



ISSN 1655-3934

# BAR DIGEST

Research and Development

Official publication of the Bureau of Agricultural Research- Department of Agriculture



2004 Gawad Oscar  
Florendo Awardee for  
Outstanding Information  
Tool for Print

Volume 7 Issue No. 3

July - September 2005



## *The potential of* **DRAGON FRUIT**

### *What's inside*

Notes: Fruits for all seasons.....2	Cover story: The potential of dragon fruit .....11
Our fruit industry: Where we stand .....3	The avian flu: A menace to the public .....15
Improving mango production using indigenous techniques.....5	Benefitting from tilapia cage culture: The story of Mang Teddy.....17
Improving 'Manila super' with giberellic acid.....6	A medical doctor's love affair with mangosteen.....19
Strengthening the citrus industry in Nueva Vizcaya .....7	Coco-biodiesel: Alternate energy source.....20
He grows citrus the scientific way... .....9	Pinoy's coconet goes global.....21
Yacon: The apple of the earth .....10	



ALVIN V. DIVINAGRACIA, Ph.D.  
*Editorial Direction*

RITA T. DELA CRUZ  
*Managing Editor/Layout*

MARIA LIZBETH SEVERA J. BAROÑA  
RITA T. DELA CRUZ  
MIKO JAZMINE J. MOJICA  
*Writers*

MARLOWE U. AQUINO, Ph.D.  
VIRGINIA A. DULDULAO, Ph.D.  
ROLANDO V. KINTANA, DVM  
*Contributors*

ANTHONY C. CONSTANTINO  
*Print Manager*

JULIA A. LAPITAN  
VICTORIA G. RAMOS  
*Circulation*

VIRGINIA A. DULDULAO, Ph.D.  
*Development Communication Specialist*

NICOMEDES P. ELEAZAR, CESO IV  
*Adviser*

**BAR R&D Digest** is published by the Bureau of Agricultural Research (BAR), a bureau of the Department of Agriculture mandated to ensure that all agricultural research is coordinated and undertaken for maximum utility to agriculture. This quarterly publication contains articles that are based on studies conducted by NaRDSAF-member institutions.

For subscription and questions, please contact:

**Applied Communication Section**  
Management Information  
Systems Division (MISD)  
Bureau of Agricultural Research  
Department of Agriculture  
3/F RDMIC Bldg., Visayas Ave.  
cor. Elliptical Rd., Diliman  
Quezon City 1104

Tel nos. 928-8505 local 2043-2044  
Fax: 927-5691  
E-mail: [misd-ac@bar.gov.ph](mailto:misd-ac@bar.gov.ph)

*\*Articles are also available online.*  
Visit our website at:  
<http://www.bar.gov.ph>

*\*Articles may be reprinted with permission from the editorial director.*

## NOTES

# Fruits for all seasons

By ALVIN V. DIVINAGRACIA, Ph.D.



Since my childhood, I must confess that I am an avid fruit eater. As a child, I remember that it was standard house policy to have a fruit or two on the table. Part of this childhood experience is my knowledge of which trees in our community produced the sweetest or the bigger fruits. Since then, I always enjoy my meals with a fruit in season.

Most of us associate the fruit season with the summer months. You will be surprised that in terms of diversity and abundance, this part of the year is equally if not the undisputed fruiting season. A testimony to this assertion is glimpsed in a survey of Philippine festivals. During these months, we celebrate a number of fruit festivals particular in the Visayas and Mindanao, and more so in some Southeast Asian countries.

It was for this reason that we decided to have the fruit industry as our feature story for this issue. The fruit industry is one bright spot of our agriculture sector. It accounts for a substantial chunk of growth in farm productivity and income in the country. Our major agricultural exports are fruits or fruit-based. We believe that its earning potential will continue to

flourish and provide sustained export earnings for the country as well as initiate multiplier effects to spur agribusiness investments in the countryside.

In spite of our abundance in fruits, it is sad to note that Filipinos are the lowest per capital consumer of fruits in Southeast Asia, and the trend is declining. What an irony, given our natural endowments as a fruit producer, we are not enjoying the abundance and benefits of the fruits we have. There are many reasons for this situation and we brought them up in our articles on this issue. Also, we are dishing forward exciting fruits, dragonfruit and yacon, that are the current fancy of fruit growers. I hope that our feature stories on fruits will provide you a brighter picture of what lies ahead and renew our interest on the fruit industry.

There are still many endemic fruits where potentials we have not explored, much more evolved into a nascent industry. Perhaps, in our future issues we will revisit some of them. Till then, I urge you to have fruits, particularly our Philippine fruits, for your snacks or dessert. It will go a long way to improve your health and gives a shot in the arm to Philippine.



# Our fruit industry: Where we stand

By MARIA LIZBETH SEVERA J. BAROÑA

**A**n industry that feeds the families of 10.3 million Filipino producers while providing for the fancy indulgences of the West bringing in billions of dollars worth of trade is good news.

The Philippine fruit industry may be one of the few industries in the country that is not wallowing from either a decreasing trend in production, or lack of market - the common afflictions of the agriculture sector.

In fact, data show that the trend in area planted to fruits, volume of production, value of production, and value of export and import have been on a steady rise for the last decade. There was an average growth rate of 1.16% for areas planted to fruits from 1991 to 1999.

Despite findings that it needs more attention in terms of research and development, the country's fruit industry lays claim to over \$18 billion on bilateral trade with the United States, one of the largest economies in the world, and enjoys a positive impression in the world market, especially banana, pineapple, and mango.

## The main players

Saba is the banana cultivar that is produced the most,



● photo source: dotocvc.gov.ph

followed by Cavendish - the cultivar being exported - *Lakatan* and *Bungulan*.

From 1994, the country's banana export has been increasing by an average of 2.5 annually. These exports may either be fresh, or as chips, crackers, catsup, flour, or blossom. After India, Ecuador, and Brazil, the Philippines is the 4<sup>th</sup> banana-producing country in the world, sharing the place with China.

Data from 1998 to 2002 show that we are the 3<sup>rd</sup> major banana-exporting country, behind Ecuador and Costa Rica. Japan, the 4<sup>th</sup> largest banana importing country in the world, imports 81% of its banana supply from the Philippines.

From a domestic point of view, 63% of our total banana export goes to Japan. South Korea, the United Arab Emirates, and Taiwan complete the top four roll with 9%, 7%, and 6%, respectively. Southern Mindanao

yields the most banana produce in the country, followed by Central Mindanao, CARAGA region, Cagayan Valley, and Western Visayas.

Mango enjoys an even more encouraging position in terms of area of production. It enjoys an average growth rate of 8.9% since

1994 to 1998. Consequently, production increased with an annual growth rate of 16% during the same period of time. This trend made us the 9<sup>th</sup> mango-producing country in the world. The major mango-producing regions in the country are Ilocos, Cagayan Valley, Southern Tagalog, and Western Visayas.

While 90% of mango produced is sold and consumed fresh, processed mango, such as dried, juice and syrup concentrate, and food preserves, is gaining grounds both in the local and international market.

The same things can be said of pineapple, of which we contribute 17% of the world's supply to the world. Mindanao, the country's food basket is dubbed such for nothing as Northern Mindanao coughs up the biggest pineapple produce in the country, followed by Southern Mindanao, Southern Tagalog, Bicol Region, and Cagayan Valley.

The issue in pineapple production in the country is that





while we are second only to Thailand in terms of production, 85% of Thailand's pineapple plantations belong to farmer-stakeholders, while in the Philippines, the same percentage belongs to multinational companies like Dole.

## Fruits and R&D

Studies have shown that research and development support given to the fruit industry has been minimal, having received 0.34% of the GVA for research. But this obviously did not slow down the performance of the fruit sector, and how it had contributed to the country's economy. Even with the modest financial attention given to the sector, technologies developed pushed it to the status it enjoys today.

The high export potential of banana is boosted by technologies, that are found helpful to the industry. This include: a) mass propagation of disease-free banana planting materials through tissue culture; b) identification and characterization of 80 banana cultivars through isozyme analysis; c) development of a diagnostic kit through monoclonal antibody technology for indexing banana bunchy top and banana bract mosaic virus; d) improvement of production technologies for Lakatan; e) collection and maintenance of 80 Philippine cultivars; f) development of storage and ripening tool for Lakatan; g) reduction of losses through modification of container van for inter-island transport; and h) rehabilitation of banana bunchy top- and bugtok- affected areas.

Improving fruit quality, cultural management, and pest and disease control have also been the focus of research and development in mango, generating technologies like: a) selection of superior strains of Carabao, Lamac, GES 73, GES

77, GES 84, GES 85, Talaban, Fresco, and Golden selections; b) island-wide control of fruitflies using Sterile Insect Technique and Male Annihilation Technique in Guimaras; c) development of hot water treatment (HWT) for control of anthracnose; d) development of modified vapor heat treatment (MVHT) protocol for fruitfly disinfestation and floatation method for maturity determination; and, e) establishment of required gas levels for controlled atmosphere storage.

