RA+ADM+UPFA+Others)] x EFP/OFP

Whereby:
FEPA – is the Fibercrop Effective Productive Area, of the optimum density and ready for harvest;
OFP – is the Optimum Fibercrop Population (hills/mats of Abaca) determined from experience, in-depth study considering the growing environment/climatic factors, the best economic return, among others;
TFA – Total Fibercrop Area, whether fully planted or not, that was based on the farm owners' Land Title, Tax declaration, or Actual Fibercrop Area Survey;
EA – Newly Opened Expansion Unproductive Areas in the last years;
RA – Rehabilitated Unproductive Areas in the last years with overmatured/diseased/ abandoned crops, adverse weather damaged, among others;
ADM – Rendered unproductive Areas by the Disease Management Project up to the current year;
UPFA – Unharvested Productive Fibercrop Areas by the farmers; and
EFP – Existing Fibercrop Population (hills/mats of Abaca) ready for harvest.

Abaca Effective Productive Area (AEPA) and *Yield*

For Abaca Effective Productive Area:

AEPA = [TAA - (EA + RA + ADM + UPFA)] x EFP/OFP

Where:

AEPA = Abaca Effective Productive Area in hectare;
OFP = 1,600 Abaca mats/hills per hectare

TAA = Total Areas planted to Abaca in hectare
EA = Abaca Expansion Area or Newly opened area in the last 2 years in hectare
RA = Abaca Area Rehabilitated (overmatured, diseased, abandoned, typhoon/drought damaged and unproductive plants) in the last 2 years in hectare
ADM = Unproductive Area after ADMP in the last 2 years in hectare
EFP = *Regional Directors unanimously agreed that 1,000 abaca mats/hills per hectare are the existing productive population*

Based on the available data on 2019 & 2018
Given:

TAA = 155,455 hectares in 2019
EA = 1,460 hectares in 2019; and 1,783 hectares in 2018 = 3,243 has
RA = 919 hectares in 2019; and 1,076 hectares in 2018 = 1,995 has
ADM = 5,294 hectares in 2019; and 5,207 hectares in 2018 = 10,501 has
UFPA = 0, unknown
EFP = 1,000 mats/ha
OFP = 1,600 mats/ha

Computation:

AEPA = [TAA - (EA + RA + ADM+ UFPA)] x EFP/OFP
= [155,455 – (3,243 + 1,995 + 10,501)] x 1000/1600
= (155,455 – 15,739) x 62.5%
= (139,716) x 62.5%
= 87,323.50 hectares

The formula to determine the Yield:

AY = AFP / AEPA

Where:

AY = Annual Yield in kilogram per hectare
AFP = Annual Fiber Production in kilogram
AEPA = Total Abaca Effective Productive Area in hectare

The Annual Yield in 2019 shall be:
Given:

Fiber Production = 69,828,800 kg in 2019
TAPA = 87,323.5 hectares in 2019

Computation:

AY = AFP / AEPA
= 69,828,800 / 87,323.5
= 799.66 kg/ha say ~ 800kg/ha

The regional offices shall submit the report directly to the Technical Assistance Division for data consolidation and evaluation.

Further, the prescribed formula shall be used starting immediately and effective until the result of the National Fibercrop Survey and Mapping Project (NFSMP) had been published.

For strict compliance.

KENNEDY L. COSTALES
Executive Director

Annex 16. Virus Diseases in Abaca*

BUNCHY TOP VIRUSES IN ABACA

Bunchy-top disease (BTD) is caused by viruses known as *Abaca bunchy top virus* (ABTV) and *Banana bunchy top virus* (BBTV). The disease is widespread in abaca-growing areas and considered the most economically important in the Philippines (Raymundo, 2000; Raymundo et al., 2001). ABTV and BBTV belong to the genus Babuvirus, family Nanoviridae (Sharman et al., 2008; Vetten et al., 2012). Both viruses are transmitted by an aphid vector known as *Pentalonia nigronervosa* Coq. or the brown aphids through a persistent, non-propagative manner and through vegetative plant material (Dale, 1987; Kumar et al., 2015). Infected plants exhibit 'bunched top' appearance, rosetting and stunting, narrowing, and yellowing of the leaves, browning of leaf blades and appearance of hooks patterns in the leaf lamina (Galvez et. al. 2019) resulting to poor fiber quality and significant fiber yield loss (Ocfemia, 1930; Ocfemia and Buhay, 1934). Both symptoms and manner of transmission of the causative viral agent of abaca BTD are very similar to those of banana BTD in banana (Ocfemia, 1931). Although bunchy top in abaca was first reported in the Philippines in 1910 (Ocfemia, 1926), the first record of BBTD in banana in the Philippines was not until 1960 (Castillo and Martinez, 1961). In 2017, both diseases were reported to be infecting abaca seeds and seed-derived abaca plants suggesting possible vertical transmission of bunchy top disease (Galvez, et al., 2017; Barbosa, et al, 2021).

