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All about THE FIBER INDUSTRY

INSIDE

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NOTES

The fabric of life

By ALVIN V. DIVINAGRACIA

When we speak of agriculture, the first thing that comes to mind is the food we eat. In some countries though, agriculture is often referred to as the food and fiber system.

Talk of fiber and you are brought back to the beginnings of industrialization and globalization. These terms are two of the most powerful forces that are shaping the conduct of our lives today. The weaving of fibers for clothing provided the impetus in the development of machines long before Adam Smith made his famous treatises on economics. Early trade between countries dealt with products made from fiber such as silk and cotton. The progress of countries such as the United Kingdom, United States, Japan, and China was sparked by their success in producing and trading fiber crops. The income generated from these crops was used to finance these countries' initial industrialization initiatives.

In the domestic scene, the early 20th Century witnessed the potential of fiber, notably abaca, in creating wealth for our country. Although this growth spur did not last long, the fiber industry evolved from abaca and later on included endemic plants that were through the ages had been sources of natural fiber. The past two decades saw a resurgence of abaca and other fiber crops as viable cash crops with the increasing demand of developed countries for natural fibers. We give you an insight on this situation through the articles featured in this issue.

To us at BAR, we see the value of the fiber industry not only as a producer of textile but more on its multiplier effect on rural economy. Talk of the production of fiber-based handicrafts, indigenous gift wrappings, hand-made paper to name a few, and you will see the transformative effect of fiber crops on the lives of Filipinos.

Next time you come across the word fiber or see it, think about the rich heritage and history that link the Filipino with other peoples of the world. Indeed, fibers are the strands interwoven and with it the Filipinos' social, economic and cultural life. ■

The Philippine fiber industry: A situationer

MARIA LIZBETH SEVERA J. BAROÑA

If the steady increase in production and the increasing local and foreign demands for our local fiber are indications, the fiber industry's muscles are flexed, very impressively.

When the Fiber Industry Development Authority (FIDA) did the math on the fiber industry's performance for the past decade, the end of the equation is a healthy, blossoming industry, with lots of room for brighter prospects.

FIDA reported that for almost half a decade, prices of raw and processed abaca are on their all time high. Exports are also soaring. These figures are reflections of the industry's performance in the past five years, weathering even the economic damage of the September 11, 2001 attacks on the United States, then biggest importer of our abaca fiber.

Arrows are going up

Fiber production, according to the report, has been increasing every year by an average of 6.0% since 2001. From 61,238 metric tons (mt) in 2001, fiber production went up steadily, registering 72,891 mt in 2004.

Reflecting on this increasing trend, total produce during the first half of 2005 is also higher than that of the first half of 2004. Foreign and local manufacturers, particularly on abaca pulp, attributed the upward movement of the production arrows to the increase in demand. The stiff competition by the players in the business sector, along with FIDA's developmental programs, were also identified as influences.

Abaca, silk, maguey, piña, buri, coir, salago, ramie, and buntal are just some of the

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fibers produced by our fiber farmers. Abaca, however, accounts for 95% of the country's total fiber production. These fibers are manufactured into pulp, cordage, yarns, fabrics, and fibercrafts.

Bicol, located in Southern Luzon, is the leader in terms of hectarage planted to fiber, but is second only to Eastern Visayas, as fiber producer. Eastern Visayas although places second in terms of land area devoted to fiber, accounts for 40.4% of the country's total fiber production. Bicol gives 28.8%, and Mindanao with 29.5% of the total fiber production.

Slugging it out with the world

Figures since 2001 show that the rest of the world is demanding more and more of our raw fibers. To be exact, raw fiber exports increased by 15.9% annually since 2001. Abaca fiber exports from our local producers have also been expanding annually by almost 16%. From supplying the world with 12,392 mt of abaca fiber in 2001, our exports grew to 19,310 mt after three years.

The United Kingdom, our current top raw fiber trade partner, gets more than half of our total raw abaca exports. The British demand for our fiber goods more than doubled in 2003, compared to the figures in 2001. In 2004, exports continued to soar. Our abaca fiber market in China, the world's fastest growing economy, increased from 13 mt to 585 mt last year.

Since Japan is changing its bank notes to one made from materials with fiber product, the export potential to this country is expected to increase. The United States, a former top importer, experienced upheavals in its business setting, with the world's biggest abaca pulp and paper mill plant formerly located in the US being transferred to England.

There is, however, a shift in the demand for our abaca products. The first half of 2005 saw a decrease in the exports of raw abaca fiber. This is because some of the demand for abaca shifted to abaca pulp.

FIDA, whose policy bats for value-added services and domestic processing, encouraged some importers to buy the abaca pulp. This resulted to paper companies in the US and UK importing some of our abaca pulp.

Germany is our main trade partner for abaca pulp export, followed by Japan, the United Kingdom, and France. The demand from countries in the First World resulted to a 10.6 % increase in abaca pulp exports.

There is an increase in the annual abaca pulp export since 2001. Even as our major trade partners, UK and Japan decreased their raw fiber imports, they however increased their import of abaca pulp.

Filipiniana outfit made from abaca fiber

How is the fiber doing locally?

Last year, our abaca fiber consumption was 50,900 mt. During the first half of 2005, we used up a whopping 28, 493 mt. This increase in consumption of abaca fiber is reflected in the 20.5% increase of total local consumption this year.

Abaca pulp was the top performer among the abaca products. It accounts for 68.8% of the total local fiber consumption, while use of cordage hit 21.4% and fibercraft, at 9.8%.

Abaca is Filipino

The champion of the fiber industry is abaca, "Manila Hemp" to the international community.

Abaca is endemic and indigenous to the country's warm, wet climate and it has been flourishing on Philippine soil for centuries, long before the Spaniards found our shores. Historical accounts have it that the world took a first glimpse of our abaca when an American navy lieutenant brought samples of the fiber back to the United States. To make the story short, the Americans opened the gates for a healthy fiber trade relationship with the Philippines.

Soon abaca plantations sprouted across the country with Davao identified as the province most suitable for the plant. After the Americans provided the momentum for abaca production and trade in our country, the Japanese, after the First World War, also took keen interest in the business prospects of the fiber and went on to improve the production methods of abaca.

We enjoyed being the only abaca producing nation in the world until the 1920s.

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The Americans regarded the abaca cordage, supplied solely by our country, as an important element in their superior navy fleets. They decided to break the monopoly we enjoyed, and using the best Philippine abaca varieties, cultivated abaca in the South Americas.

Our monopoly of the abaca industry slipped further from our grips as a Japanese owner of an abaca plantation in Davao also established plantations in Ecuador. Today, Ecuador is the only other country producing abaca for the world, next to us.

More to look forward to

Several things are going well for the industry but there is still room for improvement. Farmers fighting pests and diseases need resistant varieties. There is also room for high yielding varieties in order to improve fiber production and be able to supply rising local and international demands.

There are also issues of inconsistent quality of fiber and having too many fiber grades. The lack of infrastructure for more efficient marketing network is also an existing problem for fiber farmers and other stakeholders.

Ecuador, concurrent competitor in world trade, is also posing a threat. Our only competitor is exhibiting a more consistent increase in production and more consistent fiber quality.

Fiber power

These issues, however, are not about to dampen the industry's bid to make a stronghold on both the local and international markets. As the world starts to get nervous about keeping the environment intact, more opportunities for the natural raw materials like abaca is emerging. Why can't it be when abaca is both natural and of superior quality?

If there is any more doubt about the ability of our fiber industry to hold on to its vice-like grip as the world's main fiber supplier, the statistics at the end of 2004 shows that a total of 8,525 ha of new abaca farms have been opened. A total of 4,691 ha of abaca land were also rehabilitated. Two new abaca pulp mills opened in the country, with three of the four already existing mills expanding their operations.

There are more to come but we contend ourselves with the achievements as we strive to do more for the fiber industry, the fiber farmers, and the country.

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banana and proposed it to DA-BAR.

The collaborative project, *Introduction, Evaluation, and Adoption of Improved Land Races of Banana for Food and Income Alleviation,* among DA-BAR, INIBAP, Bureau of Plant Industry (BPI), and Institute of Plant Breeding (UPLB - IPB), invested on the introduction and multiplication of improved hybrids and superior local cultivars in the Philippines.

