GENDER-RESPONSIVE ECONOMIC ACTIONS
FOR THE TRANSFORMATION OF WOMEN
(GREAT WOMEN) PROJECT
Canadian International Development Agency (CIDA)
Department of Environment and Natural Resources –
Forest Management Bureau (DENR-FMB)
Philippine Commission on Women (PCW)

GREEn Kit

Gender-Responsive ENR Enterprises in the Philippines

UPLAND ECOSYSTEMS

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Quezon City, Philippines
April 2011

Message from the Chairperson of PCW

Women's roles and participation in managing our environment are often overlooked. They are at the forefront of livelihoods that turned into profitable entrepreneurial ventures in many communities. These enterprises make use of natural resources as raw materials—from non-timber forest products, agricultural products, and recyclable waste materials. Often, many other entrepreneurial (or livelihood) opportunities are lost and not maximized because women (and men) do not have knowledge, skills, and technology to develop products from these types of materials that are readily available in many communities.

Under the Gender Responsive Economic Actions for the Transformation of Women (GREAT) Project, the Philippine Commission on Women (PCW), partnered with the Forest Management Bureau of the Department of Environment and Natural Resources (DENR) and agreed to develop this Gender Responsive ENR Enterprises in the Philippines (GREEn) Kit, a "successor" of the sustainable livelihood kit of DENR in the past that have helped introduce income-generating technologies appropriate for upland, urban–lowland, and coastal resources context. The difference is that GREEn is now presenting mainly tried and tested and **gender-sensitive** technologies ready for adoption by the women and men in these communities. This kit is intended to help national and local agencies promote economic empowerment for women within the context of local economic development and good governance.

PCW commends the National Technical Working Group of the Forest Management Bureau for the effort and hard work they provided to complete this kit. Together with DENR-FMB, I would like to thank the Canadian International Development Agency (CIDA) for their untiring support to the GREAT Women Project.

As we work together as partners in the dissemination and implementation of the enterprise technologies from this kit, we look forward to seeing more women realize their dreams of becoming entrepreneurs, earning better incomes and enhancing their capacity to provide for their needs.

Remedios I. Rikken

REMEDIOS I. RIKKEN
Chairperson
Philippine Commission on Women

Message from the Secretary of DENR

No citizen is too poor so as to be disqualified from becoming an investor in the environment. From scavenging and recycling, to eco-tourism, people can earn decent livelihoods while helping reinvigorate our environment.

This kit on Gender Responsive Environment and Natural Resources Enterprises (GREEn) in the Philippines shows how to go about establishing various environmental enterprises, based on real-life models, as a guide to new investors. The kit features 63 ongoing micro- and small enterprises (MSEs) of women and men entrepreneurs. It walks the reader through step-by-step processes, material requirements, marketing considerations, legal bases, and economic analyses. The focus is on enterprise development in the upland, lowland–urban, and coastal ecosystems. These are the ecosystems that are in urgent need of protection and restoration to their former health and productivity. Through this GREEn Kit, we at the DENR hope to popularize the establishment of gender responsive, environmentally sustainable, and economically viable MSEs that will generate jobs, increase incomes, promote preference for green businesses, and enhance economic empowerment among women and men.

For this kit, we thank the Philippine Commission on Women, particularly the Gender Responsive Economic Actions for the Transformation of Women (GREAT Women) Project, which enjoys the support of the Canadian International Development Agency. This kit is in fact an updated version of the DENR's 1997 Sustainable Livelihood Options package.

With this kit, we hope to accelerate the attainment of our Millennium Development Goals, particularly those on poverty reduction, gender equality and women empowerment, and environmental sustainability. This GREEn Kit also supports the six-year National Greening Program (NGP) by featuring mature technologies for livelihood development. The NGP aims to mobilize the citizenry for reforestation, food security, and climate change mitigation. The NGP and the GREEn Kit are among the major activities that the DENR will present at the United Nations Forum on Forests, in connection with the declaration by the UN General Assembly of 2011 as the International Year of Forests with the theme "Forests for People."

To all those who contributed to the production of this GREEn Kit, including the National Technical Working Group of the Forest Management Bureau, my commendations and thanks.

Mabuhay!

RAMON J.P. PAJE
Secretary
Department of Environment and Natural Resources

Foreword

In 1997, in an effort to promote livelihood development in upland, lowland-urban, and coastal ecosystems, the Department of Environment and Natural Resources (DENR) packaged the kit, "Sustainable Livelihood Options for the Philippines." Consolidated mostly by the DENR Research Sector, the said kit promoted greater interests among local communities, women's groups, cooperatives, and associations to commercialize matured technologies and to establish income-generating activities. The kit contained 93 manuscripts on livelihood development, and provided systematic processes on how they could be properly implemented and managed. Expense–income forecasts, marketing considerations, legal bases, supporting agencies/institutions, and information on environmental sustainability were also included.

The technology kit helped encourage livelihood development; however, DENR realized that communities still needed direct financial assistance and technical support before they could engage in the livelihood options. Thus, in 2003, DENR established the Community Livelihood Assistance Program (CLASP) to provide financial support to 103 livelihood projects in the Philippines. Financial assistance ranging PhP20,000 to PhP400,000 was offered for agroforestry establishment, as well as for food processing, eco-tourism, and plantation development. Success stories on CLASP had been documented, including lessons and experiences, which then served as input to policy formulation and program development.

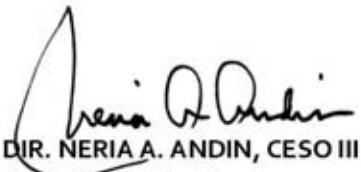
Consistent with the UN Millennium Development Goals (MDGs), DENR initiated programs and projects geared toward "eradication of extreme poverty and hunger" (Goal 1), "promotion of gender equality and empowerment of women" (Goal 3), and "ensuring environmental sustainability" (Goal 7). In 2008, DENR collaborated with the Philippine Commission on Women (PCW) for the Gender Responsive Economic Actions for the Transformation (GREAT) Women Project. One of the sub-projects, "Support to Micro and Small Enterprises: The Community Livelihood Assistance Project" was spearheaded by the Forest Management Bureau (FMB).

The "Gender Responsive Environment and Natural Resources Enterprises (GREEn) in the Philippines," which allowed DENR-FMB to update the technology–livelihood kit published in 1997, presently contains 63 manuscripts on environment and natural resources (ENR)-based enterprises for upland, lowland-urban, and coastal ecosystems. It discusses the actual experiences of women and men of micro- and small enterprises, subsequently offering an overview on how they started, implemented, and sustained their respective businesses. The GREEn Kit also provides information on supporting agencies/organizations, marketing considerations, legal bases, and technical measures to sustain the supply of raw materials required by the enterprise. The business endeavors featured in the GREEn Kit are managed by individual families, cooperatives, and federations; all are environmentally sustainable and gender responsive.

One highlight of the GREEn Kit is the section on Gender Analysis. It presents how the enterprises promote economic empowerment of men and women; it shows how both genders complement their roles at home and in the workplace. The

GREEn Kit also shares information on the time required by women and men to accomplish certain activities in the ENR-based businesses, a clear indication of the enterprises' capacity to continuously enhance the reproductive and productive roles of men and women. In fact, it is quite revealing how these businesses have opened the space for women to contribute to economic development while increasing their competency and confidence, thus promoting self-empowerment.

To the men and women behind the production of this kit, my heartfelt **congratulations**!



DIR. NERIA A. ANDIN, CESO III
OIC, Office of the Director
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Department of Environment and Natural Resources

Introduction

The development of the Gender Responsive Environment and Natural Resources Enterprises (GREEn) Kit has provided the Department of Environment and Natural Resources-Forest Management Bureau (DENR-FMB), through its National Technical Working Group (NTWG), the opportunity to interact with micro- and small entrepreneurs—both women and men owners/workers—engaged in environment and natural resource (ENR)-based enterprise development. The NTWG coordinated the various activities of the sub-project, "Support to Micro and Small Enterprises: The Community Livelihood Assistance Project," in collaboration with the Philippine Commission on Women (PCW).

KIT PRODUCTION

Producing the GREEn Kit involved the following: (1) inventory and short-listing of existing micro- and small enterprises in three major ecosystems (upland, lowland-urban, and coastal); (2) the conduct of two national workshops and follow-up discussion meetings; (3) field validation, and (4) review sessions. Through these participatory processes, a hefty amount of insights and ideas from the entrepreneurs, authors, and the NTWG were generated, thereby enriching the content of the kit.

Inventory of ENR-based enterprises: The start-up activity involved reviewing initial reports; enumerating ongoing enterprises in upland, lowland–urban, and coastal ecosystems owned or managed by cooperatives, community associations, women's groups, federations, and other individuals/families; and instructing DENR Regional Offices to submit their recommended list of enterprises for inclusion into the kit. Initially, about 90 livelihoods/enterprises were identified, most of which are projects funded through the Community Livelihood Assistance Program (CLASP). The inclusion criteria were as follows: the enterprise must have existed for at least two years, contributes to environmental management, and is ENR-based and gender responsive.

Short-listing the manuscripts: Based on the lists submitted by the different Regional Offices, the NTWG shortlisted the initial list in consideration of availability of authors. Ultimately, 63 of the initially targeted 90 ENR-based enterprises were identified, which is distributed accordingly as follows: 29 for upland, 27 for lowland–urban, and 7 coastal ecosystems. Most of the authors of the shortlisted manuscripts are DENR personnel of the Ecosystem Research and Development Sector or staff of the Community-based Forest Management Program in the field offices; a few of the authors belong to the academe. As for Region 9, the documentation and writing were initiated by FMB staff while the field staff served as resource persons.

National workshops: In 2010, the Chairperson of the DENR Gender and Development (GAD) Focal Point System issued a Special Order to conduct two national workshops—one in Lucban, Quezon and the other in Tagbilaran City, Bohol. The authors presented a brief profile of the product or services, materials and equipment, methods of production, economic analysis, ecological implications, laws and restrictions, and corresponding gender responsiveness of the ENR-based enterprise.

Some members of the NTWG and GAD focal persons of the Ecosystems Research and Development Bureau, Environmental Management Bureau, Mines and Geosciences Bureau, Land Management Bureau, and Protected Area and Wildlife Management Bureau served as resource persons. They provided suggestions and recommendations on how to improve the manuscripts. They also suggested the need to simplify terminologies, clarify some procedures, and provide pictures if the equipment used and processes are uncommon.

Field validation: Given the number of targeted manuscripts and location scope/coverage, the NTWG encountered some difficulty in consolidating the revised manuscripts in accordance with the agreed upon schedule/deadline. To address this concern, fieldwork activities were conducted not only to assist the authors rewrite the draft manuscripts, but also to ascertain the existence of the enterprise and to update some data, particularly on pricing. Of the 13 participating regional offices, four manuscripts each for Regions 9 and 13 were documented/revised by the NTWG.

Review workshops and meetings: Series of workshops and meetings were conducted to review and refine the draft manuscripts. These meetings likewise served as venues to present the edited manuscripts (e.g., content consistency), show the layout studies, and even to refine the titles of the enterprises. Editors and layout artists were sought for this purpose.

STRUCTURE OF THE KIT

The GREEn Kit is divided into two volumes, upland ecosystem and lowland–urban and coastal ecosystems. The manuscripts are arranged alphabetically and by region. Depending on the ecosystem that is of interest to the reader, the volume provides brief information about the enterprise, methods of production (including materials and equipment), cost and expected returns, economic benefits, ecological implications, laws and restrictions, and tips for consideration.

An important section of the GREEn Kit is the segment, Gender Analysis. It highlights the role complementation of men and women in every aspect of the business activity, including time spent (i.e., labor hours) for each. Under this segment, hefty reminders on health and safety requirements are also presented.

USERS OF THE KIT

The GREEn Kit can be used as a reference material on the implementation of ENR-based enterprises (i.e., micro- and small) for upland, lowland–urban, and coastal ecosystems. DENR-FMB hopes to generate greater interest on ENR-based enterprise development among the following: (1) men and women individuals who subsist primarily from natural resources; (2) cooperatives, associations, and local communities in upland, lowland–urban, and coastal ecosystems; (3) local government units (LGUs); (4) non-government organizations (NGOs); and (5) the private sector.

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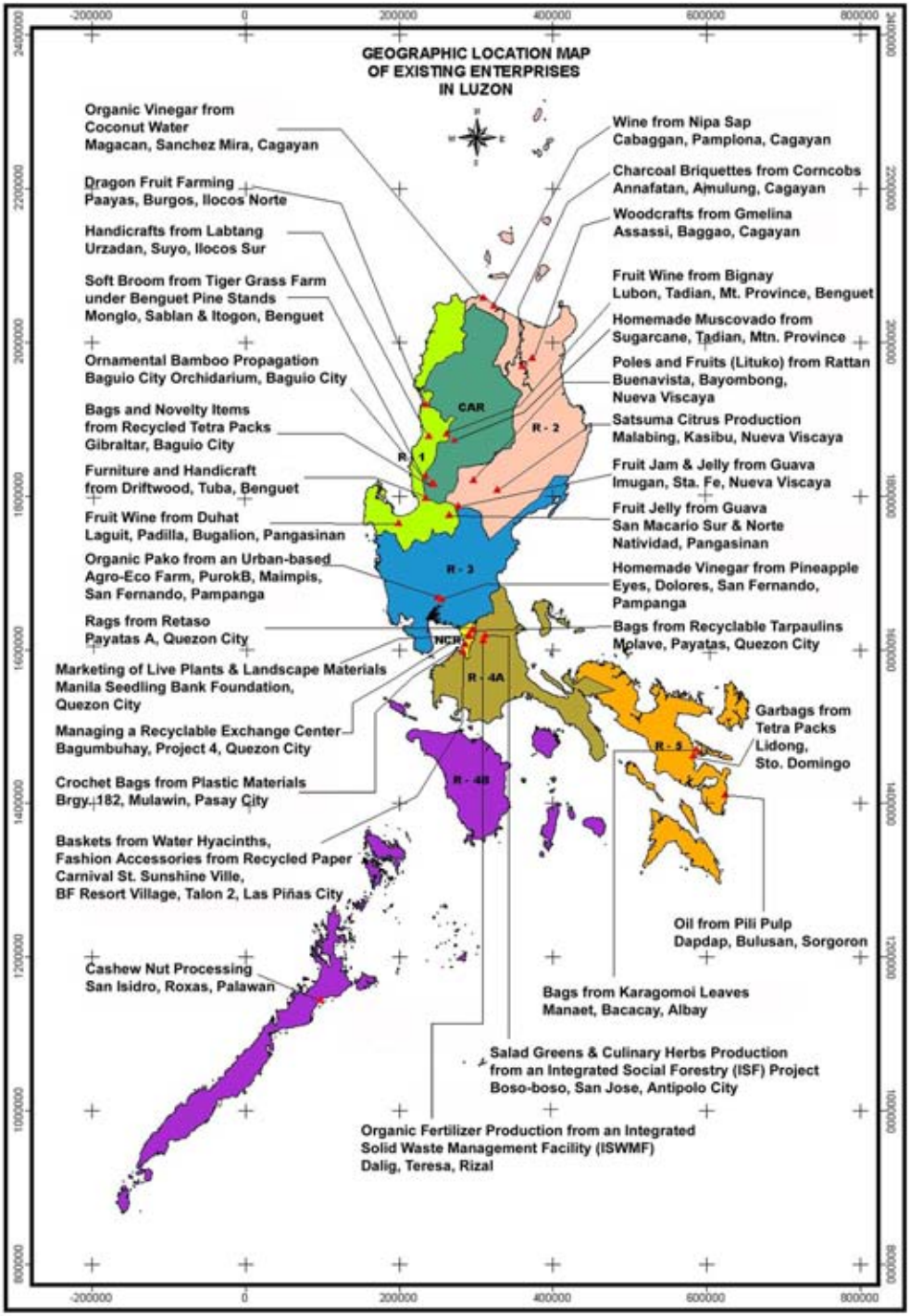
Acronyms & Abbreviations

AO – Administrative Order
BFAD – Bureau of Food and Drugs
BFAR – Bureau of Fisheries and Aquatic Resources
BIR – Bureau of Internal Revenue
BSWM – Bureau of Soils and Water Management
CADC – Certificate of Ancestral Domain Claim
CAR – Cordillera Administrative Region
CARP – Comprehensive Agrarian Reform Program
CBFMA – Community-Based Forest Management Agreement
CENRO – Community Environmental and Natural Resources Office
CEP – Coastal Environment Project
CHED – Commission on Higher Education
CLASP – Community Livelihood Assistance Special Program
CMMD – Coastal and Marine Management Division
CRMF – Community Resources Management Framework
CSC – Certificate of Stewardship Contract
CSD – comprehensive site development
DA – Department of Agriculture
DAO – Department Administrative Order
DAR – Department of Agrarian Reform
DARPO – Department of Agrarian Reform Provincial Office
DENR – Department of Environment and Natural Resources
DOH – Department of Health
DOLE – Department of Labor and Employment
DOST – Department of Science and Technology
DOT – Department of Tourism
DSWD – Department of Social Welfare and Development
DTI – Department of Trade and Industry
ECC – Environment Clearance Certificate
EO – Executive Order
EMB – Environmental Management Bureau
ERDB – Ecosystems Research and Development Bureau
ERDS – Ecosystem Research Development Services

FMS – Forest Management Service
FPIC – free prior and informed consent
FPRDI – Forest Products Research and Development Institute
GAD – gender and development
GHG – greenhouse gas
GMP – good manufacturing practice
IEC – information, education, and communication
ILARRDEC – Ilocos Agriculture and Resources Research and Development Consortium
IPM – integrated pest management
ISF – integrated social forestry
ISWMF – integrated solid waste management facility
LGU – local government unit
MMDA – Metro Manila Development Authority
MRF – material recovery facility
MSBFI – Manila Seedling Bank Foundation, Inc.
NCC – non-compliance coverage
NCR – National Capital Region
NIPAS – National Integrated and Protected Area System
NGO – non-governmental organization
NSWMC – National Solid Waste Management Commission
NZAP – New Zealand Aid Program
OTOP – One Town, One Product
PAMB – Protected Area Management Board
PCARRD – Philippine Council for Agriculture and Resources Research and Development
PD – Presidential Decree
PDDCP – Product Design and Development Center of the Philippines
PENRO – Provincial Environment and Natural Resources Office
PFA – Pesticide and Fertilizer Authority
PO – people's organization
ROI – return of investment
SEA – Self-Employment Assistance
SRA – Sugar Regulatory Administration
TESDA – Technical Education and Skills Development Authority
UDP – Upland Development Program


GEOGRAPHIC LOCATION MAP
OF EXISTING ENTERPRISES
IN LUZON
Organic Vinegar from
Coconut Water
Magacan, Sanchez Mira, Cagayan
Dragon Fruit Farming
Paayas, Burgos, Ilocos Norte
Handicrafts from Labtang
Urzadan, Suyo, Ilocos Sur
Soft Broom from Tiger Grass Farm
under Benguet Pine Stands
Monglo, Sablan & Itogon, Benguet
Ornamental Bamboo Propagation
Baguio City Orchidarium, Baguio City
Bags and Novelty Items
from Recycled Tetra Packs
Gibraltar, Baguio City
Furniture and Handicraft
from Driftwood, Tuba, Benguet
Fruit Wine from Duhat
Laguit, Padilla, Bugalion, Pangasinan
Organic Pako from an Urban-based
Agro-Eco Farm, PurokB, Maimpis,
San Fernando, Pampanga
Rags from Retaso
Payatas A, Quezon City
Marketing of Live Plants & Landscape Materials
Manila Seedling Bank Foundation,
Quezon City
Managing a Recyclable Exchange Center
Bagumbuhay, Project 4, Quezon City
Crochet Bags from Plastic Materials
Brgy. 182, Mulawin, Pasay City
Baskets from Water Hyacinths,
Fashion Accessories from Recycled Paper
Carnival St. Sunshine Ville,
BF Resort Village, Talon 2, Las Piñas City
Cashew Nut Processing
San Isidro, Roxas, Palawan
Wine from Nipa Sap
Cabaggan, Pamplona, Cagayan
Charcoal Briquettes from Corncobs
Annafatan, Amulung, Cagayan
Woodcrafts from Gmelina
Assassi, Baggao, Cagayan
Fruit Wine from Bignay
Lubon, Tadian, Mt. Province, Benguet
Homemade Muscovado from
Sugarcane, Tadian, Mtn. Province
Poles and Fruits (Lituko) from Rattan
Buenavista, Bayombong,
Nueva Viscaya
Satsuma Citrus Production
Malabing, Kasibu, Nueva Viscaya
Fruit Jam & Jelly from Guava
Imugan, Sta. Fe, Nueva Viscaya
Fruit Jelly from Guava
San Macario Sur & Norte
Natividad, Pangasinan
Homemade Vinegar from Pineapple
Eyes, Dolores, San Fernando,
Pampanga
Bags from Recyclable Tarpaulins
Molave, Payatas, Quezon City
Garbags from
Tetra Packs
Lidong,
Sto. Domingo
Oil from Pili Pulp
Dapdap, Bulusan, Sorgoron
Bags from Karagomoi Leaves
Manaet, Bacacay, Albay
Salad Greens & Culinary Herbs Production
from an Integrated Social Forestry (ISF) Project
Boso-boso, San Jose, Antipolo City
Organic Fertilizer Production from an Integrated
Solid Waste Management Facility (ISWMF)
Dalig, Teresa, Rizal
CAR
R - 1
R - 2
R - 3
NCR
R - 4A
R - 4B
R - 5
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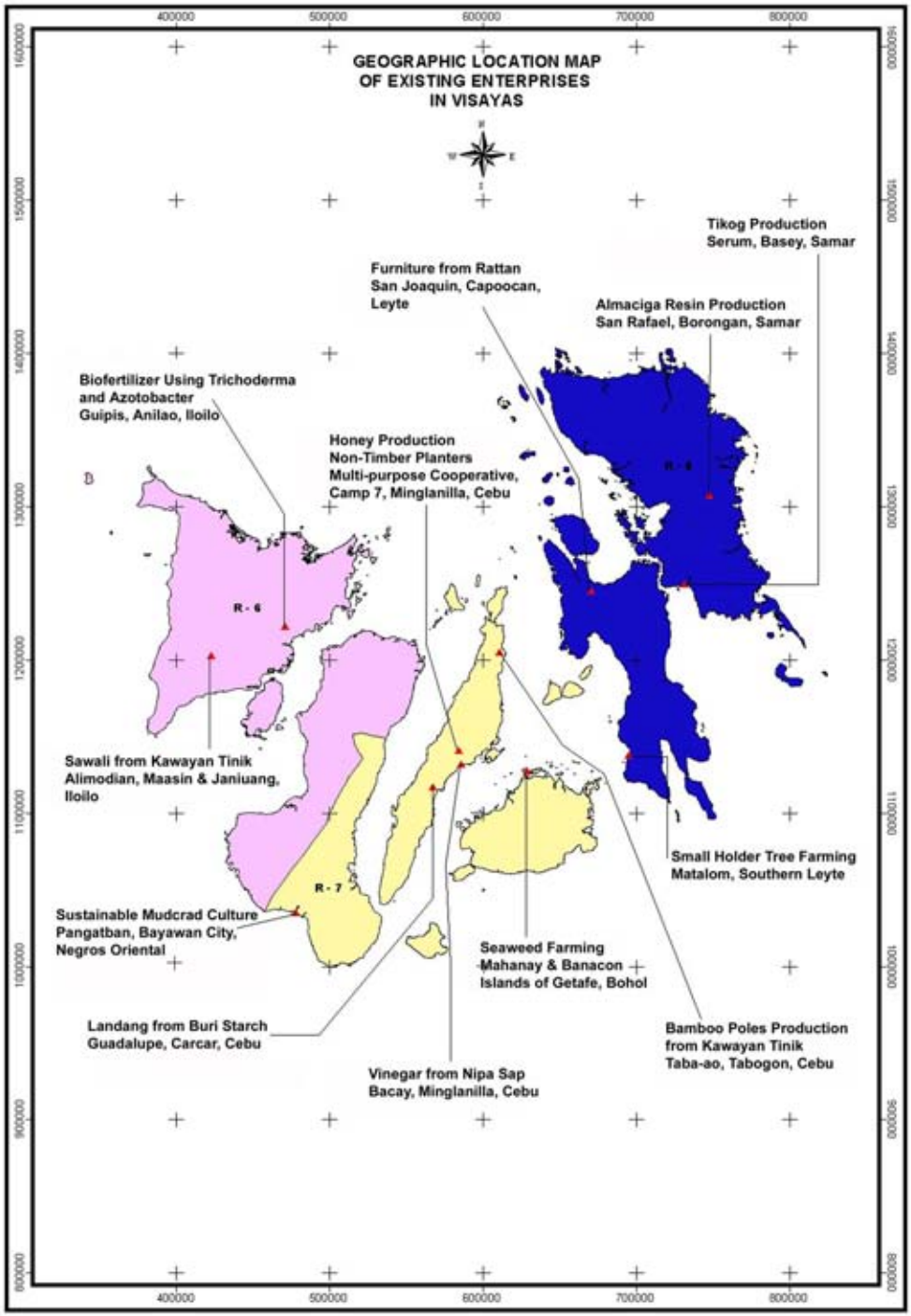
GEOGRAPHIC LOCATION MAP
OF EXISTING ENTERPRISES
IN VISAYAS
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Serum, Basey, Samar
Furniture from Rattan
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Leyte
Almaciga Resin Production
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Biofertilizer Using Trichoderma
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Small Holder Tree Farming
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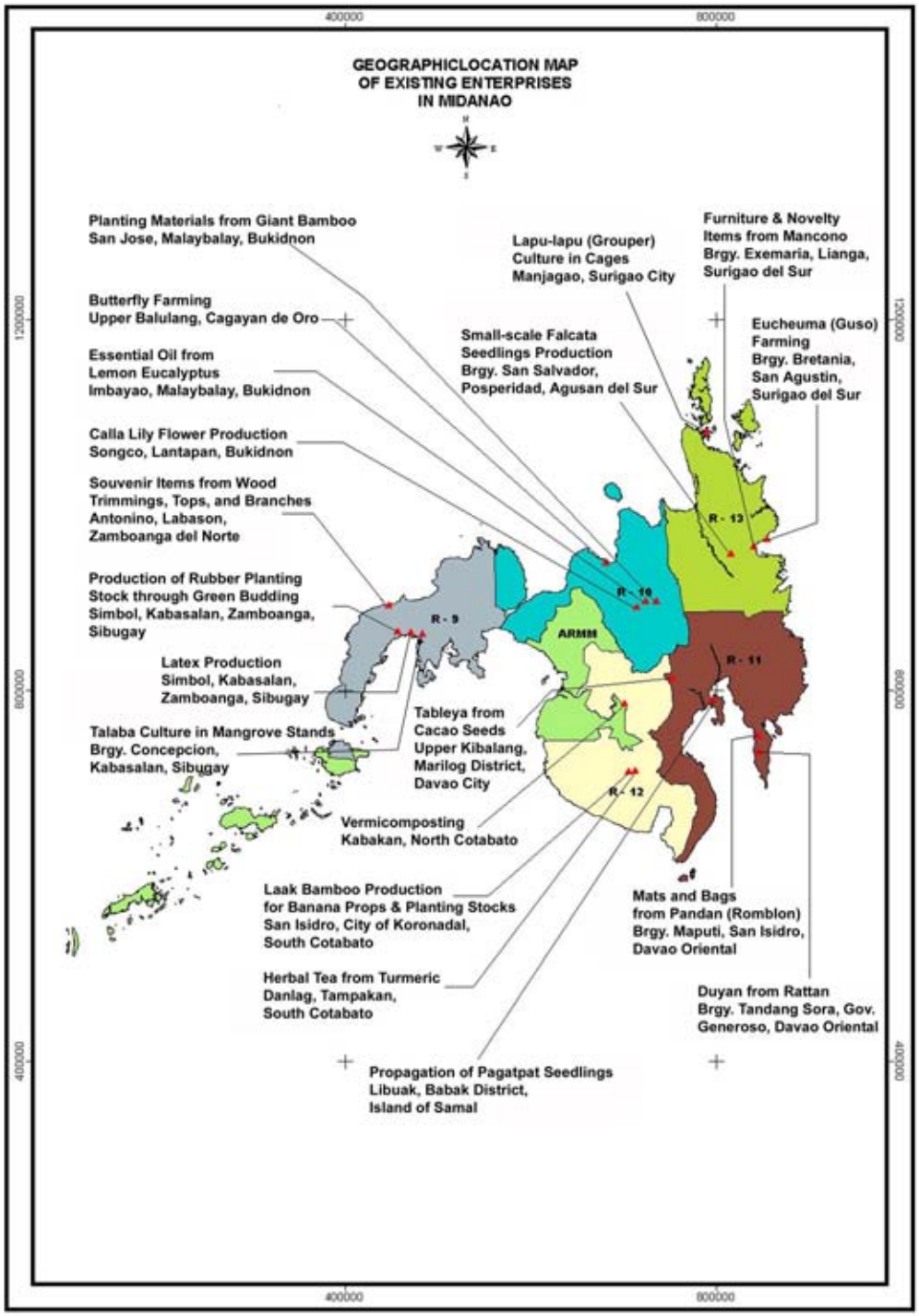
Bamboo Poles Production
from Kawayan Tinik
Taba-ao, Tabogon, Cebu
Vinegar from Nipa Sap
Bacay, Minglanilla, Cebu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GEOGRAPHICLOCATION MAP
OF EXISTING ENTERPRISES
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Butterfly Farming
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Souvenir Items from Wood
Trimmings, Tops, and Branches
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Laak Bamboo Production
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800000
400000

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FRUIT WINE FROM BIGNAY

Entrepreneurs and Location: Mrs. Rosita Ay-ayek (Lubon in Tadian, Mt. Province) and
Mrs. Maria Que (Longlong, Puguis in La Trinidad, Benguet)
Authors: Helen A. Maddumba and Elizabeth B. Antolin

Bignay (*Antidesma bunius*) is a species of fruit tree in the spurge family. It is popularly called "bignay" by Ilocanos, Kalingas, and Kankanaeys, and "bugney" by Kiangans of Ifugao. Bignay trees are commonly found in thickets and open slopes. Bignay are known for their red, sour, void single-seeded fruits. The white pulp of bignay has a colorless juice. Fruits are medicinal; a decoction prepared from leaves or fruits promote perspiration and can lower one's fever. Ripe fruits can also assist in poor appetite and indigestion. Fruits are also used for seasoning fish or meat. Moreover, they can be processed into jelly, vinegar, and wine.

Producing wine from bignay is one of the fastest growing cottage industries in the Cordillera, particularly in Benguet, Kalinga, Mt. Province, and Baguio City. Accordingly, wine is an integral part in the lives of the locals as this can combat the region's cool climate. Moreover, as an enterprise, it holds a very promising position in the global market. Data from Department of Science and Technology (DOST) has shown that the global alcoholic drinks market for beer, cider, flavored and alcoholic beverage, and spirits and wines have generated total revenues of US$812.4 billion in 2006 and is expected to hit US$903.5 billion in 2011. Bignay wine is classified as red wine.

METHODS OF PRODUCTION

Materials

1 part ripe bignay fruits
1 part water
Brown sugar
Dry active yeast
Wooden spoon
Utility bowl
Measuring cup
Kettle
Plastic bottles (for juice preparation and fermentation)
Lean glass bottles (for pasteurization)
Sealer

Use distilled or filtered water for better quality wine.

Procedure

Step 1. Juice preparation

- Sort, weigh, and wash fruits. Boil these with equal amount of water to obtain extract.
- Strain and measure extract. For every 4 cups (approx. 1 quart) of extract, add ¾ cup brown sugar.
- Heat to boil for a few minutes.
- Allow to cool then cover.

