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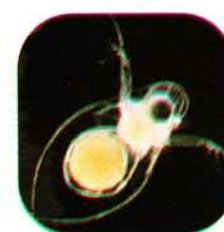
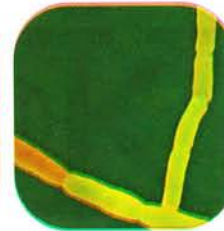
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# Utilization research: Do we have it?

One pastime that keeps me from ennui is visiting book sales and going home with a bagful of books that sometimes are never read. My preference is also changing from fiction to non-fiction. This time, I only want easy reading and nothing of the scientific stuff that is too tiresome to the brain. It is in one of these visits that I came across the **United States 1992 Yearbook of Agriculture**. It is one decade old but nonetheless has a refreshing title, **New Crops, New Uses, New Markets**. Biotechnology was young at that period and I thought that the agricultural scientists were already crossing two breeds or species then came up with new crops. And I was intrigued. I bought the book and now share you with what is inside. No, this is not intended as a book review.

It is interesting to know that some crops that the United States are planting did not actually originate in that country. The first agricultural activity that the federal government did was to encourage its U. S. embassies to collect seeds from different parts of the world for distribution to their farmers. And who knows, with the wealth of Philippine flora and the American having occupied our country for sometime, we may have crops that have taken roots in that country like our many countrymen who chose likewise. Be that as it may, this practice is still being done today among countries except that there are now laws that govern the transfer and sharing of plants and animals throughout the world.

The beauty of reading the practices of other countries is to have a basis of comparing what they are doing with that of ours and to give us insights where we can pick out an idea that can be tried. Initially, U. S. agriculture focused on improving productivity by using better agricultural practices and varieties. (And this is what we and other developing countries are still doing, trying to develop technologies to improve the yield and

quality of our agricultural products.) The very success of their research resulted to overproduction thus depressing prices below the level of productivity. It became clear to the Americans that they had to find new uses for the surplus products and their byproducts. This triggered the birth of their utilization research. In the coming years, utilization research became increasingly important. They even had a separate Bureau of Chemistry to find ways to chemically break down farm products into substances for industrial use.

Peanut and sweet potato were two crops that they already knew how to grow but not planted for commercial purposes. One of their most successful utilization researchers, George Washington Carver, developed 100 new products from peanut and sweet potato making peanut hectareage quadrupled in a 30-year period contributing substantially to their economy.

The American initiatives in agriculture were backed by law. The expansion of their utilization research was an act of Congress when it passed the Agricultural Adjustment Act. This act created four regional research laboratories with each laboratory specializing in the crops grown in the region. This was strengthened by the Research and Marketing Act eight years later which set up a mechanism for the government to contract private research facilities and for it to draw on the expertise of private sector scientists as well as its own. In sum, all these efforts resulted to synthetic rubber, replacements for chemical cellulose, dehydrated foods, mass production of penicillin, frozen foods, juice concentrates, instant potato flakes, powdered milk, etc., all products of utilization research.

We, too, have this kind of research in our country only that it is not categorized separately or done by a as

separate body but by a section or division in a research institution. PhilRice, for instance, has its Food Science and Chemistry Division that takes charge of developing value-added products from rice. All crops have good potential not only as food and feed but for industrial uses where utilization research could zero in. But what can be more frustrating than having the product but there would be no market for it? This must be the reason why the book was titled **New Crops, New Uses, New Markets**. In the farmers' end he can sell his raw product to the industries but at what quality, what price, where and how. There are mechanisms, systems, and arrangements to put in place before things could move smoothly. Does it take a law to do this like in the U.S.?

The utilization research establishment, the author of the article

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# Protamino Aqua: A low-cost shrimp feed

By: Ma. Lizbeth J. Baroña  
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*Penaeus monodon*

Aqua feeds is declining as fish production is increasing, thus the big demand for feeds with imported ingredient becomes pressing. This means costly aquaculture feeds as well as strain in the supply of feeds and its ingredients. But not anymore.

A group of scientists from the Southeast Asian Fisheries Development Center (SEAFDEC) in Iloilo says an alternative protein source called Protamino Aqua could be an answer to the problems.