The reality that no institution in the country is responsible for multiplication and distribution of banana varieties was sticking out like a sore thumb. Thus, the establishment of a National Repository, Multiplication, and Distribution Center (NRMDC) was proposed to maintain the banana germplasm. Maintaining them virus-free becomes the role of BPI and IPB.

The project deals with three major phases to improve banana cultivars in the country: introduction and multiplication of cultivars from INIBAP's International Musa Testing Program (IMTP) and local popular cultivars; evaluation of varieties planted under local condition; and promotion of improved hybrids and superior local cultivars for adoption of farmers through an improved production system using tissue culture planting materials.

The introduction and multiplication of disease-free and high-yielding resistant varieties compose the foundation stocks of NRMDCs. The evaluation of these varieties under local conditions is also being done. The team from IPB and BPI, led by Dr. Felipe dela Cruz Jr. and Lorna Herradura, respectively, aims to identify good varieties from banana demo sites where they recommend distribution of the selected varieties to farmers and state universities and colleges (SUCs) that need virus-free planting materials. The evaluation phase of the project also includes research about the BBTV - its nature, management, and epidemiology.

Most of the funding in the project was allocated to the maintenance of the banana germplasm through introduction and multiplication of new cultivars; maintenance of the collection of disease-free and high yielding foundation stock; and evaluation of the varieties for distribution to farmers and SUCs.

Having an NRMDC as a repository made the request for planting materials from all over the country easier as compared to what had been done before -forwarding requests for planting materials to Belgium, where the global banana gene bank is located, which could be limited in supply, more expensive, and would eventually take time to be delivered

Tissue Culture Technology

Tissue culture technology is the technique developed to have disease-free planting materials. "There were advances in banana R&D that revolutionized the banana technologies one of which is tissue culture," explained Dr. Molina.

Dr. Molina added that all the planting materials for tissue culture should come from the NRMDC. In this way, farmers and SUCs can avail of planting

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A multi-stranded yarning machine for abaca

■ MARIA LIZBETH SEVERA J. BAROÑA

Value adding seems to be the most logical path to take given the consistent increase in abaca production and demand for our local fibers. The abaca yarn can be made into different products. Using the material depends on how the raw abaca fiber was yarned, whether single, double, triple, even quadruple stranded.

Stranding is done manually. When the demand starts to pile up, the fiber producers cannot catch up. The quality of the yarn is also affected. Manually multi-stranded yarn is of low-quality because the end-products have protruding fibers. Researchers from the National Abaca Research Center located in Leyte State University, Baybay, Leyte, developed a yarning machine capable of producing multi-stranded untwisted yarn that can produce high-quality abaca twine.

The process of developing the machine design began by observing existing methods of yarn-making, noting output capacities and techniques that can be adapted in the design. The engineers considered the following parameters in the design: peripheral speed of the spooling reel must be 6 m/min or 10 cm/sec; revolution per minute (RPM) of the feeding funnel must be 150 RPM; the binding fiber that will wrap the fibers together must be fine, strong and colorless. The engineers also suggested a mechanism that stops the machine's operation in case the fibers get entangled. They also suggested an automatic lock when the desired length of the yarn is achieved.

The prototype of the machine was made after the design was critiqued by a pool of engineers with workability, cost, output capacity, and availability of needed materials as bases for their recommendations.

The resulting machine, powered by a single-phased 1/4 Hp electric motor, is 63.5 cm long and 76.2 cm wide, and weighs 60 kg. It is made up of four major components: a mechanism for power transmission, which is composed of a power source, transmission pulleys, and clutches. The second major component is the feeding and wrapping funnel. This is where the raw fiber is fed. It contains the very fine fiber wrapped around the abaca fiber, which is then spooled into the third major mechanism, the spooling reel. Two or three strands of fiber tied into the spooling reel together with a fine polyester yarn is made to pass through a hole provided in the guide bar and the feeding funnel. The fourth major component is the timer. Once the yarn reaches 100 m, the timing device locks up and the operation is stopped.

After being thoroughly familiarized with the machine and how it is operated, potential operators in Matalom, Leyte tested the newly-developed machine. They observed that the machine made weaving easier, smoother, and the product cleaner and aesthetically acceptable.

Further, the capacity evaluation showed that the machine can produce an average of about 800 m/hr multi-stranded yarns. It is also able to weave an average of 1,200 m yarn.

Cost benefit analysis of the machine showed a 165% return on investment. The researchers, however, recommended that the machine be tested in other abaca-producing areas to determine its acceptability and promote its use. They also recommended testing the use of other binding materials like silk, and other natural fibers and developing a twining machine to process the multi-stranded yarn to complete the system.

Source:
Development of multi-stranded yarning machine for abaca fiber by Feliciano G. Sinon and Macuin F. Delantar, National Abaca Research Center, Leyte State University, Visca, Baybay, Leyte.

Extracting fiber with a clever machine: World's first

■ MIKO JAZMINE J. MOJICA

FIDA's Engr. Adriano Valenzuela extracts fiber from abaca using the multi-fiber extracting machine.

Extracting fibers can be very tedious. Before, farmers extracted fibers through hand scraping or by a manual spindle-stripping machine introduced by the Japanese. This device is stationary and posed hazards to its operator because it can chop fingers with a wrong turn of the device. Then, a machine that can churn out several kilos of fibers a day, easier to operate, and has a safety device was developed. This time, it is proudly Filipino-made and a first of its kind in the country.

Multi-fiber extracting machine

"The machine was a total refurbishing of the older device. Every glitch we spotted in the manual stripping machine was solved in this latest version. Since this new machine is mobile, it can easily be moved from one barangay to another so that farmers from far-off places are not burdened by the labor and cost of transporting their fiber," Engr. Adriano C. Valenzuela, one of the developers of the technology, cited these advantages of the new machine in fiber extraction.

The scientists and engineers from the Fiber Industry Development Authority (FIDA) developed the mechanical and mobile machine for extracting pineapple, banana, and abaca fibers. The developers of the technology are Dr. Aurora G. Peralta, Engr. Adriano C. Valenzuela, Engr. Fidel S. Josol, Edgar A. Abriol, Romeo P. De Vera, and Engr. Petronilo B. Jabay. They are all stationed at the Fiber Processing and Utilization Laboratory (FPUL) of FIDA.

The machine is already registered with the Intellectual Property Office (IPO) and is undergoing several examinations for acquiring its patent. This technology proves attractive to our neighboring countries. "There are some countries which are particularly persistent in buying the device. Of course, we are anxious that our technology might be pirated from us so we are very careful in relating with them. We do not want another country to reap what we sow before we can even commercialize it in our own land," says Dr. Peralta, head of the FPUL.

What can it do?

There are two kinds of fibers, primary and secondary. In the industry, only the primary fiber is used while the secondary fiber is discarded. Usually, "tuxying" is a process done before extracting fiber from a material. Tuxying removes the abaca's outer layer using a spindle stripping device. With the use of this extracting machine, one can decorticate both the primary and secondary fibers which means nothing is wasted in the fibercrop.

Decortication means the removal of the non-fibrous material from the fibercrop. When the fibercrop stalk is fed into the extracting machine, two rounds of decortication are needed. The non-fibrous material cannot be separated in one feeding because the fibers might snap.

In decortication, there is no need to tuxy since stalks can be fed directly to the machine. However, the quality of abaca fiber extracted from this machine is low because only banana and pineapple fibers are suited for extraction in this machine. The spindle-stripping machine, on the other hand, is exclusively for the extraction of abaca fiber.

This multi-fiber extracting machine is operated with a safety device, so accidents are not likely to occur. In case the operator wants to stop the machine in the middle of spinning, he/she just has to push a pedal attached to the device and i will instantly stop. There is also a big ply wheel in the machine which is important for its efficient performance.

The device is designed in FIDA

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The Fiber Processing and Utilization Laboratory of FIDA located inside the BAI Compound, Visayas Avenue, Quezon City, is a first in Asia.

while a private fabricator in Valenzuela City manufactures the machine. Its troubleshooting and maintenance is not a problem since its design is simple and does not require high technical skills to operate and maintain.