Step 2. Juice fermentation

- For every 4 cups of extract, add ¼ teaspoon of dry active yeast. Rehydrate yeast as per package instructions, as this can give better results.
- Place the juice in plastic bottles. Set aside for about 2 weeks to complete fermentation.

Step 3. Wine pasteurization

- Store and allow sediments to settle.
- Decant or separate clear wine and heat to 50° C to kill undesirable organisms.
- Do not put the wine in bottles if the liquid is not clear (i.e., there should be no cloudiness or haze); if such is the case, wait another week. To check for clarity, siphon a small amount of wine into a glass.
- Transfer the liquid into wine-type glass bottles.
- Seal and allow to age for at least 8 months. In big-scale preparation, ageing should be at least 9 months. Ageing results to better quality wines.

Fermentation and siphoning of the clear liquid part of the wine

Observe proper sanitation during processing. If not properly done, the wine will likely spoil.

GENDER ANALYSIS

In Cordillera culture, men are more knowledgeable on trees and their propagation while women are more familiar with the different uses of medicinal plants. In the complementation of tasks in the bignay wine enterprise, women are the main doers of most activities whereas men help in fruit gathering and in the delivery of finished products to far-off markets. Interestingly, more men have engaged in packaging having learned these from the women. Young women can also be trained in food processing and preparation. Hairnets, masks, and gloves should be worn as part of good manufacturing practices (GMP).

Women entrepreneurs in Lubon (Tadian, Mt. Province), Longlong (La Trinidad, Benguet), and Loakan (Baguio City) make bignay wines in their own house and usually during their free time. The high income derived from producing bignay wines is the foremost factor that motivates women to engage in this type of enterprise. In addition, the technology is easy to follow and non-laborious, and women can do other household chores in the process; in fact, prior the enterprise establishment, producing local wines is considered a household activity. Consequently, women entrepreneurs become even more productive, allowing them to earn more for living.

Bignay fruits are gathered from July to October, the months when they become fully ripe. Wine processing is done simultaneously, as the fruits cannot be stored for long periods. Women devote most of their time in the enterprise during these months. However, they have idle time during the fermentation period (4–6 months), allowing them to do other work or income-generating activities.

ECONOMIC BENEFITS

Items	Value (in pesos)	Total value (in pesos)
Average revenue 25-(750 ml) bottles of bugnay wine @ P100/bot		2,500
Production cost wooden spoon bottles (25) measuring cup utility bowl big bottle bugnay fruits (5kg) brown sugar (3.75 kg) dry active yeast (1.25 tsp)	 10 125 20 50 50 100 150 10	515
Net income Revenue Less production cost	 2,500 515	1,985
Return on Investment Net income/production cost		3.85 or 385%

MARKETING STRATEGIES

Drinking wine is a long-standing culture of the Cordillera people. Wine preference however is on homemade wine, especially on native fruits. The locals, especially the elderly, drink wine to combat the cool climate of the region. These make the product highly marketable in the locality. There is also big demand for native fruit wines among local visitors and foreigners.

One of the interviewed entrepreneurs converted a part of her house to a store, given that her home is situated along a busy road. The products branded as "Kayong" and "Jason's" are widely distributed in stalls in Baguio City and La Trinidad, Benguet. The products are also sold in hotels and stores in Camp John Hay and other restaurants in the region. Packaging is not a major problem for entrepreneurs. Producers can easily design unique packages to promote their own products.

Bignay wine production utilizes common materials that are found readily in any household. It also involves minimal processing. A kilo of ripe bignay berries, which costs PhP20.00/kg, can produce five 750 mL wine bottles that sells at PhP100–120 each. The simple technology involved in bignay winemaking can be applied to other fruits. The enterprise can be learned easily; by merely watching others, one can apply the process. It can also be improved as new tastes are discovered through time.

ECOLOGICAL IMPLICATIONS

Making bignay wine encourages the production or planting of more fruit trees. Existing stands are also conserved, protected, and enhanced. To ensure continuous sources of fruits, entrepreneurs are encouraged to propagate the species by reforesting forests and upland farms.

There is not much waste generated in processing bignay into wine. Pulps and seeds can serve as planting stocks or feeds for pigs; if not, they can decompose easily.

As a form of waste management, separate fruit pulp from seeds. Then, air-dry the seeds and use these as planting stocks or feeds.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Agriculture (DA): Training
- Local Government of Tadian: Product promotion
- Department of Environment and Natural Resources (DENR): Product promotion and technology provision for tree propagation
- Department of Trade and Industry (DTI): Technical assistance in product registration
- DOST: Training; technical assistance (i.e., provision of materials) on Bureau of Food and Drugs (BFAD) registration

LAWS AND RESTRICTIONS

- Gathering of minor forest products is prohibited under Presidential Decree No. 705 (Forestry Reform Code). However, inasmuch as gathering of forest fruits is not specified, the gatherer should coordinate with the proper authority (e.g., LGUs) to avoid any breach in protocol.
- The product is BFAD-registered as BFAD-LTO-RDII-CAR-F-176.

HOMEMADE MUSCOVADO FROM SUGARCANE

Location: Bgy. Masla, Tadian, Mt. Province
Entrepreneur: Lubon-Masla People's Organization
Author: Ma. Trinivic Silang

Muscovado sugar is the pure, moist, brown, and unrefined sugar that retains all the natural minerals of sugarcane. It is primarily classified as a healthier sweetener and is used in gourmet coffee and native delicacies like rice cakes, candies, and cocktails.

Lubon-Masla People's Organization manages a local enterprise on homemade muscovado. The vision of the people's organization (PO) is to be the major supplier of muscovado and other related sugarcane by-products not only in the municipality, but also throughout Mt. Province. Prior engaging in this enterprise, brown sugar and muscovado were supplied from Baguio City, incurring very high transportation costs. The local muscovado enterprise has directly benefitted the local producers and the immediate community (consumers) because they can now buy the product at a cheaper price. Moreover, muscovado production has not only fulfilled the sugar needs of households, it has also improved the community's economic status.

METHODS OF PRODUCTION

Part A. Establishment of sugarcane plantation

Step 1. Gather canepoints (planting stocks), also known locally as "salog," during sugarcane harvest. Ensure that each salog has 1–2 buds.
Step 2. Prepare 0.75 ×0.75 m spacing when setting up the plantation; this can cover about 18,000 planting stocks per hectare.

Part B. Processing

Step 3. Harvest the sugarcanes when they reach their peak maturation, which can be determined by (a) sugarcane size and (b) presence of uncovered sugarcane (i.e., about ¾ of the leaves are dry, yellowish, and/or have fallen to the ground).
Step 4. Bring the cut sugarcanes to the mill at the same day they have been cut.

Tip Cane variety and maturity, soil condition, and amount of organic fertilizers are the most important agronomic factors affecting the quality of muscovado sugar. At its peak maturation, sugarcanes achieve their maximum content of sucrose and minimum simple sugar.

Step 5. To extract the juice, wash the cut sugarcanes and pass them through rollers. The fibrous by-product called "bagasse" can be used as fuel in cooking the juice.

Tip The main objective of milling is to extract juice from the sugarcane. The sugar mill shed of the Lubon-Masla People's Organization was constructed in a **500x500** sq. m. area, which houses one set of sugar mill machine and cooking area, and even the PO's office and display/market center.

Step 6. Filter by passing the juice through a 07 mesh to remove impurities. Ensure that the sugarcane juice has a pH of around 5.7 (normal); if below this value, correct the acidity to avoid excessive darkening of the finished product. Do this by adding lime milk to the sugarcane juice at 5–6 tablespoons for 10 oilcans (17 kg capacity); alternatively, add 1 kg lime per ton of sugarcane.

Step 7. Set the cooking temperature to 105–120° C. Stir the juice continuously. Continue cooking until the reference point is achieved, which can be checked by pouring a small portion of the mass in a container with cold water, and then with stirring, the mass would eventually thicken.

Filtering to cooking

Tip At the onset of heating, foams containing impurities (e.g., gums, greases, and waxes) are formed. Together with pectic acids and some nitrogenous substances, these will form the "organic" solid of the juice (non-sugar).

Step 8. Cooling: After obtaining the reference point, remove immediately the thick mass from the boiler before it becomes hard and brittle (i.e., it disintegrates when placed in solid surface). Put the mass in a cooling porringer. Beat the mass (agitate) in all directions using wood or metal shovels until it cools.

Step 9. Packaging and storage: Sieve the sugar in a 10 mesh to achieve consistency in crystal size. Store the sugar in a dry ventilated area and cover with plastic to prevent the product from getting moist. Moisture is the main deteriorating factor of sugar.

GENDER ANALYSIS

There is complementation in the workload of men and women, may this be in gathering planting stocks, plantation establishment, harvesting, milling, filtering, cooking, and packaging. Muscovado production is non-laborious. However, pregnant women may find it difficult to implement the more laborious aspect of the enterprise (e.g., stock gathering, plantation establishment, harvesting, and milling), especially since some production sites in Bgy. Masla are located in hilly terrains.

Harvesting sugarcane can be done any time of the year depending on the volume of matured sugarcanes (i.e., 2–3 batches of production per cooking). However, production is usually done only twice a year due to the limited number of raw materials. During such time, women can engage in other activities, such as in their family farm and households. One of the key strength of the enterprise is its promotion of partnership with other organizations in terms of cost sharing. The enterprise has trained farmers, men and women alike, on entrepreneurship. The women who are mostly in charge of marketing spend additional time and effort in transporting their products from their production site in Bgy. Masla, which is about 3–5 hours away from the nearest markets and Baguio City. However, they gain satisfaction when they are in control of the financial aspect of the enterprise.

ECONOMIC BENEFITS

Cost and Return Analysis: One (1) hectare plantation

Gross Income	
Gross Income from Produce (133 vat of brown sugar produced @P700/vat)	₱ 93,100.00
Production Cost	
1. Labor for planting	₱ 8,333.00
2. Cost of Planting material (18,000 @ P1.00 each)	18,000.00
3. Labor for planting (50 persons for P190/day for 1 day)	9,500.00
4. Cost for pest & disease	1,000.00
Total Cost	**₱ 36,833.00**
Processing Cost	
1. Labor in harvesting (50 person for P190/day for 1 day)	9,500.00
2. Processing (6 persons for P190 for 1 day)	1,140.00
Total Cost	**₱ 10,640.00**
Grand Total (Production/Processing Cost)	**₱ 47,413.00**
Net Return Income less Production Cost)	₱ 45,627.00
Return on Investment	₱ 45,627.00/ 47,413.00 or 0.962 or 96.2%

MARKETING STRATEGIES

Muscovado sugar has been positioned as an "affordable organic sugar for a healthier life." Interestingly, organic food items are perceived as more beneficial to one's health. Packaged as an organic product, muscovado can then be offered at a high price, but still affordable to consumers.

Sugarcane farming is a technically and economically feasible endeavor. It does not require much chemical input and labor, thus allowing entrepreneurs to engage in other forms of livelihood. In effect, muscovado can be priced lower than its competitor products. Cooking, cooling, and packaging can also be done simultaneously under one roof/infrastructure.

The PO also delivers its homemade muscovado to groceries, supermarkets, restaurants, and coffee shops in some municipalities and provinces like Baguio City for a higher price. Apart from the external market, members of the locality (community and municipality) purchase the products at a lower cost.

ECOLOGICAL IMPLICATIONS

Muscovado production is a chemical-free production. Given that organic fertilizers are used to grow sugarcanes for muscovado sugar, the enterprise have helped lessen the acidity of the soil, thereby increasing productivity and eventual earnings. This type of enterprise is fit for communities affected by declining water resources, which brings heavy toll in the daily activities of women. It also allows the rejuvenation of the environment. In fact, resource protection and development has significantly changed the lifestyle of the community members of Bgy. Masla.

The enterprise also promotes conservation, enhancement, and wise utilization of land resources; soil erosion is also minimized. Even if much by-product (bagasse) is generated in the processing of sugarcane, this can be used in cooking the sugarcane juice. Bagasse can also be regenerated as a new product in hand papermaking industry.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Issuance of Community-Based Forest Management Agreements (CBFMAs) and provides technical assistance in the farm and production aspect.
- Department of Agriculture (DA): Technical assistance in agricultural production
- Local government unit (LGU): Technical and financial production support

The Philippine Development Assistance Programme, Inc. (PDAP) has assisted a number of POs bring down the cost of muscovado for farmers (who also wish to acquire organic certification), thus allowing local entrepreneurs to access foreign markets more easily.

ORNAMENTAL BAMBOO PROPAGATION

Location: Baguio City
Entrepreneurs: Mrs. Conie Garcia and Mrs. Lolita Tiongco of the Orchidarium Association of Baguio City
Author: Fatima T. Tangan

Bamboo has become a significant feature in landscape planning. It can be used as ground cover, live fence, hedge, and indoor plant. The demand for bamboo as a landscape material in parks and as a potted ornamental plant indoor is currently a popular trend among many urban households.

Propagating ornamental bamboos is an acknowledged enterprise in the Cordillera, especially at the Baguio City Orchidarium. Small- to medium-scale nurseries consider this enterprise simple and easy to follow. It benefits mostly women because of ease in production and cultivation. Common tools are used in collecting and propagating bamboos, and only small production areas are needed (e.g., backyards). Overall, the propagator-entrepreneur requires minimal capital.

This technology used by this type of enterprise is replicable in other regions, considering the availability of bamboo varieties that can grow both in lowland and upland areas.

METHODS OF PRODUCTION

Materials

6×8-inch polyethylene bags
Planting stocks
Soil and water
Fertilizer (optional)
Insecticide (optional)

Procedure (Bamboo Offset)

Step 1. Separate 3–5 culms from a vigorous clump. Preferably, these should be culms with varying heights.
Step 2. Before potting, prune the root system to remove damaged roots from digging.
Step 3. Pot the propagule immediately after collection to prevent evapotranspiration. Then, pot the clump in a prepared plastic bag half-filled with ordinary garden soil and compost. Punch holes at the bottom of the plastic bags.
Step 4. Transfer the potted plants in a 50% shaded area where they will be maintained for about 6 months. Provide ample space for bamboo growth.
Step 5. Water the plants right after piling (i.e., arranging the potted bamboos in rows or lines).
Step 6. Observe for any possible attack of pests and diseases. Fertilizers are not necessary if the potting soil is mixed with compost. In addition, install a fence to protect bamboos from stray animals. Once the leaves are browsed, the quality of the plants is degraded.

Step 7. Weed and cultivate the bamboos. Grow the bamboos 6–8 months before selling.
Step 8. About 1 month before selling, shock the bamboos to allow for acclimatization (i.e., exposing them to direct sunlight and more adverse surrounding). Trim the bamboos to the desired aesthetic appearance.
Step 9. Repot new propagules.

GENDER ANALYSIS

Ornamental bamboo propagation and cultivation can be a backyard enterprise by either women or men, or in partnership. The privilege of women in attending seminars on ornamental bamboo production is an opportunity to attain new knowledge and skills. Accordingly, women can conduct research and help identify different bamboo varieties and classification (i.e., scientific and family names of bamboos). When functioning as managers of the enterprise, women take control of the work and financial plan, and even the overall business operation; these are done simultaneously with the devotion and interest of bamboo collection. Men complement the work task by helping women in the physical aspects of the production, such as in culm collection, garden soil preparation, and potting. This type of enterprise is a year-round venture although production is done during the rainy seasons. Maintenance and marketing is done throughout the year.

ECONOMIC BENEFITS

Tonkin Cane Bamboo (5-7 culms per pot)	
Sales	**P 200.00**
1 pot	
Cost of Production	**84.86**
Cost of propagule per pot	56.00
Soil collection and bagging (12"x14")	10.70
Plastic bag	8.00
Maintenance (6-8 mos)	10.16
Net Income	**P 115.14**
ROI	**1.35 or 135%**
Oldham Bamboo (3 culms per pot)	
Sales	**P 500.00**
1 pot	
Cost of Production	**178.86**
Cost of propagule per pot	150.00
Soil collection and bagging (12"x14")	10.70
Plastic bag	8.00
Maintenance (6-8 mos)	10.16
Net Income	**P 321.14**
ROI	**1.79 or 179%**

Chinese Bamboo (5 poles per pot)	
Sales	**P 150.00**
1 pot	
Cost of Production	**103.86**
Cost of propagule per pot	75.00
Soil collection and bagging (12"x14")	10.70
Plastic bag	8.00
Maintenance (6-8 mos)	10.16
Net Income	**P 46.14**
ROI	**0.44 or 44%**
Wamin Bamboo (3 poles per pot)	
Sales	**P 1,000.00**
1 pot	
Cost of Production	**210.20**
Cost of propagule per pot	200.00
Soil collection and bagging (12"x14")	10.70
Plastic bag	8.00
Maintenance (6-8 mos)	10.16
Net Income	**P 46.14**
ROI	**0.44 or 44%**
Yellow Bamboo (3 offsets per pot)	
Sales	**P 350.00**
1 pot	
Cost of Production	**178.86**
Cost of propagule per pot	150.00
Soil collection and bagging (12"x14")	10.70
Plastic bag	8.00
Maintenance (6-8 mos)	10.16
Net Income	**P 171.14**
ROI	**0.95 or 95%**

MARKETING CONSIDERATIONS

The people's attitude and awareness on climate change has encouraged many to look for novel and readily available varieties of landscape materials; they also look for materials that are of low maintenance. Because of these, the demand for bamboos has risen not only in the Cordillera, but also in many communities in Manila, Tagaytay, Batangas, and Laguna.

Ornamental bamboo is a lucrative business, but prices vary depending on the species (i.e., rarity), ease and method of propagation, and ornamental features. Except for the collector's items, ornamental bamboos are generally cheap. An averaged-income family can easily purchase bamboos for their landscaping needs. Species like the Chinese bamboo (*Phyllostachys aurea)* are readily available in Baguio City, Manila Seedling Bank Foundation Inc. (MSBFI), and along highways in Laguna and Batangas en route to Tagaytay and Cavite.

The best approaches to marketing are as follows:

- Always provide the common and scientific name of the ornamental bamboos, as their prices are determined by this information.
- Provide the buyer tips on how to maintain and propagate specific species of bamboos.
- Provide your contact number to buyers for possible technical assistance and possible business ventures.
- Get orders so you can plan the number of propagules for production. If possible, get advance payment.
- Produce planting stocks of high quality to ensure business sustainability.

ECOLOGICAL IMPLICATIONS

Bamboos are available in both lowlands and highlands. For instance, semi-temperate bamboos (i.e., *P. aurea* and *Semi-arundinaria fastousa*) are common in the highlands whereas yellow bamboo (*B. vulgaris* var. striata*)* can be seen mostly in the lowlands. Bamboos can grow even in barren areas. Given that bamboos can grow in almost any type of soil, they can be planted even in degraded areas. Studies have shown that some bamboos can survive even in mine tailings ponds.

P. aurea and Semi-arundinaria fastousa can also grow in warmer climate, but not as vigorous as those under cooler temperature.

Ornamental bamboo propagation and cultivation supports the reforestation activities of both private and government organizations. Bamboos are not considered as weeds if appropriate technologies to contain them are adopted (i.e., monopodial bamboos). They are not hazardous to animals when eaten; in fact, the leaves of some types of bamboos can be used as fodder. Bamboos can also co-exist with other plants.

Although bamboos propagated through the offset technique are exhumed from the ground, which may cause soil erosion, this is not detrimental as long as the soil removed during collection is dumped back to cover the hole where bamboos have been collected. The hole can also be planted with other vegetation. In addition, the technology involved in bamboo propagation neither does produce toxic materials nor cause pollution that can cause harm to humans and animals.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Technical assistance on propagation techniques in terms of research and development, and provision of supporting documents/permits
- Local government units (LGUs): Provision of space, such as the Baguio City Orchidarium, for display areas
- Department of Trade and Industry (DTI): Product promotion (e.g., schedules of trade fares and exhibits)
- Some private nurseries outside of Cordillera also patronize the product

LAWS AND RESTRICTIONS

Transport permits are necessary during plant transfer, and these can be obtained from DENR and concerned LGUs. For imported bamboo species, a phytosanitary certificate from the Department of Agriculture (DA) is required. In some instances, transport permits and official receipts are inspected in checkpoints.

GLOSSARY

- Propagule – A plant part that is separated from a mother plant that can grow into a new plant
- Offset – Culm with the rhizome axis basal to it and its roots used for propagation
- Culm – An above-round stem that grows from the underground rhizomes
- Clump – Emerging shoots from a clumping bamboo forming a circular mass of vegetation

SOFT BROOM FROM TIGER GRASS FARM UNDER BENGUET PINE STANDS

Location: Monglo, Sablan, Benguet; San Ramon, Manabo, Abra; Bilis, Burgos, La Union
Entrepreneurs: Mr. and Mrs. Rene Alionso (Benguet); Pastor and Mrs. Oscar Uttao (Abra); Bilis Farmers Association
Authors: Helen A. Maddumba and Rhandy S. Tubal

Tiger grass (*Thysanolaena maxima*) is a semi-perennial grass that grows as high as 2.5 meters. It belongs to the family of Graminae. The species grows fastest in higher elevation, but they can also thrive in other areas. As a raw material, tiger grass is widely used in the production of soft brooms, also known as "boi-boi" in Ilocano and "tambo" in Tagalog.

Tiger grass can be planted as main crop or interplanted/interspersed with fruit trees and other perennial crops. Tiger grass farming under forest stands, which utilizes land already planted with trees, and production of brooms thereafter are viable sources of income for upland communities. Establishment of tiger grass farms not only ensures supply of raw materials for the broom and handicraft industry, but also enhances environmental promotion and land utilization. Moreover, tiger grasses are used as materials to rehabilitate degraded areas. As an enterprise, both tiger grass farming and broom production require minimal farm input, maintenance, and labor. In effect, much time can be devoted for other activities like caring for the family.

METHODS OF PRODUCTION

Part A. Tiger grass farming

Procedure

Step 1. Production of planting stock

- Uproot the clump suckers of mature tiger grass.
- Cut the upper portion and retain 10 cm of its vegetative part.

Step 2. Plantation establishment

- Select the site for tiger grass, which can thrive in medium to high elevation, such as in hillside slopes and logged-over areas.
- Prepare the site. Spot-clear the area. Dig holes 30 cm wide and 30 cm deep, with spacing of 2×2 m if under monocropping or 4×4 m if interplanted with other crops. Use contour planting (i.e., planting along slopes).
- Haul the planting stock to the prepared planting site. Do not expose the stocks to direct sunlight. To reduce mortality, plant the stock the same day they were collected.
- Plant at least 3 suckers in every hole. To ensure good root and shoot development, plant at the onset of the rainy season. Apply organic fertilizers once a year before the onset of the rainy season.

Step 3. Plantation maintenance and protection

- Replant dead suckers before the end of the rainy season.
- Weed as necessary to minimize competition for soil nutrients, water, and sunlight, as well as to minimize fire hazard.
- Protect the area from stray animals. If appropriate, introduce integrated pest management (IPM) for regular clearing of plantation and minimized pests.

Step 4. Harvesting and hauling

- Cut the panicles with a sharp knife.
- Gather and sundry the panicles. Regularly turn the panicles for 2–3 days to ensure uniform and fast drying.
- Shake slightly the panicles against a flat surface to remove the seeds. Bundle the panicles for easy handling.
- Re-dry the panicles under the sun for about 2 weeks.
- After the last harvest, cut all remaining vegetative parts down to 30 cm for regeneration so that new tillers can develop. The cut portion can be used as fodder for animals.

Tip

The potential health arises in the handling and processing of panicles. The current practice of removing seeds is to shake off or pat panicles (i.e., to "pag-pag" or shake against solid or concrete structure), scattering the seeds in all directions. The associated "dust" may be potentially hazardous to those with asthma or other respiratory allergies. Wearing mask is highly prescribed.

Part B. Broom production

Materials for one (1) broom

Panicles	Tie wire	Sharp knife
Wood or bamboo stick	Plastic string or split rattan	Pointed stick

Procedure

Step 1. Bundle 60–70 panicles.
Step 2. Sort the panicles. Retain some of the stalk to serve as handle. Remove spikelets from the main stem.
Step 3. Arrange the spikelets and tightly bind them with plastic string. Gather 5–6 small bundles (1–1.5 cm diameter) to make one big bundle.
Step 4. Bind tightly the stalks using tie wire or split rattan. Re-bind the panicles with the handle (e.g., wood or bamboo stick).
Step 5. Arrange the panicles into fan-like formation by systematically weaving the segments with a plastic string or split rattan.
Step 6. Decorate the handle by rolling it with plastic or split rattan.

For more durable brooms, harvest the panicles 1–2 days before maturity.

GENDER ANALYSIS

Soft broom production from tiger grass is an enterprise with minimal capital and is easy to manage. Women are widely seen joining their husbands making brooms while watching TV. The tandem of husband and wife is encouraged in different aspects of the entrepreneurial activity. Men can do the more laborious activities, such as tiger grass plantation establishment and harvesting. Meanwhile, women can uproot lump suckers, haul, plant and fertilize, and cut panicles after harvest; these are all done under shaded areas.

In broom production, women do not have to go out to earn, as the enterprise is a home-based activity. Apart from selling the products to neighbors, women are at ease in marketing/displaying their products in front of their houses, which are along the Naguillian Highway going to Baguio City. Since soft brooms is the "One Town, One Product" (OTOP) of Sablan and the Province of Benguet, tourists stop over their display areas/residences to purposely buy brooms. Apart from this, women do not need to rush their production and therefore have time to relax or engage in other activities. In relation, brooms can also stocked while awaiting adjustments in prevailing retail price. There is also not much capital involved because production requires only simple tools. In addition, making brooms can be done even if the entrepreneurs do not have a spacious working area. However, dust from tiger grass panicle can be damaging to the lungs. Hence, it is advised that workers wear protective masks. Moreover, panicle stalks are sharp and rough, which can cause cuts, and so gloves should be worn.

The bulk of broom production is done in accordance with the Panagbengga Festival (February), and the summer (March to May) and Christmas (December) seasons. Unless time management is ensured, the participation of women in the planting and harvesting of tiger grass may conflict with their rearing of children and household chores. However, broom making is usually done at home and thus, women become fully productive, as this activity complements with household activities and child rearing.

ECONOMIC BENEFITS

First Year

Sales	
Number of brooms @ 70/pc for regular and 140 for special	15,400 (Regular broom) 30,800 (Special Broom)
Establishment Cost	
Planting	1,000
Replanting	200
Wedding/ brushing	400
Fertilizer application	400
Material Cost for Plantation Establishment	
Planting Stock	5,000
Fertilizer	300
Harvesting and Processing Cost	
Harvesting and Hauling	230
Drying and cleaning	173
Broom Processing	
Labor	796
Material per broom	
Tie wire, wood, plastic string, split rattan	580
Marketing Cost	150
Total Product Cost	9,229

Net Income = (Regular Broom)	(Special Broom)
= 15,400 – 9,229	= 30,800 – 9,229
= 6171	= 21,571

ROI -= (Regular Broom)	(Special Broom)
= 6,171 / 9,229	= 21,571 / 9,229
= 0.66 ore 66%	= 2.33 or 233%

Second Year

Sales	
160 Brooms @ 70	16,100 (Regular Broom)
	32,200 (Special Broom)
Establishment Cost	
Wedding/ brushing	400
Fertilizer Application	400
Material Cost for Plantation Establishment	
Fertilizer	300
Harvesting and Processing Cost	
Harvesting and hauling	245
Drying and cleaning	184
Broom Processing	
Labor	878
Material per broom	
Tie wire, wood, plastic string, split rattan	640
Marketing Cost	160
Total Production Cost	3,207

Net Income = (Regular Broom) (Special Broom)
= 16,000 – 3, 207 = 32, 200 – 3,207
= 12,893 = 28, 993

ROI = (Regular Broom) (Special Broom)
= 12,893 = 4.02 or 402% = 28,993 = 9.04 or 904%
3,207 3,207

The highest yield is on the sixth year of plantation.

MARKETING STRATEGIES

One product that is readily associated with Baguio City and La Trinidad, two notable tourist destinations, is soft broom. Products are sold in different stalls/stores along Naguillian Road and Marcos Highway, and in Baguio City Market. Soft brooms from La Union are even brought to Baguio City just so they can be packaged as if they have been made there. Some household-produced brooms are also displayed in front of the houses of entrepreneurs, which are located along national roads. In cases where the products are displayed inconspicuously, retailers and wholesalers go out of their way to do the purchase.

Baguio-based retailers claim that the demand for the product increases during holidays and summer seasons when visitors come to the area for vacation. Soft brooms are very affordable. The prevailing selling price is PhP70.00 and PhP140–P150 for regular and special soft brooms, respectively. Wear and tear ensures that there is continuous demand for soft brooms. In the local market, the demand for the product is projected to rise together with the annual increase in households.

ECOLOGICAL IMPLICATIONS

When planted in close spacing, tiger grass can effectively control soil erosion. Tiger grass can also be used as cover crop or hedgerow to minimize runoff in the highlands. In doing so, soil is shielded from the impact of raindrops. Thereafter, soil becomes more pervious or intact and run-off water movement is slowed down.

As for entrepreneurial waste management, one can set aside and bundle neatly the discarded stalks and use these to make other handicrafts. For example, dried panicles can be dyed and developed into novelty or decorative items. Then, after each harvest, the cut portions of the tiger grass can serve as fodder for animals.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Training on the establishment of tiger grass plantation and product promotion
- Department of Trade and Industry (DTI): Marketing and product development through training
- Ecosystems Research and Development Bureau (ERDB): Financial assistance
- Local government units (LGUs): Product promotion

GLOSSARY

- Integrated pest management (IPM) – When applied in agriculture, IPM is an integrated approach to crop management in order to solve ecological problems. It involves three stages: prevention, observation, and intervention. IPM aims to significantly reduce or eliminate the use of pesticides while managing pest populations at acceptable levels.
- Panicle – A pyramidal loosely branched flower cluster of grass
- Spikelet – A small or secondary cluster of flowers
- Suckers – Young vegetative parts of grasses that can be used as planting materials

DRAGON FRUIT FARMING

Location: Bgy. Paayas, Burgos, Ilocos Norte
Entrepreneur: Rare Eagle Forest Marine Agriculture Development (REFMAD) Farms
Authors: Aurora M. Reyes, Lourdes P. Calacal, PhD, and Lani P. Simeon

Dragon fruit (*Hylocereus undatus*), with local name "pitaya" or "saniata," is the fruit of several cacti species native to Mexico, Central, and South America. These vine-like epiphytic cacti are also cultivated in Southeast Asian countries like Vietnam, Thailand, Malaysia, Taiwan, and the Philippines. Dragon fruits only bloom at night; their large white, yellowish, or reddish flowers are often referred to as "moonflower" or "queen of the night." The plant is easy to propagate and requires minimal maintenance. Its life span can reach up to 50 years. Harvesting is from May to November.

Dragon fruit contains lycopene, a natural anti-oxidant known to fight cancer and heart disease. It can also lower blood pressure and protect individuals against stress-related disorders. Among many factors, but most especially with these healthful benefits, dragon fruits have become popularly known as the new money crop. All parts of the plant can be processed: from salad, soup, herb, drinks (wines), and jams, to flavoring of drinks and pastries.

METHODS OF PRODUCTION

Materials

7 ft. × 5 in. wooden posts (e.g., kakawate or ipil-ipil)
Rubber tire (e.g., tricycle tire)
String maps
Pruning shear
Improvised insect traps
Hose

Dragon fruit grows better and bigger when placed on a wooden post compared with concrete posts because the moisture absorbed by the wood does not easily evaporate. Use recyclable materials when setting up the posts. Moreover, recycled water is effective for use as anti-ant, control especially for newly planted cuttings.