Although we have not ventured on exporting papaya, it is nevertheless an important domestic fruit crop. R&D developed the first Sinta papaya, Philippine-bred papaya variety that is moderately tolerant to the papaya ring spot virus. Several technologies on post-harvest handling and controlling pest and diseases have also been developed.

Breakthrough on production and post-harvest on other fruit crops like citrus, pili, and durian have also been achieved.

## Issues

Problems on low adoption of technology, low productivity, lack of quality planting materials, limited infrastructure, incidence of pest and diseases, ineffective cultural management and high post harvest losses.

These are the problems that seem to arise for the major fruit crops. Since research and development seek answers to some of these problems, it has been recommended that higher R&DE financial support be given to the fruit industry, increasing the GVA for research from 0.34% to at least 1%.

BAR's RDE agenda on the fruit industry aim to increase current production by 15% and decrease postharvest losses by at least 20%.

More effort should be focused in promoting integrated pest management to lessen dependence on inorganic means to keep pest and disease incidence in check.

Japan, our major trade partner in banana export, has also raised the issue of excessive use of chemical-based pesticides on banana production. This is a concern that cuts across several issues on health, environment, and human rights. Not only are consumers wary of the chemical residues in the bananas they consume, but also the workers in the banana plantations who are exposed to hazardous chemicals.

## Charting the future

It would be foolhardy to take the relatively good position our fruit industry enjoys now in both trade and trend of production, as the 'be all and end all' of the industry. The existing issues and concerns raised by small-holders across the country sends BAR off to a policy direction that prioritizes varietal improvement, integrated pest management, genetic resources, cultural management practices, postproduction, and socioeconomic and marketing.

### Sources:

1. *The National Research, Development, and Extension Agenda and Program for Fruits*, Department of Agriculture, Bureau of Agricultural Research, 2003
2. *Modernizing Agriculture, Report and Recommendations of the Congressional Commission on Agricultural Modernization*, 1995
3. <http://tradelinephil.dti.gov.ph/betp/FreshFruits>, retrieved on September 01, 2005
4. <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr114988e.html>, retrieved on September 13, 2005
5. <http://www.american.edu/ted/philippine-banana.htm>, retrieved on September 14, 2005



# Improving mango production using indigenous techniques

By MIKO JAZMINE J. MOJICA

**T**he latest situationer report of the Agribusiness and Marketing Services of the Department of Agriculture (DA-AMAS) states that world mango production averages 22 million metric tons annually. Asia contributes 77% of the total world production wherein the Philippines ranks 5<sup>th</sup> in Asia, contributing about 4% of the total amount of mangoes produced every year.

## Export revenues

A large chunk of our export revenues on mango is generated through marketing fresh mangoes, garnering about three-fourths of the total export value. The DA-AMAS reported that a rise and fall of Philippine's export of mangoes was seen from 1995 up to 1999. However, we were second in the world's list of top exporters of mango from 1996-1998 with an average growth rate of 14.32%. Hongkong, Japan, and US are the top importers of our fresh, dried, and pureed mangoes. Although our rate of production is fluctuating, we remain to be among the world's top producer and exporter of this much coveted fruit, opening several windows of opportunity for our export industry and the agribusiness sector.

## Premium variety

The "Carabao" variety produced in our country is recognized as one of the best tasting fruits of its kind. Region I, particularly Pangasinan province gives a lion share of mango

production in the country followed by Region IV (Batangas, Quezon, Cavite).

However, there are still necessary improvements in crop protection and postharvest handling to further develop our mango industry. Although a number of modern technologies have been introduced to control the quality of our fruits, e.g. cryogenic freezing, most of these are utilized only by big industries.

## Indigenous crop protection

A study on indigenous techniques for crop protection was conducted by Orden, M.M., Paderes A.S., Aveno, J.L., and Santos, A.L. of the Central Luzon State University (CLSU). They determined the effects of bagging and pruning technologies on the productivity, cost, and income of mango growers in major producing areas in the Philippines. The Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (PCARRD) funded the study which was completed in August 2003. The research was made based on the premise that pruning technology improves productivity of mango trees while bagging the fruits reduces insect infestation and other mechanical damages.

## Determining nationwide effect

The study was involved the top 27 mango producing municipalities from Pangasinan

► turn to page 18

● photo by CLSU



# Improving "Manila Super" with Gibberellic Acid

By MARIA LIZBETH SEVERA J. BAROÑA

**G**ibberellic acid improves the quality of Carabao mango, known in the world market as "Manila Super".

This was proven through experiments by the team of Gavina Huelgas of the Lipa Agricultural Experiment Station of the Department of Agriculture in Lipa, Batangas City.

## Keeping tabs on quality

We are enjoying a good position in the world market as one of the leading producers of mango. However, issues on how to improve the quality of the fruit have hit the notes of controversy. Last year, the government announced that the United States Department of Agriculture (USDA) gave the Philippines US\$ 2.3 million worth of grant to help mango growers improve the quality of their produce using irradiation method.

Irradiating mangoes means that the fruits are exposed to high doses of ionizing radiation to kill bacteria and extend its shelf life. Major importing countries in the European Union, Asia, including the United States use irradiation method. This process is prescribed by the USDA before Philippines mangoes are allowed into the American market.

At present, only mangoes from the Guimaras Islands are allowed into the United States. Guimaras has been under quarantine for more than 15 years and is the site of the application of sterile insect technique that uses radiation to control fruitfly population.

Although the province produces only a small fraction of Philippine mangoes, the USDA

maintains that only an irradiation facility may be able to make the rest of Philippine mangoes safe for export to the US.

Concerns have been raised on the safety of irradiating food. Some non-government organization said that this method is a threat to the health after consumption, and irradiation facilities are also threats to communities where they are located.

## An option

Plant hormones have been known to enhance growth. There are five recognized classes of plant hormone. Some of these classes are represented by only one compound, while others are by several different compounds.

The study chose to test the effect of Gibberellic acid on fruit quality. Gibberellins is the class of plant hormones that promotes growth and stimulates flowering in mature plants.

Recommended rates of Gibberellic acid was formulated in Argent Laboratories. Eighty-five percent Gibberellic acid in white crystal powder form was dissolved in 100 ml Isopropyl alcohol to produce a 4% Gibberellic acid stock solution.

The stock solution was sprayed on the test trees on three occasions: first at 35 days after flower induction (DAFI), second time at 55 DAFI, and the last application at 93 DAFI. These trees were not previously fertilized before flower induction, and neither were they



• photo source: rdelacruz

irrigated. Insecticide was applied until the fourth week before harvesting.

Results showed that the biggest and heaviest fruits, the thickest skin, and highest edible portion came from trees treated with Gibberellic acid at the rate of 100 ppm. The fruits from this treatment also had longer time to ripen, which is a positive manifestation for longer shelf life.

The researcher of the study recommended that more studies be conducted on the efficacy of Gibberellic acid on parameters like total soluble solid. Since seeds from the treatment with 100ppm rate of Gibberellic acid was lighter compared to the other treatments, the researcher also suggested that the relationship of the time of application and the development of the seed be considered in further studies. This recommendation was on the premise that seedless mangoes command higher price in the market.

The results of the study gave options to mango growers to improve the quality of their yield.

This article was based on the study, "Fruit Quality Improvement of Carabao Mango by Gibberellic Acid Application" by Gavina M. Huelgas, Lipa Agricultural Experiment Station, Lipa Batangas, 2004.



# Strengthening the citrus industry in Nueva Vizcaya

By RITA T. DELA CRUZ

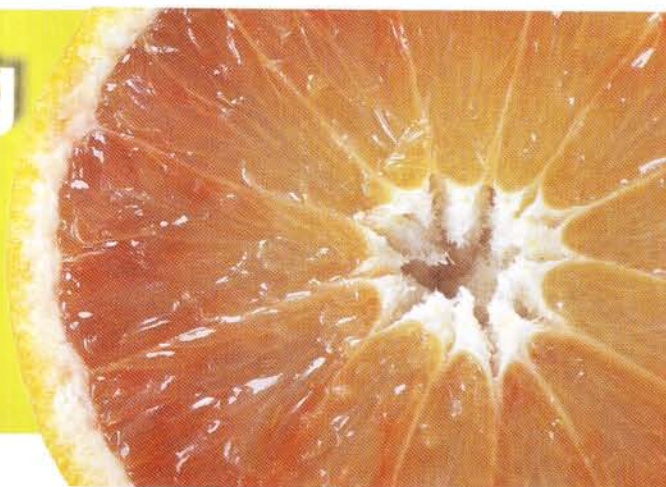


photo source: [www.free-pictures-photos.com](http://www.free-pictures-photos.com)

Citrus is one of the most important commercially grown fruits worldwide with a global production of over 102 million metric tons. Brazil, United States, and Mexico are the three top citrus producing countries in the world with a 10-20% increase in production every year. Meanwhile, the Philippines contributes 163,090 mt or 0.16% to this total world production. Citrus ranks fourth among the fruit crops with the greatest contribution to the country's economy, next to banana, mango, and pineapple.