These machines are already stationed at several fiber-producing regions of the country wherein the local government units organized a common service facility for easy access to farmers. The private sector in some provinces became interested after seeing this technology, paving the way for its gradual commercialization.

Basic economics

According to the study made by the authors, with an output of 11 kg pineapple fiber per day sold at P120/kg, a profit of P360/day can be realized. For an output of 20 kg banana fiber per day sold at P80/kg, a profit of P467/day is likely. On the other hand, there is much lower recovery for abaca fiber using the multi-fiber extracting machine.

According to Engineer Valenzuela, the machine costs P60,000. If one buys an expensive engine which costs about P50,000-60,000, then he needs about P100,000-120,000 as investment for the machine. "The machine consists of three major parts: the extracting cylinder, the breastplate, and the feeding chute. The machine is mounted on a chassis with pneumatic tires and powered by a diesel engine," he explained.

The Fiber Processing and Utilization Laboratory

There is another first in the history of fiber industry that the country should be proud of is the Fiber Processing and Utilization Laboratory of FIDA where the Mobile Multi-fiber Extracting Machine was developed. This one-of-a-kind laboratory, a first in Asia, became operational on December 17, 1990 to strengthen the capability of FIDA to undertake researches aimed at developing and promoting the domestic processing and utilization of fibers. It has the capacity tests and development on the extraction, characterization, and utilization of fibers.

The lab offers the following services: physical and morphological testing of fibers, fiber identification, chemical analysis of fiber, pulp test, performance evaluation of fiber, extraction machine, specific fiber research as requested, and seminars on handmade papermaking, bleaching, and dyeing of fibers.

For the morphological analysis of fiber, the fiber cells are measured under the microscope to determine their length, diameter, width, and cell wall thickness.

The pulp test measures the thickness, air permeability, weight (gm/sq m), and elongation of fibers. The fiber is also tested for its durability through several foldings while the analysis of its cellulose content and moisture is determined to identify its potential in the paper or textile industry.

FIDA disseminated the paper making technology through special trainings and demonstrations. Abaca is not the only one used for paper making in the laboratory since other less popular fibers such as those from water lilies can be used.

According to Dr. Peralta, through their initiative, pulp utilization has doubled since our paper money of P500 and P1000 denominations and other security papers such as land titles and checks are now partly made from abaca fiber.

From more information, please contact Dr. Aurora Peralta at BAI Compound, Fiber Processing and Utilization Laboratory, Visayas Ave., Diliman, Quezon City. Tel # 924-7986; 920 0427

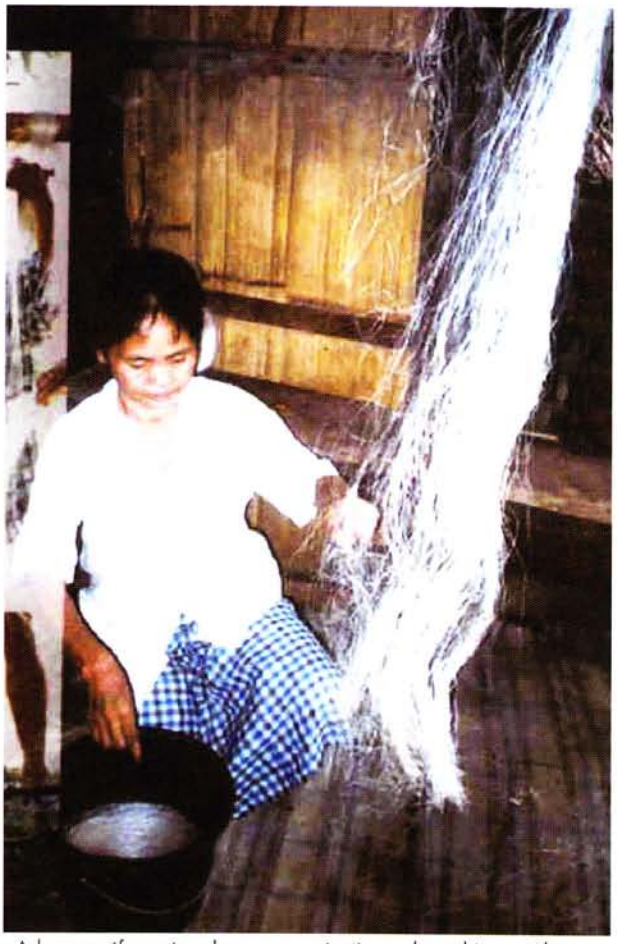
The laboratory uses high-tech machines for papermaking.

Tinagak-making:
Spinning thread to success

RITA T. DELA CRUZ

What is the role of entrepreneurial activity in fostering a community organization? In John C. Allen's "The Role of Community in Fostering Entrepreneurship," the answer may be as obvious as putting your left and right index fingers together to find out later that you have two. Entrepreneurship is an economic development strategy embraced within broader concept of community development. Building an organization around an activity that provides members with tangible economic benefits motivates a community to be continuously involved.

But for the farmers of Brgy. Maligang, Kiamba, Sarangani Province this seemingly scholarly insight may not be as logical as they hoped it would be, especially if the farmers have to hurdle a lot of uncertainties before getting the big hitch to progress.



A housewife seriously engages in *tinagak*-making at the comfort of her own home earning money for the family.

The Rise of a Cooperative

The story started when the Upland Development Programme (UDP) initiated its operations in Brgy. Maligang in 2001 by conducting trainings on *tinagak*-making. UDP is a special project of the Government of the Philippines funded by the European Union and implemented by the Fiber Industry Development Authority of the Department of Agriculture (FIDA-DA).

Tinagak, also known as *tumbong* in the T'boli dialect, is the craft of tightly knotting abaca fiber strand; the raw material for handwoven fabrics like *pinukpok, sinamay, dagmay,* and *tinalak*.

What the government hoped then was to provide an alternative livelihood for the upland community of Brgy. Maligang whose means of survival was constantly on edge almost always on a hand-to-mouth existence, barely making both ends meet.

Farmers of Brgy. Maligang were interested to attend these training on *tinagak*-making, which later became an important factor in the establishment of a sitio-based association, Sitio Malayo Tinagak Producers Association (SIMATIPA). The Association was established with the help of FIDA, UDP, and Kiamba LGU.

Aside from the trainings, UDP also provided them technical assistance to develop both their technical and organizational capabilities. SIMATIPA started producing *tinagak* in October 2001 with 8.35 kilos as initial volume. FIDA facilitated the delivery and the sale of their produce and later with the help of DTI and LGU, they were able to stabilize the marketing arrangements for the *tinagak* that the Association was producing. This encouraged more people in the community to produce more *tinagak*. It also paved the way to the expansion of SIMATIPA's membership. With the increasing number of people interested in joining the Association, the volume of *tinagak* produced also increased.

In the middle of 2003, with encouragement of UDP, DTI, FIDA, and LGU, the Association was transformed into a multi-cooperative. The Coop was finally registered with the Cooperative Development Authority (CDA) in September 2003 as the United Maligang Farmers Multi-Purpose Cooperative (UMFMPC), with operations covering the entire barangay of Maligang. A pre-membership education seminar was conducted and the initial 28 coop members were elected officers. The membership grew from an initial membership of 28 to 125, coming from various ethnic groups of the barangay like T'boli, B'laan and Visayan.

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Difficulties

Behind every successful story is a hard beginning. With initial problems like weak cooperation and coordination among its members resulting in a loosely-organized group, and inadequate institutional and technical support to overcome its organizational weakness at that time, the Cooperative grew to what it is today.

Doubts among community members and getting people involved in the project became the immediate concern of the officers. Rivalries among families also stood in the way, making coordination among members even more difficult. There were also initial objections regarding operational policies of the Coop particularly the "communistic appeal" and misconception about government interventions. More important was how to manage their meager capital funds and the zero capital shares of its members.

Accomplishments

The Cooperative has successfully promoted *tinagak*-making as an off-farm income source for the community of Brgy. Maligang. Nowadays, members earn more by selling *tinagak* that even women have engaged in *tinagak*-making enabling them to have enough money to support their children's school expenses as well as helping provide food for the family. The promising income attracted more people to turn to abaca fiber and *tinagak*-making that makes it a popular activity even among children. There are more women than men members in the cooperative.