Cuttings

Procedure

Step 1. Prepare the plantation area. Before installing the posts, clean the plantation by removing undesirable weeds.
Step 2. Set up posts 4–5 m between columns and rows. Sufficient space is required for easy access of dragon fruits.
Step 3. Plant 3–4 cuttings per post. Plant the directly rooted cuttings 5 cm away from the post but at angles leaning toward the post.

Step 4. Apply organic fertilizer during planting. Complete the fertilizer application 3 months thereafter; subsequently, apply every 3 months. Water the plant when applying fertilizer and during fruiting.

Step 5. Spray organic foliar fertilizer every 2 weeks during the vegetative stage (cuttings/bud germination).



Step 6. Hand-weed within the inner 30 cm diameter of each post. Prune to obtain open, manageable, and productive umbrella-shape canopies. Plants can bear fruits 8 months after planting, provided the technology is properly applied

Step 7. Harvest fruit 25–30 days after flowering. Use pruning shears to avoid damaging the fruit and cuttings.

Step 8. Store fruits at 5° C with 90% RH (i.e., under normal temperature) up to 40 days.

Tip Dragon fruit can be propagated by using either seeds or cuttings; the latter can be used for faster rearing. These plants prefer free-draining soil with pH 5.3–6.7 and with high organic matter.

GENDER ANALYSIS

In upland and lowland rural communities, dragon fruit farming is generally considered a family enterprise where the father, mother, and children equally contribute in plantation establishment, harvesting, processing, and marketing. At times, women lead the business to augment family income. Some of the women entrepreneurs were even given the opportunity to go to Thailand for advance technology training on dragon fruit propagation. In effect, these have enhanced women participation and economic empowerment, and further developed their social responsibility in the community. Women take charge of the marketing whereas men handle plantation establishment, which is usually done from May to December.

ECONOMIC BENEFITS

Cost and Return Analysis of One-hectare Plantation

Income	:	400,000.00
2 kg. per post of 4 cuttings or 4,000 kgs at P100/kg		
Production Cost		300,000.00
Net Income		100,000.00
ROI		0.33 or 33%

One can start in a backyard level with minimum capital and by using indigenous materials. A 10-post with 4 cuttings will yield 20–30 kg on the first year, increasing yearly by 50%–75%. One (1) kg of dragon fruit costs PhP90–150. A one-hectare dragon fruit plantation with 2,000 posts spaced at 3×4 m will require an input of PhP300, 000, assuming that a post costs PhP1,500. The costing herein includes the cost for the construction of the posts hence, a lower rate of return. On the second year and thereafter, the derived income is expected to be higher.

MARKETING CONSIDERATIONS

The biggest selling point of dragon fruit is its medicinal property and affordability, hence the label "poor man's fruit." It can be sold as planting material, raw fruit, or even as processed food like burger, soup vegetable, and flavoring for ice creams, cookies, wines, and jams.

Marketing can be done through direct and indirect selling (i.e., through intermediaries), either in wholesale or retail. Product outlets may include supermarkets, trade fairs, display centers, and on-site farms.

ECOLOGICAL IMPLICATIONS

Dragon fruit is exotic to the Philippines. As a drought-resistant species, it can effectively rehabilitate marginal lands, may they be in the lowland or upland. Their greenish vegetative structure, attractive flowers, and glaring red fruits also add beauty to the environment.

In the processing of fruits, there is no problem in waste handling. All parts of the plant can be eaten or processed into various products.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Technical assistance
- Department of Science and Technology (DOST): Provision of equipment and funding facility
- Department of Trade and Industry (DTI): Product investment and promotion
- Ilocos Agriculture and Resources Research and Development Consortium (ILARRDEC): Technical assistance and provision of post harvest facilities
- Local government units (LGUs): Product promotion and policy formulation

LAWS AND RESTRICTIONS

Business permits issued by the concerned LGU and DTI are required when setting up the dragon fruit enterprise.

FRUIT JELLY FROM GUAVA

Location: San Macario Sur and Norte, Natividad, Pangasinan
Entrepreneur: Saranay Multipurpose Cooperative
Author: Mary Jocelyn C. Sagun

Guava (*Psidium guajava*), locally known as "bayabas," is popular because of its high levels of pectin, which can easily set fruits into gel. A mature guava tree can yield 10 kg of fruits during peak season (May–August).

The women members of the Saranay Multipurpose Cooperative based in San Macario Sur currently manage an enterprise that produces fruit jellies from guavas. Native guava trees are indigenous in the community. Based on their 2009 inventory, there are about 2,000+ guavas in the two adjacent towns of San Macario Sur and San Macario Norte. Incidentally, these guava trees are threatened because of the charcoal industry, which is currently prevalent in the communities.

To sustain the source of raw materials of the jelly enterprise, the cooperative has encouraged its members to plant more guava trees. Many have proposed planting more guava seedlings in their own backyards and farm lots, as well as in Community-Based Forest Management (CBFM) areas. The cooperative-led enterprise has previously won 3rd place in the "Gender and Development (GAD) Service Awards" by the Department of Environment and Natural Resources (DENR). In 2006, the livelihood was also recognized as the "Most Gender Responsive Project."

METHODS OF PRODUCTION

Materials and equipment

10 kg ripe guava
1 ¾ kg white sugar
8 tbsp. calamansi juice
Water
Tray or basin
Measuring cups and spoons
Wooden spoon
Big-sized pan
Knife
Fine strainer or clean cloth
Sterilized bottles
Sealer and tape
Label sticker
Wood for fuel

Procedure

Step 1. Wash and clean ripe guava fruits then slice them into quarters. Remove the seeds with a knife.

The best time to harvest guava is when they have turned yellow or yellow-green. The fruit can be harvested using a pole harvester, also locally known as "sarokang." Wear hairnets and gloves for safety purposes.

Step 2. Put the cut guavas in water just enough to cover the fruits. Boil the fruits until they become very soft.
Step 3. Use a fine strainer or clean cloth to separate the juice from the fruit.
Step 4. With a mixture of 3 cups of juice and 1 cup of white sugar, add 1 tbsp. of calamansi juice.

Do not squeeze the pulp if you want to get more juice because this will make the jelly look cloudy. Also, calamansi can make the jelly more flavorful and aromatic. It also serves as a natural preservative and prevents hardening of jelly.

Step 5. Boil the mixture up to 71° C or until sticky. Do not overcook the juice because the jelly will taste bitter.
Step 6. Boil to sterilize the bottles. Pour the jelly into bottles and let cool before covering.
Step 7. Re-boil the bottled jelly for 10 minutes to eliminate air bubbles.
Step 8. Seal the cap and label the product for marketing.

Processing guava into jelly

GENDER ANALYSIS

The guava jelly endeavor of Saranay Multipurpose Cooperative is women-led and there are only two men directly involved in the enterprise. Moreover, the guava trees grow in their own backyards and the production site is near their multi-purpose building; in effect, activities related to gathering and processing is not at all burdensome. To ensure sustainability of the enterprise, women join the men in the production of guava seedlings for planting in the CBFM farms. They also join inventories and in guarding the trees from being cut and utilized as charcoals. Men are also sought in the gathering process and in bringing the fruits to the processing site. Meanwhile, children can earn their school allowance from gathering guava fruits by selling them to the cooperative.

Guava jelly production is a seasonal activity from May to August, the fruiting months of guava trees. During these months, women are greatly involved in the production. Marketing can be facilitated easily, as bottled jellies can be stocked and

displayed throughout the year. Orders are also facilitated via direct selling. Then, while waiting for the next fruiting season, women can make use of their idle time by maintaining their farms and doing productive activities.

Women are greatly motivated to participate in this enterprise because they can earn additional income, enhance their skills, and enjoy the company of other women. In addition, due to their good credit record, they are able to access capital and finance, as well as technical assistance from supporting institutions.

ECONOMIC BENEFITS

ITEM	VALUE (Php)	TOTAL VALUE (Php)
Sales 10 bottles at	60.00	600.00
Costs of Production		
10 kgs. ripe guava	3.00/kg.	30.00
1 ¾ kg.white sugar	50.00/kg.	87.50
10 bottles & cap	5.50/bottle & cap	55.00
¾ kg. calamansi juice	25.00/kg.	20.00
Fuel/LPG (4 bundl(es firewood)(donot inc.LPG)	10.00/bundle	40.00
Labor Costs	10.00 per bottle	60.00
TOTAL		**292.50**
NET PROFIT/10 KG		**307.50**
ROI		**1.05 or 105%**

MARKETING CONSIDERATIONS

Because guava is a seasonal fruit, production is conducted only during the peak season (May to August). Marketing can be done with the help of the Department of Agrarian Reform Provincial Office (DARPO) and Department of Trade and Industry (DTI) in Dagupan City. In many occasions, the cooperative has participated in trade fairs and festivals. They also display their

products in the multi-purpose building and sell them by order to various offices like DENR, DAR, and local government units (LGUs).

ECOLOGICAL IMPLICATIONS

As wastes, the pulp can be used as organic fertilizer while seeds can be gathered in the nursery for seed production. Establishment of plantations in CBFM areas is encouraged to sustain the availability of raw materials. Specifically, for waste management, gather the guava seeds and use these for seedling production to sustain the source of raw materials for the guava jelly enterprise.

LAWS AND RESTRICTIONS

Guava fruits may be sourced from private farm lots; no permits are required in the harvesting of fruits. However, in order to sustain the production of guava jelly, planting was incorporated in the CBFMA scheme, particularly in the agroforestry plantation. This was also reflected in the Community Resources Management Framework and Five-year Work Plan/Resource Use Plan.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DARPO and Pangasinan State University (PSU) in Sta. Maria, Pangasinan: Hands on training on making guava jelly
- DENR–Ecosystem Research Development Services (ERDS) and Forest Management Services (FMS): Production of planting materials and technology
- DTI, DARPO, and LGUs: Technical assistance and marketing
- DTI and Bureau of Food and Drugs (BFAD): Product analysis, development, and promotion

FRUIT WINE FROM DUHAT

Location: Laguit Padilla, Bugallon, Pangasinan
Entrepreneur: Laguit Padilla Multipurpose Cooperative (LPMC)
Author: Delia R. Gonzales

Duhat (*Syzigium cumini*) is a species indigenous to the Philippines. They can thrive under extreme conditions through natural regeneration. In fact, trees are distributed sporadically in lowland and upland areas.

Producing wine from duhat is an enterprise currently managed by the Laguit Padilla Multipurpose Cooperative (LPMC), a holder of the Community-Based Forest Management Agreement (CBFMA). LPMC is also a project beneficiary of the Department of Environment and Natural Resources–New Zealand Aid Program (DENR–NZAP) program, "Enhancing Natural Resource Management through Enterprise Development in the Philippines." Their fruit wine labeled "Le Dilla" is processed adjacent to the CBFM area within the barangay. According to consumers, duhat wines have high medicinal and therapeutic value. They can be used as remedy for diabetes, ulcerations of the mouth, and appetite loss. LPMC carries the "One Town, One Product" (OTOP) seal of the Municipality of Bugallon for having reaped provincial and national awards for Le Dilla's quality and taste.

METHODS OF PRODUCTION

Materials and equipment

Ripe duhat fruits
Yeast
White sugar
Mineral water
Stainless basin
Teaspoon
Ladle
Casserole
Cloth strainer
4-gallon containers (e.g., glass containers)
Cotton
Siphoning hose with pump
Measuring cup
Sealer gun
Sterilized 750 and 350 mL bottles
Refractometer
2 burner gas stoves

Procedure

Step 1. Collect only ripe, fresh, and fleshy duhat fruits.
Step 2. Wash fruits in running tap water. Then, toss the fruits in boiling water for sterilization. Drain immediately and start the depulping process.
Step 3. Strain the depulped duhat flesh to separate juice from flesh.
Step 4. Dilute the duhat fruit juice with mineral water at a ratio of 1:2.

Step 5. For every 3 cups of dilution, add 1 cup of white sugar. Boil to dissolve sugar.
Step 6. Store in 4-gallon containers and add 1 teaspoon of yeast.
Step 7. For 3 weeks, cover the gallon with cotton to absorb bubbles. During the first week, replace the cotton daily.
Step 8. After 3 weeks, siphon the liquid to remove settled solids.
Step 9. Then, reheat the fermented juice for 10 minutes. After cooling, re-store the liquid in clean glass containers and seal tightly. Re-ferment the juice for 6 months.
Step 10. After 1 month, re-siphon the liquid to remove residues.
Step 11. As part of packaging, transfer the wine in sterilized 750 and 350 mL wine bottles.

Siphoning the wine

GENDER ANALYSIS

LPMC employs mostly women to supervise the different activities of the enterprise. Although not compulsory, the cooperative also gathers male workers in the mixing process; they also participate in product sampling. Women members are greatly motivated to participate in the wine enterprise because of poverty and unemployment in the area. All resources of the cooperative are open and can be accessed freely by any of the cooperative members. Inasmuch as majority of the members of LPMC are women, they regard their winemaking production with high-esteem. Women wine-makers are aware of their big contribution to the cooperative and their communities. Majority of the activities on wine production is from March to May, the fruiting months of duhat. This can extend to June when the processing of the mixture is conducted. Thus, women have enough time to engage in other activities or businesses while waiting for the juice to ferment into wine (i.e., idle time for the enterprise).

The women members of LPMC have accessed financial and technical assistance from the local government and DENR–NZAP. This allowed them to improve their production infrastructure and the labeling/packaging of their wine products. LPMC is in the process of securing certification from the Bureau of Food and Drugs (BFAD) in preparation for bigger production and wider market. Finally, inasmuch as wine is classified as a food item, it is recommended that good manufacturing practices (GMP) be considered, such as wearing the proper attire like apron, gloves, masks, and hairnets.

ECONOMIC BENEFITS

SALES ------------------------------------ 2,000 bottles @ P75/pc	**150,000.00**
PRODUCTION COST ------------------------- Production and promotional activities of the project	**49,000.00**
INCOME --------------------------------------	**101,000.00**
RETURN ON INVESTMENT	
$\frac{101,000.00}{49,000.00}$ = 2.06 or 206%	

MARKETING CONSIDERATIONS

The office of the people's organization (PO) in Laguit, Padilla functions as the display and selling center of Le Dilla. The wines are also sold at the offices of the Community Environment and Natural Resources Office (CENRO) and Department of Trade and Industry (DTI) in Dagupan City, as well as at the Municipal Hall of Bugallon. LPMC also promotes its wines during town feasts. It also participates in promotional/trade and agricultural fairs.

Le Dilla wines are packaged in 350 and 750 mL bottles and sometimes offered to customers as product samples. Billboards have been set up in November 2010 to promote Le Dilla to potential customers. Traditional promotions through word of mouth, distribution of business cards, brochures, and fliers, printing of calendars, and advertising through radio and print media are also utilized.

Duhat wine ready for marketing

ECOLOGICAL IMPLICATIONS

Processing duhat into wine through fermentation has no detrimental effect on the environment, considering that the production is done naturally without the use of any chemicals. Any unused seeds are propagated as source of planting materials in the CBFM nursery. Meanwhile, the pulp generated from the production process is used as organic fertilizer. Excess water is channeled to a concrete canal/storage for use in the nursery.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR: Technical Assistance
- DTI: Product promotion and marketing
- BFAD: Patenting and licensing of the product
- Department of Science and Technology (DOST): Provision for equipment and funding facilities
- Local government units (LGU): Policy formulation

LAWS AND RESTRICTIONS

Le Dilla Wine is registered with DTI, Bureau of Internal Revenue (BIR), and the Office of the Mayor in Bugallon, Pangasinan. Having been considered as the OTOP of the town, the enterprise is also bound to the regulatory policies of the LGU.

HANDICRAFTS FROM LABTANG

Location: Bgy. Urzadan, Suyo, Ilocos Sur
Entrepreneur: Suyo Integrated Labtang Association of Weavers (SILAW)
Authors: Remedios O. Ridual, Aurora M. Reyes, and Lourdes P. Calacal, PhD


Labtang (*Anamirta cocculus*) is fast becoming an important minor forest product because of its importance in the handicraft industry. It is grown naturally as a vine and is abundant in hilly areas. Labtang can be used as mixed media for handicrafts, competing at par with the quality and durability of rattan and bamboo-based products. Labtang products have high prices and are very much in demand by the local and export markets. Excellent home decors, bags, baskets, vases, novelty items are among the highly demanded products.

The establishment of a 10-hectare plantation through the Community Livelihood Assistance Special Program (CLASP) has served as source of raw materials for the labtang handicraft enterprise. However, to ensure that raw sources can be supplied readily to the handicraft industry, additional plantations must be further established.

METHODS OF PRODUCTION

Materials and equipment

Bolo/knife
Meter tape
Pliers
Heating torch
Splitter
Paintbrush
Organic varnish, stain, and dye

Procedure

Step 1. Labtang propagation

- Propagation by cuttings: Cut vines 6 inches from the base and only up to the middle portion. Prior planting, soak the basal portion of the cuttings in a rooting hormone and alpha napthalene acetic acid (ANAA) for 5-8 hours.
- Propagation by wildlings: Collect quality wildlings from source and mud paddle for 1 week and pot these in garden soil (soil media).
- Propagation by seeds: Soak seeds in water overnight in a seed box or polyethylene bag and place in a shaded area. Completely expose the seeds to sunlight a month before transplant.

Labtang can be propagated with the use of cuttings, wildlings, and seeds. Cuttings grown in nurseries are proven better than wildlings. Meanwhile, propagation by seeds is seasonal, as they are only available during the flowering season.

Step 2. Plantation establishment and maintenance

- Place the plant vertically into planting holes and gently compress the soil.
- Mulch and apply 8-10 g of fertilizers per plant a month after transplant.
- Apply another round of fertilizers a year after planting.
- Conduct weeding and brushing, and protect the plants from physical damage and disease.

Step 3. Handicraft production



Cutting labtang into strings to make baskets

- Gather materials from existing natural labtang stands.
- Debark the labtang to produce the core (e.g., for making baskets).
- Cut the core to the desired length, preferably 4 m.
- For pre-treatment, place the labtang under the sun and air-dry for 3–5 days.
- Sort and split the labtang either as core or weaving material using a knife or a splitter.
- Smoothen the labtang with shaver or sandpaper to remove extra fibers and lint.
- Weave according to design. They may be in the form of base, body, edges, or handle holders.
- Apply organic bleach, dye, stain, and lacquer.
- Remove excess fibers using a heating torch.
- Package and label the product for marketing.

GENDER ANALYSIS

Both men and women partake in the enterprise. Men contribute in harvesting, gathering of raw materials, vine cutting, and scraping and splitting. Meanwhile, women supervise the weaving, design, quality control, and marketing of labtang products. Through proper scheduling, men and women work together in the nursery during seedling production, which is done from January to March. Some join in the collection of labtang wildlings every May, after which planting is done from June to September.

Women participate actively in the labtang handicraft enterprise because of the

added income for the family. Making handicrafts also enhances their social being, aesthetic skills, and creativity. In addition, while doing splitting and weaving, women can socialize with each other. Hence, through this enterprise, some of the idle time of women workers is maximized.

As for ensuring health and safety, workers are encouraged to use hand gloves when weaving or when handling sharp objects (e.g., knife or splitter). Similarly, they must wear protective masks when applying the finishing treatments. Finally, they should take extra precaution when using the heating torch for product quality control.

ECONOMIC BENEFITS

The assumptions are as follows: each plant produces an average of eight poles (average length: 12 m; ready for use), with unit price of PhP2.50, and one (1) hectare has about 1,111 plants.

PRODUCING 600 SETS OF LABTANG BASKETS

ITEMS	VALUE (in Pesos)	TOTAL VALUE (in Pesos)
Annual revenue 600 sets of baskets/ year at 265.00/set		P 375,000.00
Annual production cost		204,725.00
Materials		
31,800 Labtang poles (4m @ P2.50/pc.)	79,500.00	
Varnish	14,400.00	
Sanding	6,300.00	
Depreciation Cost	4,325.00	
Labor	100,200.00	
Net Income		170,275.00

MARKETING CONSIDERATIONS

Labtang handicrafts are displayed and sold at the SILAW Display Center located along the national highway of Bitalag in Tagudin, Ilocos Sur, and sold in both wholesale or retail. Product displays are also set up in trade fairs, markets, and exhibit arenas. Some of their labtang products are exported to other countries.

ECOLOGICAL IMPLICATIONS

Labtang can effectively rehabilitate inadequately stocked forest stands, thereby increasing soil fertility and productivity. Plantations can serve as protection from further erosion and stream–bank denudation. Labtang located within natural stands can prevent soil erosion by trapping accumulated dry leaves and debris onto the ground during rainy seasons. As for waste management, entrepreneurs can gather labtang wastes and use them as fuel wood or stuffing material; alternatively, they can be decomposed and mixed with soil.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Technical assistance
- Department of Science and Technology (DOST): Provision of equipment and funding facility
- Department of Trade and Industry (DTI): Product investment and promotion
- Ilocos Agriculture and Resources Research and Development Consortium (ILARRDEC): Technical assistance
- Local government units (LGUs): Policy formulation

LAWS AND RESTRICTIONS

Cutting and transport permits should be secured from DENR. Business permits are handled by the concerned LGUs and DTI.

ORGANIC VINEGAR FROM COCONUT WATER

Location: Magacan, Sanchez Mira, Cagayan
Entrepreneurs: Mr. and Mrs. Roger Labasan
Authors: Arjay T. Almazan and Froilan A. Pacris

Major parts of northwestern Cagayan are planted with coconut (*Cocos nucifera*) trees. To maximize the use of coconut water, the Cagayan State University (CSU) in Sanchez Mira and the Department of Science and Technology (DOST)–Region 2 established a mini-vinegar plant within the CSU compound. One of its beneficiaries is the Labasan family; they started selling homemade organic vinegar in 2010.

Vinegar is one of the prime commodities of every Filipino household. In the past, many have produced "natural" vinegar using the traditional but lengthy process of fermentation. To shorten this process, CSU and DOST spearheaded the high impact program (HIP). One of the program objectives is to teach community members how to use an acetator in order to increase vinegar production at a shortened period.

Coco vinegar is made from pure and fresh coconut water. By using the HIP technology, producing it does not exceed 4 hours after harvest, thus avoiding spoilage of beneficial organisms. Unlike synthetic vinegar, no chemicals are added to naturally fermented coconut vinegar, and hence a healthier alternative.

METHODS OF PRODUCTION

Materials and equipment

Coconut water (from 8–12 month-old nuts)
Sugar (white or light brown)
Yeast
340 mL glass bottles (recycled liquor/wine bottles)
Plastic caps
Label
Seal
LPG
Cheesecloth
Storing containers (50 Li. capacity)
Stainless casserole (15 Li. capacity)
Acetator with compressor
Acetator pressure gauge and air sparger
pH meter
Weighing scale

Storing containers

pH meter

Acetator

Procedure

Step 1. Prepare the coconut liquor (alcoholic coconut water).

- Collect fresh coconut water and filter using cheesecloth.
- Prepare the liquor within 4 hours after breaking the coconut shell to avoid spoilage prior fermentation. For every 50 Li. of coconut water, add 8.8 kg of sugar. Mix well until sugar is fully dissolved. Put the coconut liquor in a storage container in preparation for fermentation.
- Cup a small amount of coconut liquor and dissolve 29.4 gm of yeast. Then, add and mix this with the remaining coconut liquor. Cover the container with cheesecloth and leave to ferment for at least 2 weeks.
- Check occasionally for presence of bubbles and smell of alcohol, which indicates that the mixture is undergoing fermentation. Thereafter, the coconut liquor is ready for vinegar production.

The common sources of bulk coconut water are native delicacies producers (suman latik, bukayo, bibingka, buko pie, etc.) and nata de coco producers. White or light brown sugar is recommended in order to produce lighter-colored coco vinegar.

Step 2. Prepare the mother vinegar by extending the fermentation of a batch of coconut liquor to 1 month. Its pH reading should be 4.

Mother vinegar is a cellulose substance made up of various acetobacter, a very acidic strain of bacteria. Acetobacter combined with oxygen in warm air will cause fermentation in alcoholic liquids and produce vinegar. The mother vinegar is the main ingredient that gives the finished vinegar its characteristic sourness. In the initial production, mother vinegars can be bought from establishments that already produce coconut water vinegar or from DOST.

Step 3. Combine the mother vinegar and coconut liquor in preparation for the conditioning stage.

Step 4. In the acetator, mix 20 Li. of coconut liquor with 20 Li. of mother vinegar.

- To achieve proper aeration, adjust the aerator to its maximum by opening the air supply to the air sparger assembly. Too much air during startup might cause alcohol evaporation. Thereafter, adjust the air pressure to 2 psig.
- After 2 weeks, measure the acidity using a pH meter. If the pH reading is higher than 4, add daily 10 Li. of coconut liquor until the level reaches three-fourths full.
- Let the mixture stay in the acetator. After 2 months, if its pH reading is 4, the vinegar is ready to harvest.

Acetators are designed to accelerate the traditional fermentation process of vinegar production.

Step 5. Produce the coco vinegar.

- Harvest at least 20 Li. of vinegar per day, but leave at least 20 Li. in the acetator to serve as mother vinegar for the next batch of production.
- Strain the harvested vinegar using cheesecloth.
- Boil the harvested vinegar for 5–10 minutes and let cool before pouring into vinegar bottles.
- Cap, seal, label, and store the ready-for-sale finished product.

GENDER ANALYSIS

The enterprise advocates the promotion of women empowerment and gender sensitivity; this, alongside the recognition of the contribution of both men and women in each part of the production process.

Naturally, given the food-based processing nature of coco vinegar, women are drawn to this type of enterprise. Women workers show interest in the preparation of raw materials, monitoring of fermentation and conditioning processes, and post-production processes like bottling, labeling, and packaging. Men take charge of the installation of the equipment and delivery of finished products.

Good manufacturing practices (GMP) should always be a practiced to ensure product quality. To avoid occupational hazards, the proper attire should be worn at all times. The production area should also be well ventilated to diffuse the smell of acetic acid.

MARKETING CONSIDERATIONS

The enterprise virtually caters to all Filipino households, as vinegar can be used for cooking, food processing, cleaning, and others. The recent trend for organic food is also another selling point for homemade organic coco vinegars.

The vinegar products are sold in sari-sari stores, department and grocery stores, and even government and private offices across northwest Cagayan, reaching as far as Tuguegarao City and some towns in Ilocos Norte. Radio advertising and personal selling are being used to promote the product.

ECONOMIC BENEFITS

SALES ---------- **28,540.00**
2,854 bottles @ P10/bottle

PRODUCTION COST ---------- **20,573.50**

Materials (Seal, bottles, caps, label, cheesecloth) - 11,858.30
Ingredients (Coco water, sugar, yeast) - 8,715.20

INCOME ---------- **7,966.50**

RETURN ON INVESTMENT

$$\frac{7,966.50}{20,573.00} = 0.38 \text{ or } 38\%$$

ECOLOGICAL IMPLICATIONS

The utilization of coconut water, which is considered waste in copra production and in the desiccated coconut and native delicacies industries, provides added income to both coco vinegar entrepreneurs and coconut farming communities. In Sanchez Mira, Cagayan, communities generate income from this technically feasible, socially acceptable, and environmentally safe enterprise. This makes the town a prodigy, a case of success, and a well-known municipality not only in Cagayan, but also throughout the Philippines. In addition, the enterprise reflects the continuous effort of coconut-based communities to lessen their generated wastes. Furthermore, the enterprise encourages the use of natural plants for their medicinal benefits, thus allowing producers to perform socially and environmentally responsible activities while satisfying consumer needs.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Labor and Employment (DOLE) and Development Bank of the Philippines (DBP): Financial support
- Department of Trade and Industry (DTI): Product Promotion and marketing
- Food Product Development and Training Center of DOST and Product Development Program of DTI: Trainings and seminars
- DOST and Technical Research and Development Institute and Technical Education and Skills Development Authority (TESDA): Technical assistance

LAWS AND RESTRICTIONS

- DTI: Business name registration and related permits
- Local barangay (Bgy. Secretary, Treasurer, and Captain): Barangay permit; other local government units (Mayor, Municipal Treasurer, and Municipal Health Office): Municipal permits (business and sanitation)
- Bureau of Food and Drugs (BFAD): License to operate and related permits
- Bureau of Internal Revenue (BIR): Tax requirements

POLES AND FRUITS (LITUKO) FROM RATTAN

Location: Bgy. Buenavista, Bayombong, Nueva Vizcaya
Entrepreneur: Mr. Dopinio Mento of the Federation of Vista Hills, Kalongkong and Kakilingan Upland Farmers, Inc. (FVHKKUFI)
Author: Tess Jasmin

The production of rattan (*Calamus manillensis*) is an easy to adopt, environmentally friendly, and economically viable enterprise. Rattan can be grown for fruit production. For male plants that do not bear fruits (such as those common in Bgy. Buenavista), they are utilized for their poles.

The entrepreneur, Mr. Dopinio Mento, is a beneficiary of a 2-hectare farm lot awarded through the Certificate of Stewardship Contract (CSC). His farm is within the 3,000-hectare Community-Based Forest Management Agreement (CBFMA) area awarded by the Department of Environment and Natural Resources (DENR) to FVHKKUFI. Of the 212 members of FVHKKUFI, about 80 have duplicated the enterprise in their own farm lots.

METHODS OF PRODUCTION

Materials and equipment

Ladder
Pole with scythe attached
Seed containers for cleaning
Seed containers for germination
Jute sack
4×6-inch plastic bags

Procedure

Part 1. Production of planting stocks

PROPAGATION BY SEEDS

Step 1. Seed collection, extraction, and cleaning

- Gather fruits by climbing or by using a pole with scythe attached to it. Collect only ripe fruits, as evidenced by their light to deep yellow color and chocolate-colored fringes. About 50–70 kg of fruits can be collected from a single stem.
- Macerate the fruits to separate the seeds.

- Extract seeds by rubbing or stumping the fruits while inside the sack or net bag. Gather the seeds and wash them with water. In doing so, scales, pulp, and undesirable seeds will float while good seeds will sink. Mature seeds are those that are brown to dark brown in color.
- Properly discard the used water, scales, pulp, and other wastes.
- Repeat the process until all seeds are thoroughly clean.

Lituko can be collected from plantations or natural stands usually found in second growth forests and near kaingin areas in the uplands. Lituko can also be bought from local markets during fruiting season.

Step 2. Seed storage
- After cleaning, do not dry the seeds as dried seeds will not germinate.
- Place seeds not intended for immediate sowing in plastic bags or bottles and bury them 1 m below the ground. Around 70% of these can still germinate even after 7 months.

Step 3. Pre-germination: There are two ways to hasten germination: hilar cover removal and incubation.
- Hilar cover removal: Locate the hilum, which is the scar on the seed that attaches to the fruit. Carefully remove the cover using a pointed knife or scalpel, but be careful not to destroy the embryo, which is the plant developing inside the seed. Hilar cover removal hastens germination from 90 days to 2–3 days.
- Incubation: In three successive steps, (a) clean the extracted seeds with tap water; (b) place the clean seeds in a warm but moist container; and (c) wash the seeds again. Repeat (a)–(c) at least thrice to dislodge the hilar cover. By around 7–10 days after seed extraction, germination has already started.

Step 4. Germination, sowing of seeds, and potting
- Line the box with sterilized jute sack.
- Fill the box with 5 cm thick sterilized sawdust to allow for the production of long straight roots, and eventually, easy potting.
- Sow the plant seeds in rows in a shady but warm place. Cover the sown seeds with sterilized jute sack.
- Water the sown seeds daily.
- Spray fungicide in case of fungal attack, although this can be avoided with thorough cleaning and fungicidal dressing of seeds before sowing.
- Observe for the development of germinant 2–3 days after sowing.
- Pot the germinant with at least 1-inch long shoots in 4×6 in. plastic bags filled with top soil mixed with about 10% organic fertilizer.