In the Philippines alone, the national per capita consumption of citrus is 5.2 kg only compared to the 35-40 kg in many developed countries. In terms of area allotted for production, citrus plantation in the Philippines covers more than 35,000 hectares. Production-wise, citrus is also not far behind especially with *calamondin*, *mandarin*, and *pummelo* which the Philippines widely grows and produces due to their promising potential for development and global competitiveness.

Although the country produces enough citrus for Philippine consumption and still export to other countries still a lot of the produce goes to waste.

One major constraint identified is the inefficient postharvest handling system. This is true in Malabing Valley of Kasibu, Nueva Vizcaya, the emerging major citrus growing area in Luzon.

## The 'Vizcaya oranges'

Nueva Vizcaya is considered the citrus capital of the country. Its soil and climate are conducive for propagating citrus varieties. The area is well known for its "Vizcaya oranges" which are harvested from July to January every year and are brought to different urban markets in Luzon through local traders.

At the heart of this citrus-producing area is the Malabing Valley Multi-purpose Cooperative Inc. (MVMPCI), a cooperative of all the citrus farmers who produce the oranges. The farmer-members themselves propagate the best citrus varieties especially those that command high value in the market such as the *Satsuma* (Japanese mandarin) and *Ponkan* (Chinese mandarin). Farmer-members also produce other varieties like *Clementine* (US mandarin), *Washington navel*, *Valencia*, and *Hamlin oranges*. These imported varieties have been successfully adapted to local conditions. The potential area that is best suited for citrus production is 2,000 hectares

and farmers are hopeful that at least half of this area will be planted with citrus over the next five years.

## Postharvest handling

Aside from production, an efficient postharvest handling system is also a crucial element in strengthening the stand of the Philippine citrus industry.

The key to good postharvest handling is careful harvesting. The quality of perishable foods is achieved from the moment they are picked or harvested. From this point, it is ideal that farmers should maintain postharvest conditions so that deterioration is minimized, and quality is preserved at its best. But this is easier said than done since most of the citrus farmers lack high-tech equipment and necessary facilities to properly handle their produce. Farmers also lack promotional strategies to expand their outlets. The leading source of overproduction wastage is the lack of postharvest facilities to preserve and process these products.

The study conducted by Ms. Rowena Q. Gutierrez, supervising science research specialist at the Bureau of Postharvest Research and Extension (BPRE) identified postharvest handling as the major constraint to attain high efficiency and productivity in citrus production.





The other five important areas mentioned are: 1) laborious and tedious postharvest operations, 2) high postharvest losses, 3) lack of grading standards and procedures, 4) over ripening of fruits, and 5) limited availability of labor.

Through rapid appraisal, socio-economic and market survey, and documentation and assessment of existing postharvest handling and marketing operations of MVMPCI, the researchers were able to identify and recommend an improved postharvest handling system fit for the citrus industry. Generally, the recommended strategies are: 1) put in place support structures, 2) strengthen R&D on citrus, 3) enhance market linkages between producers and consumers, and 4) provide needed infrastructure support the farm to market roads.

Specifically, on the production level, the researchers recommend the following activities to strengthen the citrus industry: 1) effective management of pests and diseases particularly fruitflies to reduce fruit damage; 2) formulate locally produced fruit wax; and 3) improve the quality of produce in terms of taste to gain full acceptance particularly in the world market.

In terms of marketing, the researcher recommends a more



● photo source: rdelacruz

aggressive strategy in sourcing for market outlets to accommodate their production and more importantly develop a competitive pricing scheme. Packaging and labeling of products are also crucial in establishing the identity of Nueva Vizcaya citrus in the market.

-----  
This article was based from the study, "Towards the Improvement of the Handling and Transport System of the Malabing Valley Citrus Industry" by R.Q. Gutierrez, R.G. Idago, R.S.M. dela Cruz, and R.S.R. Rapusas of the Bureau of Postharvest Research and Extension, CLSU Compound, Science City of Muñoz, Nueva Ecija. You may contact

them at tel. no. (044) 4560213 or fax: (044) 4560110

#### Other sources:

1. Fruits: The National Research, Development, and Extension Agenda and Program for Fruits. 2003. Publication prepared by DA-BAR National RDE Network for Fruits
2. "GATT, lack of post-harvest facilities hounds Ifugao citrus producers" by Ben Moses Ebreo as retrieved from: <http://www.nvzcaya.gov.ph/news/news7.html>
3. "Total Citrus Production in the Top Producing Countries" as retrieved from: [http://www.fas.usda.gov/hp/Hort\\_Circular/2004/08-04/8-31-04%20Citrus%20Feature.pdf](http://www.fas.usda.gov/hp/Hort_Circular/2004/08-04/8-31-04%20Citrus%20Feature.pdf)

## He grows...from page 9

season. One month before the flowering stage, I apply urea and two months before ripening, I put complete fertilizer for color change and potassium for sweetness."

"And have you shared your technology to other farmers?" I asked him.

"This land is God's gift to the people. If you love your fellowmen, you should be unselfish. If you become a millionaire, let others become millionaires by

sharing your knowledge. I have dreams for this beautiful and fertile land. I am now into exotic fruits, later on into cut flowers. I will integrate these farms into a recreational and educational tourist spot where one can enjoy and learn at the same time. There will be banca rides on a man-made lake at the top of the mountain."

As if guessing again my questions noticing my raised brow he said, "God is generous to us. We have the water, a good climate, unpolluted environment, and

industrious people. The lodging house where you stopped is for visitors who will stay for the night."

"It is difficult to come here," I remarked.

"The difficulty in coming here is the joy of it. If you go to heaven, it is much more difficult."

What more could I say to this philosophical citrus scientist who has singularly changed the landscape of his beautiful Malabing Valley?



# He grows citrus the scientific way

By VIRGINIA A. DULDULAO, Ph.D.



● photo source: vduldulao

**W**e reached a big two-storey wooden structure that looks like a lodging house in a prairie after a bumpy ride negotiating a zigzagging road that climbs along mountainsides and ravines from the town of Solano, Nueva Vizcaya, the fog thinning as if afraid of our intrusion as we approached the highest altitude.

We were Cely Miranda, citrus project coordinator of Region 2, Arthur, our driver and myself. Three hours earlier, we were debating whether we proceed to Malabing or not. If it rains we could not come down and would stay in the Valley for the night. I prayed hard we would proceed. I strongly desired to meet the 'king of citrus' in northern Philippines.

"You look Japanese," I immediately commented as he met us in his citrus farm.

"Yes, and I work like a Japanese ever since I started growing citrus," was Mr. Alfonso Namujhe, Jr.'s answer. "I applied for this land in 1964. Malabing Valley was an open settlement for people displaced by the Ambuklao and Binga Dam projects but the Benguet people preferred to stay in Dupax [another municipality of Nueva Vizcaya]. The first commissioner

of the Commission on National Integration was Judge Dolongan, a Kiangnan, so he brought in people from our place to occupy this place. I just graduated in high school then. My mother and I came here; my father who was a teacher and my other siblings stayed behind. My mother who was a forward-looking woman thought that the younger children (am one of them) would not have any inheritance if we stayed together in Kiangnan. I applied for this land as a homestead. The requirement was to clear the land (was able to clear two hectares), improve it for one continuous year, and apply for the title. I saw the potential of this place and I was inspired to pursue college. I took up agriculture, major in animal husbandry determined that I would come back and develop it." Mr. Namujhe reminisced.

"And now, the people of Malabing speak of you like you are a god," I told him my observation the other day when I talked to members of the Malabing Valley Multi-purpose Cooperative.

"Is that so?" he laughed. "It was hard work," he continued. "I had to learn many things before embarking on my project. I worked as farm manager and later as feed

mill quality control officer at Monterey in Laguna. It was there that I learned about management and it was also there where I met my wife, also an agriculture graduate and a native of Tiaong, Quezon," he intimated.

"I started learning and researching everything about citrus. I went to PCARRD for a citrus technology because I had to grow citrus scientifically. How can we ever succeed if we don't do things scientifically? My sister in Australia who was going to finance the first year of my operation required me to go there and learn everything there was to know about citrus growing. When I returned I brought with me different scions plus the technology of growing citrus. Maintaining an orchard is not as easy as planting bananas. You need time, money, effort and skill to grow citrus and the life span of the orchard depends on your maintenance."

It was citrus time when we went to Malabing Valley. Some heavy-laden branches (I was able to count 13 fruits in one branch) were provided support for them not to break.