With the growing interest in this business, the Coop is able to provide its members and interested people in the community the necessary hands-on training to master the craft. Some of the women members of the Coop even go to neighboring barangays to extend the technology. Those who have been trained are tapped as trainers on *tinagak*-making in other municipalities of Sarangani, to even as far as Davao del Sur.

Production of *tinagak* increased from an average of 20 kg/month during the last quarter of 2001 to 69 in 2002 and 177 in 2003.

Government agencies also provided support. The Department of Trade and Industry (DTI) extended financial assistance for the purchase of facilities and supplemental capitalization, particularly for the construction of a multi-purpose building and acquisition of a mobile spindle stripping machine and handlooms. A portion of the aid was used as working capital to supplement funds for the business operations of the Coop.

The Coop became an institutional member of the Maligang Upland Farmers Cooperative or MUFARCO, thereby increasing its working capital and enabling it to access short-term loan. After fully paying back its loan, the Coop was qualified to avail of higher loan from the Upland Development Loan Fund (UDLF), managed by UDP's partner financial institution in the municipality.

The Coop has become an active partner in the implementation of community development projects in terms of agricultural infrastructure support, resource management, sustainable agriculture development, community development, institutional development and extension, and marketing/enterprise development.

To sustain and expand abaca production in the area, in 2002, the Coop developed a 100-hectare communal abaca production project in Monte Ulit. As benefits, the Coop extends a Pph200 providential aid to its members for emergency need like hospitalization. The Coop also grants mortuary aid amounting to Pph100.

Farmers from Sarangani are busy with *tinagak*-making

Due to this project, the community of Maligang developed a stronger sense of oneness and a shared purpose as well as confidence in themselves and in the future. Needless to say, there was a great improvement in the life of the community.

Future plans

The people of Maligang hope to achieve more. Among its future plans is the setting of a consumer store where they will directly sell their products. They also wish to eventually expand the Coop's trading business to include other products like coffee beans, coconut, and corn, which are the main crops in the area before *tinagak*-making entered their life.

The Coop hopes to fully develop the 100-ha communal abaca production area, expand its membership, develop more markets for their *tinagak*, and finally, put up micro-credit services for its growing membership.

Aside from its commitment to maintain its success, the Coop is committed to maintain the environment by practicing sustainable agriculture, engaging into diversified farming, and soil and water conservation.

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Key to success

Entrepreneurial activity plays a crucial role in fostering community development. This was proven by the Maligang Cooperative. Injecting an entrepreneurial activity into the community served as a catalytic instrument for the upland people to strive hard and develop what started out as a mere interest among a few of them. It was the promotion of *tinagak*-making as a value adding economic activity that provided the impetus for the emergence and growth of the Cooperative.

Providing the mechanism for marketing also proved effective for the Coop members because it gave them the assurance that members could indeed earn money from this value-adding activity. Furthermore, the concerns of an on-going enterprise posed challenges that allowed the organization's leaders and officers to continuously practice and hone their knowledge and skills gained from development activities.

Other success factors include: effective maintenance of the Coop, continuous generation of financial resources, committed and energetic leadership that commands respect among members, problems that were successfully overcome, members that are willing to learn and devote their time and effort, and external assistance from the government in the form of training, market linkaging, technical support, or provision of supplemental resources

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materials that are virus-free. These materials are also cheaper than what have been produced by government tissue culture laboratories.

To augment the rising needs of farmers and colleges and universities for banana planting materials, the local varieties and the IMTP stocks coming from the NRMDC nurseries were given to private tissue culture laboratories for mass and commercial production.

Delivery System

INIBAP wanted to develop the delivery system of tissue culture planting materials to avoid the spread of the virus and to have a steady supply of banana plantlets in the northern part of the Philippines. Dr. Molina explained, however, that they are looking for ways to have a system that will produce and deliver tissue culture materials in large quantities.

As there are no available planting materials for small-scale farmers that are less expensive than what the government laboratories are producing, the Lapanday Group of Companies in Mindanao produces the tissue culture materials that supply nurseries in Luzon.

Farmers' acceptance of the technology is also one of the issues addressed by the project. To let the farmers see the advantages of the technology applied to banana R&D, one of the options is to teach the farmers how to grow these materials. "In the project, we teach the farmers how to grow tissue culture planting materials and make them realize the economic viability of tissue culture propagation to manage BBTV and increase productivity," Dr. Molina added. At the same time, the project is creating a system that will deliver these materials that are sustainable and reliable.

Off shoot of the Project

Dr. Molina explained that a PCARRD project, which was an off shoot of the DA-BAR/INIBAP project, focused on the promotion of tissue-culture cultivars to farmers. PCARRD and seven SUCs are supplied with foundation stocks from NRMDC. In this project, PCARRD emphasized the promotion and adoption of tissue culture planting materials to smallhold farmers in a wider scale.

To date, state colleges in Luzon such as Cavite State University, Ilocos Sur Polytechnic State College, Pampanga Agricultural College, and Quirino State College have been involved in the distribution and evaluation of banana tissue culture planting materials.

The linkage with DA-BAR and PCARRD is one of the most important factors that would make the project successful. The tissue culture technology is already disseminated all over Luzon. Farmers now have more access to healthy and high yielding planting materials. Some are even growing the IMTP's FHIA variety for adoption purposes. Farmers in Quirino are now commercially growing tissue culture Lacatan. In the near future, Dr. Molina stressed, "we would reap the seeds that we sow, which started from this project."

And hopefully, a few years from now, most of the banana varieties that we see in the market will come from Luzon as well.

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FIDA and the

■ MARIA LIZBET

"Ninety-eight percent of industry comes from aba of fiber like banana, pin contribute to the industry

We turned up at the headquarters of the Fiber Industry Development Authority (FIDA) expecting to interview one person. However, as division heads and important personnel of the Authority walked into the room where the interview was to be held, one thing came to mind: we were about to talk to a team.

EO 709

FIDA oversees the country's fiber industry. Executive Order No.709, signed in 1981, mandated it to "promote the accelerated growth and development of the Philippine fiber industry in all its aspects including research, production, processing, marketing and trade regulation." More than three decades since this Order tasked the Department of Agriculture to administratively supervise, the handlers of the Authority are happy with the way the fiber industry is performing.

"I became administrator in January 2000 but I have been working for the fiber industry since 1979. I started out as a market analyst," recalled FIDA Administrator Cecilia Gloria J. Soriano. She related how she rose from the ranks to become chief of marketing, to deputy director, and finally, as administrator.

"When I took over the position of administrator, the industry was well on its way. There were already mills, farmers, and processing activities," she remembered. But administratively, she saw room for improvement, specifically in communicating with stakeholders of the industry.

"My team and I made it a point that we involve our stakeholders, especially the private sector, in our decision making. We consulted them on conducting reviews, planning, strategies and priorities in research, even on regulatory issues. The constant communication we established with our stakeholders was important." Admin. Soriano said.

"We institutionalized our feedback mechanism, both in research and regulatory issues." She added that she learned this management strategy for a growing agency when she worked with the Bureau of Agricultural Research.

"What we learned in research management, we also apply with the regulatory aspects of this agency," she added.

Administrator Soriano also revealed the working formula they adopted in bringing the fruits of their programs to the farmers.

"In everything we do -from controlling diseases to encouraging farmers to use our tissue culture plantlets - it must always be a cooperative activity among FIDA, the local government units, and the private sector," she said.

Partnering with the local government, she said, pays revenues especially because the abaca farmers want to reach far-flung barangays where only the local officials can have consistent access.

She gave as an example their efforts in bringing in the Integrated Pest Management (IPM) technology to abaca farmers. "The success of the IPM technology, sometimes, is just a matter of having a clean farm," Mrs. Soriano explained. They have the local officials as partner to instill this fact on the farmers.