Step 5. Care and maintenance in the nursery
- Place the potted germinant under the shade and water daily. Fence the nursery to protect plants from stray animals.
- Apply foliar fertilizers 2 months after potting to ensure healthy seedlings and to boost growth.
- Harden the seedlings prior out-planting in open planting sites by exposing them gradually to sunlight. Seedlings in partly shaded planting sites do not require hardening.

PROPAGATION BY WILDLINGS

Step 1. Wildling collection

- Collect young wildlings; these are those with 1 pair of leaves or those not taller than 20 cm. Bigger wildlings have higher mortality rate.
- Uproot wildlings carefully to avoid extensive root damage.
- Trim the leaves but not the roots.

Step 2. Storage and transport

- Wrap the wildlings in wet newspapers or moss, especially if the nursery is far from the source.
- Place the wrapped wildlings in a container. Wildlings should be kept moist, although there is no need to keep them soaked in water.
- Prepare soil bags in preparation for potting of wildlings.
- Using the soil bags, pot immediately the wildlings in the nursery.

Step 3. Potting and care in the nursery

- Follow the same potting and tending procedure as rattan propagated by seeds.

Part 2. Plantation establishment

A pre-activity involves selecting sites that closely duplicates areas with sandy clay or clay loam and with location at 200–2,900 m above sea level, as these are the type of soil and elevation where rattan grows best.

Step 1. Site preparation

- Clear a strip about 1 m wide.
- Plant at a distance of 4×4 m. Use available materials for staking. Adjust the spacing in consideration of the trees growing in the area.
- Dig 1-foot-deep holes in every stake, which should also be wide enough to fit the planting stock. Separate the top soil from the subsoil.

Step 2. Transport and seed planting

- Place the seedlings in a box prior transport to the planting area.
- At the site, arrange them temporarily in the middle part of the planting areas for easy access.
- Remove the plastic containers of the seedlings without breaking the ball of soil around the roots.
- Plant the seedlings in the hole with their root collars leveling with the ground surface.
- Pulverize the top and subsoil separately. Put the top soil first to provide the basic nutrients needed for plant growth. Then, put the subsoil and press gently.

Step 3. Maintenance and protection

- Replace dead seedlings after the second/third month of planting to ensure even-aged growth of rattan.

- Conduct ring weeding within 50 cm radius every 6 months for the first 3 years to allow for enough sunlight and to facilitate faster growth of seedlings. Rattan will start to develop thorns on its second year; its growth rate is about 0.52 m/year, increasing thereafter.
- Apply organic and/or inorganic fertilizer. Apply complete fertilizer (14–14–14) at an initial rate of 6 g/seedling every 6 months for the first 2 years. For second growths, fertilization is not necessary.
- Establish fire lines about 10 m wide at the area/plantation perimeter.
- Mulch to conserve soil moisture and to control weed growth.
- Maintain and protect the area/plantation.

Improvised tool for weeding

Part 3. Harvesting and transportation

Step 1. For fruits

- Look for female rattan (i.e., on their seventh year), as these are those that bear fruits.
- By taking extra precaution, harvest fruits by climbing or by using a pole with scythe attached to it. Ensure that individual fruits will not detach from the peduncle, which is the stem that holds the fruits.
- Harvest only ripe fruits; they are light and deep yellow-colored and have chocolate-colored fringes.

Tip Harvest fruits from 7-year-old rattan trees. Subsequently, fruit harvests can be done every year. The average harvest is **50–70** kg/stem. Based on the experience of rattan entrepreneur Mr. Dopinio Mento, rattan fruit production declines only after **20** years of bearing fruit. Another clue if fruits are already ripe for picking is when bats, cloud rats, or other wildlife feed on the fruits.

Step 2. For poles

- Look for male rattan (i.e., on their eleventh year); they do not bear fruits so they can only be maximized for their poles. Subsequently, harvesting can be done every one or two years.
- Select only mature canes as indicated by their green-to-yellowish color or those with leaf sheaths that have been already detached.
- Cut mature canes using a sharp bolo from about 15–30 cm above the ground. At this level, the diameter of the poles is almost constant with that of the thorny leaf sheaths.
- Remove the thorny leaf sheaths and cut off the soft, whitish, and immature portion of the cane to pull down easily the poles.
- To facilitate transport and to avoid wastage, cut the canes to 2.5–2.8 m (standard lineal length) starting from the base. Bundle and transport the poles to the designated stockyard.

While non-fruit-bearing, male rattan pollinates female rattan. Based on the experience of Mr. Dopinio Mento, mature canes reach 50–55 m or longer depending on environmental conditions and age (i.e., number of years). The longest rattan cane in Dopinio's farm is longer than 60 m.

Part 4. Treatment and drying

Step 1. For fruits

- Soak fruit in salted water to prolong shelf life. Lituko can be eaten raw or in pickled form.

Step 2. For poles

- Stack the poles vertically against a horizontal frame to remove sap. Dry the poles before treatment.
- In treating poles, dip one end of the pole in an anti-stain fungicide solution for 3–5 minutes. Then, invert the pole and repeat the treatment. Air-dry the poles under a shade in an upright position.
- Peel or scrape the outer cover using a sharp knife. Smoothen the poles using sand paper. Scraping can be done before or after treatment.

GENDER ANALYSIS

Rattan production can be done by both men and women. The activities involved in this type of enterprise do not discriminate by gender or by age. Men and women can participate in all stages, although some activities involved in plantation establishment, maintenance and protection, and pole harvesting are preferred activities of men. Notably, women are very effective in the production of planting stocks and product marketing. Even the elderly can take part in the planting stock preparation.

Women are motivated to participate in this type of enterprise because it can greatly help augment their family's financial needs. It is also a good venue for establishing stronger relationship among family members. The prevailing price of fruits at the local market is PhP25–30/kg whereas poles are sold at PhP12.00 per 9 feet. A single rattan stem can bear an average of 50–70 kg per fruiting season while each mature cane is about 50–55 m long. Rattan products are collected from April to September in Nueva Vizcaya, May to July in Zamboanga, August to November in Palawan, and October to February in Surigao and Agusan.

During fertilizer application, masks and gloves should be worn to avoid inhaling the fertilizer and to avoid skin irritation, respectively. During ring weeding, brushing, and harvesting activities, workers should also wear gloves to avoid skin cuts.

MARKETING CONSIDERATIONS

Rattan can be raised for the production of canes/poles and for its edible fruits. Fruits are sold locally because of their distinct taste. They can also be bought for household consumption. Meanwhile, rattan poles are widely used in the export-driven furniture and handicraft industries because of their strength, lightness, versatility, and pliability.

According to the International Resources Group, close to 1 million Filipinos are employed in the rattan industry in various capacities, mostly as gatherers and workers in the furniture and handicraft business. Rattan poles have a sure and steady market. In fact, the market demand for rattan in the Philippines exceeds the supply; hence, Philippines has started to import from other countries to safeguard its rattan-based industries.

ECONOMIC BENEFITS

For 1 ha. area

Sales	**Php 2,436,270.00**
Fruits : Php 27.50/kilo	
Poles : Php 12.00/9ft	
Cost of Production	**Php 82,700.00**
Seedlings	7,500.00
Plantation establishment	4,000.00
Plantation maintenance	26,000.00
Harvest cost	27,200.00
Transportation cost	12,000.00
Miscellaneous/Harvest season	6,000.00
Net Income	**Php 2,353,570.00**
ROI	**28.46 or 2846%**

ECOLOGICAL IMPLICATIONS

One of the problems faced by upland communities is the continuous depletion of natural resources. Incidentally, identifying areas for rattan production has helped protect the existing forest cover, rehabilitate degraded lands into productive and ecologically stable environment, increase biodiversity, and maximize land use. Rattan grows under trees, whether in primary or secondary forests, and even in plantations. Naturally, trees are preserved because they act as support crop for rattan. Integration of rattan in any area can add productivity to one's land. In addition, inasmuch as rattan plantations provide fruits for food and ready source of raw materials for the rattan-based industries, it lessens pressure on natural stands.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR: Issuance of permits for the harvesting and transportation of rattan poles; technical services; billing of tax due to the government; and funding assistance
- Department of Science and Technology (DOST): Technical services and funding assistance
- Department of Trade and Industry (DTI): Technical assistance

- Local government units (LGUs): Funding assistance
- Department of Labor and Employment (DOLE): Funding assistance
- Non-governmental organizations (NGOs): Technical services and funding assistance

LAWS AND RESTRICTIONS

Although the rattan plantations are established within tenure areas, the entrepreneur members of FVHKKUFI still have to acquire cutting and transportation permits for the harvested poles at the DENR-Community Environmental and Natural Resources Office (CENRO) in Bayombong, Nueva Vizcaya. No permit is required for harvesting and transporting fruits.

REFERENCES

Sustainable Livelihood Options for the Philippines. An Information Kit for Upland Ecosystem. Rattan Plantation Establishment and Management. Department of Environment and Natural Resources, Visayas Avenue, Diliman, Quezon City, Philippines, 1997.

Growing Rattan. Agroforestry Technology Information Kit (ATIK). Philippines: IIRR, DENR, and FF, November 1992.

Charlz Castro. Agroforestry Stories, "Mr. Littuko," GTZ-DENR-SFFI, 2009.

Mento, Dopinio. Bayombong, Nueva Vizcaya, Philippines. Interview and Documentation, 2010.

WOODCRAFTS FROM GMELINA

Location: Assassi, Baggao, Cagayan
Entrepreneur: Cagayan Valley Resources Developers and Protectors Federation (CVRDPF)
Author: Robert V. Rivera

Yemane (*Gmelina arborea*, Roxb.), or simply known as gmelina, grows relatively fast. From an entrepreneurial perspective, sizeable income can be achieved 3–5 years after planting (Mercado, et. al., 1982). With the increasing growing demand for wood amid declining tree production, gmelina remains a worthy alternative for construction, furniture, paper, and others.

Considering the high demand for furniture products within and outside the region, the Cagayan Valley Resources Developers and Protectors Federation (CVRDPF) has realized the capacity of the local community to generate extra income by venturing into the gmelina woodcraft industry. Furniture products are produced from its Community-Based Forest Management Agreement (CBFMA) site covering 5,050.50 hectares. Initial funding was provided by the New Zealand Aid Program (NZAP), whereas technical assistance was offered by both Department of Environment and Natural Resources (DENR) and the local government unit (LGU).

METHODS OF PRODUCTION

Materials and equipment

Gmelina wood (lumber form)
Sanding sealer with hardener
Paper sander
Varnish or wood polish
Anti-fungal
Wood and metal glue
Finishing nails (1, 1.5, 2, and 2.5 inches)
Meter stick
Wood crayons and pencils
Heavy-duty wheelbarrow
Table saw
Curving saw
Trimmer or swing cutter
Band saw
Thickness planer
Jointer
Bar and C-clamp
Rooter
Planer
Disk sander
Hand drill
Grinder
Blowtorch
Molder
Drum sander
Compressor
Circular saw
Blower
Lathe machine
Kiln dryer building
Welding machine
Gloves
Eye goggle

Procedure

Step 1. Pre-production/site requirements: Area of at least 2,000 sq. m. for the establishment of a processing plant, which may include a log pond and lumber yard; maximum supply of not less than 40,000 board ft./mo.; and post-harvest facilities like kiln dryer to obtain high-grade furniture products.
Step 2. Harvesting: Cut gmelina trees (at least 40 cm in diameter) in the designated cutting area.
Step 3. Hauling: Haul the logs from the cutting area to the milling site by using animal skidding (carabao) with improvised sled during wet seasons; during dry seasons, a 6×6 hauling truck can be used.
Step 4. Milling: Saw/mill the log at its maximum dimension using a band saw.
Step 5. Edging and trimming: Re-cut the sides of the squared timber to remove unwanted parts, then trim into the desired dimension (i.e., cut across the squared timber).
Step 6. Slicing: Slice the lumber into the desired size. (Refer to the suggested wood requirement to make a particular item.)
Step 7. Planing: Plane each of the furniture parts.
Step 8. Marking, boarding, and assembly: Mark the area for boarding and assemble the furniture part into the desired product.
Step 9. Finishing: Patch holes, defects, and gaps. Sand using 100, 180, and 320–400 grade sanding paper and apply sanding sealer. Conduct sanding in succession (i.e., thrice) to obtain the finest texture.
Step 10. Apply varnish.

SUGGESTED WOOD REQUIREMENTS

DOOR PANEL

No. of Pieces	Dimension			Volume Requirement Board feet
	T	W	L	
2	2	6	7'	14
2	2	6	34"	5.6
1	1.5	26	6'	19.5
		TOTAL		39.1

Dimension			Finish Volume Board feet
T	W	L	
2	6	7'	14
2	6	34"	5.6
1.5	26	6'	19.5
	TOTAL		39.1

SINGLE BED

No. of Pieces	Dimension			Volume Requirement Board feet
	T	W	L	
2	1.25	8	34'	4.6
2	3	3	16'	1.8
2 legs	3	3	3'	4.4
16 slats	0.75	2	76"	11.2
7 brace	2	2	36'	7
2 facia	1.25	8	76'	10.4
1 headboard	1.75	33	35'	13.9
		TOTAL		53.3

Dimension			Finish Volume Board feet
T	W	L	
1	8	33"	3.6
2.75	2.75	15"	1.4
2.75	2.75	3'	3.6
0.5	2	75"	8
1.75	1.75	36"	4.9
1	8	75"	8.2
1.5	32	33"	10.8
	TOTAL		40.5

HIGH-BACK CHAIR (ORDINARY)

No. of Pieces	Dimension			Volume Requirement Board feet	Dimension			Finish Volume Board feet
	T	W	L		T	W	L	
2 long legs	2	3	48"	4	1.75	2	46"	2.2
2 short legs	2	2	18"	1	2	2	17"	0.8
4	1	4	15"	1.6	1	3	14"	0.8
1 seat board	1.25	20	20"	3.3	1	18	18"	2.2
1	1	7.5	18"	0.9	1	7	16"	0.7
		TOTAL		10.8		TOTAL		6.7

PLATERA (REGULAR)

No. of Pieces	Dimension			Volume Requirement Board feet	Dimension			Finish Volume Board feet
	T	W	L		T	W	L	
2	1.25	3	17"	0.8	1	3	17"	0.6
1	1.25	8	53"	3.6	1	8	53"	2.9
2	0.75	15	28"	4.1	0.5	15	28"	2.8
2	0.75	53	28"	15.2	0.5	53	28"	10
2	1.35	3	28"	1.4	1	3	28"	1
2	1.25	5	28"	2.2	1	5	28"	1.8
3	1.25	3	11"	0.8	1	3	11"	0.6
1	1.25	2	53"	0.9	1	2	53"	0.7
3	1.25	2	11"	0.3	1	2	11"	0.3
1	1.25	2	53"	0.9	1	2	53"	0.9
2	1.25	2	17"	0.4	1	2	17"	0.4
1	1.25	19.5	58"	9.7	1	19.5	58"	7.8
1	1.25	2	56"	0.9	1	2	58"	0.7
2	1.75	2	17"	0.8	1.5	2	17"	0.6
2	0.75	16	32"	5.2	0.5	16	32"	3.4
2	1.75	1	32"	0.6	1.5	1	32"	0.6
6	1.25	2	24"	2.4	1	2	24"	1.8
3	1.25	3.5	12"	0.9	1	3.5	12"	0.6
1	1.25	1.5	51"	0.6	1	1.5	51"	0.5
3	1.25	1.5	12"	0.3	1	1.5	12"	0.3
2	1.75	1	31"	0.6	1.5	1	31"	0.6
3	1.25	13	21"	6.9	1	13	21"	5.4

2	1.25	15	52"	13.4
6	1.75	5	16"	5.4
6	1.75	5	12"	4.9
2	1.75	5	20"	2.2
1	1.75	5	56"	3.3
1	1.25	12	48"	5
		TOTAL		93.7

1	15	52"	5.3
1.5	5	16"	4.8
1.5	5	12"	3.6
1.5	5	20"	2
1.5	5	56"	2.8
1	12	48"	4
	TOTAL		66.8

GENDER ANALYSIS

The enterprise encourages complementation of men and women in every aspect of the production, although the latter contribute greatly in the finishing (patching and sanding) and quality control of finished products. In the finishing and varnishing processes, workers should wear masks and apron to avoid inhaling dust and chemical toxics. Gloves should also be worn to avoid skin irritation.

Women are motivated to join the enterprise because of the equal responsibility and benefits practiced by CVRDPF. However, some opt not to partake in the enterprise because they live far away from the production site, apart from having to devote their time taking care of their children.

ECONOMIC BENEFITS

Assumptions: One board foot of raw gmelina can give as much gross income of PhP54.00 per semi-finished product. The selling price of semi-finished products is PhP71.00/board ft. The number of working days is 312.

Anchored on the prevailing price of gmelina lumber at PhP17.00/board ft., additional gross income of PhP9.00 can derived if raw materials were to be processed into semi-finished products. Production of gmelina-based furniture requires a production cost of PhP4,182,000/year; accordingly, the net income is PhP4,242,000/year.

Particular	Annual Cost of Production (Php)	Annual Sales (Php)	Annual Income (Php)	ROI
Door Jam	4,155,590.00	4,587,960.00	432,370.00	0.10 or 10%
Single Bed	4,155,451.00	5,853,120.00	1,697,669.00	0.40 or 40%
Double Bed	4,151,901.00	6,786,000.00	2,634,099.00	0.63 or 63%
High Back Chair	4,155,245.00	7,221,240.00	3,065,995.00	0.73 or 73%
Platera Regular	4,151,030.00	7,483,320.00	3,332,290.00	0.80 or 80%
Tokyo Sala Set (Love Set)	4,155,440.00	17,496,960.00	13,341,520.00	3.21 or 321%
Center Table for Tokyo Set	4,155,787.00	9,013,680.00	4,857,893.00	1.16 or 116%
Cleopatra Long	4,154,115.00	42,868,800.00	38,714,685.00	9.31 or 931%

MARKETING CONSIDERATIONS

CVRDPF has created and delivered finished products (school chairs and tables) to the Department of Education (DepEd) in Pampanga, Laguna, and Pangasinan. Chairs, benches, and tables are also sold to the local market and churches around Region 2. Semi-finished products are sold locally and to adjacent provinces. A potential export market for CVRDPF is Taiwan.

Semi-finished sala sets are sold at PhP5,000–18,000; dining set at PhP7,500–12,000 for 6- to 12-seaters, respectively; and single and matrimonial beds at PhP2,000–4,000, respectively. CVRDPF also sell specific building components, such as doors, balusters, stepladders, handrails, and door and window jams. Lumber can be sold at PhP16.00/board ft. (minimum pick-up price).

Entrepreneurs are strongly advised to implement the pay-and-carry system when selling furniture.

ECOLOGICAL IMPLICATIONS

Creating furniture from gmelina helps the government protect the natural stand. For this type of enterprise, the primary sources of raw material are the established CBFM-accredited gmelina plantations. According CBFMA, harvesting should be done in a sustainable manner and only trees with diameter of at least 40 cm can be cut. Taxes are also collected for the rehabilitation of open areas. Should the demand of finished forest products increase, "Tree for Legacy Holder" or private individual plantations may be identified as secondary sources of gmelina wood.

Zero waste management in the processing plant should be strictly observed. Sawdust may be collected to produce charcoal and or for use as organic fertilizer.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR and Department of Trade and Industry (DTI): Technical assistance and marketing, financial assistance, enterprise promotion, and capability building
- Bureau of Internal Revenue (BIR): Issuance of receipts

LAWS AND RESTRICTIONS

- Zoning permit, environment clearance certificates (ECCs), and business permits should be secured from DENR, DTI, the Mayor's Office, and BIR.
- Harvesting of gmelina trees conforms to the directive, "Lifting the Suspension of Harvesting and Transporting of Planted trees/Timber Cut in Plantation Forest Covered by Forestry Tenure Instruments" (DENR, July 12, 2007).

REFERENCES

Lucena U. Mercado. Techno Transfer Bulleting No. 5, DENR-Region 2. "How to increase seed yield of yemane (*Gmelina arborea*, Roxb.)."

Forester Ernesto Ablao and Mr. Celestino Tunque, Jr., "Inventory/Scaling Report," Forest Resources Conservation Division, DENR-Region 2.

Personal interview with officers and members of Cagayan Valley Resources Developers and Protectors Federation.

CASHEW NUT PROCESSING

Location: Bgy. San Isidro, Roxas, Palawan
Entrepreneurs: Mr. and Mrs. Enrique and Erlina Jardin
Author: Merlyn L. Blaza

Cashew nut (*Anacardium occidentale*), locally known as "kasoy" or "balubad," is a versatile crop with many economic uses in the food industry (i.e., either as food or feeds). Kasoy is the kernel that remains after the removal of the testa of the cashew seed; essentially, this part is the edible seed of the cashew tree. Kasoy has a sweet, buttery flavor and contains about 48% fat. It is rich in protein, minerals, vitamins, carbohydrates, and fats, which are found rarely in other nuts. Consumption of cashew nuts helps the body utilize iron; eliminates free radicals; develops bone and connective tissues; and produces skin and hair pigment melanin.

In the Philippines, Palawan is the top producer of cashew nuts. Among members of Bgy. San Isidro Integrated Social Forestry Beneficiaries Multi-Purpose Cooperative (BSIISFBMPC), processing of cashew nuts is a family enterprise where members can help in the various activities. As a product, the price is affordable and hence is a popular gift from local and foreign tourists. The more popular kasoy finished products are the fried, roasted, and sweetened or "bande" cashew nuts. These kasoy products have garnered the "One Town, One Product" (OTOP) label of Roxas, Palawan.

Tip

Cashews are harvested from March to May.

Kolukati is used to split cashew

METHODS OF PRODUCTION

Part 1. Preparatory activities (Steps 1–4)

Materials and equipment

- Kolukati or a knife
- Improvised screwdriver
- Whole nut decorticator
- Containers
- Stoves or other improvised cooking tools
- Cooking pan
- Strainer
- Tray
- Filter pan
- Plastic bottles/bags
- Label
- Decorticator (whole nut extractor)

Procedure

Step 1. Cleaning: Detach seeds from the cashew and clean impurities. Sort to eliminate defective nuts.
Step 2. Soaking: Immerse the seeds in big containers filled with water. Seeds that sink are the good seeds that can be used for nut processing; those that float can be discarded.

Step 3. Drying and temporary storage: Sundry the good seeds for at least 2 days to reduce moisture content up to a maximum of 7%; that is, as soon as the kernels separate from the shell and a rattling sound is heard when seeds are shaken, the drying process is complete. The longer the seeds are to be stored, the longer they should be dried to prevent acquiring molds. Dry at least once a week to prevent infestation by molds and weevils. When dried, the seeds become shiny gray to brown. Keep dried seeds in sacks or bags for use throughout the year. Properly dried seeds can be stored up to 1 year.
Step 4. **SPLIT-TYPE NUT EXTRACTION:** Split cashew seeds using a kolukati or knife. Place the split cashew nut in the holder of the kolukati and cut seeds along the grooves of the cotyledons. Use an improvised strainer with screwdriver (i.e., with a sharp end placed between the inner shell and the edge of the nut) to extract halved nuts.
WHOLE NUT EXTRACTION (alternate to the split-type): Place the cashew seeds in the holder of the kolukati and use a knife to cut the seed. Make a small cut at one end of the seed. Then, make two small cuts on the rounded portion of the seed. Insert the improvised screwdriver with a sharp end between the cut to remove the shell. Use a smaller improvised screwdriver to remove the whole nut. Extract the whole kernel using a whole nut decorticator.

Nuts placed in an improvised oven.

Tip

Peeling the coat of raw cashew nuts. Peeling goes with the extraction of the kernel. Roast the nuts to 275° F for about 30 minutes to allow the easier skin removal and to prevent the nuts from acquiring tangy and irritable tastes.

Part 2. Processing of cashew nuts (Step 5 onwards for every product)

A. Fried Cashew Nuts

Materials

½ kg cashew nuts
½ gallon cooking oil (8 cups)
¼ tablespoon salt
Strainer
Stove
Cooking pan
Tray
Filter pan
Plastic bottles/plastic bag for packaging
Label

Procedure

Step 1. Put raw cashew nuts in a strainer. Blanch by dipping the nuts in boiling water for 10 seconds.
Step 2. Transfer the blanched nuts to a big container. Add salt and mix thoroughly.
Step 3. Pour cooking oil into a frying pan and heat to 1400° C.
Step 4. Fry the nuts for 3–4 minutes or until golden brown.
Step 5. Transfer the fried nuts into a big strainer to drain excess oil.
Step 6. Place nuts over a filter paper to filter the oil. Let cool.
Step 7. Sort and remove broken nuts.
Step 8. Seal and package the cashew nuts in bottles or plastic bags. Label the products for marketing.

B. Cashew Brittle

Materials

5 tablespoon sugar
¼ teaspoon baking soda
50 g chopped cashew nuts
½ teaspoon glucose
½ teaspoon butter
Wooden ladle
Kitchen knife
Rolling pin
Measuring cup
Non-stick pan
Stove
Chopping board
Plastic bag/bottles
Label

Procedure

Step 1. Heat the pan and put the mixed glucose, sugar, baking soda, margarine, and chopped cashew nuts. Stir constantly.
Step 2. When sugar is caramelized, remove the mixture and place in a chopping board.
Step 3. Cut the mixture lengthwise.
Step 4. Apply margarine onto the rolling pin and press the mixture until it becomes ¼-inch thick. While hot, cut the mixture into 1-inch widths.
Step 5. Pack the cut cashew brittles in plastic bags or bottles.
Step 6. Seal the package and label for marketing.

C. Roasted Cashew Nuts

Materials

½ kg cashew nuts
¼ tablespoon salt
Oven
Baking pan
Strainer
Bottles or plastic seal
Label

Procedure

Step 1. Blanch raw cashew nuts, add salt, and mix thoroughly.
Step 2. Spread the nuts evenly into a baking pan.
Step 3. Pre-heat the oven to 275° F and place the baking pan filled with cashew nuts into the oven.
Step 4. Cook the nuts for about 30–45 minutes or until golden brown.
Step 5. Cool the nuts for about 15 minutes. Then, place them into a box lined with paper and cover.
Step 6. After 12 hours, strain the kernel by removing the seed coat. Winnow the cashew nuts and remove broken nuts.
Step 7. Pack the roasted nuts in plastic bags or plastic bottles, seal, and label for marketing. Store packed products in room temperature.

D. Bande

Materials

2 kg fried cashew nuts
2 kg sugar
2 cups water
Stove
Non-stick pan
Scoop
Tray
Plastic bag/bottles
Label

Procedure

Step 1. Heat the pan. Add all ingredients and stir continuously.
Step 2. When sugar is caramelized, scoop the mixture and arrange in tray.
Step 3. Cool the mixture. Then, turn the dropped nuts upside down and allow the other side to cool.
Step 4. Pack in plastic bags/bottles, seal, and label for marketing.

GENDER ANALYSIS

At BSIISFBMPC, the overall production is largely women-led, but men are sought during harvesting and nut extraction. Women participate in the enterprise mainly because they want to gain additional knowledge, experience, and extra income for the family, as well as to enhance community camaraderie. However, women sometimes could not participate actively in the enterprise because of their time spent caring for young children and insufficient capital to engage in the enterprise. Specifically, in the husband-wife entrepreneurial tandem, having been employed at the community DENR office (i.e., CENRO) in Roxas, Mr. Enrique Jardin applied for a loan worth PhP10,000 for start-up capital. His wife, Erlina, has since managed the major activities of the enterprise; in fact, she decides whether to implement improvements or modifications in the business operation. The acquired income is of great help to the couple in terms of augmenting the education expenses of their children. The wife also has access to technical assistance, seminars and training, and product development for marketing and promotion through various supporting agencies. The local enterprise employs five female high school students, who regularly partake in the kasoy processing in order for them to secure daily school allowance.

The bulk of work is done during the fruiting season of kasoy trees. Both men and women spend time in seed/nut gathering, drying, and storage. Given that the demand for kasoy products is year-round, Erlina strategizes her production quarterly to manage properly the sustainability and availability of raw materials. In effect, she could devote extra time for household chores, seminars for product development, and establishing linkages with target markets. However, during the summer and Christmas seasons, tourists flock to Palawan, and there is a marked increase in production. During these months, Erlina hires working students in the production site from 5 to 9 p.m.

Kasoy nuts secrete toxic oil/substance that can burn the skin during processing. Hence, wearing gloves and masks is necessary.

MARKETING CONSIDERATIONS

- In Roxas City, Palawan, both cashew nuts and processed products are sold in markets, stores and outlets of Department of Trade and Industry (DTI), and the city airport, either on wholesale or consignment basis. Reasonable prices are offered for products of good quality. Raw nuts are also sold to individual buyers from nearby towns, as well as in provinces like Antipolo, Rizal (i.e., a known kasoy-selling locality).
- BSIISFBMPC annually joins mini-trade fairs set up by DENR during the Environment Month (i.e., held at its provincial office/PENRO in Sta. Monica, Puerto Princesa City) and during the Kasoy Festival in Roxas, Palawan.

ECOLOGICAL IMPLICATIONS

- Processing cashew nuts has encouraged farmers and entrepreneurs to establish and develop cashew plantations.
- Cashew is a potential crop for reforestation. It is resistant to drought and can also be used as source of firewood.

ECONOMIC BENEFITS

Annual Financial Analysis

SALES		**P 452,400.00**
Roasted (Whole nut) 10 kls/sack @ 450		270,000
Fried (Split nut) 8 kls/sack @ 350		168,000
Class C 1.5 kls/sack @ 160		14,400
* they produced 60 sacks per year		
PRODUCTION COST		**124,025.00**
Fixed Investment	10,250	
Decorticator	4,000	
Kolukati	350	
Oven	5,000	
Weighing scale	900	
Depreciation Cost		1,025
Labor (5 x 24 days x 200/day)		24,000
Raw Cashew Nut 60 sacks @ P1,500/sack		90,000
Cooking Oil		6,000
Fuel		3,000
NET INCOME		**328,375.00**

ROI = 2.64 or 264%

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR: Issues Community-Based Forest Management Agreement (CBFMA) and monitors compliance
- DTI: Packaging and marketing assistance
- Department of Science and Technology (DOST): Product registration and development
- Local government units (LGUs): Issuance of license and business permits

LAWS AND RESTRICTIONS

- The enterprise is registered with DTI under its OTOP program.
- BSIISFBMPC should secure registration with Bureau of Food and Drugs (BFAD).
- In relation to packaging and labeling, the product is DOST-registered.

BAGS FROM KARAGOMOI LEAVES

Location: Cagraray Island / Bgy. Manaet, Bacacay, Albay
Entrepreneur: Manaet-Tanagan Upland Farmers Association
Authors: Gregorio M. Llave and Efren C. Operio, Jr.

Karagomoi (*Pandanus simplex* Merr.) grows abundantly in the Cagraray Island and is the common source of raw material in the production of mats, bags and baskets, hats, placemats and other novelty products. The plants are resilient and provide simple source for the island's home-based handicraft industry.

The local artistry involved in weaving using karagomoi has been handed down through generations. Majority of the households in the island are involved in bag production. These items have commanded good price both in the local and international market because they utilize natural and indigenous materials that are durable yet biodegradable.