As if guessing my next question, Mr. Namujhe said, "I apply chicken manure right after the harvest

➔ turn to page 8



# Yacon: The apple of the earth

By RITA T. DELA CRUZ

**O**n the outside, it looks exactly like an elongated potato but its white, juicy, and sweet flesh tastes like a pear or somewhat like the taste of turnip due to its succulence and crunchiness. In Ecuador it's called *jíquima*, in Peru and Bolivia it's *llakuma*, but in all other parts of South America, where it is abundantly grown and naturalized, it's just their good 'ol *yacon* (*Smallanthus sonchifolius*).

Here in the Philippines, *yacon* is rarely known or perhaps many Filipinos will not even recognize one if ever they saw one. This plant was first brought into the country in 1998 and from then on, it has been planted and reproduced in some parts of the Philippines. Since *yacon* thrives in temperate areas, the plant is easy to grow without fertilizers and insecticides, which makes it inexpensive for the farmers to grow.

## Nutritional value

The *yacon* is a distant relative of the sunflower family. Unlike the sunflower, it is not grown for its seeds but mostly for its edible roots, which is naturally sweet but low in calories. It is recognized as a health food due to its nutritional and medicinal value. The *yacon* tuber contains 86-90% water and certain traces of phosphorus (22%), glucide

(11.1%), protein (0.8%), fiber (0.6%), lipids (0.6%), and cellulose (0.5%). One *yacon* tuber is also complete in other essential elements such as iron, calcium, sodium, potassium, carotene, magnesium, and Vitamins A, B1, B2, and C.

Among the rootcrops, *yacon* has the lowest calorie content (54 cal). It is more than twice lower in calories than sweetpotato (123 cal) and relatively less than potato (77 cal), and taro (60 cal) This makes *yacon* a perfect nutritious diet food. *Yacon* is high in oligofructose (also called fructo-oligosaccharide), a dietary sugar which the human body is unable to metabolize, hence its potential use for diabetics and body weight control. Moreover, researchers found that an increased intake of oligofructose is associated with the improvement of gut health because of the stimulation of the beneficial bifidus bacteria in the colon.

## Medicinal value

Aside from its naturally nutritious content, *yacon* also provides a lot of medicinal benefits to those who suffer from diabetes, obesity, constipation, insomnia, arthritis, hypertension and kidney diseases, to name a few. Since *yacon* is not yet as popular as other rootcrops, findings and studies on



● photo source: rdelacruz

its actual health benefits are limited. And like any supplementary food, *yacon* does not promise immediate results but as health food, its characteristics are meant not only to maintain good health but also to improve it.

*Yacon* is high in *inulin*, a fructose sugar, making it a sucrose-free food for the diabetics. It stores carbohydrates in the form of *inulin* and not in the form of starch, which is common in other rootcrops.

*Yacon* is also good for constipation due to its high fiber content that assists in digestion. The high moisture content in *yacon* also makes it a good blood purifier.

The leaves and roots of *yacon* can be both used for their medicinal value particularly for the diabetics. Both are rich in *inulin* which helps normalize the blood glucose. For the root to take its full healing effect, it must be first kept for 10 days before consuming it, so that it reaches its full level of sweetness. Then, simply peel it, cut into thin slices, and eat it raw. Its healing



effect is initially noticeable within approximately 7-10 days.

Meanwhile, the leaves are best consumed after drying them naturally in the shade. The dried leaves are then cut into suitable sizes and boiled in water, just like a regular tea. Researchers recommend diabetics to drink at least two cups of this tea daily. After approximately 4-5 days, initial results are already noticeable.

### Marketability of yacon

Yacon is easy to grow and since it is recognized as a health food, it promises a high marketability especially to health-conscious consumers. However, farmers produce only few yacon presently due to limited market outlet. There is yet a need to promote this crop particularly its health benefits.

Doalnara Multi-purpose Cooperative is one of the few commercial producers of yacon here in the Philippines. The Cooperative produces 100% organically grown yacon in the foggy and unpolluted mountains of Claveria, Mindanao. It also distributes yacon in few shops in Metro Manila selling organically-grown food items. In the recently

held 2<sup>nd</sup> Agriculture Fisheries Techno Forum, which was coordinated by the Bureau of Agricultural Research (BAR), the Doalnara Multi-purpose Cooperative participated in the exhibits and products display wherein they conducted a free taste promo to those who want to know what yacon looks and tastes like.

The author was one of the curious onlookers of the short demonstration and taste promo and indeed yacon tastes like pear (without the sandy texture) or apple (due to its sweetness and crunchiness). From the short-demo, the author learned that the root of the yacon can be consumed even when the flesh are dried. In fact, the demonstrator mentioned that once the roots have been dried in the sun, they become sweeter.

Yacon has a great potential as a health food, it only needs proper packaging and more aggressive information dissemination about its many benefits. The public needs to know



● photo source: ccs.vis.ne.jp

its potential and thereon follows the natural course to yacon's future.

#### Sources:

1. "Miraculous Yacon" brochure produced by Doalnara Multi-purpose Cooperative, Claveria, Mindanao
2. "Pocket guide to nine exotic Andean roots and tubers" as retrieved from: <http://www.cipotato.org/Market/ARTguide/artguide5.htm>
3. "Yacon in the Philippines" as retrieved from: <http://yacon-phil.tripod.com/>
4. "Future foods: Yacon" as retrieved from <http://www.futurefoods.com/yacon.html>
5. "Why Philippine Doalnara Yacon Excel?" as retrieved from <http://www.cloudforest.com/cafe/forum/17132.html>

## Flourishing mangosteen...from page 19

North Cotabato. During that meeting, he said that the accreditation of his technologies is being processed at the Bureau of Food and Drugs (BFAD) and ISO.

He is recognized in his community as a significant contributor to Kidapawan's development by providing jobs to the people and sharing his knowledge in mangosteen production. He is busy overseeing his farms and businesses in and

out of the country while continuing his medical practice and studies on mangosteen. He said he is also promoting organic farming which he is practicing in his farm. He claims that he does not apply herbicides on his trees. He also recommends water impounding as a source of irrigation.

Needless to say, this ingenious medical doctor cum agricultural scientist is exhausting all possibilities for

developing the highly regarded fruit. He challenges the government and every Filipino who wishes for sustainable development and prosperity to become a leader and innovator and not mere followers of the developed countries.

#### Source:

DA AMAS Situationer report on Mangosteen as of September 2005 on the website: <http://www.philonline.com.ph/~webdev/da-amas/mangosteen.html>



One will not be surprised if new fruit discoveries are sprouting all over the fruit basket of the Philippines, Davao City. Come to think of it, people really go out of their way to find new fruits that boost the fruit industry. One of the newest fruit discoveries is the Dragon fruit (*Hylocereus undatus* Britt & Rose) locally called "Pithaya." Others call it Thang loy or cactus fruit. It thrives well in warm climate.

The dragon fruit is a native of Central and South American countries and was introduced in the Philippines in the 1900s through trading and exchange of goods by the Spaniards and the Filipinos. Today, the crop is grown in Vietnam, Thailand, Malaysia, and Taiwan. The Philippines is gaining a competitive edge through mass propagation and production in Cavite and Davao. However, Davao is dead serious in making the fruit a part of its booming fruit industry.

In a recent dragon fruit harvest festival held on 12 August 2005 in Manambulan, Tugbok, Davao City, the research personnel of the Department of Agriculture - Southern Mindanao Integrated Agricultural Research Center (DA-SMIARC) testified that the fruit showed potential and competitive advantage for the local fruit industry because of its production and economic performance. This can be attributed to the crop's growth and adaptability performance as evidenced by its big and heavy fruits that demanded higher price during the harvest festival.

During the festival, other Mindanao regions committed their support in making the fruit a part of their agricultural programs through partnership of the local government units, fruit growers and private sector, and networking in research and development, marketing and enterprise development, and processing and product development. Based on these commitments, DA-SMIARC is now expanding its propagation and production areas to address the required planting materials of interested parties. Incidentally, the Ayala Group of Companies (AGC) handling the agribusiness sector started their share of crop production with an initial 5,000 hills. If proven to have economic returns, the AGC will expand to wider areas complete with technical and financial support.

### Physical characteristics

The fruit is round, often red colored with prominent scales. The thin rind encloses the large mass of sweetly flavored white or red pulp and small black seeds. Some varieties are pinkish or yellow called a "priceless treasure". It can be taken as fruit, flower, vegetable, health product and medicine.

The crop belongs to the cacti family either as climbing cacti - epiphytic with aerial roots to cling to supporting hosts or structures or singly growing without any support. There are two common dragon fruit varieties propagated in the country, namely the red varieties

## The potential of

By MARLO



The dragon fruit is a native of Central and South America and was introduced in the Philippines through trading and exchange of goods by the Spaniards and the Filipinos.



# the dragon fruit

J. AQUINO, Ph.D.



●photo source: DA-SMIARC

al and South American countries  
nes in the 1900s through trading  
niards and the Filipinos .