She said that making the farmers understand their end of the

fiber industry

VERA J. BAROÑA

he earnings of the fiber a. But the other sources apple and ramie also ."

bargain entails involvement of the local political leaders, from the congressman, to the governor, down to the barangay captain. Mrs. Soriano, however, pointed out that efforts at the local level must be overseen by the Department of Agriculture's regional field director in the area.

No letting up

Bringing in the business sector to the equation of FIDA's success was not easy.

"During our first years, the business sector saw research to be just *gastos* (expense). But my team persisted. *Hindi namin sila tinantanan* (We persisted in courting them). You have to make them understand that this is also their industry and whatever happens in the field affects their enterprise," she revealed.

She went on to relate the positive effects of their efforts in pursuing the business sector. "Now, they are partnering with Jojo in our tissue culture program and with Au in the construction of machines for extraction," she cited. She was referring to FIDA's Crops Research Division Chief, Ms. Josephine B. Regalado, and Fiber Technology Utilization Division Chief and Marketing Division Officer-in-Charge, Dr. Aurora G. Peralta.

Pivotal moments

"We have many," Mrs. Soriano mused when asked to cite significant moments for the Authority.

One of them is the passing of Republic Act 9242. It mandates the use of indigenous fabric for government uniforms. "Two textile mills are now weaving home-grown fibers," Mrs. Soriano shared.

The sky blue and lavender blouses of FIDA personnel are made from indigenous fabric.

Dr. Peralta pointed out that national pride is enough reason to don the indigenous fabric-made uniform. "Although there are physical discomforts in wearing it," she added.

The ultimate clincher, however, on why they opt to use the fabric is, it is much cheaper than the conventional fabric the government buys for its employees' uniform. In addressing the downside of wearing the fabric, like the itchiness, "It only takes a little perfection of the technology," Dr. Peralta said.

Another pivotal moment for FIDA is the establishment of its tissue culture program.

Three private pulp mills are now working with FIDA through Ms. Josephine B. Regalado on the production of virus-free planting materials in its tissue culture laboratories in Bicol and Leyte. The project aims to support the expansion and rehabilitation of abaca plantations to assure adequate supply of planting materials for farmers. FIDA distributes tissue-culture derived planting materials to the LGU for distribution to farmers.

"Before, farmers were skeptical to plant the tissue culture plantlets. But after the plantlets proved better than the naturally produced materials, we could now hardly cope with their demand." Mrs. Soriano said.

Ms. Regalado explained that propagation through tissue culture is a relatively new technology. She explained that they have

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"We have good, even award-winning researchers at FIDA. All they need is exposure to what is happening in the global picture."
– Soriano

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established a tissue culture nursery in Region 5. The plantlets produced in the nursery are distributed to the farmers through trained LGU personnel.

Another significant moment for FIDA was when the Central Bank approved their proposal of incorporating abaca in the material for the peso bill.

Mr. Danilo Ocayo, office-in-charge of the Planning and Statistics Division, revealed that our peso bills are made up of 80% cotton and 20% abaca. "We hope to increase the abaca component of the peso bill to even 70% cotton and 30% abaca."

Prospects of the industry

"We are happy that another pulp mill has been put up, and that an additional 8000 ha has been added to the land area planted to abaca," Mrs. Soriano shared.

However, according to her, this is not enough. The demand is high so the price of the commodity is also high.

FIDA statistician, Ms. Mystic Pelayo gave the low-down on the prospects of abaca in the world market: "About 80% of Philippine abaca is being used in the pulp sector. If we look at the trend of abaca demand abroad, the prospect of abaca pulp abroad is good," she shared.

She cited that this year, pulp exports increased by 125%. Since 2001, there has been a continuous growth in exports. Last year, the export was about 21,000 tons of pulp. This year it was expected to increase to about 23,000 tons. "The market has shifted from cordage to pulp so the growth area is in the pulp sector. As to fiber crafts, the demand from the United States went down after the 9/11 attacks. But it is now going up," she added.

Ninety-eight percent of the earnings of the fiber industry comes from abaca. But the other sources of fiber like banana, pineapple and ramie also contribute to the industry albeit their contribution is not as significant.

Dr. Peralta pointed out that banana and pineapple, are planted primarily for their fruit and not for their fiber, unlike abaca whose sole purpose for being propagated is for its fiber.

"We are working on this. We have a laboratory, the Fiber Processing and Utilization Laboratory located in Visayas Avenue, Quezon City, that identifies uses of different kinds of fibers. We are working on how to extract more fiber from these plants and identify their uses," she added.

Wanted: P5 million or some

Admin. Soriano shared that what is lacking in the FIDA laboratories that would really help in the management of disease is an ultracentrifuge. This is a high-velocity centrifuge, an apparatus that separates liquid and solid particles from a suspension - used in the separation of colloidal or submicroscopic particles. FIDA operates three diagnostic laboratories where abaca is tested for presence of viruses. However, the agency lacks the facilities to produce the anti-sera necessary in its detection work.

"It costs so much and we do not have enough money to buy it. Once we have that equipment, we will be able to create our own anti-sera for our disease identification tests. The imported serum from Australia is expensive." Mrs. Soriano admitted.

Funds for chemicals against pests and diseases are also lacking. The Administrator also dreams of having her researchers see the fiber industry at the global setting for them to acquire a perspective that would help them in their research work.

"We have good, even award-winning researchers at FIDA. All they need is exposure to what is happening in the global picture," she said.

Money gets in the way

As essayed by the team when we closed the interview, what is left wanting in an industry that is currently doing well is money. "There are many things we want to do because there are so many things that need to be done."

The lingering feeling when we left the office of the guardians of the fiber industry was that of hope for the country's agriculture sector. FIDA steered the fiber industry into what it is today given problems on lack of funds. Although government support could only take us so far, FIDA's dedication took the fiber industry farther down the road.

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Entrepreneur Alex Tan
Living by the fiber

■ MARIA LIZBETH SEVERA J. BAROÑA

"You will find his life interesting. He was born on an abaca field."

This was Fiber Industry Development Administration's (FIDA) Gloria Cecilia Soriano's way of introducing Mr. Alex Tan, an entrepreneur who tried his luck in the fiber industry, and succeeded.

The FIDA Administrator was talking about February 14, 1942, the date Alex Tan made his first tryst with abaca. Mr. Tan was born in Barrio Kag-abaka of Catarman, Northern Samar, an abaca farmland. Northern Samar, whose land area is 3,498 square kilometers, counts abaca as one of its major provincial products, along with palay, coconut, banana, corn, camote, sugarcane, vegetables, and fruits.

"You will find his life interesting. He was born on an abaca field."

Mr. Tan is no stranger to the plant having spent his childhood in an abaca plantation. His family has been engaged in abaca business since the Second World War and at a very young age, he has involved himself in his family's business that included planting, trading, and exporting.

The success of his family's business gave satisfaction to Mr. Tan. "The business has actually provided jobs to a lot of my fellow Samareños and exporters of abaca fiber all over the world."

His company, the SCTan Export Corporation, a pioneer in its field of business has through the years transformed from just abaca production, to trading and finally exporting abaca directly to foreign end-users.

His efforts, and his business' contribution to the fiber industry earned Mr. Tan respect and appreciation from players of the industry, especially those in research. In his capacity as a member of the University of Eastern Philippines (UEP) Board of Regents, with the assistance of FIDA, he supported the promotion of agricultural R&D in the educational system, specifically in the UEP.

"We have set up an agriculture research and development department at the UEP in addition to the training facilities the University offers to deserving farmers." He was recently conferred the degree of Doctor in Business Administration, *honoris causa* by the UEP.

He also helped promote the accelerated growth and development of the fiber industry by being an active member of abaca affiliated organizations. He is president of the Philippine Fiber Exporters Association, and serves as consultant to the FIDA.

Mr. Tan is happy with how the fiber industry has taken its niche in the global market. "The Philippines supplies 85% of abaca fiber all over the world. With this, we could claim that we are the world leader in this kind of industry," he beamed.

But he also warned against complacency and stressed that, "In order to maintain the country's leadership in the world abaca industry, FIDA must continuously perform research, provide production and marketing support, technologies ready for utilization, extension, and standard regulations for implementation and trade for the growth and development of fiber industry." ■

Dr. Remy Abgona
A scientist with a heart

RITA T. DELA CRUZ

If a scientist's worth is measured by his or her productivity and contributions to the world, it is apparent that Dr. Remedios Villa Juan-Abgona or *Remy* to friends, has never been off the main track. A scholar, a leader, an accomplished scientist, a multi-awarded researcher, an expert in her own field, an achiever. She's all these and more.