METHODS OF PRODUCTION

Part A. Karagomoi leaf production

Materials

Bolo
Stake
Stripper

Procedure

Step 1. Plantation establishment

- Select site preferably in moderate to highly elevated areas with some trees.
- For site preparation, clean and brush the area but retain the growing trees to serve as nurse trees (i.e., larger and faster-growing trees that can shelter smaller and smaller-growing trees or plants). Strip or spot-brush the site when karagomoi is intended for intercropping with coconut or other fruit trees. Stake at 2×2 m distance. Dig holes 15–20 cm deep and 10–15 cm wide prior planting.
- When sourcing planting materials, select suckers that are 46–100 cm high from the base from healthy karagomoi mother plants. Using a sharp iron bar or bolo, collect the suckers by digging 2–3 inches around the base and by cutting them from the roots. Prune mature leaves by cutting them close to the base. Plant the suckers directly in prepared holes and cover with top soil; do this at the onset of the rainy season. Typically, a 1-hectare plot needs 2,500 suckers when planted at 2×2 m distance. To facilitate subsequent harvesting and to promote production of quality leaves, plant one sucker per hill. Do not disturb the newly planted suckers 5–6 months after planting.

- For protection and maintenance, brush and ring-weed the planted suckers once on the first year, twice per year on the second and third years, and during every harvest for succeeding years. Protect the plantation from animals and monitor the occurrence of pest and diseases. Should there be any insect pests, remove them manually. In addition, regularly remove dried and matured leaves. In every harvesting, separate the growing suckers from the mother plant and use these as planting materials.

Suckers from mother plants

Do not plant karagomoi too close to coconut palms and bamboo clumps. Provide a distance allowance of at least 2 m away from standing coconut palms and 3–5 m from bamboo. During harvesting, do not pull the young leaves to uproot the suckers during collection; hold the seedling at the base and do not disturb the young leaves; and do not cover the sucker buds with soil during planting.

Step 2. Harvesting

- Cut leaf sheets close to the trunk using a sharp bolo or sickle.
- Harvest twice a year starting from the third year of plantation establishment.
- During initial harvesting, retain 12–13 leaves per plant. In succeeding years, harvest 17–20 leaves per plant.

Step 3. Leaf processing

- While leaves are still fresh, remove the spine using a sharp knife. Remove the base and the tip of the leaves 6–8 inches from both ends.
- Strip the leaves into the desired size using a stripper locally known as "batakan."
- Bundle 300 pieces of stripped leaves, which is enough to weave mats of average size.
- Hang and expose the leaves from the bundle to ensure uniform drying. Sundry the leaves for 2–3 days and do not over-dry, as leaves tend to become brittle and unsuitable for weaving.
- Re-bundle the dried leaves and keep at room temperature or in a shaded area.

Removing the spine, stripping, and drying karagomoi leaves.

Part B. Bag production

The main activities involved in bag production are flattening, dyeing, and weaving (Steps 4–6).

Materials

Dried karagomoi strips
Wooden log
Coloring powder
Molding materials of different sizes
Bag handle
Zipper
Thread

Procedure

Step 1. Flattening

- Flatten dried leaves using wooden logs locally known as "liguisan" in Bicol. This approach makes the dried leaves soft and pliable for weaving. The standard flattening or pressing time is 20–30 minutes.

Step 2. Dyeing

- Boil 2–3 Li. of water and pour one sachet of coloring powder. Stir continuously.
- Dip the leaves for 20–30 minutes in the coloring mixture.
- Remove the leaves from the mixture and dry.

Step 3. Weaving

- Using a prepared mold of different size and shape, weave the leaves into the prescribed bag design.



GENDER ANALYSIS

The local enterprise encourages men-women complementation in the work process, from plantation establishment to producing woven bags. Although men do most of the labor, women partake in spine removal, bundling, flattening, drying, and dyeing. It is recommended that women use working gloves when removing the spine and to use carefully the sharp tools. Moreover, women show great interest in bag weaving, having been trained in the production of bags with different designs. On the average, they spend 4.5 days a week in weaving especially during April to May. The marketing aspect is also largely dominated by women.

The primary motivation of women in participating in the local enterprise remains rooted in securing cash availability for every household. Their secondary purpose is to continue the family tradition of mat weaving. A routine in the community includes weaving bags and mats in the afternoon and at night after dinner. However, women are less likely to participate if they are still adjusting to their routine as nursing mothers or if they are involved in daily activities like attending to schoolchildren or sick members in the family. Nevertheless, participating mothers eventually improve their marketing schemes and learn to streamline their production and marketing skills. In effect, the time devoted to household routines is increased.

ECONOMIC BENEFITS

COST AND RETURN ANALYSIS OF ESTABLISHING ONE HECTARE KARAGOMOI PLANTATION FOR LEAF PRODUCTION AT 2 M. X 2M. DISTANCE FOR 5 YEARS

ITEMS	Y1	Y2	Y3	Y4	Y5
Revenue	0	0	56,250	75,000	75,000
Production cost	39,200	8,400	14,000	14,000	14,000
Establishment cost					
Clearing, brushing (24 md @ P175.00/md)	4,200	-	-	-	-
Stakes 2,500 pcs. (1 meter long)	2,500	-	-	-	-
Staking (3 md @P175.00/md)	525	-	-	-	-
Holedigging (6 md @ P175.00/md)	1,050	-	-	-	-
Planting materials (2,500 @ 10.00 each)	25,000	-	-	-	-
Planting (6mandays @ P175/md)	1,050	-	-	-	-
Replanting (1 md P175)	175	-	-	-	-
Tools	500				
Maintenance and Protection	4,200	8,400	1,050	1,050	1,050
Harvesting, hauling, drying, bundling and marketing for 2,250 bundles (37md)		-	12,950	12,950	12,950
Net Income	(39,200)	(8,400)	42,250	42,250	42,250

ROI : $\frac{126,750.00}{89,600.00}$ or 1.41 or 141%

Note: for the succeeding years, leaf production increases by 750 bundles.

ECONOMIC BENEFIT IN WEAVING BAGS

Bags without handle sells at 60.00/bag

SALES 10 bags at P60/bag	:	600.00
PRODUCTION COSTS		
Materials		Cost
2 bundles karagomoi striped		50.00
1 sachet coloring materials		15.00
Labor		
Coloring and flattening		12.00
Weaving		400.00
TOTAL		487.00
Net Income		113.00
ROI		0.23 or 23%

MARKETING CONSIDERATIONS

Dried stripped leaves are sold to traders and weavers in the locality, as well as those engaged in this type of cottage industry from other nearby localities. Finished products like bags, mats, and placemats are sold locally and abroad. Meanwhile, a bundle of unprocessed karagomoi leaves can sell at PhP25.00.

ECOLOGICAL IMPLICATIONS

- Karagomoi helps in soil and water conservation. As a raw material, karagomoi is fully biodegradable, thus making the finished product environmentally friendly.
- Karagomoi can be planted in combination with other agricultural crops and forest tree species.
- Karagomoi is easy to maintain and does not need intensive inputs; hence, it does not contribute to soil acidity unlike with other crops.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Research Sector of Department of Environment and Natural Resources (DENR)–Region 5: Community support in terms of technical assistance and establishing linkages in order to promote the products in collaboration with Philippine Council for Agriculture and Resources Research and Development (PCARRD) and Department of Science and Technology (DOST).
- Department of Trade and Industry (DTI): Assistance in the development of new designs and product line to enhance further the productivity and income of the community.

OIL FROM PILI PULP

Location: Dapdap, Bulusan, Sorsogon
Entrepreneur: Aggrupation of Advocates for Environmental Protection–Bulusan, Inc. (AGAP-Bulusan, Inc.)
Authors: Arlene B. Ranara and Judy G. Doma

Pili (*Canarium ovatum*, Engl.) is indigenous to Bicol and is the region's banner commodity. Region 5 accounts 82% of national pili production, the bulk of which is supplied by Sorsogon during the fruiting season from June to September.

Pili pulp is the fibrous, fleshy, and greenish yellow flesh covering pointed end and hard thick shell of the fruit. Processing the oil from pili pulp is a profitable business. In fact, for many upland families in Bulusan, Sorsogon, it is a very lucrative post-harvest enterprise. Products are delivered to AGAP-Bulusan, Inc., a non-governmental organization (NGO) registered with the Security and Exchange Commission (SEC), which then employs quality control and product packaging for retail.

METHODS OF PRODUCTION

Materials and equipment

3 plastic basins
3 plastic pails
2 stainless basins
1 cooking vat
1 stainless cooking spoon
1 wooden spatula
1 stainless strainer
1 charcoal-fired oven (pugon)
2 yards cheesecloth
6 sacks
4 onion sacks
25 packs charcoal
920 pcs. bottles
Improvised manual presser (wood planks) or manual presser (optional)
Improvised filter (see below)

Tip

In making an improvised filter, the basic materials needed are three plastic containers (1 gallon, 1.5 Li., and 500 mL. mineral bottle), filter, cotton, and activated carbon: Cut open the bottom of the three plastic containers. Then, pulverize the charcoal (e.g., coconut shell, pili shell, or wood) to produce sugar-fine activated carbon. Next, turn upside down the empty 1-gallon bottle and put cotton inside. Insert a cheesecloth lining (filter) inside the 1.5 Li. bottle. Pour the pulverized charcoal and fill about $\frac{1}{6}$ of the container. Put another cheesecloth lining inside the 500 mL. bottle. Finally, prepare the filtration assembly by affixing the three bottles in the following order: 1 gallon, 1.5 Li., and 500 mL. Insert pieces of cloth or cotton at the rims to hold the bottles in place. Tie the assembly to hold the different parts in place. One improvised filter can process 1.5 Li. of pili pulp oil per day.

Procedure

Step 1. Preparation of raw materials

- Sort fresh whole pili fruits and eliminate the defective ones. Put the fruits in a basin of tap water and clean.
- Soak the clean fruits in lukewarm water for 5 minutes and discard those that float. For larger volumes, soak them overnight.
- Depulp by removing the pulp from seed nuts and then macerate.
- For juice extraction, wrap the pulp (just enough for squeezing) using a cheesecloth. Put the cheesecloth with pulp inside an onion sack. Extract juice either by squeezing by hand or by pressing using wood planks, or by using a presser. Place the extracted juice in a stainless basin.

Sorting fruits to juice extraction

Wooden planks vs. a mechanical presser

Use hairnet and gloves for sanitary purposes.

Step 2. Cream extraction

- To separate cream and water components, set aside the extracted pili pulp juice overnight.
- Scoop off the cream using a big stainless cooking spoon.
- Place the cream in a stainless cooking pan.

Step 3. Cooking

- In a charcoal-fired oven, cook the cream in low fire. The cooking time of 5 Li. of cream is about 1.5 hours.
- Remove from heat when cream pili solids ("latik") form on top of the mixture.
- Separate cream pili solids from the oil using a stainless strainer.

Pili shells can be used as cooking fuel.

Step 4. Filtration

- Place a wide-mouth sterilized glass container under the improvised filter.
- Pour carefully the oil for filtering.

Step 5. Packaging

- Pour the filtered pili pulp oil in sterilized glass bottles.
- Label the product for marketing.

Sterilize glass bottles in boiling water or wash with diluted regular bleach solution.

GENDER ANALYSIS

In the Bicol region, oil production from pili pulp is considered a family enterprise. The peak season of oil production is June to July, and may extend to September. The task of harvesting pili fruits is shared by both male and female. Men climb the trees while women, including their children, help in picking/gathering the harvested fruits. In a week, women spend an average of 1 day; 1.5 days by men; and 0.5 days by children. The same is true with washing of fruits up to the depulping process. Most of the time, men conduct juice extraction; however, when men are out farming or doing other work, women take over in this activity. Then, women take charge of the subsequent processes: cream extraction, cooking, filtration, and packaging.

Overall, women spend a bit more time compared with men in pili pulp oil production (around 53 % of the whole production cycle). After extracting the juice, men would only participate again in the cleaning of washed and depulped pili nuts for kernel production (another source of livelihood among locals).

Women are motivated to partake in the production of pili pulp oil primarily to augment the family income; in fact, there has been a notable decrease in unemployment levels among them. As a family enterprise, supervising this family enterprise can be done simultaneously with household chores, hence minimizing time and mobility constraints.

MARKETING CONSIDERATIONS

The increasing consciousness among consumers to purchase organics has allowed pili pulp oil producers, mainly through microenterprises, to inch their way into the local market. Prospects for establishing markets at the international community are also promising. However, while there is increasing demand, production remains low because of the manual method of extraction, apart from being laborious and time-consuming. The need to fabricate a mechanical pulp presser is therefore essential.

Among locals, oil from pili pulp is used as medicine to treat skin diseases and to de-worm livestock. In the cities, it is now being used as fragrant oil in spa establishments because of their high moisturizing property. Nutrition-wise, pili pulp oil is very similar to olive oil; it contains phytochemicals and is a good source of vitamins A and E. There is an increasing number of individuals who take pili pulp oil as dietary supplement to control their cholesterol levels and to enhance their immune system.

The growing demand for pili pulp oil sets off new opportunities for lowland households to augment their family income. In the past, the more popular products are pili candies and novelty items made from pili shells. Presently, AGAP-Bulusan Inc. sells pili pulp oil in local markets in Sorsogon and the other provinces in the Bicol region. Notably, there is an increasing purchase of pili pulp oil from among spa owners in the region and nearby localities.

ECONOMIC BENEFITS

Labor Schedule:

ACTIVITY	NO. OF WORKERS	NO. OF DAYS IN A CYCLE	TOTAL WORKING DAYS (@ 8hrs/day)
Harvesting	3	1	3
Washing, sorting, depulping	4	1	4
Juice Extraction	3	2	6
Cream Extraction	1	1	1
Cooking	2	2	4
Filtration and Packaging	2	3	6
		6	**24**

Assumptions:

Production period	:	June-September (peak months)
Average single processing cycle	:	6 days
Labor requirement per cycle	:	24 mandays
Total production cycles	:	16
Depulping capacity of one worker per day	:	5,000 pcs fresh whole pili fruit/day
No. of filter assembly	:	7 pcs
Volume of raw material to be processed per cycle	:	20,000 pcs fresh whole pili fruit
Average yield	:	2 liters pili pulp oil/ 1000 pcs fresh whole pili fruit
Average production per cycle	:	40 liters
Cost of product (350ml pili pulp oil)	:	P 75.00

ITEMS					TOTAL
Total Revenue					
1828 bottles (350 ml) @ P75.00 per bottle					**137,100**
Total Production Cost (Initial production)					**60,639**
Material	3 plastic basin	225	1 stainless strainer	30	
	3 plastic pail	225	1 charcoal-fired oven or "pugon"	300	
	2 stainless basin	500	2 yards cheesecloth	40	
	1 cooking vat	400	6 sacks	50	
	1 stainless cooking	25	4 onion sacks	20	
	1 wooden spatula	30	25 packs charcoal	250	
	1 stainless strainer	30	1828 pcs bottle	914	
Labor	384 mandays @ P150	57,600			
Net Income					**76,461**
	Total Revenue	137,100			
	Less: Total Production cost	60,639			
Return on Investment					**1.26**
	Net Income	76,461			
	Total Production cost	33,755			

ECOLOGICAL IMPLICATIONS

Pili pulp is commonly treated as waste after extraction of pili nuts (i.e., considered the most important product from pili due to its high commercial value). Extracting pili oil is environment-friendly and promotes optimum utilization of the pili fruit, including the pulp. Once the juice is extracted, the pulp meat can be used as feeds when dried and as media for mushroom culture. The growing demand for pili pulp oil has encouraged more farmers and entrepreneurs to establish pili plantations and farms.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Science and Technology (DOST): Product processing and research and development
- Department of Trade and Industry (DTI): Training on product development and packaging
- Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), and local government units (LGUs): Support for pili growers and processors

- Department of Tourism (DOT), AGAP-Bulusan, Inc., and Leslie Pili Products (Sorsogon City): Marketing and product promotion
- Bicol Consortium for Agriculture Resources Research and Development and Ecosystems Research and Development Service: Research and development
- Bicol Pili Board, Inc.: Enhanced linkages among key commodity players, from microenterprises to the rest of the stakeholders of the pili industry
- Pili Processors Association of Sorsogon: Product promotion by joining International Food Expo Exhibits and Fairs
- Various pili growers: Supply of raw materials

LAWS AND RESTRICTIONS

AGAP-Bulusan, Inc. is registered with SEC. Since the product is used as food and for health and cosmetic applications, permit from Bureau of Food and Drug (BFAD) must also be secured.

REFERENCES

Asuncion, Jerry N. "Pili oil extraction technology in DOST-V," www.sntpost.stii.dost.gov.ph/NewPOST/.
Bartilet, Philip. AGAP-Bulusan, Inc. Bulusan, Sorsogon. Personal interview, 2010.
Calleja, Danny O. "DOST develops pili pulp oil extraction technology in Sorsogon," Positive News Media.
Department of Agriculture RFU 5, UMAsenso Vol. 15 No. 2, April–June 2006.
Department of Agriculture. BAR R&D Digest, April–June 2008.
Flores, Helen. "Coming soon: Virgin pili nut oil," Headlines Post, 2010.
Gonzales, Ruben. AGAP-Bulusan, Inc., Bulusan, Sorsogon. Personal interview, 2010.

SAWALI FROM KAWAYAN TINIK

Location: Municipalities of Alimodian, Maasin, and Janiuay in Iloilo
Entrepreneur: Katilingban sang mga Pumuluyo na Naga-atipan sa Watershed–Maasin (KAPAWA-Maasin), a federation 16 people's organizations (POs)
Author: Apolinario Librodo-Corbal; Co-author: Bernabe H. Garnace

Sawali production is a primary source of livelihood in the uplands, particularly in the Municipality of Maasin and neighboring towns in Iloilo. Sawali has various uses and high demand in the market: (1) drying of rice, corn, coffee, beans, and cacao; (2) walling and design of native houses; and (3) fence construction.

The bamboo species widely used in sawali production is the Kawayan Tinik (*Bambusa blumeana*, Family Gramineae). At the Maasin Watershed Forest Reserve (MWFR), a protected area, this species is abundant and widely used for riverbank rehabilitation and agro-forestry farms because of its ability to grow rapidly, providing immediate protection for soil stability.

Sawali production became a large-scale enterprise in Maasin through the assistance of New Zealand Aid Program (NZAP); this was after the federation was recognized for its best practices in Community-Based Forest Management (CBFM). Prior the establishment of the enterprise, in 2002, the member POs individually managed small businesses in the form of "buy-and-sell" of sawali. Initially, they used the savings generated from comprehensive site development (CSD) contracts acquired through the Forestry Special Projects (FSP) loans from Department of Environment and Natural Resources (DENR)–Japan International Cooperation Bank (JBIC). Within the same period, the POs were awarded CBFMA No. 38416 with an area of 3,415.92 ha. The sawali production sites are situated in the periphery of the 6,738.52-hectare Maasin Watershed.

In 2007, the Municipality of Maasin was designated as the Bamboo Capital of Region 6. Sawali-based crafts and products were labeled "One Town, One Product" (OTOP) by the Department of Agriculture (DA) and Department of Tourism (DOT).

METHODS OF PRODUCTION

Materials

10 freshly cut bamboo poles
Bolo
Sharpener
Improvised needles
Small strips of rattan

Bolo, sharpener, and improvised needles

Procedure

Step 1 Stripping

- Cut 3-meter-length bamboo poles using a bolo. Divide the bamboo poles into two parts.
- Split the broken bamboo poles into the desired size, but preferably to 1-inch width.
- Scrape the bamboo nodes using a bolo.
- Split and separate the innermost part of the bark, as these can be used as materials for roofs, fences, fuel, and decorations. Locally, this is called "lip-lip." Then, split and separate the middle and outer strips, as these can be used for walling. Locally, this is called "amakan."
- Hang and air-dry the bamboo strips for 1 day to allow for shrinkage.

Step 2. Weaving

- Lay at least 5 pieces bamboo strips on a flat surface and put under your feet in a vertical position.
- Insert the first horizontal strip under the first, fourth, and fifth vertical strips. Then, insert the second horizontal strip under the first, second, and fifth vertical strips. Finally, insert the third horizontal strip under the third and fourth vertical strips.
- Repeat this process to complete the weaving until the desired size of the sawali or amakan (e.g., 2.4×4.8 m) is attained.
- From time to time, tighten the strips.
- Thicken the edge/side of the sawali by twisting back the strips and inserting/hiding it to the next immediate strip.
- Side-stitch the rim and firm up the sawali or amakan with rattan strips using the improvised needle. For finishing, trim the edges using a bolo.
- Air-dry the finished product to release moisture and to prevent from fungal attack.
- Store the finished product in a ventilated place.

GENDER ANALYSIS

Sawali production is essentially a family-led enterprise that encourages the participation of husband, wife, and children. Men conduct the cutting of bamboos into strips and stitching them together. Side-stitching or edging is shared by both men and women. Women show greater interest in weaving and selling the products compared with men; these activities do no prevent women from performing their chores, as they can be done simultaneously with household roles, hence minimizing time and mobility constraints. Children can also participate in all aspects of the production, although their engagement in the family enterprise should not prevent them from going to school. In the weaving process, one sawali can be completed in two days.

As a precautionary measure, it is advised to hold sharp tools carefully and to cover the nose to avoid inhaling dust accumulated during the production.

ECONOMIC BENEFITS

Monthly Financial Analysis

SALES		**P 9,960.00**
12 Amakan @ P590		7,080
12 sets of Lip-lip @ P240		2,880
PRODUCTION COST		**8,163.33**
Fixed Investment	550	
Bolo	250	
Cutter	120	
Improvised Needle	60	
Sharpener	120	
Depreciation cost (3 yrs)		183.33
Bamboo pole @ 20/pole x 10 poles (12 sets)		2,400
Rattan @ P50/bundle (12 sets)		600
Labor (for 12 sets)		4,980
NET INCOME		**1,796.67**

ROI = 0.22 or 22%

MARKETING CONSIDERATIONS

KAPAWA-Maasin has established business outlets in Mindoro, Kalibo in Aklan, and Iloilo City. Products are sold to individual or direct buyers. Usually, sawali sells more in January and September.

ECOLOGICAL IMPLICATIONS

Sawali production is considered a sustainable and low-impact activity in the Maasin Watershed protected area. Upland farmers conduct selective cutting or harvesting of matured bamboo poles only for this purpose.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Enterprise Development Project of NZAP
- Department of Trade and Industry (DTI)
- Fiber Industry Development Authority (FIDA)
- Japan Bank International Cooperation (JBIC)

LAWS AND RESTRICTIONS

KAPAWA-Maasin is a legitimate holder of CBFMA No. 38416 issued by DENR R6 last December 17, 2002.

Law enforcement and strict implementation of rules and regulations governing the National Integrated Protected Area System (NIPAS) are strictly observed and implemented by DENR and Protected Area Management Board (PAMB). Maasin Watershed is a protected area by virtue of Proclamation No. 16 (February 12, 1923).

REFERENCES

Development of designs and production of deformed bamboo culms for Bambusa blumeana Schult. and Bambusa blumeana var. luzonensis Hack. Ecosystems Research Digest, DENR-ERDS R6, Iloilo City, Vol. 1 No.1, July–September 2006.

Bamboo Production. Techno Transfer Series. DENR ERDS, Region IX, Pasonanca, Zamboanga City, Vol. 2 No. 4.

Pagpreparar sang Sukdap nga Kawayan para sa Pagrara. Techno Transfer Series, DENR ERDS Region 6, Maasin FITS Center and WESVARRDEC, March 2009.

PAMB Resolution No. 03 Series of 2005 "RESOLUTION ADOPTING THE COMMUNITY RESOURCE MANAGEMENT FRAMEWORK (CRMF) OF KAPAWA-MAASIN IN THE ZONIFICATION OF MAASIN WATERSHED FOREST RESERVE."

HONEY PRODUCTION

Location: Camp 7, Minglanilla, Cebu
Entrepreneurs: Guadalupe Upland Agricultural Resource Developers Organization (GUARDO)
Authors: Chona M. Tura and Lyndisa C. Quiachon

Apiculture, popularly known as honeybee keeping, is the art of caring for and manipulating colonies of honeybees so they can produce and store honeybee products above their own needs. Honey is the most common bee product. Other products include pollen, royal jelly, beeswax, propolis, and bee venom. Apart from the nutritional and medicinal values of honeybee products, bees are also efficient pollinators, thereby promoting seed yield, fruit-setting, and increased yield of various plants.

In 2004, this enterprise was initially funded under the Community Livelihood Assistance Program (CLASP) with a total budget of PhP230, 000. After the end of the project, Ecosystem Research Development Services (ERDS) continuously provided financial and technical assistance under the Gender and Development (GAD) activities.

METHODS OF PRODUCTION

Materials and equipment

Smoker
Bee veil
Bee brush
Beehive/bottom box - A wooden box with ten frames where the bee colony lives and builds its nest
Super hive/upper box – A receptacle placed over or above the brood chamber wherein bees store surplus honey
Foundation wax – A sheet of beeswax embedded in a frame in which the bees build their combs
Pollen trap – A wooden or plastic rectangular container (measuring the same length with the entrance of the beehive) used to trap or collect pollen
Hive tool – This is used to move the frames inside the beehive. It is also used for scraping wax and propolis inside the hive.
Queen excluder – A rectangular frame made of round iron bars placed on top of the bottom box used to separate the queen from the upper box (super hive) where ready-to-harvest honey frames are placed. An excluder is used only during the honey flow period.
Honey extractor – A cylindrical drum with at least two-frame containers into which a handle is driven manually to create centrifugal force, allowing the honey to spill put from the uncapped honeycomb
Gloves
Knives
Basins
Strainer
Funnel
Styrofoam box


Smoker


Bee veil


Bottom box


Upper box


Foundation wax


Pollen trap


Hive tool


Queen excluder


Honey extractor

Procedure

Step 1. As a preparatory activity, maintain at least 2–3 starter colonies. A starter colony is a three-frame colony with the presence of all the stages of brood-egg, larva and pupa, and a young good-laying queen. It also has pollen and nectar.

The colony should be free from mites and diseases.

Step 2. Colony/hive management: This includes two sub-activities, inspection and feeding of colonies.

INSPECTING THE COLONIES

- Inspect honeybee colonies once a week to check for presence or absence of pests and diseases; to determine if there is enough food for the bees; to ascertain when to add a frame with foundation wax; and to assess the queen's performance in terms of laying eggs.

Use bee veil to avoid sting. Do not stand in front of the hive; otherwise, the foraging bees will be blocked.

- Acquire mated queen bees from a reliable source. The bee species used by GUARDO is an imported honeybee known as *Apis mellifera*, purchased from Australia and Hawaii through the assistance of Cebu Honeybee Keepers Association, Inc. (CHKAI).
- Lift the upper cover of the hive, including the entrance of the hive, and gently puff smoke. Avoid using the smoker when the bees are gentle.
- Remove one frame at a time and inspect both sides. Examine the rest of the frames and arrange them such that the queen is provided with empty cells for laying eggs. Ensure that food and brood frames will not block the queen from finding cells where she can lay eggs.

- Place the food frames at the outside-most portion of the hive, followed by the sealed brood frames, then the larvae and egg frames.
- If the colonies are attacked with mites, treat them with miticide. If infected with bacteria-causing "foul brood," treat them with antibiotic (e.g., Terramycin) with confectioner sugar.

FEEDING THE COLONIES

- Provide supplemental feeding by using sugar syrup during rainy season (dearth period) in the following concentrations: (a) 60% sugar: 40% water for comb building; (b) 40% sugar:60% water to maintain the population; and (c) 50% sugar:50% water to increase the population of worker bees.
- Place the sugar syrup in a plastic bag (e.g., 3×16 cm ice water cellophane). Hole-pinch the plastic bag and place on top of the frames/hive.

Tip (1) Never feed during rainy days. (2) Reduce the entrance of the beehives. (3) Avoid spilling sugar syrup in the apiary, as this will cause robbing. (4) Ensure that feeders are not accessible from outside predators and intruders.

Step 3. Harvesting

- Harvesting honey can be done via two methods: selective harvesting wherein frames with ripe honey or sealed frames with honey are selected for harvest, and one-time harvesting, which is usually done at the end of honey flow.
- Select frames with ripe honey, as characterized by sealed honeycombs.
- Put selected frames in a styrofoam box. Cover to prevent entry of worker bees.
- Prepare, clean, dry, and sterilize the paraphernalia to be used for honey extraction (e.g., honey extractor, basins, knives, strainer, funnel, and honey container).
- Uncap honeycombs using sharp knives so that honey can flow easily out of the cells.
- Place uncapped frames in the extractor in an upright position and spin manually in a clockwise direction. By centrifugal force, honey will spill out of the frames.
- Allow the wax capping to drip for several hours, as it still contains plenty of honey. Thereafter, press it down to extract the remaining honey.
- Filter the extracted honey to eliminate most of the coarse impurities. Let the honey settle for a few days. Remove lighter particles (e.g., wax debris, dead bees, air bubble, etc.) and other scum.
- Transfer the collected honey in bottles using a funnel and a very fine mesh strainer. Seal and label for marketing.

Tip (1) Honey frames fully sealed with beeswax indicate ripe honey, hence ready for harvest. (2) Honey easily absorbs odors as well as air humidity so any harvested honey should be stored in closed containers placed in clean, dry, and odor-free storage. (3) Extracted honey also attracts bees easily, such that if a bee-tight room is not available, extraction should be done at night when bees are not flying actively.

Step 4. Post-harvest management

- Reduce the population of bees to about 4–5 frames to minimize feeding costs during dearth period.
- Wrap any unused frames in newspaper. Then, place them in a wooden box with naphthalene balls. Seal the box tightly to prevent attack of wax moth.

ECONOMIC BENEFITS

Cost & Return Analysis of Honey Production in two (2) years

	YEAR-1 (in Pesos)	YEAR-2 (in Pesos)
SALES	**P 39,000.00**	**P 97,500.00**
Year-1, 2 colonies		
64 bottles honey @ 250 per 375 ml bottle	16,000	
Increase in brood for 10 frames @ 850/frame	10,000	
Value of original colony	13,000	
Year-2, 5 colonies		
160 bottles honey @ 250 per 375 ml bottle		40,000
Increase in number of colony @ 6,500/colony		32,500
Increase in brood for 25 frames @ 1,000/frame		25,000
PRODUCTION COST	**28,053.00**	**37,740.40**
Nucleus colony with 3 brood frames, 1 mated queen, 7 empty frames with foundation wax	13,000	
Super Hive	800	
Frames with foundation wax	3,000	9,000
Smoker	1,200	
Hive tool	500	
Queen excluder	1,000 (2 pcs)	1,500 (3 pcs)
Bee veil	150	
Bottles & seals	133.50	320.40
Medicine (Apistan, Terramycin, Confectioner sugar)		1,420
4 strips	520	
2 packs	106	
1 pack	40	
Sugar	2,784	6,960
Miscellaneous expenses (Funnel, Moslim cloth, plastic bags, Styro foam big)	500	1,000
Honey Extractor (rental)	647.50	860
Labor (P34/hour)		
Maintenance	3,264	8,160
Harvesting	272	680
Packaging	136	340
Bottom box & Super Hive w/ cover (3 sets)		3,600
Additional Queen		3,900
NET INCOME	**10,947.00**	**59,759.60**
ROI	**0.39 or 39%**	**1.58 or 158%**

MARKETING CONSIDERATIONS

There is high demand for pure honey in local markets. However, the quality of packaging, including proper labeling, should be ensured. Product labeling is important to advertise the producer of the honey and to inform the consumer of its source.

In the locality, bottled honeys are sold at a very reasonable price. Honey in 375 mL plastic bottles are sold by GUARDO for PhP250 at farm gate price (i.e., patterned by GUARDO after CHKAI). Some individuals buy an average of 2–3 bottles every purchase; others purchase by the gallons. GUARDO uses 375 mL plastic bottles for packaging. Their honey products are also packaged in 4 L. containers, which is about the volume of a gallon.

GENDER ANALYSIS

Apiculture is an income-generating venture that encourages the participation of both men and women. The technology involved in the enterprise requires minimal labor, time, and input.