(*Hylocereus undatus* and *Hylocereus polyrhizus*) and yellow variety (*Selenicereus megalanthus*). The red variety (*Hylocereus undatus*) is favored over the yellow variety because of its unique physical features such as color, taste, and size.

## Bio-physical requirements and cultural management

Dragon fruit grows best in areas with uniformly distributed rainfall throughout the year. Pitaya prefers free draining soil such as the sandy to clay loam types with pH of 5.3 to 6.7 with high organic matter. However, pitaya is also grown successfully in sandy soils, avoiding water-logged areas and saline soils. Mounding is recommended for flat terrain that is subject to periodic flooding. Pitaya is shallow rooted with most roots concentrated at the top 15-30 cm soil depth. Optimum elevation is 100 to 800 above sea level preferably with 30% shade to full sun, as Pitaya grows slowly when shaded.

## Propagation

Pitaya is propagated by seeds or stem cuttings. The latter is more preferred. Stem cuttings are raised in nurseries for 2-3 months.

**Plant Establishment.** Recommended planting distance is 3 meters between concrete posts and 4 between rows. A narrower spacing allows quicker production than wider spacing. Higher density plantings also produce quicker returns, but plants begin to crowd each other sooner. Planting is done with 3 to 4 plants per post. Rooted cuttings may be planted directly or kept in 9 x13 black polyethylene bags. For direct rooted cuttings, they are planted at 15 cm away from the post at an angle leaning towards the post. Direct planting is 5 cm depth, but for transplants, the hole depth should be the same height as the plastic bag's soil depth. Irrigate and protect newly emerging foliar buds from ants and other insects.

**Fertilization.** Apply a handful of complete fertilizer (14-14-14) 3 months after planting and continue fertilizer applications every 3 months thereafter. Pitaya also requires organic fertilizer. Nitrogen is necessary during the vegetative growth of the plant and is reduced during dormant and pre-flowering stages (later December to mid-March). Apply foliar sprays every 2 weeks during vegetative stage and less during fruiting stage. Frequency of fertilizer application varies according to personal





judgment and preferences. Optimum frequency and quantity depends on the plant's response. *Pitaya* is very responsive to soil and foliar fertilizer applications. Plants that are 1-2 years need 200 nitrogen gm/tree/yr, 100  $P_2O_5$  gm/tree/yr, and 15  $K_2O$  gm/tree/yr. Meanwhile, for the 2-3 yrs and the 4 years-above, they need 500 nitrogen gm/tree/yr, 200  $P_2O_5$  gm/tree/yr, 400-500  $K_2O$  gm/tree/yr; 800-1000 nitrogen gm/tree/yr, 400-500  $P_2O_5$  gm/tree/yr, 500-800  $K_2O$  gm/tree/yr, respectively.

**Pruning.** Major and minor pruning is a regular orchard operation regardless of age of *Pitaya*. Prune to obtain an open, manageable and productive umbrella shaped canopy.

**Crop Protection.** The roots, stems, foliar and flower buds, flower and fruit are attacked by a range of pests and diseases. Pests include mites, thrips, ants, scale insects, mealy bugs; beetles, slugs, borers, nematodes, fruitflies and rodents such as mice, birds, or bats. Chlorpyrifos-based insecticides may be used to control ants and other pests as well. Copper-based fungicides (copper, copper oxychloride, dithane M45, cupravit, mancozeb, etc.) can be applied at



●photo source: DA-SMIARC

appropriate dosage and spray as needed. Systemic fungicides such as benomyl, carbendazim, azoxystrobin, etc. are also effective for a wide range of pitaya diseases. Avoid, however, pesticide spraying when nearing harvest time. Bagging of green fruit using clear perforated polyethylene bags (China-made) are recommended to protect fruit from fruitfly stings.

**Weeding.** Gasoline-driven weedcutters are recommended for orchards. Handweed within the inner 30 diameter of each post to avoid damage to plants. Control weeds as they harbor pests and compete with soil nutrients.

**Irrigation.** Water requirement of *Pitaya* is similar to papaya. Irrigation is critical during fertilizer applications and fruiting. Excess drying of soil and

less frequent irrigation result in abnormally high splitting of fruit. For newly planted *Pitaya*, allow soil to dry before irrigation to avoid collar rots.

**Harvesting.** Harvesting indices include full red coloration of the terminal petal and swelling of the navel end to the point of cracking. Based on Davao planting, harvest period include : First Cycle of harvest, June-October; 2<sup>nd</sup> Cycle of harvest, December-January. Fruit is harvested from 30-50 days after flowering with a 5-6 fruit crop cycles a year (between May and November) The fruit can be stored at 5°C with 90% relative humidity up to 40 days. Average weight per fruit ranges from 200 g to 1.2 kg.

-----  
Sources:

1. "Pitaya or dragon fruit (*Hylocereus undatus* Britt & Rose): A production manual under Indang, Cavite Agroclimatic Conditions" by Alex Litton.
2. "Dragon fruit production" A production guide published by DA-SMIARC Knowledge Management FITS Center, Bago Oshiro, Davao City.



●photo source: DA-SMIARC





● photo source: Dr. Miguel Marquez

49 have died. Health experts are concerned that if someone contracts the avian and human flu virus at the same time, the viruses might mix and mutate into a new and deadly virus. In the worst case scenario, this could lead to a global human influenza pandemic, said Samuel Jutzi, director of the Food and Agriculture Organization (FAO)'s Animal Production and Health Division (OIE).

"The disease will be present for several years in the countries that experienced recent outbreaks" the FAO reports. Avian flu is an ongoing emergency disease that spreads across borders. It has serious health implications for both human and animal sectors in the affected countries. In addition to human suffering, the recent avian flu outbreaks devastated many local economies. The FAO reports that close to 140 million birds have died or been destroyed in the Asian epidemic to date, and loss of their flocks left many farmers in deep debt. Total poultry farm losses in Asia in 2004 are estimated at more

than \$10 billion, according to Oxford Economic forecasting.

It is, therefore, in the interest of our poultry industry and public health that strict biosecurity measures need to be applied throughout the poultry chain, from farms and small producers to distribution channels, markets and retailers. Public awareness of the disease risks must be raised.

### Protecting yourself

Like any other disease, the best way to protect yourself and your loved ones from bird flu is to practice sanitation measures especially if you have contact with birds or fowl.

For poultry raisers, scientists of the United States Department of Agriculture (USDA) recommend a "Keep an all-in, all-out philosophy of flock management" by protecting flocks from coming into contact with wild fowl, only allowing workers to enter the poultry houses. Other management measures include providing clean clothing and disinfecting facilities for farm

the wet market (buyers, sellers, and consumers) where live birds are sold, the scientists recommend the following preventative measures: use plastic instead of wooden crates for easier cleaning; keep scales and floors clean of manure, feathers, and other debris; clean and disinfect all equipment, crates, and vehicles before returning them to the farm; keep incoming poultry separate from unsold birds, especially if birds are from different lots; clean and disinfect the marketplace after every day of sale; do not return unsold birds to the farm.

For more specific information about cleaning and disinfecting practices, contact the nearest field office of the Bureau of Animal Industry.

### Sources:

1. "Where the germs are" Reader's Digest, June 2005
2. "Fighting bird flu at its origin to prevent human flu pandemic" 23 February 2005. FAO Newsroom
3. "Bird flu situation in Asia remains

*Like any other disease, the best way to protect yourself and your loves ones from bird flu is to practice sanitation measures especially if you have contact with birds or fowl.*