Typical scientists tend to share certain traits to include objectivity, strong analytical skills, and the ability to counter preconceived notions and misconceptions. True to her craft, Dr. Abgona is more than the typical scientist. She says, "I always listen to my heart when I do my science."

Each scientist follows the scientific method but creativity and making smart guesses and knowing what to do next before the results come in are skills of the best researchers. Most scientists do it using their mind alone, Dr. Abgona uses both her mind and heart to battle every day's challenges.

Being a plant pathologist

Dr. Remedios V.J. Abgona has always been an enthusiast of science. Her initial dream was to become a nurse, which would eventually lead her to pursue medicine. But coming from a big family that could not send all its children to an expensive course, her dream had to be compromised.

Her brother who sent her to college encouraged her to take the University of the Philippines College Admission Test (UPCAT) and consider other course aside from medicine. In 1974, she took B.S. Agriculture (major in plant pathology) from the University of Philippines Los Baños (UPLB), which was a good choice because it satisfied her natural love for science and her need to work with nature, requiring an objective and wide understanding of the pathological occurrence.

In 1992, she pursued MS Agriculture (also in plant pathology) in Gifu University, Japan and after two years, took her PhD degree in Agricultural Science also from the same university under the Ministry of Education, Culture and Sports Japanese Government (MONBUSHO) scholarship.

Working with FIDA

Fired by her nationalism, she came back to work for her country. She has been with the Fiber Industry Development Authority (FIDA) of the Department of Agriculture (DA) since 1984 where she was first appointed as a senior agriculturist in the Crop Research Division and later as supervising agriculturist of the Crop Research Division in 1996.

Before joining FIDA, Dr. Abgona worked at the Field Trials Services Division of the Bureau of Plant Industry (BPI) for eight years as a research assistant. She soon climbed the ladder when she was appointed Agronomist I of the Biological Control Laboratory at the DA Region 4 Tiaong Experiment Station, Quezon Province in 1984. It was here that she was exposed to actual pest and disease problems in the field. She did investigatory research on the control of rhinoceres beetle (*Oryctes spp.)* using *Metarrhizium anisopliae*, Sorokin wherein she worked closely with Ms. Venus Fandialan, an entomologist in the station. This started her career as a researcher.

Productivity

While new diseases and changes in existing pathogens remain a constant threat to agriculture, the development of new and innovative ways to control plant diseases has become a constant challenge for Dr. Abgona. As a serious agent of science, she must continuously seek ways to contribute to this challenge.

Dr. Abgona specializes in three major fields: (1) induced host resistance, (2) biological control of soil borne pathogens (*Rhizoctonia* and *Fusarium spp.*), and (3) identification, detection and control of fungal and viral diseases in abaca.

Her productivity as a scientist is evident through numerous international and local publications where her scientific research works have appeared. Some of the well-renowned refereed journals that published her works are: The Australasian

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Journal of Plant Pathology, European Journal of Plant Pathology, Annals of the Phytopathological Society of Japan, Plant Pathology, and American Phytopathology.

Among her significant works and technologies recently developed/generated include: the development and adoption of rapid immunofilter paper assay (RIPA) to detect abaca viruses (2004), first record of natural infection of abaca with banana bract mosaic potyvirus (1999), development of pectic substance accumulation induced by BNR to inhibit the formation of infection cushions in cucumber seedlings (1997), inhibition of infection structure formation of *Rhizoctonia solani* on cucumber (1996), protection of cucumber seedlings from damping-off disease (1994), and dentification of cucumber as a viable bioassay for testing hypovirulence of *Rhizoctonia solani* (1993).

Other outputs from her scientific works include: (1) initiatives in abaca viral disease management (2003), identification, detection and spread of viral diseases in abaca (2002), natural infection of abaca with banana bract mosaic potyvirus (1999), and sanitary and phytosanitary measures and technical barriers to trade in abaca (1998). Most of the results of these research works were presented during various scientific congress, training, seminar, and forum.

Dr. Abgona has reaped various awards for her research works. Some of her recent awards include: Best AFMA R&D Paper Award for 2004 (applied research) for her research work on the development and adoption of RIPA and Best Poster Paper Award (first place) for the same research initiative. Her studies on bract mosaic disease in abaca also bagged the Best FIDA R&D Paper Award for 2000 (second place).

In 1998, Dr. Abgona was awarded the "FIDA Most Conscientious Award for Crop Research" for her exemplary behavior, professionalism, sincerity, dedication, and commitment to public interest. Recently, she was nominated for the Search for Outstanding Agricultural Scientists for 2004-2005.

The other side

People have different perceptions about scientists. Most of the time, such perceptions lead to misconceptions, one of which is that all scientists are individualistic and often detached from the world. When asked to describe herself, Dr. Abgona says, "I am just a simple, unassuming person who has the passion for investigative research. I want things done to the best of my effort. I give particular importance to my job because I know this is the fulfillment of my mission in this world at the same time maintaining a wholesome and a God-fearing family."

She adds that, "People think I am a snob because I am the silent type, which has been one of my prevailing traits since childhood. This was reinforced when I studied in Japan. The Japanese are self-effacing, they work more and talk less." Although she has already achieved something, she wants to remain humble.

Dr. Abgona's greatest achievement in life, she says, is having to fulfill her role as a researcher and to be recognized in the scientific community, at the same time have a great family that supports her all the way. Her family, composed of a supportive husband and wonderful, loving children, is to her, her most cherished treasure. ■

What can genetically improved carabaos do for the industry?

MIKO JAZMINE J. MOJICA

These genetically improved calves developed at the Philippine Carabao Center will be used for breeding.

"Our import dependency on numerous commodities particularly milk and meat often leave us at the realm of economic crisis. Producing our own premium water buffaloes that could produce meat and milk will at least address the local demand and provide alternative source of income especially to the rural farming families." Ms. Danilda Hufana-Duran, a reproductive biotechnologist at the Philippine Carabao Center (PCC), said when she presented the latest technology they developed on the production of water buffaloes. The technology was featured in the 3rd Agriculture and Fisheries Technology Forum at the Bureau of Agricultural Research (BAR) as part of its national program on technology commercialization.

Finding ways

The PCC, as the lead agency in the development of water buffaloes (locally known as 'carabao') as source of food and income, acted on the commodity's declining value and number through the production of superior water buffaloes. Aside from increasing supply and income, the mass production of superior buffaloes will deal with the malnutrition problem of families mainly in the rural areas and the poor quality of our water buffaloes as source of meat and milk.

According to Ms. Duran, our indigenous breed is inferior in terms of its milk and meat production. The indigenous breed produces only 1.45-2.64 liters of milk a day while the genetically superior buffalo gives 7-20 liters a day. Moreover, the superior buffalo can weigh from 600 kg to 700 kg compared to the indigenous breed, which weighs only 420-500 kg.

Biotechniques

Genetically-superior water buffaloes are produced in PCC using three major reproductive biotechniques, namely, *in vitro* embryo production (IVEP), cryopreservation, and embryo transfer.

"IVEP is the main method to produce an embryo for the production of genetically-superior buffaloes. Using this technique, we are able to generate the genetic material for our genetic improvement program in PCC," explained Ms. Duran. She added that the viability and survivability of the embryo for cryopreservation and transfer largely depend on the *in vitro* culture system. The process of IVEP requires high technical skills and competent staff because it has to be performed in a laboratory where a tissue culture environment is appropriate.

Cryopreservation, the storage of embryos by freezing at low temperatures, is done to safeguard the viability and survivability of the embryo especially when it needs to be transported around or outside the country. Apparently, cryopreservation is crucial for the transport of embryo since it can last only two hours at room temperature without losing its viability.

The last technique, embryo transfer, is the actual implanting of the embryos to the recipient animal. Ms. Duran stressed the importance of the correct procedure of transferring the embryo to recipient animal at the right time for it to attain full term development into a calf.