In GUARDO, both men and women equally share in the production work, specifically in the inspection and feeding of honeybees; both devote 2 hours a week. On the treatment of honeybees infested by mites, both spend an hour per application, a task that is done twice a year. Both men and women also allot 4 hours for the splitting and merging of colonies, and harvesting of honey and pollen activities. Men make the boxes and frames, and repair them (24 hours). Women focus on packaging and marketing (4 hours).

Women are motivated to participate in this enterprise to gain additional knowledge and to develop their skills in marketing and production, as this can increase their income. As a consumer product, families also gain from the added nutritional/medicinal benefits derived from honey.

ECOLOGICAL IMPLICATIONS

The apiculture enterprise contributes and supports sustainable forest management. In particular,

- INCREASE IN NATURAL VEGETATION: Beekeepers are motivated to plant more flowering trees as source of nectar for the honeybees. Furthermore, bees are agent of pollination and thus, there has been enhanced regeneration of natural vegetation.
- PROTECTION OF WILDLIFE SPECIES: Culturing honeybees is one way of increasing its population, thereby protecting them from extinction. Apiculture also minimizes dependence on local wild bees for honey.
- PROMOTION OF INDIGENOUS PRACTICES IN RESOURCE MANAGEMENT: Honey extraction is an indigenous practice that needs technology development and enhancement.
- CONTRIBUTION IN RESOURCE RECOVERY: Honeybees are important resource with vital contribution to plant pollination. The enterprise contributes and enhances recovery of local resources in terms of honey, pollen, and other bee-related products, which are largely untapped.
- CONSERVATION AND DEVELOPMENT OF PROTECTED AREAS: Beekeepers are encouraged to plant more trees and other flowering plants; they also exert pressure against illegal cutters of trees within the Community-Based Forest Management Agreement (CBFMA) area. The enterprise production area, which is located within the vicinity of Guadalupe Mabugnao Mainit National Park, is expected to bring positive impact to the said protected area, particularly in terms of plant pollination.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The enterprise seeks support from Department of Trade and Industry (DTI) in terms of improving the packaging and labeling of their honey products. They have also established linkages with Bureau of Food and Drug (BFAD) for food quality control. Department of Agriculture (DA) and Department of Environment and Natural Resources (DENR) provide technical assistance and financial support.

LANDANG FROM BURI STARCH

Location: Bgy. Guadalupe, Carcar, Cebu
Entrepreneurs: Shirley Quilaton, Carmelita Quijoy, and Pedro Bas
Authors: Joselito T. Sumabat and Lyndisa C. Quiachon

The enterprise involves the production of local foodstuff known as "landang" out of starch extracted from Buri palm (*Corypha elata* Roxb.). Landang can also be produced from sago palm, but landang from buri is preferred because of its taste and longer shelf life. For many in Visayas and Mindanao, landang is an important ingredient to a number of delicacies. The peak of landang production is usually in February and March in anticipation of high demands for the Holy Week.

Starch extraction and utilization is just one of the many uses of buri palm, which is also considered a "Tree of Life" next to the coconut tree. The most important products from palm trees are its three kinds of fibers—buri, buntal, and raffia—that are traditionally woven into fabrics, hats, mats, baskets, bags, and various handicrafts. Palm is also a source of "tuba" (local wine) and vinegar. Needless to say, products from landang can be considered the "last" product from the buri palm.

METHODS OF PRODUCTION

Materials and equipment

Axe or bolo
Modified sickle with two opposite handles
Wooden mortar and two pestles
Strainer (fine mesh net or silkscreen)
Plastic pail or basin
Plastic chicken mesh
Bamboo winnow
Cooking utensils (frying pan and ladle)
Jute sack
Coco cloth
Ordinary sack
Wicker basket
Big-sized transparent polyethylene plastic bags
Polyethylene sando bags
Cooking oil
Weighing scale

Procedure

Step 1. Palm felling and cutting: Cut felled buri trunk into 2–3 ft long boards.

To maximize its economic potentials, harvest only mature buri palm (i.e., prior initiation of flowering/fruiting stage). Follow appropriate felling procedures for safety purposes.

Step 2. Bark removal and pith slicing: Remove the bark and thin wood layer ("bahi"), and slice the piths into chips or 0.5–1 cm thick planks ("tablon"). Piths are the soft-core portion of the buri palm trunk.
Step 3. Drying and storage of planks/chips: Sundry the chips and planks in a concrete pavement, regularly turning them to expose both sides and to speed up drying. If not immediately used, place the chips and planks in a sealed sack and store for up to 1 year.



Tip

Under normal sunny day conditions, drying of planks/chips from one buri palm can take up to 5–7days. Planks may be piled around a burning wood fuel (e.g., buri palm residuals) to speed up drying.

Step 4. Starch extraction: Using a mortar and pestle, pound the chips and planks until they into powder. Sieve the flour using a fine mesh net, occasionally returning coarse granules for further pounding. Purify the powder by sifting it with the use of a silk screen.



Tip

Two wooden pestles can be used simultaneously, one with sharp end for chopping and the other with round end for pounding. Use facemask when sieving flour.

Step 5. Flour processing/pelleting: Using a plastic container, wet the flour and let it settle for an hour. Drain the water and collect the wet flour. Pound the wet flour using a coco cloth to remove excess water, then knead or rub it in a plastic chicken mesh. Winnow the flour to produce pellets (landang). Spread over a jute sack or coco cloth and air-dry.

Tip

For every 50 kg of flour, add 25 gallons of clean water. Optional: Add 60 g of pink food coloring.

Step 6. Cooking: Lightly grease the frying pan with cooking oil and fry the pelletized landang in low heat until firm. Stir occasionally to prevent the landang from burning. Spread the cooked landang over a nylon mesh net, jute sack, or coco cloth to cool. Cover with nylon mesh net to protect from housefly.

Tip

To prevent contamination, put the cooked landang in a transparent polyethylene bag before placing in a sack or wicker basket.

Step 7. Packaging and marketing: Sell landang by retail or bulk. Adopt a clean and good packaging practice.

ECONOMIC BENEFITS

Sales	
12 Buri Palms	300,000
Cost of Tools	
Farmer's Bolo	700
Modified Sickle	400
Sack	200
Wooden Mortar and Pestle	200
Fine Mest Net	50
Silk Screen	50
Plastic Basin	100
Plastic Pail	100
Bamboo Winnow	100
Frying Pan	1,200
Ladle	100
Jute Sack	40
Sub Total Cost of Tools	3,240
Product Cost	
Buri Palm	6,000
Transport of Buri	6,000
Big Wicker Basket	3,600
Plastic	2,400
Basic Food Coloring	1,200
Water	
Fuel Wood	6,000
Cooking Oil	480
Sub Total Cost Of Product	25,680
Cost of Labor	
Buri Palm Felling; Bark Removal and Cutting into Boards	2,988
Slicing into planks and chips	5,976
Sun Drying	29,880
Heating	2,988
Pounding and Sieving	29,880
Actual Landang production	29,880
Sub Total Cost of Labor	101,592
Marketing Cost	15,000
Contingency Cost	30,000
Total Cost	175,512

Net Income = 300,000 – 175, 512
= 124, 488

ROI = $\frac{124,488}{175,512}$ = 0.70 or 70%

MARKETING CONSIDERATIONS

A harvestable buri palm can produce at most 20 sacks or 1,000 kg of landang. The prevailing price is P25.00/kg or P1,250/sack. In Cebu, the price of landang when retailed in the market can reach PhP50.00/kg. In the Visayas, preparation of raw materials from buri peaks in February or March, weeks before the Holy Week. In some places, there is a considerable demand for landang during schooldays, as "binignit," a local delicacy that uses landang, is served as common affordable snacks in school canteens.

Landang is essentially carbohydrates with no nutritional value. However, this can be supplemented by other nutritional sources. Specifically, landang is used in combination with other foodstuff or used as ingredient in a number of local delicacies, namely binignit (root crop porridge in coconut milk), budbud (pudding rolls), puto (steamed pudding), and tinamping (a salvaro-like delicacy), among others.

Finally, while the sliced piths can be stored up to a year, landang as a processed product can be attacked easily by molds. In such cases, locals recommended rinsing the landang using clean water to remove the molds and bring back its palatability.

GENDER ANALYSIS

Knowledge on landang production has been handed down from the old, and both male and female have equal knowledge on every step of the landang production. However, on certain stages that require greater manual force, such as felling and cutting of buri palm and subsequent cutting of felled trunk into boards and slabbing/slicing, males prefer to handle these tasks; they devote 8 and 16 hours, respectively. Meanwhile, women have developed more skills and patience on cooking landang, given that these tasks are related to their reproductive role, which they adeptly perform in their own households. In addition, since the wife usually takes charge of the selling/marketing of products, she has direct and first-hand access to income derived from the sales, which she directly uses to buy household goods and food.

Male and female workers allot 48 and 40 hours, respectively, for drying/heating and storage of planks/chips. For starch processing (pounding and sieving), the hours allocated by men is 64 hours while women devote 16 hours. Finally, for flour processing/pelleting, men consume 12 hours while women allocate 32 hours.

Aside from the shared task in the processing of starch and/or in the production of landang, the wife actively participates in the decision-making and she oversees the management of the enterprise. Overall, this landang enterprise can enhance the well-being of both husband and wife through the additional income derived for the family.

ECOLOGICAL IMPLICATIONS

Landang production from buri palm promotes resource conservation, protection, and sustainability. Protection of buri palms from unnecessary or premature cutting is encouraged; this is mainly because buri is allowed to mature in landang production, as achieving the mature stage ensures optimum starch accumulation in the trunk. Likewise, to ensure sustainability, one buri palm is retained as mother tree and then used as source of propagules for stock replenishment.

Additionally, this landang-based enterprise promotes efficient utilization of the environment. Production of landang from buri is just a proof that buri, like coconut, is a tree of life because of the numerous uses and products that it can provide. The bark can be used as fuel wood, residual fiber can be sold or used as stuffing for beds and sofa sets, and residual powder or

bran ("tahop") can be sold or used as livestock feed. Instead of allowing buri palms to die naturally, the trunk is also harnessed to provide livelihood for marginalized upland dwellers. Buri harvesting for landang production does not conflict with its other usage (e.g., leaves for fiber production) since the trunk is only harvested towards the end-life of the trees.

Buri palm can also be planted as a component of agroforestry farms, as boundary plant, or as windbreaks when placed at a distance of 10 m between plants.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The enterprise seeks technical services, funding services, and registration assistance and permits from the local government unit, Bureau of Food and Drug (BFAD), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), Department of Agriculture (DA), and Department of Environment and Natural Resources (DENR).

LAWS AND RESTRICTIONS

- Permits may be required if the products are transported across provinces.
- If chainsaws are used during palm felling, regulations as per Republic Act No. 9175 (Chainsaw Act of 2002), should be followed strictly.

ALMACIGA RESIN PRODUCTION

Location: Bgy. San Rafael, Taft, Eastern Samar
Entrepreneur: Mr. Roberto Recto and Shirley Recto
Author: Leo M. Poculan, D.M.

Almaciga (*Agathis philippinensis* Warb.) grows naturally in almost all forests in the Philippines, typically at the 150–2,000 m above sea level elevation. Its trees can grow as high as 60 m.

The Philippine government has prohibited the felling of the almaciga trees. Because of this, utilization is limited only to the gathering of resin, popularly known as almaciga resin or Manila copal. Almaciga resin can be used in manufacturing varnish, soap, paint, printing inks, linoleum, shoe polish, floor wax, plastics, waterproofing, turpentine, and perfume base. In local communities, it is used as incense for religious ceremonies, fuel and torches, caulking substances, and smudge for mosquitoes.

Although regarded as a minor forest product, almaciga resin is one of the leading dollar earners of the country.

METHODS OF PRODUCTION

Materials and equipment

Bolo
Small axe or tapping knife
Wood block ("pamalo")
60–80 kg sacks
Funnel-like container ("saluran" or "panaksakan")

Procedure

Step 1. Using these criteria, select almaciga trees for tapping:

- Trees with diameter at breast height (dbh) of at least 40 cm;
- Soft and thick bark;
- Crown exposed to sunlight;
- Located near water source valleys and slopes; and
- Protected from strong winds.

Step 2. Make the cuts on the tree trunk.

- Remove loose bark, dirt, and other foreign materials from the trunk using sharp bolo or wood chisel. Thoroughly clean the portion prior the tapping procedure.
- Start tapping at the basal portion of the trunk, which should not be more than 12 inches above the ground.

- Make a V-cut or horizontal incision about 1 inch wide and 6–12 inches long using a sharp tapping knife or bolo ("sundang") and pamalo.
- Repeat the cutting tapping procedure after 15 days. Make a ¼-inch cut immediately above the first cut to induce resin flow. Subsequently, cut vertically upward on the untapped portion of the trunk from the initial cut.

Step 3. Collect the resin.
- Collect the exudates using the saluran or panaksakan (e.g., anahaw leaves) after 3–6 months and bimonthly thereafter, or when the resin had dried and accumulated on the trunk.

Tapping and collecting resin

Start the first tapping at a point not more than 30 cm above the ground. Take utmost care to avoid damaging the cambium.

Step 4. Haul and package the resin.
- Haul the sacks of resin from the designated camp.
- Repack the resins in 60–80 kg sacks to maximize their capacity.
- Suspend the sacks just above the ground and compact the resins using big stones or any heavy materials that are available in the area.

Step 5. Caring for and maintaining the almaciga trees.
- Clean the surroundings of the almaciga trees to prevent the sticking of leaves and attack by termites.
- Avoid damaging the cambium layer, as this is easily attacked by termites. In case of termite attack, apply organic spray.

Step 6. Grade the almaciga resin.
- Samar grades: white, mixed black, and powdered.

GENDER ANALYSIS

The technology involved in this resin enterprise (i.e., tapping of almaciga) has been practiced by the community since the 1950s. Expectedly, both male and female have equal knowledge on the different activities involved in tapping. In the selection of almaciga trees, men devote an average of 3 hours while women devoted about 1 hour. Then, both male and female equally spend 1 hour in the tapping procedure and 3 hours in grading the almaciga resins. Resin collection is performed jointly by men and women, although the latter greater time (i.e., 18 versus 13 hours, respectively). The cleaning of almaciga trunk and marketing are activities fully initiated by women; they spend 1 hour for each activity. Accordingly, hauling and related packaging from the tapping camp to the roadside are fully performed by men, who devote about 4 hours.

As the wife usually takes charge of selling/marketing in the local market, she has the direct and first access to income, which she then directly uses to buy food and household goods. Aside from the shared task that this enterprise provides, the wife also gains the opportunity to share in the productive role while maintaining her reproductive role in the family. Likewise, the enterprise improves family bonding and camaraderie.

ECONOMIC BENEFITS

Item	Value (in Peso)	Total Value (in Pesos)
Annual Sales 4,320.00 kilos at P8.00		**34,560.00**
Annual Production Cost: - Tools: bolo,tapping knife funnel,mallet, sacks,katupis - Labor cost - Transportation cost (72 sacks at P10.00/sack)	 800.00 7,200.00 720.00	**8,720.00**
Net Income		**25,840.00**
Return on Investment Net income/production cost		**2.96 or 296%**

MARKETING CONSIDERATIONS

Gathered resins are placed in sacks and sold for PhP10.00/kg. One sack is equivalent to 75–80 kg of resin. Some buyers go to Bgy. San Rafael to directly buy the resin; however, it is more common for the wife to bring the resin products to nearby markets, if not personally deliver them to identified buyers.

Based on statistics, almaciga resin has a ready export market. Data has shown that about 300,000 kg of resin, with an estimated value of US$247,000, have been exported to China, Germany, and Hong Kong (1999). Locally, about 142,000 kg were exported to Cebu City (2008–2010).

ECOLOGICAL IMPLICATIONS

The protection and maintenance of the immediate surroundings of almaciga trees is observed so as not to interrupt the resin production. Accordingly, tappers contribute to the protection of the environment by patrolling the forest and sanctioning illegal activities. The enterprise has also helped improve the dipterocarp tree stand and other tree species in the site.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The Department of Environment and Natural Resources (DENR) continuously provide support on capability building, such as for meetings, information and education campaign, and training on proper tapping of almaciga trees. DENR also issues

Community-Based Forest Management Agreements (CBFMAs) and Resource Use Permits (RUPs), apart from providing some financial resources to help small entrepreneurs establish almaciga plantations.

LAWS AND RESTRICTIONS

DENR Administrative Order No. 74 and CBFM Executive Order 2008 cover a nationwide ban on the cutting of almaciga trees.

SMALLHOLDER TREE FARMING

Location: Bgy. Alegre, Dulag, Leyte
Entrepreneur: Salvador Ciega
Author: Emma M. Germano

Smallholder tree farming is a term that emerged from the collaborative project, "Enhancing Financial Returns of Smallholder Tree Farmers in the Philippines," implemented in Leyte Island, of which the collaborating agencies include the Australian Center for International Agricultural Research (ACIAR), University of Queensland (Australia), Visayas State University (VSU), Department of Environment and Natural Resources (DENR)-Region 8, and Visca, Baybay, Leyte. In this tree farming enterprise, trees are planted under the agroforestry scheme; the ultimate product is lumber. Smallholder tree farming and processing is an entrepreneurial activity of farmers with small parcel/s of land and lumber dealers/buyers from Leyte Island.

The Ciega Family's mahogany plantation and their residence–farm

METHODS OF PRODUCTION

Part 1. Nursery operation

Step 1. Site selection

- Ensure the following criteria for site selection: (a) the nursery is flat, well-drained, and large enough to accommodate all nursery activities; (b) water is available throughout the year; (c) it should have good exposure to sunlight and is protected from strong winds; and (4) it is easily accessible.

Step 2. Setting up the nursery

- Use materials that are available in the locality.
- Construction materials for the transplanting shed: Bamboos, small wooden poles, chicken wire, and acetate/coconut leaves.

It is more economical to set-up a nursery than to buy planting materials.

Step 3. Collection and preparation of growing substrates

- Materials for the substrate: river sand and ordinary garden soil.
- Sieve the river sand using a mesh wire. Using a vat with water placed just above the substrate surface, sterilize the substrate through heating for 30 minutes. Place the sterilized substrate in a perforated plastic tray and let cool for at least 12 hours.

Treat the sterilized medium with fungicide to avoid soil-borne diseases like damping-off. This can be done by soaking the medium overnight.

Step 4. Potting and transplanting the medium

- Materials for the substrate: 20% river sand, 20% rice hull, and 60% garden soil.
- Sieve the soil. Place the potting medium in 3×6-inch polyethylene bags. Apply fertilizer to the potting mix (optional): urea = 1.59 g/15.7 kg mixture; muriate of potash = 0.95 g/15.7 kg mixture; or solophos = 5.39 g/15.7 kg mixture. Prick the germinated seeds and put them individually into the polyethylene bags. Water the bags before and after transplanting using an atomizer hand sprayer.

Step 5. Hardening

- Nine (9) weeks after potting, place the potted seedlings outside the screen-house to harden the seedlings

Part 2. Plantation establishment

Step 1. Brush/clear the planting area.
Step 2. Stake at a planting distance of 2×2 m, 2×3 m, and 3×3 m.
Step 3. Dig 20×20×30 cm holes for clay soils or 30×30×45 cm for hard clay soils.
Step 4. Plant the seedlings.

Remove the plastic bag or tear the bottom part of the bag before planting.

Part 3. Maintenance

Step 1. Weed at 1 m diameter around the seedling when necessary.
Step 2. Conduct total brushing if the canopies of planted trees overlap.
Step 3. Establish a 10 meter-wide fire line around the plantation before the onset of the dry season.

Part 4. Harvesting

Step 1. Conduct thinning 4 years after planting (initial harvesting) and after 6 years (final harvesting) for Mahogany (*Swietenia macrophylla*) or if harvestable size is attained.
Step 2. Saw felled timber into the desired dimensions using a registered chainsaw while in the farm. Haul/transport the felled timber to the processing plant. Alternatively, use a band saw for cutting if brought to the processing plant of lumber dealers.

GENDER ANALYSIS

Inasmuch as this type of enterprise is largely managed by men, women do indeed have minimal participation in the various production processes. However, women are enjoined to participate in various tasks like potting, seedling production, transplanting, and care and maintenance of the nursery. Women also help in site preparation and field-based planting, which are usually done in the months of June to September.

Although men take charge of the marketing or selling of the planted mahogany, part of the sales is given to the women (e.g., wives), as they have a direct knowledge and control of their daily needs at home. The enterprise also gives women the opportunity to share in the productive role while maintaining their reproductive role in the family.

ECONOMIC BENEFITS

FARMER'S GROSS INCOME AFTER SIX YEARS FROM PLANTATION **P 19,595.00**
(175 sq. m. = 350 trees @ a spacing of 1 m x 2 m)
Buyer shouldered all processing expenses

Species	Product	Selling Price(Farm Gate Price)	
Mahogany	Flitches w/ big/commercial dia.	P2.17 x 3,500 bd. ft, for 150 trees	7,595.00
	Standing Tree w/ dia. ranges from 18-22 cm	P20.00/tree for 200 remaining trees	4,000.00
Branches for firewood to bakeries			8,000.00

VARIABLE COSTS *(Mr. Salvador ciegas's mahogany plantation in 1992)* **5,509.00**

1. Seedling Production
   - Polyethelene bag/Cellophane (3 x 5) 9.00
   - Seeds 100.00
   - Potting (2 man-days @ 100/day 200.00
   - Planting (2 man-days @ 100/day 200.00
2. Land rental 5,000.00

NET INCOME **14,086.00**

RETURN OF INVESTMENT *(after six (6) years)* **2.55**

Assumption:

Production data	17 years old
Species	Mahogany
Planting density	1 m x 2 m
Total number of trees	350 trees
Diameter and merchantable height	18 – 22 cm, 3 – 4 m

MARKETING CONSIDERATIONS

Marketing wood products or lumber from Bgy. Alegre is not a problem due to the many activities of furniture entrepreneurs in nearby towns. Additionally, lumber dealers buy trees from the plantation due to scarcity of lumber from dipterocarp species. An association of small-scale farmers was organized to help the beneficiaries widen its marketing and sales reach.

ECOLOGICAL IMPLICATIONS

Establishment of tree plantations restores the vegetative cover of unproductive/idle lands, minimizes soil erosion, and improves soil condition, thereby improving the microclimate in the surrounding area. It also enhances habitat diversity.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Funding and technical assistance from DENR.

LAWS AND RESTRICTIONS

Chainsaws must be registered at the nearest Community Environmental and Natural Resources Office (CENRO) before using them in the field. Tree plantations should also be registered with the DENR. Entrepreneurs/workers should always bring their Certificate of Tree Registration during harvesting and transport of lumber.

REFERENCES

Baynes, J. Growing and Managing Trees on your Farm: A summary of current research and observations applicable to farmers in Leyte. Australian Centre for International Agricultural Research (ACIAR) and Leyte State University (LSU), Visca, Baybay, Leyte, 6521-A, Philippines, 2005.

Bernaldez, SO, JK Vanclay, JL Herbohn, SR Harrison, and EO Mangaoang. Farm Boundary Survey and Study Block Establishment: A Set of Prior Activities for ACIAR/ASEM/053/2003 – Tree Measurement and Socio-Economic Survey. Proceedings of IUFRO 3.08 Conference, 2007.

Cedamon, ED, EO Mangaoang, JL Cedamon, J Herbohn, and S Harrison. Nursery Establishment and Practices for Smallholder Tree Farmers: Smallholder Forestry Info Kit, No. 1, 2005.

Cedamon, ED, SR Harrison, JL Herbohn, and EO Mangaoang. Reliability of the barangay-based small holder tree farm inventory: research and policy implications. Proceedings from the End-of Project Workshop, Ormoc City, Philippines, pp. 31–40, February 1-12, 2009.

Cedamon, ED, JL Herbohn, and SR Harrison. Recovery of milling timber from smallholder tree farmers using chainsaw and mini-bandsaw. Proceedings from the End-of Project Workshop, Ormoc City, Philippines, pp. 49–57, February 1–12, 2009.

DENR. Sustainable Livelihood Options: An information kit (*Upland Ecosystems*), pp. 315–331, 1997.

Monterola, JGN, FF Morales, JL Herbohn, JL Vanclay, GW Johnson, EO Mangaoang, and SR Harrison. Measurement of smallholder tree farms on Leyte Island: Proceeding from an International Conference held in Ormoc, Philippines, pp. 33–37, June 18–21, 2007.

Nasayao EE, EM Germano, ME Barillo, and AM Lumacad. Tree Establishment Technologies for the Philippines. Completed Reports of an ACIAR funded Research Project. Ecosystems Research and Development Service-Department of Environment and Natural Resources, Region VIII, Tacloban City, Philippines, p. 55, 1996.

LATEX PRODUCTION

Location: Simbol, Kabasalan, Zamboanga Sibugay
Entrepreneur: Avelino Tampol
Author: For. Nely M. Butic; Co-author: For. Dionisio Rago

Rubber tree (*Hevea brasiliensis*) belongs to the family Euphorbiaceae, a native of South America and introduced to Southeast Asia during the 19th century. It grows best in tropical places with temperatures ranging 20–28°C and a well distributed annual rainfall. It grows on almost all types of soil, provided that the drainage is adequate. Depending on conditions, rubber trees usually take 5–6 years to mature; this is the time when farmers can start tapping and collecting latex, the milky white sap from rubber trees.

Latex is the main ingredient in making natural rubber, which is used in the manufacture of various products in the automotive, mining, agriculture, shipping, chemical, pharmaceutical, and consumer industries. Consumer products include tires, footwear, sporting goods, toys, globes, prophylactics, medical tubing, and feeding bottles nipples.

Rubber planters in the Philippines are predominantly smallholders owning an average farm area of 3 to 10 ha. In 2007, Zamboanga Peninsula (composed of the provinces of Zamboanga del Norte, Zamboanga del Sur, and Zamboanga Sibugay) attained the highest production area and volume of rubber latex with 42,133 hectares and 404,070 metric tons, respectively.

The Tampol family owns and manages a rubber plantation. The whole 30 ha. is intended for latex production, but only 20 ha. is still in the production stage, as some trees are newly planted and/or are less than 5 years old. Their average daily harvest is 13 kg/ha.

METHODS OF PRODUCTION

Materials and equipment

Tools (shovels, bolo, and sprayer)
Planting materials (budded rubber seedlings at plantable size)
Complete fertilizer (14-14-14)
Chemicals (herbicides/fungicides)
Tapping knife
Collection cup
Rubberized vat (for molding)
Formic acid as coagulant

Procedure

Part 1. Rubber plantation establishment

Step 1. Prepare the plantation area. Clear the site adequately to avoid competition for nutrients.
Step 2. Dig planting holes at a spacing of 4×5 m. The size and shape of the hole depend on the soil condition and planting materials. In fertile and soft soils, the hole should be 25–30 cm in diameter and 40–45 cm depth. In poor and hard soils, bigger holes are required with 40–45 cm diameter and 50–60 cm depth.
Step 3. Remove the polybag carefully. Place the seedling in the hole and backfill with fertile soil.
Step 4. Control weeds by using herbicides, slashing, line weeding, and ring weeding.
Step 5. Replant on the second year of plantation establishment so that the replants can develop fully before canopies close in. Use polybag buddings of the same age as those used during the initial planting in the field.
Step 6. Apply complete fertilizer every year for 4 years after planting.

PERIOD AFTER PLANTING	AMOUNT (14-14-14) TREE/6 MONTHS	PLACEMENT FROM THE BASE OF THE TREE
First year	62.5 g	30 cm
Second year	125 g	60 cm
Third year	250 g	90 cm
Fourth year	250 g	120 cm

Step 7. Prune to a height of 2–2.5 m. This allows smooth trunk to develop without branches or large scars.

Part 2. Latex tapping

Step 1. Rubber trees are ready for tapping when the trunk reaches 40–50 cm in circumference. Correspondingly, trees are on their 6th or 7th year after planting.
Step 2. Using a tapping knife, shave off a thin layer of the tree bark in a spiral direction and at an angle of about 30° covering half of the circumference of the tree. The cut should be about 2 mm deep so as not to damage the cambium.
Step 3. At around 10 a.m., collect the latex using a cup. Pour the collected latex into a container.
Step 4. Prepare a solution of formic acid and water at 1:30 ratio.
Step 5. Pour the latex in rubber vats and add a solution of formic acid and water to form rubber lumps using a ratio of 1 Li. solution for every 20 Li. of latex.

Tapping, gathering latex, and producing rubber lumps

Trees should be tapped every other day. Tapping should be done between 4–6 a.m., as the coolness of the early morning air encourages latex flow, thus improving yield. Observe the thickness of the cut layer, as a too thick cut will damage the tree and reduce its productivity and life whereas a too thin cut could not produce sufficient latex.

GENDER ANALYSIS

Latex tapping can be both done by men and women. Based on the study undertaken by Dr. Tenny Alcala of the University of Southern Mindanao, it was found that in other rubber producing countries in Asia (e.g., Malaysia, Sri Lanka, and Vietnam), majority of the tappers are women; accordingly, women are believed to be fine tappers because of their efficiency and diligence. In the Philippines however, only a meager 2.4% of rubber tappers are female.

In Simbol, the enterprise owned by Mr. Avelino Tampol is categorized a family enterprise. Mr. Tampol manages the business with the help of his male tapper and caretaker, Mr. Fernando Bacos. No female family member participates in the production process.

Women can participate in the collection of latex and placing them in containers. They can also be expert tappers, provided that they undergo training. Considering that there are odorous compounds emitted during the latex production process, gas masks should be worn during the entire process to ensure worker safety.

ECONOMIC BENEFITS

Assumptions:

- Latex production (based on data gathered from Mr. Tampol and data presented in the Rubber Production Guide, SMIARC, Jan. 2007)
- Yearly production of rubber

Year	Production/Year	Production/Day
6	1536	4.2
7	2048	5.6
8	2816	7.7
9	3584	9.8
10	4352	11.9
11	4864	13.3
12	5632	15.4
13	5888	16.1
14	6272	17.2
15-22	6400	17.5

- Price per kilogram of rubber lump = PhP 68.00
- Cost of production = 20%

Cost and Return Analysis of Establishing a One-hectare Rubber Farm

Particular	Year										Total
	1	2	3	4	5	6	7	8	9	10	
REVENUE						104,448	139,264	191,488	243,712	295,936	974,848
- Annual Latex Production						1,536	2,048	2,816	3,584	4,352	
COST											
- Plantation Establishment	40,000										
- Maintenance - 2nd year		6,500									
- 3rd year			5,500								
- 4th year				5,500							
Cost of Prod'n.						20,890	27,853	38,298	48,742	59,187	194,970
TOTAL COST	40,000	6,500	5,500	5,500		20,890	27,853	38,298	48,742	59,187	194,970
NET REVENUE	(40,000)	(6,500)	(5,500)	(5,500)	0	83,558	111,411	153,190	194,970	236,749	779,878

Age of Tree	Yield/yr (kg.)	Price/kg	Gross Income	Cost of Prod'n (20%)	Net Income per ha/yr	Monthly Income/ha
6	1,536	68	104,448	20,890	83,558	6,963
7	2,048	68	139,264	27,853	111,411	9,284
8	2,816	68	191,488	38,298	153,190	12,766
9	3,584	68	243,712	48,742	194,970	16,248
10	4,352	68	295,936	59,187	236,749	19,729

ROI (10 years) = $\frac{\text{Average Annual Profit}}{\text{Average Annual Production Cost}}$

= $\frac{\text{PhP 77,987}}{\text{PhP 25,247}}$

= 3.08 or 308%

MARKETING CONSIDERATIONS

Because of its many uses, the demand for natural rubber has increased; hence, marketing is not a problem. The most popular industry sector that uses natural rubber is the tire sector, which consumes around 70% of the rubber industry, according to Director Nicomedes P. Eleazar of the Bureau of Agricultural Research (BAR).