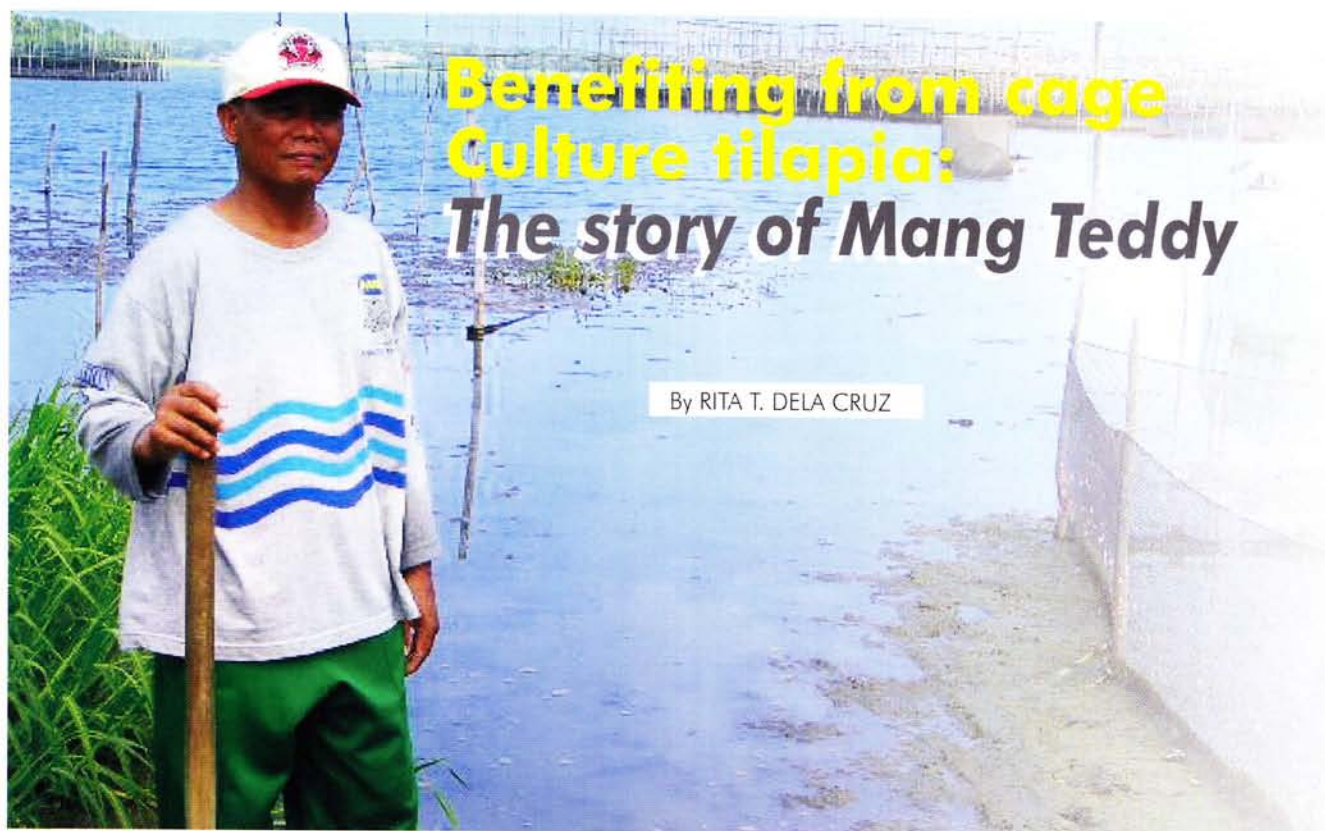
workers or helpers; cleaning and disinfecting equipment and vehicles regularly; not loaning or borrowing equipment or vehicles from other farms; and avoiding visits to other poultry farms. After visiting another farm or live-bird market, always change footwear and clothing before working with your own flock.

For people who frequent

critical" 4 July 2005. FAO Newsroom

4. Avian Influenza - Fact Sheet. 15 January 2004 © Copyright 2004 World Health Organization
5. Bird flu crisis: Mass cull needed
6. Avian influenza A (H5N1) in Humans and Poultry in Vietnam. 13 January 2004
7. Highly Pathogenic Avian Influenza, February 2002 by the Veterinary Services of the United States Department of Agriculture





# Benefiting from cage Culture tilapia: The story of Mang Teddy

By RITA T. DELA CRUZ

• photo source: rdelacruz

// Fishing is my livelihood. I'm a one-man band trying to muddle my way through life bringing up my two children," said the earnest but genial Teodoro Padamada or simply *Mang Teddy* when asked how fishing helps him in life. Mang Teddy, 52, is one of the few active farmer-cooperators of cage tilapia culture in Paoy, Ilocos Norte. He owns fish cages of tilapia along the Nanguyudan Cove. This was made possible by the Regional Freshwater Aquaculture Techno-Demo Center (RFATDec) of the Bureau of Fisheries and Aquatic Resources (BFAR) to provide livelihood for small fisherfolk.

## Tilapia cage culture

Cage culture is the practice of rearing fish in cages in any existing bodies of water that cannot be drained or seined such as lakes, large reservoirs, farm

ponds, rivers, cooling water discharge canals, estuaries, and coastal embayments (a bay in a coastline). Cage culture is popular in areas where fishing and farming are the two most common livelihoods.

When asked why Mang Teddy opted to choose tilapia to culture, he made no qualms in saying "because tilapia is easy to manage." Indeed, tilapia is one the most suitable fishes for cage culture because it can be cultured at high densities in mesh cages where water can freely circulate.

Cage culture also offers a lot of advantages. According to Mang Teddy, with cage culture, the breeding cycle of tilapia is disrupted due to the mixing of the sexes. Since they are reared in cages, stunting, which is major constraint in pond culture, is likely to be avoided. The eggs from the female tilapia are easily aborted because they fall through the cage bottom thus,

unable to develop even if they are fertilized.

Aside from the flexibility in management, there are other benefits in culturing tilapia in cages, namely: ease and low cost of harvesting, security of the space, thus providing close observation of fish feeding response and health, economical treatment of pests and diseases, and the relatively low capital investment needed to start this livelihood.

## Drawbacks

Like any business enterprise, big or small, drawbacks are indispensable. This is also true with fish cage culture as attested by Mang Teddy. According to him, the mortality rate for tilapia cage culture is at 10-20 % or higher during extreme weathers. There is a big risk of loss from poaching or damage to cages from predators, storms, or even humans i.e., burglars and crooks. Tilapia has less tolerance to poor water quality and they are totally





dependent on feeds for nutrition and sustenance. There is also a greater risk for disease outbreaks and since the whole population is confined in one specific area only, the spread of the disease is outright. Another problem in fish cage culture is its legal status since the bodies of water used for cage culture are public water.

### Life as farmer-cooperator

Mang Teddy started as farmer-cooperator in 1994. As farmer-cooperator of RFATDec, his occupancy is free, all he needed to invest on are: capital for the fingerlings and the supplies i.e.,

bamboo, fishnet, and feeds.

Mang Teddy now owns a total of eight cages of tilapia, which he laboriously tends all by himself so he does not pay for extra labor. Each of the fish cage measures 10m x 15m. He put about 1,500 fingerlings in each of the cage, which he requested from BFAR-Laoag City. Mang Teddy is rearing the Mozambique tilapia (*Oreochromis mossambicus*), one of the most popular breeds of tilapia in the Philippines.

It takes 4-5 months before tilapia is ready for harvest. His average harvest is about 100 kilos per harvest. These would be

directly delivered to market vendors around Paoay and sold at 75 pesos a kilo. According to Mang Teddy, he could recover all investments in a year ensuring a modest profit.

For more than a decade now, his earnings from his tilapia fish cage were able to send his two children to college. His eldest, a girl, finished B.S. Computer Science and his youngest, a boy, has just finished his two-year vocational course. Both his children are now working and are helping Mang Teddy and his wife in their daily ends.

## Improving mango...from page 5

and Zambales in Luzon, Cebu and Guimaras in Visayas, and Davao del Sur in Mindanao. A total of 322 mango growers and contractors were interviewed nationwide.

The study determined the effects of bagging and pruning technology on fruit quality as well as the proportion of fruits accepted for export. Yield and income were used as indicators of productivity. Cost and return analysis was made to determine the profitability of the technologies. Since pest management gets a big portion of cost, profit analysis was done to determine the pest management cost (PMC) using the indigenous technologies.

### Bagging

Based on the results of the study, majority of the growers/contractors in Pangasinan, Zambales, Guimaras, and Davao use local newspapers as bagging materials. Bagging of mango fruits is done 55 to 60 days after flower

induction (DAFI). At this stage, the fruits that are the size of a thumb or teaspoon are still free from pests and diseases. Bagging reduced the number of chemical sprayings from seven to five, slashing 22% off the cost of chemical control. Bagging also improved the quality of fruits since latex burn and other mechanical damage were reduced.

### Pruning

The study found that the mango growers practiced three pruning techniques: conventional, center, and traditional pruning. Center was the preferred technique because it allows better sunlight penetration at the center of the fruit tree. It also resulted to the dwarfing of the trees that made management of the fruits easier.

The growers observed a reduction in pest and disease occurrence through pruning and thus, an increase in mango production.

For more info. on the study, please contact Ms. Maria Excelsis M. Orden at



● photo source: CLSU

(044) 4560-704.

#### Other sources:

- 1 Orden, MM., Paderes A.S., Avena, J.L., and Santos, A.L. Effects of pruning and bagging technologies on productivity and cost in mango production in selected areas in the Philippines. Central Luzon State University, Nueva Ecija. August 2003.
- 2 Agribusiness and Marketing Assistance Service, Department of Agriculture. Mango Industry Situationer Report. <http://www.da.gov.ph/agribiz/mango1.htm>





● photo source: rdelacruz

## A medical doctor's love affair with mangosteen

By MIKO JAZMINE J. MOJICA

**D**r. Alfredo S. Villarico is a medical doctor but has an extraordinary interest in farming. More than 20 years ago, he dreamt of growing mangosteen in the vast lands of Kidapawan, North Cotabato. Agriculturists discouraged him, saying no mangosteen would possibly grow in the soils of their province. Armed with his medical background and the will to disprove provincial agriculturists, he studied anything and everything there is to know about the fruit and its production. Today, he is the proud owner of a 25-hectare mangosteen farms in Kidapawan, Palawan, and other parts of the country.