Refining the technology

The technology was derived by PCC through the study of *in vitro* maturation of oocytes, *in vitro* fertilization, and *in vitro* culture of embryos. "When the techniques of IVEP and cryopreservation were in place, we

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established a laboratory in India where we refined the techniques and produced embryos for transfer trials and researches. After 11 months, we found the technology feasible," recalled Ms. Duran.

The team of PCC scientists brought the first batch of embryos to the Philippines in March 2001. The first batch of calves was born in April 2002. The production of genetically superior embryos takes only 8-9 days while the birth of the calf is usually expected after 302 days.

Stumbling blocks

Some of the impediments to the development of the technology are lack of funds and the delay in implementation because of several formalities required in the India-Philippines bilateral project. The inadequacy of funds affected the adoption of the technology since laboratory facilities, equipment, and supplies would initially require big amounts.

Since many of the needed supplies and materials come from India, there is often a delay in the procurement of these items. "The transport of embryos from India is also a big problem because of severe airport checks and security considerations. Embryos are stored in liquid nitrogen, people who cannot understand the procedure consider it as a dangerous item," Ms. Duran remarked.

Commercialization of the technology

According to Ms. Duran, the technology is already commercialized in several countries but the Philippines is still in the promotion stage of the commercialization process. When asked about the cost effectiveness of the technology, Ms. Duran asserted that it is cost effective because producing our own superior buffaloes will only cost us P20, 000 per animal compared to about P120, 000 if we import.

"If we have P1.2 million, we can only import 10 buffaloes which will produce 70 liters of milk per day as against 60 water buffaloes produced locally through the technology which can produce up to 420 liters of milk per day," she explained. Although it may appear that milk production is the same given the two options, she said that in the long run consumers can expect greater milk production and sustainability by producing our own superior buffaloes. There are 300 days lactation period of the buffalo every calving.

Anyone who is interested in adopting the technology can coordinate with PCC for its technical assistance. The main requirement is to own or raise female buffaloes. In the case of farmers, they are advised to organize a cooperative so that the provision of technical assistance and application of the technology would be easier.

What to expect

Our genetically superior water buffaloes have export quality. In fact, it was found that its milk and meat have high anti-cancer components. Ms. Duran said this posted a very good opportunity for us to export our product to Japan and other neighboring countries. However, we cannot export unless our own demand has been satisfied first.

When asked about the future of the buffalo industry, she said, "If we seriously work in supporting the water buffalo genetic improvement programs of the government, time will come when this industry will play a significant role in establishing strong milk and meat supply that can contribute to our food security and nutrition. And also, it will generate employment opportunities and income for the various sectors of society."

During the technology exhibit in this year's National Agriculture and Fisheries R&D Week held at BAR, she got a chance to promote the technology to Sen. Ramon Magsaysay Jr., head of the Senate agriculture committee. Her persuasive conversation with the senator resulted to his promise of a funding aid for the technology's commercialization.

When asked why she thinks she could readily solicit support from the Senator, she quipped that she simply showed him the relevance and efficiency of the technology as one way of addressing our national concerns. This might serve as inspiration to a number of the Department of Agriculture's attached bureaus and agencies who are in dire need of financial support.

For more information, please contact the Philippine Carabao Center, Science City of Muñoz, Nueva Ecija; Tel. no. (044) 456-0731 to 32; E-mail: pcc-oed@mozcom.com or danildahd@yahoo.com.

PCC scientists show off a riverine calf born from IVEP vitrified-transferred embryos. Dr. Danilda Duran stands second from right.

Sago: A wealth leached from the pith

■ RITA T. DELA CRUZ

When we speak of *sago*, what usually comes to mind are the familiar white pellets which turn transparent when cooked or the chewy pearly shakes that are popular and well enjoyed by young and adults. But there's more to sago than just the pearly shakes. *Sago* is one of the unexploited and less appreciated crops whose uses and potentials can be taken full advantage of if only Filipinos were aware of its innovative uses.

According to Prof. Alan B. Loreto of the Philippine Root Crop Research and Training Center (PhilRootcrops), in his lecture on the potentials of sago during the 17th National Research Symposium held at BAR, among the starch crops in the Philippines (i.e., rice, corn, wheat, and potato) the productivity of sago per land area is the highest.

The sago palm is far more productive than rice, producing four times more starch (100-200 kg per palm), which is enough to feed a family of 4-5 for a month. It is also the least labor-intensive starch to harvest and takes 10 days only for a person to process or faster if a group works on it.

Cutting the sago into thin strips before drying.

Mankind's oldest food plant

According to the International Plant Genetics Resources Institute (IPGRI), the true sago palm, *Metroxylon sagu*, is said to be "mankind's oldest food plant." The starch contained in the trunk is used as a staple food in Southeast Asia. The plant was thought to have originated from Papua New Guinea where sago palm is the most dominant plant in the area and has spread throughout many regions in Southeast Asia, Oceania, and other parts of the Pacific Islands.

The palm grows quickly in extreme conditions. It thrives in tropical peat swamp rainforests, where very little else can grow. It can tolerate very acidic soil condition with high concentration of metals that can poison other plants, or in heavy clay that can suffocate other surviving plants. But it can also grow on dry land. The stems of sago palm are protected by fierce sharp thorns making the groves of these palms almost impenetrable to humans.

The most common sago palm variety grows in clumps of several trunks and suckers and can be harvested on a sustained basis. A sago palm sucker first develops as a rosette of leaves and grows from 6 to 14 meters tall. It blooms only once in its life, and not until it reaches 15 years of its maturity and forms fruits for about two years and then, the palm dies shortly after. The palms only form fruits when they are cross-pollinated by insects. The fruits take about one and a half to two years to mature. New palms can only germinate from seeds, which have been eaten by animals. Prior to this, the palm builds up a large reserve of starch in its pith converting its stored nutrients into starch that fills the trunk

In the Philippines, the palms of sago are common in wetlands, creeks, and other areas where water is abundant. The farmers commonly plant them along rice paddies to optimize the use of their farmlands. The most known species of sago in the country are the thorny or spiny variety. Some of the known sago growing areas in the country are Leyte, Cebu, Panay, and Mindanao.

Potential uses of sago

According to the study of PhilRootcrops, sago has many uses either as foodstuff, raw material for manufacturing food additives (i.e., sugars and flavorings), and has the potential for the production of biodegradable polymer and recyclable source of energy. According to Professor Loreto, the sago starch has a distinctive and peculiar

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property compared to other starch. The starch can be easily expanded due to the unique dilution property of its macromolecule which is not found in other food starch.

As foodstuff, the use of sago slightly differs in terms of its preparation. In Asia, they are popularly and mostly used for its flour while in the West, it is commonly used as thickener. In India, the starch from sago is used to make wafers. In Thailand it is used to make *saku sai moo*, a bite-sized snack with a cooked filling of pork, coriander, garlic, peanuts, fish sauce and palm sugar inside the sago covering. Sago is also a popular ingredient in Asian desserts, for thickening soup, and making puddings or converted into other types of food. It is now widely used together with other starches to make noodles, to produce monosodium glutamate and soft drinks.

Besides providing starch as food, sago starch could also be used as adhesives in paper, textiles, and plywood. For industrial purposes, the starch of sago is used to stiffen textiles. It is used as stabilizers in pharmaceuticals or used as crosslinked wound dressing sago hydrogel. New uses for sago include biodegradable plastics, fuel alcohol and ethanol.

Village-level sago grater

The sago pearls are the end product but prior to that, sago goes through a rigorous process of extraction from debarking to sedimentation and drying of its starch. There are many ways of extracting the starch from the sago palms, the most common of which is the traditional process that would take 5-6 days to complete the processing of one log and would usually employ 10-12 laborers to finish.

In the traditional starch extraction process, the stage starts with the tree selection. The palm is harvested just before it flowers, when starch content is at maximum. The palm is cut down and split lengthwise into half usually, 60-100 cm. The logs are then transported to processing where they will be debarked. The barks are recovered and used as fuel wood while the white pith is stripped by knife at 6-10 mm thick and the starch washed out. The resulting thick white starch suspension is sieved and collected, then dried in the sun or over a fire to produce dry sago flour. They are sun or air dried on concrete pavements or through the use of mat.