(A) BT-infected abaca plant with severe symptoms
(B) Abaca with Pentalonia nigronervosa Coq

ABTV and BBTV can occur in single or mixed infections in abaca and without showing initial or early symptoms which makes disease control strategies very challenging. Early detection of BTD is critical for selecting virus-free planting materials for mass production, for timely removal of diseased plants and replanting with healthy planting materials to rehabilitate diseased abaca plantations (Chandrasekar et al. 2011, Barbosa et al. 2020, Koh et al., 2020). For this purpose, modern methods such as nucleic acid amplification techniques (NAATs) are employed, which include uniplex PCR and loop-mediated isothermal amplification LAMP (Sharman et al. 2008; Peng et al. 2012; Sta. Cruz et al. 2016; Galvez et al. 2020).

BANANA BRACT MOSAIC DISEASE

Banana brat mosaic disease (BBrMD) is caused by the *Banana brat mosaic virus* (BBrMV). The disease is widespread not only in banana-growing regions but also in abaca-growing areas as well and is considered the most widely occurring disease in abaca plantations (Raymundo et al., 2001). BBrMV was first isolated from bananas in the Philippines in 1979 (Magnaye and Espino, 1990; Thomas et al., 1997) but it was only reported in abaca in 2000 (Sharman et al. 2000). Sequence analysis of the cloned BBrMV CP isolates showed that there is high sequence similarity to BBrMV database sequences belonging to the Philippines and other Southeast Asian countries such as Thailand and Vietnam. Percent identity matrix among the BBrMV CP sequences isolated from abaca showed sequence identity of 95.8-99.9% indicating low sequence variation among the BBrMV isolates infecting abaca (Galvez et al, 2019; Rodoni et al., 1999). Infected crops exhibit the characteristic mosaic symptom on the flower bracts, broad chlorotic leaf stripes, chlorotic spindle-shaped lesions, and mosaic patterns on the leaves. Abaca plants affected by BBrMV also showed reduced plant height and stalk diameter thus resulting in poor fiber yield and quality (Lalusin and Villavicencio, 2015).

BBrMV can be transmitted through non-persistent manner by vectors such as *Aphis gossypii* Glover, *Pentalonia nigronervosa* Coq. and *Rhophalosiphum maidis* Fitch. Moreover, BBrMV can be mechanically transmitted through vegetative planting material including corms, eyebuds, and suckers. In 2020, Selvarajan et al. reported that BBrMV is seed transmitted.

MOSAIC DISEASE IN ABACA

The Mosaic disease in abaca is actually caused by a member strain of the sugarcane mosaic subgroup of the genus Potyvirus, designated as SCMV-Ab (Gambley et al, 2004). In contrast to other members of the subgroup, it has a wider host range and naturally infects *Musa textilis* (Musaceae), *Canna indica* (Cannaceae), and *Maranta arundinaceae* (Marantaceae) and experimentally infects various cultivars of banana (*Musa sp.*), cowpea (*Vigna sinensis* L.), corn (*Zea mays* L.), sugarcane (*Saccharum officinarum* L.), cogon (*Imperata exaltata* Brongn.), and other species in Poaceae (Kent, 1954; Thomas et al, 1997). The virus may be transmitted mechanically and through vegetative propagules, as well as by aphid vectors *A. gossypii*, *R. nympheae*, and *A. maidis*, but interestingly not by the banana aphid P. nigronervosa, in a non-circulative, non-persistent manner. Virus distribution is reported to be limited thus far to the Philippines (Gambley, et al., 2004). SCMV-Ab and BBrMV were confirmed to be serologically different.

Abaca leaves totally infected with SCMV-Ab showing spindle-shaped chlorotic lesions parallel to the veins

Symptoms of SCMV-Ab infected plant include various mosaic patterns, coloured midrib and streaks on petiole, and chlorotic lesions with rusty-red borders. In sugarcane, SCMV was found to alter the structure and pigmentation in chloroplasts, causing depletion in photosynthetic activity, and hence, the display of chlorosis and mosaic symptoms which is similar to its manifestation in abaca. Moreover, SCMV produces proteins that alter the size of the plasmodesmata during sucrose translocation, thus impairing the photo-assimilate trafficking. Fibers derived from infected plants are shorter and weaker, and plants mature longer. The disease cannot be diagnosed by symptoms alone, since sugar cane mosaic disease in abaca (SCMD-Ab) produces similar symptoms (e.g., chlorotic areas with rusty-red borders) as those produced by BBrMV and CMV infections in banana (Thomas and Magnaye, 1996). Recently, high incidence of mixed infections has made

determination of the etiological agents and control of the disease difficult in different regions of the country.

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* *Excerpts from* Galvez, LC, Barbosa CFC, Palacios, MC, Sevilla, RC, Asunto, JC. 2021. *Abaca Pathology Manual.* PhilFIDA-Research Division. Quezon City. *(Under technical review)*.

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