The current markets of Mr. Tampol are the rubber manufacturing companies in the locality like Pioneer Rubber Co., MJ Rubber Agricultural Products, and Goodyear-Philippines. The products are marketed in the form of lumps, brought to roadsides, and finally gathered/picked up by traders at PhP68.00/kg.

ECOLOGICAL IMPLICATIONS

The technology used by Mr. Tampol in the production of rubber lumps has very minimal negative environmental effects. In the coagulation process, no toxic effluent is released in the environment, as the formic acid used in the coagulation process

is diluted with water. Moreover, the establishment of rubber plantations helps protect the soil from the erosive influence of rain; provides habitat to various of flora and fauna; and helps mitigate the impact of climate change through carbon sequestration.

REFERENCES

DA-SMIARC, Bago Oshiro, Mintal Tugbok District, Davao City.

Tanutan, P. and J. Cardines. Rubber Production Guide. SMIARC Technoguide, Brochure No. 01, January 2007. DA-SMIARC, Bago Oshiro, Mintal Tugbok District, Davao City. http://davao.da.gov.ph/webfiles/research/rubberprodn.pdf

Mojica, MJ J. 100 years of Rubber in the Philippines: Some glimpses. BAR Chronicle, Vol. 6 No. 11 November 1-30, 2005. http://www.bar.gov.ph/barchronicle/2005/nov05_1-30_100rubber.asp

PRODUCTION OF RUBBER PLANTING STOCKS THROUGH GREEN BUDDING

Location: Guita-an, Ipil, Zamboanga Sibugay
Entrepreneur: Daniel Canayal
Author: For. Nely M. Butic; Co-author: For. Dionisio Rago

Rubber trees, scientifically known as *Hevea brasiliensis*, are perennial plants of economic importance. They can be propagated by seeds or vegetative/asexual means (i.e., budding). Nowadays, vegetative reproduction is preferred as it results to planting stocks, which are genetically superior, have high productivity and latex quality, and high resistance to pests and diseases.

Budding is a method of asexual propagation that involves inserting a strip of bark with bud from the branch of the desired clone to the seedling stock. Three types of budding are widely recognized: brown or conventional budding, green budding, and young budding. In the first method, older buds with brown color are used; in the other two, green tender buds are utilized.

In the enterprise owned by Mr. Daniel Canayal, green budding is employed.

There are two ways to produce planting stocks: polybag budding and ground budding (i.e., using budded stumps). In polybag budding, germinated seeds are planted in polyethylene bags. In contrast, in ground budding, budded stumps are produced on a ground nursery. Both methods are practiced by Mr. Canayal, although polybag buddings are preferred by consumers due to the following advantages:

- They have well-developed and undisturbed root and shoot systems;
- When transplanted in the field, they have uniform stands and are more resistant to the adverse effects of the environment;
- It covers a more efficient fertilization program, as roots are concentrated in the polybags and thus, loss of nutrients in the soil through leaching is minimized; and
- Labor cost and danger of desiccation due to delayed transplanting after uprooting is minimized.

METHODS OF PRODUCTION

Materials and equipment

Seeds of rubber plants
Budding knife
Budding tape
Bud sticks
Garden tools
Polyethylene bags with sizes ranging from 15×30 cm to 24×45 cm
Complete fertilizer
Fungicides
Pencil-size seedlings (for use as rootstocks)
Paint

Procedure

Part 1. Nursery establishment

Step 1. Seed germination

- Select seeds that are fresh, heavy, and shiny. Discard those with holes or are starting to germinate.
- Prepare the germination bed using aged sawdust (dried over 6 months) placed in a flat or level area but raised by 15 cm from the ground.
- Partially crack the seed coat of rubber seeds using mechanical pliers.
- Soak seeds in clean water overnight to hasten germination and to ensure uniform early growth of the seedlings.
- Place the seeds onto the bed's surface. Arrange the seeds in a single layer with the flat-grooved side facing downward. Press these firmly onto the bed until the seeds are leveled with the surface of the medium.
- Water the germination beds at least once a day. Then, mulch them with dried grass, preferably cogon, to avoid obtaining bent stems. Seeds will start to germinate one week after sowing.
- Carefully uproot the seedlings by hand and make sure that the cotyledons are left intact. Discard seedlings with distorted or bent roots and those without cotyledons because they have less chances of survival. Place the seedlings in a container half-filed with water.

Rubber seeds have short viability. To retain seed viability for 6–8 weeks, keep them in perforated polyethylene bags. Add a mixture of equal parts of damp charcoal powder or sawdust (i.e., 10% moisture content). Otherwise, saw the seeds immediately in the germination bed upon delivery to avoid very low germination rates.

Step 2. Transplanting to polyethylene bags

- Fill the perforated polyethylene bags with loam soil (compost, fine sand, top soil in 1:1:1 ratio) or ordinary garden soil collected from the top 0-15 cm depth;
- Plant carefully the germinated seeds in each bag at 10-cm;
- Cover the entire root system including the cotyledon with fine soil;
- Press the soil lightly to compact the soil;
- Water the seedlings as often as necessary during dry season;
- Apply 10-15 g or 1 tsp of NPK fertilizer per seedling per bag on the 2nd, 4th and 6th months after planting;
- Spray fungicide to control occurrence of diseases;
- Fence the perimeter properly to ensure safety of the plants against stray animals.

Nursery establishment and transplanting

Part 2. Budding

Step 1. Wipe the base of the seedling stock. Make two parallel incisions 6 mm apart, 5 cm long, and 2.5–5 cm from the ground.
Step 2. Connect the top or bottom portion of the parallel incisions with the horizontal cut.
Step 3. Open the resulting flap. Partially cut the lower or upper portion to leave one-half of the flaps.
Step 4. Get a bud patch from a bud stick that is smaller than the flap of the stock.
Step 5. Insert the bud patch immediately and hold firmly.
Step 6. Do not expose the incisions. Wrap this with plastic tape from the lower cut in an upward direction. Ensure the edges of the tape overlap each other.
Step 7. Open the tape after 21 days. A green bud patch, which can be seen through the tape, indicates successful budding; a black patch indicates otherwise.
Step 8. Cut back the budded plants 25–30 cm above the bud patch 5 days after removing the tape.
Step 9. Apply enamel paint to the cut ends to prevent entry of fungus.

The whole budding process should be done in 20 seconds

GENDER ANALYSIS

In Zamboanga Peninsula, rubber planting stock production is generally considered a family enterprise. It is usually done in May or June, or at the onset of the rainy season. The enterprise is managed usually by the husband, and trained budders are mostly men. However, considering that the activities in the production process are simple and do not require hard work, the complementation of both men and women can also be observed.

Women usually prepare the germination beds and the budding processes. They also participate in soil bagging, transplanting germinated seedlings to polybags, applying enamel paint to the cut ends, and watering seedlings or planting

stocks. These activities are done early in the morning, at noon, or late in the afternoon; hence, the production processes do not interfere much with their reproductive role at home. Women can also supervise the whole enterprise process.

In this particular enterprise, Mr. Canayal together with five hired male workers undertakes all the activities in the production process. His wife participates in the supervision aspect, which is done simultaneously with household chores, therefore minimizing time and mobility constraints.

ECONOMIC BENEFITS

SALES ----------		**30,000.00**
3 Storey seedlings		
PRODUCTION COST ----------		**5,100.00**
Nursery Establishment		
Seeds	- 300.00	
Polyethelene bags	- 1,500.00	
Complete Fertilizer	- 600.00	
Budding		
Budstick	- 1,000.00	
Polyethelene bags	- 1,500.00	
Budding Tape	- 50.00	
Complete Fertilizer	- 150.00	
INCOME ----------		**24,900.00**

RETURN ON INVESTMENT

$$\frac{24,900.00}{5,100.00} = 4.88 \text{ or } 488\%$$

MARKETING CONSIDERATIONS

During the First International Rubber Conference held in Davao City last November 2005, Dr. Hidde Smit, the Secretary General of the International Rubber Study Group (IRSG) based in London, reported that the Philippine rubber industry would be soaring high in the world market by Year 2020 compared with other rubber-producing countries in Asia and other parts of the world. Given the bright future for the natural rubber industry and the upsurge in the demand of natural rubber, smallholder rubber growers have since then proliferated in Mindanao.

The current markets of Mr. Canayal are the small rubber growers in Mindanao particularly in Zamboanga Sibugay, Zamboanga del Norte, Zamboanga del Sur, and Cotabato.

ECOLOGICAL IMPLICATIONS

According to Dr. Tenny Alcala of the University of Southern Mindanao, rubber stands out as a commercial crop in the Philippines because it is highly profitable, versatile, sustainable, and environmentally friendly. Moreover, establishment of rubber plantations helps mitigate the impact of climate change through carbon sequestration. It also lessens the pressure on remaining forest areas.

GLOSSARY

- Budding – A method of asexual propagation that involves inserting a strip of bark with bud from the branch of the desired clone of the seedling stock.
- Desiccation – Excessive loss of moisture

REFERENCES

DA-SMIARC, Bago Oshiro, Mintal Tugbok District, Davao City

Tanutan, P and J Cardines. Rubber Production Guide. SMIARC Technoguide, Brochure No. 01, January 2007. DA-SMIARC, Bago Oshiro, Mintal Tugbok District, Davao City. http://davao.da.gov.ph/webfiles/research/rubberprodn.pdf

Mojica, MJJ. 100 years of rubber in the Philippines: Some glimpses. BAR Chronicle, Vol. 6 No. 11, November 1–30, 2005. http://www.bar.gov.ph/barchronicle/2005/nov05_1-30_100rubber.asp

Rubber Nursery Management, USM-OPAPA Techno Guide, Monday, 10 March 2008

http://www.openacademy.ph/index.php?option=com_content&task=view&id=1138&Itemid=387

ESSENTIAL OIL FROM LEMON EUCALYPTUS

Location: Mt. Kitanglad, Bgy. Imbayao, Malaybalay City, Bukidnon
Entrepreneur: Imbayao Multipurpose Cooperative (IMPC)
Author: Myrna S. Decipulo

Lemon Eucalyptus (*Corymbia citriodora*), also known as lemon scented gum or blue spotted gum, is a tall tree reaching as high as 50 m. Commonly found in northeastern Australia, it has smooth, pale, uniform or slightly mottled bark, and a conspicuously narrow-leaved crown that smells strongly of lemons. In the Philippines however, foliage of lemon eucalyptus is very limited. Therefore, to sustain a lemon eucalyptus-based enterprise, more plantations should be established.

The lemon eucalyptus plantation of Imbayao Multipurpose Cooperative (IMPC) was established within the multiple use zone (i.e., protected area) of Mt. Kitanglad. IMPC, a Community-Based Forest Management Agreement (CBFMA) holder, is chaired by Mr. Benjamin Maputi, a recipient of the National Gawad Saka Award in 2008.

Producing essential oil involves distillation. The extracted oil can then be used in manufacturing less expensive perfumes, soaps, and disinfectants. It can also be processed into value added products like scented soaps, candles, balms, creams, etc. Essential oil from lemon eucalyptus has antibacterial and insecticidal properties. The citronella-rich oil is a preferred natural source for the production of hydroxycitronellal, citronellylnitrite, and menthol. According to IMPC members, the aroma of essential oil while repacking or producing by-products provides relaxing and soothing effects.

METHODS OF PRODUCTION

Part A. Seedling production

Step 1. Collect seeds when the color of the fruit capsules turn brown.
Step 2. Arrange the potted germinant in pot beds. No shading is necessary in the nursery, as lemon eucalyptus requires full sunlight especially during its early growth.

Do not wait for the capsules to dry up because there is a tendency for it burst and lose their seeds.

Care of potted seedlings in the nursery

Part B. Plantation establishment

Step 1. Plant the seedlings (i.e., 25 cm in height) at a distance of 4×4 m at the onset of the rainy season.
Step 2. Maintain by strip brushing or ring weeding.
Step 3. Start pruning the leaves of lemon eucalyptus two years from field planting. Thereafter, pruning can be done annually.

Seedlings of *C. citriodora* ready for field planting and a 1-year-old plantation

Part C. Leaf oil extraction

MATERIALS AND EQUIPMENT

Complete setup of distillation still
Firewood
Foliage (newly collected leaves)
Weighing scale
Container for the oil

Step 1. Collect about 300 kg of lemon eucalyptus leaves from approximately 12–15 trees.

Leaves should be collected within the day of distillation to preserve the desired oil aroma. Then, retain at least 25% of the leaves from each tree so that physiological processes will not be severely altered.

Step 2. Remove stalks and branches. Weigh and place the leaves in the distillation still, pour water, and cover tightly.
Step 3. Boil continuously for 3 hours until the steam reaches the condenser. Through decantation, oil separates from water. Ideally, the whole process of distillation should be completed in 4–5 hours.

Tip

Proper sealing is very important so that no steam will escape the distillation still. In addition, the amount of leaves should depend on the capacity of the distillation still.

Step 4. Place the oil in an appropriate container. The 300 kg leaves should produce at least 3 kg of oil for it to become economically viable.

ECONOMIC BENEFITS

COST AND RETURN ANALYSIS IN A ONE HECTARE PLANTATION

ITEM	VALUE (Php)	TOTAL VALUE (Y2)	TOTAL VALUE (Y3)	TOTAL VALUE (Y4 & ONWARDS
Revenue				
50 liters of oil @Php1,500/liter	75,000.00	**75,000.00**	**75,000.00**	**120,000.00**
Production cost		**63,400.00**	**30,400.00**	**52,400.00**
Nursery and plantation establishment	18,000.00 5,000.00	18,000.00 5,000.00	-	-
Plantation maintenance	6,000.00 5,400.00	6,000.00 5,400.00	6,000.00 5,400.00	6,000.00 5,400.00
Water Fuel wood		2,000.00 2,000.00	2,000.00 2,000.00	6,000.00 6,000.00
Labor for oil extraction	14,000.00	14,000.00	14,000.00	24,000.00
Other costs Land rent @2,000/yr Contingencies	 2,000.00 3,000.00	 2,000.00 3,000.00	 2,000.00 3,000.00	 2,000.00 3,000.00
Net Income		**7,600.00**	**40,600.00**	**67,600.00**
Revenue		75,000.00	75,000.00	120,000.00
Less: Production and other costs		63,400.00	30,400.00	52,400.00

OTHER COSTS (not included in the computation):
Cost of distillation set up: Php380,000.00
Processing shed/building: Php50,000.00

ROI = 115,800/270,000
or 0.428 or 42.8%

MARKETING CONSIDERATIONS

Leaf-to-oil production is a labor-intensive enterprise, albeit it clearly can provide significant employment and additional income if entrepreneurs were to produce value-added products like scented candles and soaps.

Sustainability can be ensured by focusing on networking with other essential oil-based enterprises and product developers/ manufacturers. These include spa and massage parlors that use aromatherapy oils and creams. Participation in product exhibits and trade fairs for product promotion should also be pursued.

GENDER ANALYSIS

At the IMPC, the procurement of materials and equipment, construction of nursery bunkhouse and plot beds, collection of fruits/seeds and potting materials, hauling of seedlings, planting site preparation, pruning of trees, moving of equipment, gathering and hauling firewood, and oil extraction/distillation are usually done by men. Women gather the leaves, work at the distilleries, package and manufacture by-products, and market the finished products. In most cases, these activities are undertaken in their respective households, enabling them to perform their reproductive roles. Specifically, women can both attend to their household chores while earning additional incomes from soap and candle making because the activities, except for oil extraction, are home-based.

The enterprise can function year round, but this largely depends on the availability of raw materials. More time in manufacturing the by-products is needed from September to October in preparation for All Saints Day and the Christmas season when candles and soaps are greatly in demand.

The repacking area in IMPC has good ventilation and lighting. Good manufacturing practice is also observed.

Overall, additional income is gained by enterprise members; hence, the ability to augment the family budget. They also learn the value of working together so that they consolidate their production to ensure timely delivery of products. The enterprise has helped develop camaraderie and build leadership and managerial skills of IMPC members.

ECOLOGICAL IMPLICATIONS

Establishing lemon eucalyptus plantations as major source of raw materials for this type of enterprise can reduce the destructive pressure on the remaining natural forest. Plantations provide land cover and contribute to soil stabilization, conservation of native biodiversity, and improvement of the overall environment. Inasmuch as only the foliage is extracted, carbon is stored in the woody parts of lemon eucalyptus trees—a mechanism for climate change adaptation. Other barangays in Mt. Kitanglad are establishing more plantations of lemon eucalyptus through the assistance of Department of Environment and Natural Resources (DENR).

As a form of waste management, IMPC use the leaves after the distillation in composting (e.g., to produce organic fertilizers).

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The Ecosystem Research Development Services (ERDS)-Region 10 of DENR assisted in the establishment and management of the lemon eucalyptus plantations and provided trainings on oil extraction, packaging, and marketing. Department of Science and Technology (DOST)-Region 10 provided the distillation still. The local city government of Malaybalay assisted in the construction of a small water impounding system and acquisition of a new distillation still designed specifically for IMPC.

LAWS AND RESTRICTIONS

Republic Act No. 9147 ("Conservation and Protection of Wildlife Resources and their Habitats") provides some restrictions and precautions on the introduction of exotic species.

PLANTING MATERIALS FROM GIANT BAMBOO

Location: San Jose, Malaybalay City
Entrepreneur: Soulmates Ecological Stewards Association (SESA)
Author: Myrna S. Decipulo

In the last 15–20 years, bamboo has emerged as a valuable substitute for wood, especially in the manufacture of panels, boards, flooring, roofing, and pulp and paper. There are many species of bamboo, both native and introduced, in Northern Mindanao, but the most commercially important is the Giant Bamboo (*Dendrocalamus asper*), the tallest and largest bamboo species in the Philippines. Giant bamboos support agri-based industries, especially when used as props in banana, tomato, and papaya plantations.

The conventional way of propagating bamboo is by cutting the culm (pole), the most useful part. However, branches can also be used for planting. Giant bamboos have one main branch similar to its culm; this part has nodal portions with roots on the basal part. Incidentally, in pole harvesting, it is usually considered as waste and left rotten in the farm. Bamboo branches can be harvested all year round. In 6- to 10-year-old plantations, these branches grow as high as 5–8 m.

METHODS OF PRODUCTION

Materials and equipment

Fenced nursery with water system or water source
Bamboo poles (for nursery construction)
Potting medium
15×20 cm or 6×8 in. polyethylene or plastic bags
Sharp bolo or handsaw
Newly collected branches of giant bamboo
Water hose or sprinkler
Fertilizer (organic or inorganic)
Sarlon cloth, coconut fronds, cogon, or any shading material

Procedure

Step 1. Construct a nursery (temporary bunkhouse, potting shed, plot beds, and sheds) using locally available materials.
Step 2. Collect and mix the potting medium composed of ordinary garden soil with at least 10% organic fertilizer/compost.
Step 3. Put the potting medium in polyethylene or plastic bags.

Step 4. Detach carefully the branches of giant bamboos using a sharp bolo or handsaw. Each collected branch should have 2–3 nodes, live buds, and roots. Observe proper care during harvesting to preserve the live buds.
Step 5. Pot the branches immediately after collection.


Tip

Branches from 3- to 4-year-old culms are considered the best planting stocks. At least 10 branches can be collected from one culm.

Step 6. Place the potted branches in plot beds and sheds. To lessen costs of shading, place the potted branches under the trees.
Step 7. Water the potted branches daily. After 7–10 days, the potted branches will start to sprout.

Tip

Planting stocks should be watered regularly and avoid exposing the collected branches to direct sunlight. Bamboos are sensitive to moisture stress especially during their early stage of growth.

Step 8. Fence the nursery to protect the growing planting materials from stray animals.
Step 9. Conduct weeding and apply fertilizer when necessary. However, high mortality may also indicate low quality of collected branches and water stress.
Step 10. Harden the potted planting materials before dispatch/selling by gradually reducing shading, increasing exposure to direct sunlight, and reduced watering.
Step 11. Dispose or sell the potted planting materials to buyers after 3–4 months or when giants bamboos already have well-developed roots and shoots.

GENDER ANALYSIS

In the production of bamboo planting materials, men are mostly responsible in nursery site preparation, procurement of materials and equipment, construction of nursery bunkhouse, plot beds, and sheds, collection of garden soil and branches, and hauling/transporting of potted planting materials. For safety precaution, considering that branches are of considerable height from the ground, the gatherers of branches should take extra care when climbing the poles.

Meanwhile, women and children assist in nursery activities like potting, watering, and weeding, as well as in marketing. The activities done by women members of Soulmates Ecological Stewards Association (SESA) only cover a few hours a day; their tasks are also rotated such that they can choose their schedules and still perform their reproductive roles.

Through this bamboo-based enterprise, women earn additional income and help augment the family budget. It has also developed their capability to work with other community members, as well as developed their leadership and managerial skills in running an enterprise.

ECONOMIC BENEFITS

ITEM	VALUE	TOTAL VALUE
Revenue		
40,000 potted bamboo @Php15/pot for 3 years		600,000.00
Production cost		**310,400.00**
Materials	168,000.00	
Plastic bags (45,000 pcs @ 0.50/pc)	22,500.00	
Bamboo branches (45,000 pcs @ 2.00/pc)	90,000.00	
Organic fertilizer (90 bags @ 60.00/bag)	5,400.00	
Temporary nursery (construction materials such as lumber, nails, etc)	25,000.00	
Bamboo poles for nursery bed (10 poles @60/pole)	600.00 22,000.00	
Shading materials (sarlon cloth)	2,500.00	
Water system (hose, nozzles, etc)		
Labor	124,200.00	
Soil collection, potting, piling, etc @ 1.00/bag	45,000.00	
Maintenance (watering, weeding fertilizer application, etc)	79,200.00	
Other costs	18,200.00	
Water @ 200/month	7,200.00	
Land rent @2,000/yr	6,000.00	
Contingencies	10,000.00	
Net Income		**289,600.00**
Revenue	600,000.00	
Less: Production and other costs	310,400.00	
Return on investment Net income/production cost	289,600.00 310,400.00	0.93 or 93%

MARKETING CONSIDERATIONS

Bamboo enthusiasts and upland farmers, as well as those handling reforestation projects, are in constant need of planting materials. Whenever possible, entrepreneurs should receive the purchase orders for planting materials at least 1 month before actual delivery; this is to provide ample time for the production of bamboos as per clientele's desired number.

Bamboo can also be a source of income when sold as poles (whole or split), furniture and crafts, shoots for food, and charcoal. There are also engineered bamboo products like "plyboo," bamboo board, veneer.

The following imply an increase in demand for bamboo planting materials in the Philippines:

- In recognition of the many uses of bamboo, the national government promulgated Executive Order (EO) No. 879 to enhance further the development of the bamboo industry.
- In 2009, the Department of Trade and Industry (DTI) even considered using of bamboos to replace the PhP1 billion annual government expenses for school desks.
- The Department of Environment and Natural Resources (DENR) was directed to allocate 20% of their reforestation species for bamboo.

ECOLOGICAL IMPLICATIONS

The bamboo enterprise of SESA advocates the establishment of bamboo plantations. Bamboo is an eco-friendly material and a sustainable resource (i.e., self-reliant in terms of ability to regenerate after cutting). Development of bamboo resources and enterprises worldwide promotes economic and environmental growth, mitigates deforestation and illegal logging, prevents soil degradation, and restores degraded lands.

Bamboo has several advantages over tree species in terms of carbon fixing. Recent studies have shown that bamboo biomass and carbon production may be 7%–30% higher compared with fast-growing wood species. Giant bamboos also have a total above ground biomass of 297 t/ha, with a mean annual production of around 57 t/ha per yr, which almost twice that of Eucalyptus clones.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Funding assistance (PhP97,000) for nursery construction and support for technology commercialization was provided by Northern Mindanao Consortium for Agriculture and Resources Research and Development (NOMCARRD). The seed fund was paid by SESA in less than a year in three installments.

LAWS AND RESTRICTIONS

- EO 879, which provided for the creation of the Philippine Bamboo Industry Development Council (PBIDC) and the strengthening of the Philippine bamboo industry.
- With EO 879, DENR is mandated to plant bamboo in 20% of its reforestation projects, which translates to 500,000-hectare bamboo plantations, until year 2020.
- Like any other non-timber forest products, harvesting and transport permits should be secured.

DUYAN FROM RATTAN

Location: Bgy. Tandang Sora, Governor Generoso, Davao Oriental
Entrepreneur: Evergreen Tree Planters Association of Tandang Sora (ETPATS), Inc.
Author: Ms. Grace Moralde

Evergreen Tree Planters Association of Tandang Sora (ETPATS), Inc. considers duyan production from rattan a family-based enterprise. In fact, it is an age-old technology that has been inherited from the indigenous Lumad forefathers, transforming itself into a sustainable and culturally acceptable income-generating activity for families of Bgy. Tandang Sora, Governor Generoso, Davao Oriental.

Rattan is popularly known for its novelty, strength, lightness, and variety of use. Its value in the handicraft industry is recognized because of its cheapness and workability. Rattan is used to make furniture, baskets, kaings, and other handcraft items like duyan. Some of the commercial rattan species in the Philippines that can be used to make duyan products are Palasan (*Calamus merillii*), Limuran (*C. ornatus var. philippinensis*), Tumalim (*C. mindorensis*), Sika (*C. caesius*), and Panlis (*C. ramulos*), as they have a natural color, good bending quality, and are less dense.

METHODS OF PRODUCTION

Materials and equipment

Sharp knife
2 pcs. fine wood-end support (14×2 in.)
Improvised hard wood maso
15 rattan strips (4 m long and with 15 mm diameter)
4–6 pcs. wooden poles (about 4 ft long for framing and where to hang the duyan)

Procedure

Step 1. Gather 4-meter-long strips. Ideally, with this length, there will be no discontinued weaving halfway through the production process.
Step 2. Lay horizontally 10 rattan strips in the ground 2 inches apart. Get a rattan strip and start weaving from the center in a vertical direction.
Step 3. Weave by laying across under and over Strip 1.
Step 4. Twist the edges to prevent unwinding. Then, with an improvised hard wood maso, pound the woven parts to tighten them together.
Step 5. Stop weaving when the woven part at the center has a width of about 5 inches. To maintain balance of the woven duyan, the right and left end portion must be about 1 m. Refine the ends of the strips with knife, which will then be securely tightened to the wooden support.

Step 6. Prepare the frames of the duyan, which consist of paired wooden poles set at 2 m apart. Tie the wooden end support in the frame using a rope.
Step 7. Transfer and hang horizontally the duyan in the prepared frame.
Step 8. Securely tie the ends of the right and left edges in the prepared wooden support. Do not tie the other mid-portions of the ends yet for ease of weaving.
Step 9. Continue weaving until both ends are reached. Cut excess strips only when weaving the edges has been accomplished.
Step 10. Finally, fasten the mid-end portions to the edges. Get another strip and tightly braid the edge.

(1) Disentangle long twists before weaving. (2) Dry the rattan strips to reduce fungi and beetle attack. (3) In refining the rattan strips, Lumads tie maong cloths around their thighs to prevent untoward cuts when using a sharp knife.

GENDER ANALYSIS

The indigenous Lumads in the upland communities in Davao Oriental, especially women, have no fixed income. Accordingly, this family enterprise has empowered Lumad women and their families because they earn profits to help augment their daily subsistence. Aside from farming (main livelihood), a Lumad family can earn a net income of PhP8,130/mo. from selling 60 sets of duyan; for every duyan, the net profit is PhP44.50. This enterprise also allows women to have access to credit facilities, such as cash advance from their buyers (i.e., middlemen), when faced with emergency needs, such as for school expenses or medicines.

Complementation of both men and women are observed. The husbands/men perform activities like harvesting/cutting from the forest, drying, and framing. Weaving and adding finishing touches are mostly done by wives/women. Then, both men and women engage in refining the strips and product marketing, and sometimes even weaving. The work hours of men and women are 8 and 5 hours a day, respectively; accordingly, women can still perform their reproductive roles at home since the entrepreneurial activities can be done together with their household chores. Moreover, the activities women engage in are

usually done early in the morning or late in the afternoon, subject to availability of raw materials. Meanwhile, young children mostly do errands because their parents do not allow them to handle sharp knives. As for the adult weavers, maong cloths are tied around their thighs for self-protection.

Lumad men and women pride themselves with the weaving techniques learned from their forefathers. They say that creating duyan products is part of their cultural identity and is in fact a "way of life" that distinguishes them from other tribes.

ECONOMIC BENEFITS

ITEMS	Value (in Peso)	Total Value (in Pesos)
Sales 60 duyan @P180.00/pc / month		10,800.00
Production Cost Materials: 15 strips per duyan x 60 duyans @P1.50/pc Labor (weaving, fining, @ P20.00/pc) Transportation (P2.00/pc x 60)	 1,350.00 1,200.00 120.00	2,670.00
Net Income		8,130.00
Return on Investment Net income/production cost		3.04 or 304%

MARKETING CONSIDERATIONS

Buyers or middlemen purchase the duyan from the Lumad weavers at PhP180/piece. The item is then marketed to Davao Oriental, Davao City, and Davao del Sur at PhP350–380/piece to include transportation costs.

Good and marketable duyan sets are those that are smooth, well braided, has a natural color, and is free from fungal discolorations or stains. The peak of the production and sales is during summer. End-buyers include tourists, resort owners, entrepreneurs, and even common individuals who simply want to relax.

ECOLOGICAL IMPLICATIONS

The Lumads harvest the raw rattan materials from the nearby forest and/or rattan plantation established by ETPATS. They do not cut the wildlings, but only the matured ones, to preserve their rattan plantation; this is also in accordance with a barangay ordinance. Three months of non-harvest means more growth of rattan. For sustainability of raw materials, the

harvesters always replenish the gathered/extracted raw materials of rattan. The wastes generated from making duyan, such as excess strips and trimmings, are used to construct chicken cages.

LAWS AND RESTRICTIONS

Cutting, gathering, and transportation of rattan require a license/permit issued by the Department of Environment and Natural Resources (DENR) in accordance with DENR Administrative Order No. 21 (March 21, 1988). Rattan may be cut and gathered from any forest lands except in experimental forests, national parks and reserves, wilderness, and other areas that specifically prohibit rattan cutting and gathering.

INSTITUTIONAL SUPPORT/AGENCY PARTNERS

ETPATS has received financial and technical support from DENR and the Department of Trade and Industry (DTI).

REFERENCE

RATTAN. PCARRD Book Series No. 99/19.

MATS AND BAGS FROM PANDAN (ROMBLON)

Location: Bgy. Maputi, San Isidro, Davao Oriental
Entrepreneur: Nagkahiusang Kristohanong Mag-uuma sa Maputi (NAKRISMMA)
Author: Ropel O. Martije

Among individual members of Nagkahiusang Kristohanong Mag-uuma sa Maputi (NAKRISMMA), Pandan (Romblon) (*Pandanus spp.*) is the primary material used in mats and bags production. These products vary in design and size, and cater to specific buyer demands. Previously, NAKRISMMA has established a 0.25-hectare pandan plantation within their Community-Based Forest Management (CBFM) area located at Bgy. Maputi, San Isidro, Davao Oriental. The plantation in 4×4 m spacing now has its pandan ready for harvest. NAKRISMMA members also initiated backyard planting to ensure additional source of raw materials. This pandan-based enterprise has provided great contribution to the economic wellbeing of NAKRISMMA members, especially among its Enterprise Committee. The women—the direct beneficiaries of the enterprise—have acquired additional skills and knowledge through and trainings sponsored by the Department of Environment and Natural Resources (DENR), Department of Trade and Industry (DTI), and Technical Education and Skills Development Authority (TESDA), among others.

METHODS OF PRODUCTION

Materials and equipment

Pandan (Romblon) strips
Stripper
Cauldron
Dye
Wooden tool used to straighten the pandan strips
Stick
Scissor
Nylon thread
Knife
Vinegar
Salt
Wax

Procedure

Part 1. Harvesting

Step 1. Harvest pandan using an arc tip bolo or karit.
Step 2. Collect only mature leaves and leave plants to grow so they can produce new leaves for future use.