### Comparative advantage

According to the latest situationer report of the Agribusiness and Marketing Assistance Service of the Department of Agriculture (DA-AMAS) on mangosteen, the Philippines is "severely underplanted with mangosteen". But today, Dr. Villarico said that our country now beats Thailand and Malaysia, the two countries among the top producers of mangosteen. "This is because we have already expanded the land area for planting mangosteen due to its comparative advantage over the other commonly produced

local fruit," said Dr. Villarico. He added that the areas devoted to rubber production in Mindanao are already converted to high commercial crops like mangosteen. Many are not aware of this fact because of the limited information and knowledge about its production and export potential.

Hard work, persistence, and deep motivation drove Dr. Villarico to successfully prove that mangosteen could thrive in Kidapawan. He has been studying mangosteen since 1981. He was able to prove that mangosteen can successfully grow in Kidapawan regardless of the variety. His background in medicine and his wife's expertise on food and nutrition worked to their great advantage since he was able to prove in his studies that every part of the mangosteen tree is useful.

### Fruits of success

Dr. Villarico's numerous in-depth studies and experiments on mangosteen production, postharvest handling and processing are impressive. Commercially, mangosteen fruits are processed into jams, preserves, and candies, while its medicinal properties are for curing diarrhea and other intestinal disorders.

He was also able to develop other useful products out of this fruit such as tea drink, supplement capsule, and feminine

wash. His tea can be drunk hot or cold, giving a smooth and slightly sweet sensation to the throat. His supplement capsule is gaining great interest since he claims that it can prevent cancer and is effective in lowering blood pressure. Moreover, he lets his patients who give birth to use his mangosteen feminine wash which he claims to be a good cleansing agent for the women's sensitive private parts.

In fact, when he had the opportunity to present his technologies in an international convention, several countries got interested and instantly offered him a good deal to commercialize his technologies. He said that Costa Rica was among the most persistent takers. However, he refused these offers because he wanted his innovation to be known in the Philippines. Although he is currently commercializing his technologies in the United States through a company he co-owns, he said he makes sure that they are known as Filipino-made.

### Recognition and challenges

The team of the National Technology Commercialization Program (NTCP) came across Dr. Alfredo Villarico and his technologies through the provincial agriculturist and the research personnel of the DA-Central Mindanao Integrated Agricultural Research and Farmers Training Center of Region 12 in Kidapawan,

➔ turn to page 11



# Coco-biodiesel: Alternate energy source

By MIKO JAZMINE J. MOJICA



● photo source: [www.doe.gov.ph](http://www.doe.gov.ph)

The worsening hostilities in Iraq, the impending instability in Saudi Arabia, and the catastrophic Hurricane Katrina that recently hit portions of the United State's major oil refineries left the world in a state of oil-price shock. According to the report of the online encyclopedia, Wikipidea.com, the oil prices in the United States soared from \$50/barrel in March to an all-time high record of \$70/barrel when Hurricane Katrina struck the US in early September. Here in the Philippines, Malacañang officials announced that gasoline prices might hit P50/liter and diesel at P45-47/liter in the succeeding weeks if the situation worsens in international trade.

## Alternate energy sources

The unstoppable oil-price hike is creating a resurging oil crisis especially in developing countries. The search for alternative energy sources had been initiated the world over to meet the increasing demand for *oil and alleviate the suffering* created by sky-high oil prices. *Our country has tried developing* our own natural gas. Our scientists from the University of

the Philippines Mindanao (UPM) tried to process biodiesel from coconut oil.

## The practical oil

The Philippines is known to be among the few countries in the world which have large sources of coconut oil. According to UPM researchers, the production and utilization of biodiesel or coconut methyl ester (CME) in the Philippines started over two decades ago. However, most of the studies regarding these were undocumented and thus, were not disseminated.

The scientists report that biodiesel is a viable alternative for diesel fuel because of its economical and environmental benefits. The reports claim that coconut biodiesel can significantly reduce carbon dioxide emissions by as much as 109%. This conforms well with Republic Act 8749 also known as the Philippine Clean Air Act of 1999. Moreover, since coconuts are produced massively in the country, the cost of processing the coconut biodiesel *would not be a burden for our* national budget.

The Department of Energy (DoE) reports that the CME type of biodiesel which was launched in

our country has a comparative advantage because it guarantees excellent lubricity, solvency, and detergency when used by engines. The Department recognizes the use of CME as first-rate because it results in better combustion, less pollution, and extra engine power.

Furthermore, it was predicted that the use of coco-biodiesel would provide and establish a long-term and sustainable domestic market. This will mean stabilization of domestic coconut production and high income from copra, which will heighten agribusiness opportunities.

## Processing biodiesel

The UPM researchers, M.A. Soriano-Cruz, L.C. Nalangan, and H.E. Flores focused on improving CME yield and comparing one-stage and two-stage biodiesel production. Transesterification or alcoholysis, the most commonly used method to produce biodiesel, was utilized. Sodium hydroxide was used as a catalyst to generate esters and glycerol. The refined coconut oil used in this study was acquired from the Mindanao Coconut Oil Refinery in Davao City.

Different treatment combinations of sodium hydroxide,

➔ turn to page 22



# Pinoy's Coconet goes global

By MARIA LIZ\*ETH SEVERA J. BAROÑA

Coconet has made the Filipino proud. It is like one of those moments when one of our own captures the attention of the world. When one of our inimitable boxers did it, the nation virtually stopped still, thrilled. The same was true when one of our young Filipinas captured her British and international audiences with her witty extemporaneous on Pinoy diaspora.

Now, one of the innovations of our entrepreneurs wowed international judges at The World Challenge sponsored by BBC World and Newsweek. Coconet now stands along with 12 other innovation finalists from all over the world.

Coconut textile, coconet in short was developed by Dr. Justino Arboleda of Juboken Enterprise. Coconet is a mat woven from 100% coir fiber that serves as "surrogate" roots by holding loose soil together to prevent soil erosion.

## Land degradation and livelihoods

Dwellers in upland areas put extra pressure on our upland natural resources like watersheds to be able to provide for the needs of their families. Unknown to them the pressure on the land and on the watersheds are subjected to diminishing returns that ultimately adversely affect these dwellers.

When erosion occurs, crop productivity is reduced because what is washed-off is the top soil that contains the soil nutrients. The reduced level of the basic plant nutrients needed for crops, trees and other plants, decreases the diversity

and abundance of soil organisms important to plant growth.

The exigency problems on unchecked and unmitigated soil erosion prompted the Foundation for a Sustainable Society, Inc. (FSSI) and Juboken Enterprise, Inc. to form Coco Technologies Corporation, or CocoTech, to help provide long-term environment and economic solutions to the effects of land degradation. Cocotech aims to; a) stabilize and rehabilitate soils and slopes, b) develop the demand-market for coco based products, c) revive the coco fiber and coir industry, d) set the standards for quality control production, e) continue the process of developing new and innovative technologies, and f) provide livelihood opportunities to marginalized communities.

## Holding the soil in place

The coconet created by Juboken Enterprise helps stabilize slopes with loose soil. Specifically, the nets are used on critical and disturbed slopes with water velocities of 3 ft/sec and 6 ft/sec, where new vegetations are likely to be washed out with rain.



● photo source: [www.theworldchallenge.co.uk](http://www.theworldchallenge.co.uk)

Before installing the net, the slope is smoothened, rocks and unnecessary vegetation were removed. Anchoring the nets require bamboo pegs that are 25 to 30 cm long. Every square meter of coconet requires an average of 3 pegs to



ensure uniform contact of the net to the soil.

Installation starts on the top of the slope with the net laid down one meter from the edge. The net then uncoils downward along the direction of the water flow. Direct contact of the net to the soil must be maintained all the time.

The advantage of the coconet is that its installation does not require specially skilled workers. The materials used are also natural. Although it is labor intensive, it does

not require power or energy investments to install the nets. And while concrete barriers to soil erosion have to be repaired or maintained for cracks and seepage, the coconet is self-repairing.

Perhaps the most important trait of the coconet aside from its being effective against soil degradation, is that it is environmental friendly.

Coconets are now being sold and used throughout the

world. The World Challenge website reports that the coconet has improved the lives of 1500 Filipino families and helped add about US\$ 5 roughly P300 pesos to their daily income.

Sources:

1. Materials specifications for erosion control net, from Coco Technologies Corporation
2. <http://www.theworldchallenge.co.uk/finalists4.html>
3. <http://www.cocogreen.net/productlines.html>
4. <http://www.gcric.org/geo/soil.html>

## Coco-diesel...from page 20

coconut oil, and methanol using temperatures 32°C and 65°C were carried out in the experiment and were replicated three times. The Duncan's Multiple Range Test (DMRT) was used to determine the best treatment combination that produces the highest yield of CME.