In some areas, this process involves stomping on the mashed fibers over a rattan sieve until fine particles are achieved. Other methods may be more primitive. Since this is a village-level means of production, all men, women, and children help to process the flour, but in other areas, only the women extract the flour while the men plant and tend the palms.

The whole extraction process is very rigorous but with the recent development of a village-level sago starch grater machine, the long process is reduced. The machine is developed by a group of scientists from PhilRootcrops and the Tokyo University of Agriculture and Technology-Bio-Applications Systems Engineering (TUAT-BASE). The newly developed machine reduces the processing steps by 50% eliminating the drying of pith strips, which is considered as one of the bottlenecks in sago starch production.

When comparative analysis was done to test the effectiveness and efficiency of the machine, it was found that with the traditional process, postharvest losses is very high because the drying period is not sufficient whereas, with the new machine, this is not a problem since drying of strips becomes unnecessary. Farmers can also produce the starch anytime they want because processing is no longer weather dependent.

With this machine, only a maximum of four laborers are needed and takes one day to process everything unlike in the traditional process that needs to employ at least 10 laborers to process one log and would usually require 5-6 days to complete. Acquiring the machine incurs a high initial capital requirement for the village but its 15-20% higher starch recovery is enough to compensate for the additional expenses.

Village-level sago starch grater machine developed by PhilRootcrops and TUAT-BASE.

(For more information about the village-level sago starch grater machine, please contact Professor Alan B. Loreto of the Philippine Root Crop Research and Training Center (PhilRootcrops), Leyte State University (LSU), Baybay, Leyte, Philippines at tel. no.: (63) (053) 335-2616, 335-3982, 335-3988 or Fax: (63) (053) 335-2616 or Email them at: rootcrop@skyinet.net)

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Part 1

Itnegs pride: Natural dye weaving technology

MARLOWE U. AQUINO, Ph.D

When the idea of working on the *Inlaod* Itneg weaving popped into my mind, it was a mixture of excitement and challenge because it would be my first time to understand an indigenous community with its own indigenous knowledge. The main question in mind then was, how is indigenous knowledge related to community development? Based on this question, it took some reflection because of my interest in fashion, culture, and indigenous people. In short, I became emotionally attached to the idea because I learned to love and admire these people and their work. The natural dye weaving (NDW) technology became the Itnegs' pride and their cultural identity and integrity.

An *Inlaod* Itneg lady in one of the weaving sessions in Namarabar, Penniarubia, Abra. The woven material was dyed with "tayum" or indigo and later on was embroidered with animals and flowers designs for Itneg cultural symbolization.

Weaving has been considered by the Itnegs as an activity that maintains their cultural identification, spiritual protection and community development undertakings. It shows the relationship of the weavers to their fellow weavers at the same time with the environment. According to Julie Senga (2000), many Itnegs believe that weaving represents peaceful and harmonious life. They describe *inlaod* weaving as part of their lives that affects and changes the condition of their community and other people.

The NDW technology

The Itneg weaving process starts with the identification of the raw materials and arranging all the weaving apparatus before starting a new product. These must be placed close to the weaver for easy access and retrieval. Any weaver knows this rule as a basic requirement.

Traditionally, weaving made use of bark cloth and *kapas* (wild cotton) which were neatly arranged in the backstrap. The backstrap is used by the weaver to make traditional clothes, *abel* (clothing material) and *owes* (blankets). In the community, there are only three remaining backstraps kept by the old weavers. The oldest backstrap, owned by Apo Sabel is 125 years old and considered as a family treasure that is kept from generation to generation. *Inlaod* weavers find it more difficult to use the backstrap because this requires a sitting position on the ground. Nonetheless, a number of the *Inlaod* weavers still use the backstrap because it is easier to control even though this requires physical strength which normally causes back pain, poor lower body and leg coordination during weaving.

One of the parts of the backstrap is the *baliga* or spear-like structure, which is believed to protect pregnant weavers or newly born babies from bad people and evil spirits. The *baliga* is believed as an *anib* (amulet) possessing internal powers and strength with good living spirits in it especially when used during weaving.

In addition, the *baliga* serves as protection to drive away evil spirits and protect the growing child from serious dreadful diseases. To the weavers, the *baliga* is a lucky charm in the family. This is the very reason why women were encouraged to learn the art of weaving in the olden times.

Furthermore, Itneg weaving became a social function that drove the community to influence other people to do similar activities. Inherent knowledge, proper attitude, skills and capabilities coupled with artistry and creativity were the people's assets and motivation to rebuild the community and renew lives.

Weaving practices and beliefs

Stories related to the *Inlaod* weaving process were full of beliefs and practices. It is believed that a family is associated with the weaving process when there is a pounding sound heard from the beating or *bakbak* of wild cotton in the household. Once the community recognized and identified the source of the beating, the family is required to welcome anybody

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Improvements in banana

■ ANGELA E. OBNIAL

When a virus attacked the banana farms of smallhold farmers in the northern part of the Philippines, the result was a devastation of livelihood and of hope.

Banana is one of the major commodities in the country, as a major fresh fruit and as a processed product export. In the domestic milieu, it has been with the Filipino family's diet, eaten raw for snack or dessert, or as a poor man's substitute to rice.

Although Mindanao is the largest producer and exporter of banana in the country, Luzon has its share of producing bananas such as Lacatan, Latundan, Bungulan, and Saba supplying the National Capital Region (NCR) and other parts of the Philippines.

In the 1950s and 1960s, a disease called Banana Bunchy Top Virus (BBTV) destroyed both small-scale banana farms and large banana plantations. The larger plantations fairly fought off the spread of the virus. But the most devastating blow was received by the small scale banana farmers in Luzon because they cannot grow Lacatan anymore.

The BBTV has "spread rather slowly and unevenly" which led to closure of the farms or switching to other crop farming. In the BBTV infection, if the mother plant is infected by the virus, the disease will be transfered to its offspring. It is very risky, however, since BBTV does not show any signs of infection among banana trees. The infestation of the crop is much less obvious with its first symptoms seen only during the plant's next growing cycle, when the sucker, to replace the mother plant, emerges severely stunted (INIBAP 2004 Annual Report).

Because of this, the maintenance of the banana germplasm has become a problem and consequentially economic loss, especially among the northern small scale banana farmers. And since the farmers in Luzon cannot grow Lacatan, the demand for this sweet tasting banana variety is supplied mainly by multinational companies in Mindanao.

The INIBAP

The International Network for the Improvement of Banana and Plantain (INIBAP), a program of the International Plant Genetic Resources Institute (IPGRI), involved in the conservation and use of plant genetic diversity, aims to increase the productivity and stability of banana and plantain grown on smallholdings for domestic consumption and for local and export markets worldwide. Dr. Gus Molina, INIBAP regional coordinator for Asia and the Pacific, explained that to increase the cultivar diversity of banana varieties worldwide. Given the BBTV outbreak situation in the Philippines, INIBAP decided to focus on the introduction of new banana varieties that are disease resistant and high yielding through INIBAP's International Musa Testing Program (IMTP).

IMTP has been ongoing in the country since 1995, with improved hybrids being made available to scientists for testing under local conditions. The results of the trials are used as a basis to propagate healthy and disease-free *Musa* varieties for evaluation and adoption of our banana farmers.

However, the distribution of the tested varieties is not readily accessible to farmers, especially to small-scale banana farmers. After the evaluation of the potentials of the IMTP varieties, these were not distributed since there is no institution in the country that deals with the multiplication and distribution of banana varieties. "Although these tested varieties have been here since 1995, we don't actually see them being made available to our farmers," Dr. Molina explained.

DA-BAR-INIBAP collaboration

In 1999, under the helm of then DA Secretary Edgardo Angara, the Philippines renewed its contribution to the Consultative Group on International Agricultural Research (CGIAR) under restricted funding, meaning that projects where the funds will be spent are strictly specified. This was endorsed to the CGIAR by DA-BAR, as it is the central body for agricultural R&D which deals with all agriculture R&D ventures. CGIAR thus tried to identify possible projects on

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