Part 2. Mat and Bag Weaving

Step 1. Remove the midrib and thorns of the leaves.
Step 2. When necessary, such as for bag production, strip the leaves into different sizes (e.g., 1.5 or 1 cm width, and length depending on the targeted final product).
Step 3. Sundry the stripped leaves for 1 day.
Step 4. If preferred, dye the stripped leaves. Then, hang and re-sundry or air-dry the stripped leaves to ensure high quality of raw materials. Dyeing is also done to hide any stains on the dried leaves.

Harvesting pandan leaves, leaf stripping, and drying dyed pandan strips

Step 5. Straighten the leaves using a wooden box to avoid tangling. The raw materials are now ready for weaving.
Step 6. Before sales and display/delivery, conduct quality control to avoid reject or return of orders.

MINIMUM REQUIRED MATERIALS FOR BAGS AND MATS WITH DIFFERENT SIZES

ITEM	No. of PANDAN STRIPS		
BAGS	Width (1.5 cm)	Width (1 cm)	Length (m)
Small (10x32x23 cm)	55	65	2
Medium (13x36x28 cm)	65	78	2
Large (15x42x35 cm)	75	90	2
MATS	No. of PANDAN LEAVES		
Single (8x4 ft)	80		
Double (8x7 ft)	90		
Large (8x10 ft)	100		
Extra Large (8x12 ft)	110		

Do not weave during extremely hot weather so that pandan leaves will not easily tear off.

ECONOMIC BENEFITS

ITEMS	Value (in Peso)	Total Value (in Pesos)
Sales BAG- 16 weaver x 1 bag /day x192/month x 12 mos.=2,304 bags/year MAT-2 weaver x 1 mat in 2 days, for 22 working days/2=11 mats x 2 weaver= 264 mats/year	299,520.00 52,800.00	352,320.00
Production Cost labor cost -15 pesos for gathering ,drying and stripping		34,560.00
Net Income		317,760.00
Return on Investment Net income/production cost		9.19 or 919%

MARKETING CONSIDERATIONS

Inasmuch as the bags and mats made of pandan are of good quality, apart from being affordable and environmentally friendly, the market demand for these products is very high.

The Enterprise Committee of NAKRISMMA has an existing revolving fund of PhP20,000, which is used to purchase weaving supplies. Then, the finished products (e.g., mats and bags) are made in standard sizes with corresponding prices; all have a markup price of 10%, which is then paid back to the Enterprise Committee. Most weavers obtain an income of PhP150–175 per day. To date, 18 active weavers spend most of their time in weaving, especially for volume/bulk orders.

The existing market includes local consumers from neighboring municipalities (Governor Generoso, Lupon, Banaybanay, and Mati, Davao Oriental). The products are also displayed during trade fairs at the Pasalubong Center through the joint support of Department of Trade and Industry (DTI), Technical Education and Skills Development Authority (TESDA),

Department of Science and Technology (DOST), Department of Environment and Natural Resources (DENR), and the Provincial Government of Davao Oriental.

GENDER ANALYSIS

The simple yet reliable technology used in this enterprise has increased the capacity of women, allowing them to contribute to family income. The male members of the community, most of whom work as farmers (i.e., their primary source of income), have even learned the technology on mat and bag production by helping the women. In this enterprise, men usually do the harvesting, removal of thorns, and dyeing; they spend about 4 hours a day for these tasks.

Meanwhile, women spend about 6 hours a day for stripping, drying, dyeing, and weaving. Women also show great interest in sales and marketing. These activities do not prevent women from performing their household chores, as the aforementioned tasks can be done while at home, hence minimizing time and mobility.

Interestingly, the participation of men and women in the enterprise has minimized their involvement in vices such as gambling and/or gossiping. At present, most of their idle time is devoted to the more productive activities of the weaving enterprise.

For occupational health and safety measures, weavers should be extra careful when handling the thorny pandan leaves and when using the sharp stripping tools.

ECOLOGICAL IMPLICATIONS

The pandan (Romblon) plant is considered a non-timber forest product. Introduction of this species in idle areas can help mitigate soil erosion and increase vegetative cover of the particular site. It also regenerates fast because suckers are abundant and they are easy to grow. Moreover, these pandan plants can be used as alternate crops for agroforestry farms because they retain soil moisture.

As a source of raw materials for the weaving industry, these plants do not deplete easily because only mature leaves are gathered and mother plants are left to produce new leaves.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Community Livelihood Assistance Special Program (CLASP) of DENR with the New Zealand Aid Program (NZAP): Technical and financial assistance
- DTI: Marketing assistance
- DOST and TESDA: Technical assistance
- Local government units, and the Comprehensive Agrarian Reform Program (CARP) and Mindanao Rural Development Program (MRDP) of the Department of Agriculture: Permits

PROPAGATION OF PAGATPAT SEEDLINGS

Location: Libuak, Babak District, Island Garden City of Samal
Entrepreneur: Fishermen's Association of Libuak (FAL)
Author: Ms. Grace Moralde

Pagatpat (*Sonneratia alba)* is a small- to medium-sized bushy tree that reaches 26 m in height with a diameter of 175 cm. It is one of the mangrove species with great potential as an economic crop apart from its rehabilitating capacity for denuded coastal areas. The technology used by Fishermen's Association of Libuak (FAL) enables pagatpat planters and nursery growers to produce the desired volume of quality pagatpat seedlings at the shortest possible time.

By using specialized chambers, growers can germinate newly collected and cleansed pagatpat seeds, and shorten their germination period to only 10–12 days. Potted germinants grown under closed plastic chambers can be outplanted in 45–60 days from germination, and then acquire a height range of 10–20 cm. With this technology, the scarcity of pagatpat planting materials previously experienced by FAL, tree growers, the academe and researchers were addressed. The technology can ensure 95%–98% survival compared with the traditional approach of direct planting in the field, which can result in high mortality rates.

As a direct effect of this enterprise, the community has restored and now boasts of a lush mangrove stand, further resulting in the abundance of fishes and increased marine resources in the area.

METHODS OF PRODUCTION

Materials and equipment

Pagatpat seeds
Basin
Forest litters/humus
Clean fine sand
Polyethylene bags (4×6×0.02 inches)
Plastic chamber
Black A-net

Procedure

Step 1. Survey and monitor pagatpat mother trees from January to October. Flowering starts in February, and fruits start to mature in September and ends in October. Collect freshly fallen fruits, which can be done either at high or low tides during daytime. Place the collected fruits in a basin in preparation for cleansing.
Step 2. Soak the fruits in a basin of seawater for 30 minutes to disintegrate the pericarp of the fruits. Then, macerate the fruits and stir the water to separate seeds from other fruit particles. Drain and repeat the process three times until the seeds

are thoroughly cleansed. One fruit can contain an average of 300 seeds. Store the cleaned seeds in a cool place prior germination.

Step 3. Construct a germination chamber with dimensions of 1×1×4 m using 2×2-inch lumber or split bamboo. Cover the floor, walls, and top with thick plastic sheets. Place as matting a 2-inch thick layer of clean fine sand. On top of the sand, place about 1.5 inches of thick forest litters/humus taken from the mangrove forest.

Step 4. Using a sprinkler, water the seedbed in the chamber. Then, sow the seeds evenly and cover them thinly with forest litter/humus. After sowing, place a plastic cover on top of the chamber. Ensure that the chamber is completely closed to prevent loss of moisture.

Tip When sown in a tightly closed germination chamber, seeds will start to germinate after 36 hours. On Day 7, germination can reach 85%; it becomes almost complete (98.5%) on Day 12.

Step 5. Collect mangrove soil and mix it thoroughly with sand at a ratio of 1:1 for use as potting media. Then, pot them in the polyethylene bags.

Step 6. Pot the germinants 14 days after germination. The germinants can be picked and pulled up individually for potting. It can also be extracted by bulk in their desired size to include the layer of the humus where they are attached to; this is done to avoid disturbance of other germinants.

Step 7. To allow for the recovery of seedlings, construct a recovery chamber with dimensions of 1×1×4 m. This can accommodate about 1,000 pieces of 4×6-inch potted seedlings. Cover the chamber's floor, walls, and top with thick plastic sheets. Fasten the plastic materials carefully to avoid escape of air and to prevent entry of crabs and other marine animals, which can ultimately damage the seedlings. Place the potted germinants inside the chamber. The survival rate of seedlings when placed inside the recovery chamber is about 95%–98%.

Tip A fully covered plastic chamber ensures controlled and favorable microclimatic conditions (e.g., less moisture loss, high temperature, high humidity, and low light intensity), which are necessary for the early growth and development of seedlings.

Step 8. Harden the seedlings when they reach 45–60 days old. This can be done by removing the plastic cover to expose the seedlings to sunlight. Harden the seedlings for about 10–15 days before field planting.

In case of infestation by defoliators, handpick and kill the larva and spray the young seedlings with mild insecticide.

ECONOMIC BENEFITS

ITEMS	Value (in Peso)	Total Value (in Pesos)
Sales 2,850 seedlings @P8.00/pc		22,800.00
Production Cost Construction of 3 units recovery chamber (1m x 1m x 4m) **Materials** 4,000 pcs. Polyethelene plastic bags of 4"x6"x.03 @ P400/1000 3 rolls of plastic sheets (G-8) @ P 2,200/roll 10 pcs bamboo culm @ P50/c 1.5 kilo nails (1" and 2") @ P50/kilo **Labor** Carpentry – 4 mandays @ P200/manday **Bagging** 3000 bags @ P300/1000 bags **Maintenance** for 9 days at P200/day	 1,600.00 6,600.00 500.00 75.00 800.00 900.00 1,800.00	12,275.00
Net Income		10,525.00
Return on Investment Net income/production cost		0.86 or 86%

MARKETING CONSIDERATIONS

Increased awareness to protect and rehabilitate the coastal areas has resulted in high demands for pagatpat seedlings. Most of the buyers come from the academe, youth associations, the government, non-governmental organizations (NGOs), and most especially environmental groups from San Isidro, Tambo, Babak District, Island Garden City of Samal and other areas in Davao City. Buyers can easily contact FAL should they need to replenish their supply of planting materials or for their mangrove tree planting activities. FAL sells their pagatpat seedlings at PhP8.00 each.

GENDER ANALYSIS

Complementation of men and women can be observed in almost all phases of the pagatpat seedlings enterprise. Men handle the establishment of sowing beds to bagging/potting activities whereas women participate in cleansing and storage

of fruits, collection of soil media, putting holes in bags, and bagging/potting. Workers perform these activities in the work area (i.e., away from their usual household chores) usually during 8–11 a.m. and 2–3:30 p.m.

The wives are motivated to participate in this type of business because it allows them to help their husbands augment the family's financial needs (mainly, to buy food for the whole family) while enhancing their skills on seedling propagation. Their tasks are simple and do not require manual strength and are less time-consuming. Aside from financial gains, the enterprise has allowed women to bond with each other while engaging in more productive activities.

The said enterprise is also an avenue for both men and women to increase their awareness on coastal protection and management of mangrove resources. They regularly attend trainings, lectures, and meetings initiated by the Ecosystem Research Development Services (ERDS) of Department of Environment and Natural Resources (DENR). The visibility of the extension workers in the area, good camaraderie, and concern for their coastal resources are factors that also motivate both men and women to engage in this type of enterprise.

ECOLOGICAL IMPLICATIONS

The propagation of pagatpat seedlings has the following ecological implications:

- Serve as windbreak and protect coastal communities from typhoons and strong winds;
- Serve as forage and habitat of marine plants and other organisms;
- Serve as sanctuary, especially migratory birds, and improves biodiversity ;
- Provides good reforestation species in islets and areas fronting the sea, which normally encounter strong wave currents due to its massive root system;
- Helps mitigate climate change;
- Helps stabilize soil and prevent riverbank soil erosion, given the protruding and erect roots of pagatpat; and
- Creates awareness on the importance of mangrove planting among local government units (LGUs), people's organizations (POs), NGOs, the youth sector, and other groups.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR-Forest Management Service (FMS): Transport permits
- DENR-ERDS Region XI: Training and onsite coaching

LAWS AND RESTRICTIONS

Permits to transport should be obtained from the DENR Regional Office.

REFERENCES

Damada, Abdulrahman C. *Mass Propagation of Pagatpat Germinants and Plantation Establishment: Its Impact* Techno-Transfer Series Bulletin No. 34. DENR-ERDS XI, Davao City, January–June 2005.

Espina, Maribeth N and AC Damada. *Survival of Potted Pagatpat (Sonneratia alba) wildling under Recovery Chamber.* Ecosystems Research Digest DENR-ERDS Region XI, 2004, pp. 8–16.

TABLEYA FROM CACAO SEEDS

Location: Sitio Upper Kibalang, Marilog District, Davao City
Entrepreneur: Upper Kibalang Agroforestry Farmers Association (UKAFA)
Author: Efren Amalejo

Cacao *(Theobroma cacao)* is an agricultural fruit tree abundant in private farms in Marilog District. Three varieties of cacao grow in the Philippines: the native breed, Brazilian breed, and those crossbred with Malaysian species. One of its main products, "tableya" (processed cacao tablets), is used as ingredient for sweetened chocolate candies, flavoring for champorado and pastries/cakes, chocolate milk drinks and other flavored beverages, or simply consumed as is for breakfast and snack time. Among locals, tableya is also used for "kinutil," a coconut wine mixed with egg.

In the whole of Davao City alone, there are about 400–1,000 ha. of cacao plantations. According to Upper Kibalang Agro-forestry Farmers Association (UKAFA), managing and protecting cacao plantations is less laborious compared with those handled by bigger corporations.

METHODS OF PRODUCTION

Materials and equipment

Cacao seeds
Knife
Cellophane
Molder (plastic tube)
Roasting pan
Grinder
Winnow (bilao)
Sacks
Dry nets
Banana leaves or foil for packaging

Procedure

Step 1. Harvest ripe cacao fruits using a sharp knife to prevent any debarking. Ripe fruits have yellow, orange, or red colors and with a hallow sound when tapped or shaken.
Step 2. Soak the seeds overnight. Use strainers or plastic nets to drain cacao juice, which can be used for other products (e.g., making cacao vinegars).
Step 3. Wash the moistened seeds with water. Remove the flesh and pulp.
Step 4. Sundry or air-dry the seeds from 3 days to 1 week or until completely dried.
Step 5. Classify the seeds as Class A/first class (bigger and fuller seeds) and Class B/second class (smaller and deformed).
Step 6. Roast either Class A or Class B seeds until golden brown. Class A seeds require longer roasting time than the smaller seeds (Class B). Roasting time depends on the size of the frying pan.
Step 7. Squeeze the roasted seeds and winnow them to fully separate the inner seed from the shell of the cacao seeds.

Step 8. Grind the seeds using a manual grinder until they become sticky and smooth.
Step 9. Shape the ground seeds using an improvised molder (e.g., plastic tube or PVC); the commonly used molding size is 1.2 cm thick and 3.5 cm in diameter. Remove the processed cacao seeds, now known as tableya, from the molders after 2–5 minutes.
Step 10. Wrap the tableya by piece or by the dozen in 2×10-inch dry banana leaves or foils to retain the cacao's aroma and taste. Alternatively, package them according to customer specifications.
Step 11. Store the tableya in a cool compartment. Its shelf life is 6–8 months.

Drying and roasting cacao seeds, and shaping the tableya

Prior harvest, wrap cacao fruits to protect them against insect attack. Then, during seed straining, the accumulated cacao juice can be used as raw material for vinegar production. Finally, molding is best done at nighttime when the weather is cool, as tableya can be easily formed into various shapes and sizes under these conditions.

GENDER ANALYSIS

The entrepreneurial activity overseen by UKAFA can be classified as family business endeavors. Tacit in this setup is the fostering of good relationship among family members, who share equal responsibilities in the family enterprise.

Mostly, men harvest the cacao fruits and the breaking of fruits. Meanwhile, women remove the seeds from the fruit shell of the cacao fruit, and the soaking and draining of the seeds. Then, men oversee the drying process whereas women supervise the roasting. Finally, both men and women grill and grind the roasted beans. However, marketing of finished products and selling activities to nearest markets and sari-sari stores are done by women.

Both men and women spend only 4 hours a day in doing the aforementioned activities. Thus, they have ample to perform their reproductive roles within their families.

MARKETING CONSIDERATIONS

Tableya production provides additional income to members of UKAFA. In effect, entrepreneurs can provide for the daily needs of the family. Apart from providing for the family's own consumption, tableya are sold to local traders, sari-sari stores, city markets, and groceries within Davao City. Some families sell tableya to walk-in buyers, most of whom come from

Cagayan De Oro City. Notably, tableya is a popular gift or pasalubong for friends and relatives. Tableya can be packed in banana dry leaves or foils by piece, by the dozen, or sometimes by the hundreds.

ECONOMIC BENEFITS

ITEMS	Value (in Peso)	Total Value (in Pesos)
Sales 60 kg = 6,000 pieces of tableya x 1.00		6,000.00
Production Cost		3,836.00
60 kgs. of dried cacao Class A @ 35.00/kg.	2,100.00	
Plastic bags	51.00	
Molder	42.00	
Roasting pan	250.00	
Grinder	475.00	
Winow (bilao)	50.00	
Sacks	30.00	
Dry nets	400.00	
Handling storage and marketing	150.00	
Contingencies (10%)	288.00	
Net Income		2,164.00
Return on Investment Net income/production cost		0.56 or 56%

ECOLOGICAL IMPLICATIONS

Cacao plantations contribute to ecological balance and restore forest vegetation, as cacao trees are good soil stabilizers; that is, they help protect areas from soil erosion, especially when planted along hilly portions. Cacao is a sustainable and highly yielding crop because trees are not cut and only fruits are utilized. Pruning can be done periodically to evenly distribute the fruits in twigs and branches.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Agriculture (DA): Training and seminars on the technology involved in growing cacao
- Local government units (LGUs): Assists in the safety, peace, and order in the area
- DENR: Assistance in the establishment of cacao plantations

LAWS AND RESTRICTIONS

Tableya production should conform to the sanitary regulations of the Department of Health (DOH).

FURNITURE AND NOVELTY ITEMS FROM MANCONO

Location: Sitio Exemeria, Bgy. Manyayay, Lianga, Surigao del Norte
Entrepreneur: Pacific Development Cooperative (PDC)
Author: For. Antonieta A. Jurado; Co-author: For. Cheryl P. Taganahan

Mancono (*Xantostemon verdugonianus*) is endemic to the Philippines but only a limited habitat: Dinagat Is., Red Mountain of Surigao del Norte, and along Cantilan, Surigao del Sur. In the Philippines, it has long been recognized as "iron wood" because of its strength and durability; in fact, it is an excellent material in the manufacture of bearing or bushing of steamship propeller shafts. Apart from this, mancono can be created into furniture and crafts.

Creating furniture and novelty items from mancono is an enterprise led by the Pacific Development Cooperative (PDC) with 100 recognized members known as the Davisol community using Davisolian as their native tongue/dialect. The Community-Based Forest Management (CBFM) area of PDC is the former production area Lianga Bay Logging Company, Inc. PDC utilizes only sunken and abandoned mancono logs found along rivers, creeks, and mangrove areas.

METHODS OF PRODUCTION

Materials and equipment

Irregularly shaped mancono logs/driftwoods, twigs, and vines
Planer
Sander/sandpaper
Pruning shears
Knife
Hatchet
Router
Chainsaw
Handsaw
Drill bit
Wood lathe machine
Wood boring machine
Portable Sander
Spray Gun

Procedure

Step 1. Wood extraction

- Retrieve fallen or dead standing trees or sunken logs for the furniture sets. Gather also log parts that are bent or misshapen, or have burls and knots for the novelty items and finishing touches.
- Use a chainsaw or handsaw to cut the logs. Remove excess limbs before transport.
- Always stack the limbs neatly and tidy up the area from which the mancono has been collected.

The weather condition is considered one of the determining factors in wood extraction. The rainy season (September–December) helps loosen the soil so it is easier for gatherers to retrieve driftwoods. Use boots and gloves while retrieving logs to avoid cuts and injuries.

Step 2. Wood preparation

- Clean thoroughly the retrieved mancono driftwoods. Peel the bark immediately after cutting. Alternatively, remove only a portion of the bark using a drawknife or small hatchet to retain the rough, rustic look of the finished piece.
- Make a sketch of the furniture or novelty item (e.g., wine jug, chalice, barrels, plates, fruit trays, wooden plates, mortar, etc.). Determine the size of each piece needed in the design. Assemble the materials. Use the wood boring and lathe machines if necessary.

Davisolian traditional woodworkers hand-sand each piece before assembly. During design, they incorporate unusual grain patterns, burls, and knots to add character and uniqueness to every furniture and novelty items created.

Step 3. Wood assembly

- Craft the mortised and tendon joints with a sharp knife (e.g., for novelty items) or fabricate a snug fit for every major furniture piece that needs to be joined.
- Assemble the individual pieces.
- Tight-fit the joints with utmost care to create durable pieces.

Use protective gears like face masks, goggles, gloves, and helmet for occupational safety.

Step 4. Wood finishing

- After assembly, re-sand the surfaces of the furniture and novelty items, but this time very lightly, using a fine-grain sandpaper.
- Wipe the products with damp cloth to remove all traces of sawdust, then polish and varnish.

Step 5. Marketing

- Display the finished products in the display center or furniture shops.

GENDER ANALYSIS

Male members of PDC mainly derive their income from fishing and aquaculture (crab fattening). Most women engage in local tourism/ecological destination. With the existence of the mancono furniture and novelty making enterprise, the Davisol community/families earn extra income to support their everyday living.

The husband fishes at night and reports for duty at the PDC Furniture Shop in the morning to do wood extraction to assembly. Meanwhile, the wife reports to the PDC Furniture Display Center or at PDC Furniture Shop to do wood finishing and polishing after tending her household chores.

In a week, at 6–8 hours a day, a team of husband and wife is given one set of furniture (e.g., three chairs and one table) for crafting. As a pre-arrangement with PDC, for every 10 sets created, a family is given one set as incentive. Then, taking the wine barrel as example for mancono novelty item, each family (husband and wife) is given three barrels to work on. A family can accomplish sanding and varnishing activities in 2 days. In shaping the mancono wood to the desired form, a total of 50 wine barrels can be made in 1 day.

There is no seasonality in the enterprise operation. PDC operates as long as mancono lumber stocks are available.

ECONOMIC BENEFITS

Various prices of novelty goods vary depend on size and design:

	PREVAILING RETAIL PRICE (PhP)
NOVELTY ITEMS	
Small mortar and pestle	500–900
Wooden chalice	300–500
Wine barrel	1,000–1,500
Fruit tray	600–800
Chopping board	300–500
Wooden mug	400–500
Lechon tray	1,500–2,000
FURNITURE	
Coffee table	4,000–6,000
Sala set	20,000–25,000
Conference table	30,000–35,000
Center table with stall	2,500–3,500

MARKETING CONSIDERATIONS

Finished products are displayed at the Davisol Shop managed by female members of the community. They are also delivered directly to neighboring municipalities and cities. PDC has also participated in the Philippine International Flora and

Fauna Garden Expo held in July 2009 at the World Trade Center in Manila; most of their finished products were showcased in the exhibit as one of CARAGA Region's finest products.

The peak season for marketing is every summer. Most of the buyers are local tourists and novelty collectors.

ECOLOGICAL IMPLICATIONS

PDC members retrieve sunken logs/driftwoods or dead standing trees from within their CBFM area covering 870 ha.

During the silvicultural process, twisted branches and vines are collected using pruning shears to ensure a clean cut to avoid harming the mother mancono trees. In other words, the mancono trees in the Davisol community are well preserved and protected.

Finally, as a form of waste management from the enterprise production, any waste generated from the furniture shops (e.g., sawdust) are gathered and used as fillers in road network maintenance along the Davisolian community.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR)
- Department of Trade and Industry (DTI)
- Department of Science and Technology (DOST)
- Philippine Center for Coastal and Aquatic Resources Development (PCCARD)
- Local government units (LGU)

LAWS AND RESTRICTIONS

PDC was issued with CBFM No. 73014 on November 12, 1997 covering 870.00 has. The cooperative has 100 recognized members. Their community resources management framework (CRMF) was affirmed pursuant DENR Administrative Order No. 96-29 and DENR Memo Circular No. 97-12.

SMALL-SCALE FALCATA SEEDLINGS PRODUCTION

Location: Bgy. San Salvador, Prosperidad, Agusan del Sur
Entrepreneurs: Private individuals of Bgy. San Salvador
Authors : For. Joan S. Gilbero and For. Rustum A. Aguilos

Tree farming has been a way of life of most people in the CARAGA region. This bright and promising venture has in fact been encouraged by the favorable climate, vast areas for plantations, availability of technologies, lumber, market, and presence of big players in the farming industry.

Falcata (*Paraserianthes falcataria*) is the most planted species because of its suitability to the climatic condition of CARAGA, apart from the many buyers of lumber, core board, and veneer for plywood, among others. With such demand, the production of falcata seedlings by individuals/communities along roadsides—from Agusan del Norte and Agusan del Sur to Surigao del Sur—has grown from simple livelihood to profitable enterprises. Seedlings can be harvested and sold 45–60 days after planting for six rounds a year at an average.

The proliferation of tree farming in CARAGA has also generated jobs in terms of bagging and sowing of falcata germinants. At present, growers provide seedlings not only in CARAGA, but also as far as Davao, Misamis Oriental, and Bukidnon.

METHODS OF PRODUCTION

Materials and equipment

Hardening beds
Falcata seeds
Potting medium (garden soil)
Plastic bags
Seed boxes
Bamboo sticks
Sprinkler
Pesticide
Fertilizer

Procedure

Step 1. Construction of elevated hardening shed, ground beds, and seed boxes

- Construct an elevated hardening shed to display seedlings using small-sized timber as posts, bamboo poles, and nipa shingles. A shed dimension of 1×4 m can accommodate about 1,200 seedlings.

- Then, construct ground beds (1×5 m dimension to accommodate about 2,500 seedlings) to grow the seedlings using bamboo poles as sidings.
- Finally, construct wooden boxes (40×60 cm about 105 seedlings) for the easy transfer of seedlings. Use edgings and trimming collected from saw mill wastes to minimize cost.

Step 2. Soil hauling for potting and preparation of potting bags
- Collect ground soil from the nearest available site and haul them manually into the potting area for bagging.
- Cut lengthwise into five equal parts 3×16 in. ice water cellophanes. Then, seal the bottom part by heating this with a candle. Cut the corner portions to allow for drainage. Alternatively, use black polyethylene potting bags (recommended).
- Fill half of the bag with soil, put a pinch (i.e., 3–4 granules) of complete fertilizer, and fill the remaining half with soil. Place the potted bags into the wooden boxes or ground beds if ready for direct sowing.

Step 3. Seed procurement
- Buy seeds from known seed sellers. Ensure that these were gathered from good mother trees.

The Mindanao Tree Seed Center in Butuan City sells collected seeds from selected phenologically good mother trees. Buying good seeds ensures high volume harvest return.

Step 4. Seed purity testing
- Scatter the procured seeds in a winnowing basket and dry for 2 hours.
- After drying, remove bad seeds and other impurities.

Step 5. Pre-germination treatment
- Put seeds in a cloth. Dip them thrice in boiling water for 1–2 seconds each dip.
- Place seeds in a basin with tap water and soak for 24 hours.
- Remove the water from the basin.
- Cover the pre-germinated seeds with wet cloth up to 3 days or when seeds have already germinated (i.e., with sprouts). The germinants/falcata sprouts are now ready for direct sowing.




Step 6. Germinant sowing
- Before sowing the germinants, spray the pots with an insecticide solution following package directions.
- Sow the germinants into potted bags.

Ensure that height of seedlings should be a minimum of 20 cm prior disposal to ensure survival in the field.

Step 7. Care and maintenance of seedlings

- Water twice a day (e.g., early mornings and late afternoons) or as often as necessary to keep the soil moist.
- Spray an insecticide solution twice every month to prevent attack of yellow butterfly larva.

ECONOMIC BENEFITS

Items	Value (in Peso)	Total Value
Sales (10,000 Falcata seedlings x 6 settings) x P 1.50		**90,000.00**
Production Cost		**16,280.00**
Infrastructure		1,520.00
Materials:	*1,120.00*	
Nipa shingles	100.00	
Wooden poles	60.00	
Bamboo poles	500.00	
Wood trimmings	300.00	
Nails	160.00	
Labor:	*400.00*	
Seedling production (60,000 seedlings)		14,760.00
Materials	*3,960.00*	
Ice candy cellophane	2,160.00	
Seeds	1,800.00	
Labor	*10,800.00*	
Bagging	9,000.00	
Sowing (direct)	1,800.00	
Net Income		**73,720.00**
Return on Investment Net income/production cost		**4.53 or 452%**

MARKETING CONSIDERATIONS

Most of the small-scale nurseries are located within roadsides and along the national highway from Agusan del Norte to Agusan del Sur. Falcata growers even live near the buyers. Correspondingly, the market has extended to Misamis and Davao provinces. The production peak is from October to March. Cost per seedling is PhP1.50. The average rate of production averages 10,000 seedlings per setting at six settings a year.

GENDER ANALYSIS

Small-scale nursery production of falcata, which is done whole year round, is usually undertaken by individual families. The father, mother, children, and even grandparents—each family individual—play their respective role in the production process. The father usually handles the harder physical work like construction of the shed, boxes and plots, and gathering of soil from the backyard. The mother and children handle the preparation of the planting stocks and potting/bagging. Individual members take turn in doing the maintenance activities, such as watering and monitoring. During peak seasons in the production, bagging and potting are usually done in a contract basis at PhP0.18 per pot/bag. Women equally share with men the income derived from the enterprise.

In terms of occupational safety, especially during nursery management where chemicals are sometimes used (e.g., fertilizer application and pest and disease management and control), workers should wear safety gears like gloves and masks.

ECOLOGICAL IMPLICATIONS

The active plantation program of the Department of Environment and Natural Resources (DENR) in CARAGA, which resulted in a lucrative enterprise for the local communities, has addressed the region's fast degrading remaining primary and secondary forests. Small-scale production of falcata seedlings can address the continuous demand for wood production and can even be sustained for decades.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Most growers cover their own personal expenses during enterprise start-up. At the start of the business, labor is normally undertaken by family members. As soon as the business has generated enough income and has expanded, additional manpower can be recruited. Based on personal interviews, most of the growers learned the technology of raising falcata plants (e.g., nursery setup) from big lumber companies in the region. When these companies shut down years ago, workers resorted to raising their own seedlings, thereafter applying the technology, sometimes through the assistance of neighbors who are also engaged in falcata seedling production.

REFERENCES

Benchmark Assessment on Industrial Tree Plantation Species (ITPS) Production and Marketing in Caraga Region.

Phenological Guidebook of some Important Tree Species in Caraga. Ecosystems Research and Development Services. Department of Environment and Natural Resources, Caraga Region, 2008.

Commercial Plantation establishment, management and wood utilization of Paraserianthes falcataria L. (Nielsen) in the Caraga Region: A handbook.

How to Grow Falcata (Paraserianthes falcataria (L.)) Nielsen. Techno-Transfer Series Bulletin. Ecosystem Research and Development Service. Department of Environment and Natural Resources. Region XI, Davao City, Philippines.

GREEn Kit

Gender-Responsive ENR Enterprises in the Philippines

For more information on this kit, contact
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GENDER-RESPONSIVE ECONOMIC ACTIONS
FOR THE TRANSFORMATION OF WOMEN
(GREAT WOMEN) PROJECT
Canadian International Development Agency (CIDA)
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Philippine Commission on Women (PCW)

Quezon City, Philippines | April 2011