### Two-stage coco-biodiesel production

The results of the experiments showed that the better method of coco-biodiesel production is the two-stage transesterification. A mean yield of 30.08-92.33% was obtained from one-stage transesterification, and 86.79-98.74% from the two-stage transesterification process. It was found that the yield for both processes were highest at 65°C.

The scientists attest that the best sample of biodiesel produced from their experiment was of good quality and is suitable as a substitute for commercial diesel or can be blended with it. They recommend a standardized methodology for coco-biodiesel production to

maximize the yield of coconut methyl ester.

### Using coco-biodiesel

To facilitate the institutionalization of coco-biodiesel, President Gloria Arroyo issued Memorandum Circular No. 55 on Feb. 9, 2004 "directing all departments, bureaus, offices, agencies and instrumentalities of the government, including government-owned and controlled corporations to incorporate the use of one percent (1%) by volume Coconut Methyl Ester in their diesel requirements."

At present, coco-biodiesel is still in its infancy. Although several studies have proven the coco-biodiesel advantage, there are still lots of work which need to be done before the public could accept its value. Awareness, promotion, and appreciation of this technology are some of the possible initial steps that could be taken if we are to seriously consider using coconut biodiesel

over the commercial fuel.

*This article was based on the study, "Two-stage coconut biodiesel production" an AFMA Best R and D Paper 1" runner-up, basic research category during the 16<sup>th</sup> National Research Symposium, October 2004.*

*For more information, please contact Ms. Anna Marie Soriano-Cruz at telephone nos. +6382-2930302, or +63920-2827064.*

Sources:

1. Soriano-Cruz M.A., Nalangan, L.C., and Flores, H.E. Two-stage coconut biodiesel production. University of the Philippines Mindanao. March 2004.
2. Oil price increases of 2004 and 2005. [http://en.wikipedia.org/wiki/Oil\\_price\\_increases\\_of\\_2004\\_and\\_2005](http://en.wikipedia.org/wiki/Oil_price_increases_of_2004_and_2005)
3. Biodiesel. <http://www.doe.gov.ph/alternative/cme.htm>
4. International Fuel Prices. <http://www.gtz.de/en/themen/umweltinfrastruktur/transport/10285.htm>
5. List of International Fuel Prices 2005. [http://www.gtz.de/de/dokument/en\\_International\\_Fuel\\_Prices\\_2005.pdf](http://www.gtz.de/de/dokument/en_International_Fuel_Prices_2005.pdf)



### Panganiban back at DA's helm

After a short stint as secretary in 2001, Domingo F. Panganiban is back as the department's steward. The appointment was made final at a ceremony held at the Bureau of Soils and Water Management Convention Hall on 15 July 2005. The newly-installed secretary welcomed his "second-chance to make a difference in the sector" where he devoted much of his career. He made clear his policies during this occasion saying his watch will be a "people-centered" one, battling for modernized agriculture rooted firmly on the principles of equity, sustainability, and subsidiarity. He laid out his strategies which are as follows: a) invest more on productivity enhancing instruments vital to agricultural growth like R&D, irrigation, roads, and other market-support infrastructure, b) improve access to knowledge-based technology, credit, markets, agribusiness expertise, and professional management systems, and c) forge stronger cooperation between the academe and local government units (LGUs).

### BAR holds 2<sup>nd</sup> A/F Techno-Forum

BAR held its second technology forum at the RDMIC compound during the celebration of the 18<sup>th</sup> BAR anniversary, August 8-12, 2005. The theme of the celebration was "*Teknolohiya tungo sa masaganang agrikultura, pangisdaan, at industriya*". Eight technologies in the areas of crops, livestock and fisheries, were presented. The forum underscored BAR's commitment to define its role in modernizing the country's agriculture sector through technologies and new knowledge generated through research and development.

### Collaborative watershed-management project inaugurated

Far-flung Barrio Sapang-Bulak was witness to an influx of officials from the Department of Agriculture and its attached bureaus, BAR and BSWM, including heads of non-government organizations and international organizations for the inauguration of the BAR-funded "Community-based Watershed Management Approach in Improving Livelihood Opportunities Project" on 30 July 2005. The three-year project promotes an integrated watershed development project through use of participatory approach in planning, implementation, and monitoring of project activities. It will also hold skills training, workshops, and on-the-job trainings for locals especially for the women and youth of the communities for alternatives on sources of income. Among those who attended were Secretary Domingo F. Panganiban, BAR Director Nicomedes P. Eleazar, BSWM Director Rogelio Concepcion, ICRISAT Director-General William Dar, and FFF President Leonardo Montemayor.

### BAR and United Pharmachem promote agri technologies

After the MOU signing on collaborative project to establish an agricultural technology development center in Mabalacat, Pampanga, BAR Director Nicomedes P. Eleazar and United Pharmachem President Elpidio Duca, including some BAR staff, visited the demonstration farm. During the visit, Director Eleazar emphasized that ATDC will be the show window for other regions. The project's official launching is planned to be attended by Secretary Domingo Panganiban and President Gloria Macapagal-Arroyo.

### BAR lays down 5-year plan

The final phase of the 5-year strategic plan of the Bureau was finalized during the strategic planning workshop at the Development Academy Philippines, Tagaytay City. The group revisited the Bureau's mission and vision vis-à-vis President Arroyo's 10-point agenda. During the workshop, the group developed action plans and identified adjustments to be made in structures, policies, and deployment of





resources to successfully implement its plans. The plans were guided by DA's twin goals: creating more jobs and making wage goods affordable. Director Eleazar's 8-point agenda was also incorporated in the process. BAR also reviewed its 2001-2005 performance and identified issues affecting the BAR system and its policies.

### **Sec Panganiban attends BAR anniversary**

Department of Agriculture Secretary Domingo F. Panganiban helped usher in the Bureau of Agricultural Research to its 18<sup>th</sup> year of existence, which BAR Director Nicomedes P. Eleazar called "an achievement on its own". Secretary Panganiban gave the Bureau a pat in the back by acknowledging the technologies generated through research that he says would be changing the lives of the farming communities and the common consumers of the country. He also expressed satisfaction with the direction the Bureau has assumed through the National Technology Commercialization Program, and the efforts BAR has put on developing its Agritech Online and on the launching of the training manuals on geographic information systems.

### **GIS/RS manual, Agritech Online launched**

The Bureau of Agricultural Research formally launched Agritech Online and training manuals on

*Implementation of Geographic Information Systems in Agriculture and Natural Resources, and Analysis of Remotely Sensed Data* authored by BAR's GIS expert Dr. Esteban Godilano, during the BAR anniversary program, August 8, 2005. BAR's GIS expert, Dr. Esteban C. Godilano authored the training manuals on GIS implementation and remote sensing data analysis. The book aims to "provide understanding and hands-on knowledge of the issues and requirements for implementing and applying geographic information systems and technology in agriculture and natural resources". Dr. Godilano is an expert on space technology. He holds a doctorate degree in environmental information system from Cornell University.

### **BAR staff visit private demo farm**

Director Nicomedes Eleazar, along with several BAR staff and partners from the region visited to a privately owned farm that demonstrates the use of drip irrigation for vegetable production. The staff and visitors were given lectures and demonstrations of irrigation equipments and drip systems by experts of NETAFIM, an Israeli-owned company at its site in Barrio Bucal, Silang, Cavite. NETAFIM is a business entity that provides innovative solutions to increase crop yield and preserve scarce water resources. It offers

cutting edge core-drip irrigation technology and agronomic expertise for irrigation landscaping, turnkey greenhouse projects, wastewater recycling for environmental irrigation, and advanced crop management and monitoring systems.

### **NTCP fast-tracks implementation**

The Bureau's National Technology Commercialization Program holds a series of activities to fast track its implementation. During the week-long celebration of the BAR anniversary, NTCP conducted its 2<sup>nd</sup> Techno-Forum this year, and held a consultation-briefing with the Department of Agriculture's Regional Fisheries Research and Development Centers and the Regional Integrated Agricultural Research Centers. A poster-making contest for Quezon City elementary pupils was also held. At least 15 schools participated.

### **Mindanao vegetable stakeholders discuss global competitive advantage**

Industry-leaders, farmers, government and non-government officials held a Mindanao Vegetable Congress on 18-19 August 2005 at the Grand Men Seng Hotel in Davao City. The event sought to bring to light issues and challenges that are being faced by the vegetable industry, and come up with recommendations for viable government interventions and private sector participation. Going by the theme, "Mindanao Vegetable Industry Stakeholders' Collaboration: A Stronger Linkage to Market", the stakeholders shared their best practices in vegetable industry development that can provide farmers and producers the best market opportunities.

**BAR** Research and Development  
**DIGEST**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_