## Protamino what?

Protamino Aqua is a processed by-product from slaughterhouses, meaning it can be acquired cheap. It undergoes processing like mincing, pressing, and sterilizing - to form a product rich in protein. This product can be a dietary supplement in feeds for fish and shrimps. It is sterilized to prevent it from possible contamination by harmful bacteria. The product has high crude protein content at 72-76% and high pepsin with digestibility 93-95%. It is known to be of high nutritive value protein, making it an ideal substitute or for partial replacement to costly fish meal.

When fed to juvenile tiger shrimp, *Penaeus monodon*, protamino aqua improved the water stability of the diet. Water stability of shrimp diets is important to prevent faster breaking up of feed, along with its nutrients while in water for a period of time. It is also important to know this particular feed property for feeding.

Based from the results of the growth and survival of the shrimps, it was found that the Protamino aqua was consumed efficiently, leading the scientists to believe that *processed* slaughterhouse by-products can be cost-effective replacement for fish meal in tiger shrimp feeds.

## A treat for the shrimp...

The scientists tested different combinations of squid meal, and Protamino

Aqua on the tiger shrimp. These five combinations consist of; (1) 5% processed meat soluble (Protamino Aqua), no squid meal; (2) 2% processed meat soluble, and 3% squid meal; (3) no meat soluble, 5% squid meal; (4) no meat soluble, no squid meal; and (5) commercial feed. The diets were prepared and pelleted in the SEAFDEC Nutrition Laboratory. A locally acquired commercial shrimp feed was used as standard basis for comparison.

Shrimps in their post larvae stage were randomly stocked in fiberglass tanks at 10 shrimps per tank. These tanks were provided sand-filtered seawater in a flow-through system with good aeration. The shrimps were examined for infections and diseases to ensure only healthy ones were used. Before the experimental feeding, the shrimps were conditioned to a one-week diet of *Artemia sp.*, as a follow-up food from hatchery, gradually shifting to the artificial diet towards the last day.

They were fed the four experimental diet treatments and the commercial feed at these times: 8:00am, 12:00 noon, and 4:00 pm. The amount of feed depended on the bi-weekly bulk weighing of the subjects. The treatment went on for 60 days.

It turned out the highest rate of survival for shrimps were those fed with 5% processed meal soluble (0% squid

meal). The lowest survival rate is among shrimps fed with 5% of squid meal and no processed meat soluble. Adding Protamino Aqua in shrimp diet will result to better survival rate, weight gain, and a more efficient feed conversion and protein utilization.

Squid meal an excellent source of protein but is expensive, costing between P320-360 per kilogram. In sharp contrast, is the cost of processed meat soluble at only P32 for every kilo. Looking at it from the economic point of view fish farmers, in a rare circumstance, can find themselves in a winning situation with the Protamino Aqua. After all, a P328 saving at the end of the day is everything to a tired farmer and more.

Source: *Processed meat solubles, Protamino Aqua, used as an ingredient in juvenile shrimp feed* by: Oseni M. Millamena and Nelson V. Golez - Aquaculture Department, Southeast Asian Fisheries Development Center, Tigbauan Iloilo 5021, Philippines For more information: tel: 6333-335-1009 Fax: 6333-335-1008 email: [oseni@aqd.seafdec.org.ph](mailto:oseni@aqd.seafdec.org.ph) or [nvgolez@aqd.seafdec.org.ph](mailto:nvgolez@aqd.seafdec.org.ph)  
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*Penaeus monodon*



## Editorial...

says, has been solidly in place for over 50 years... has the advantage of using biotechnology to open a vast new horizon and the demand for research has never been greater and has never come from so many different directions. Utilization research can benefit some rural economies by bringing new factories to process raw materials. Our agriculture definitely cannot compete but we can take lessons from the experiences of other countries. We may be doing what the other countries are doing only that we are not conscious that that is what it is.

Perhaps, one of the best things that happened in the economy of a municipality in Ilocos Norte, in particular and the province in general, was the establishment of the Northern Foods Corporation, a tomato processing plant. It

is a rural industrialization effort and a plain example of the importance of utilization research. But what the people behind the venture failed to consider was other products that could be processed from tomato. There were plenty of these rotting by the roadside and they made the highway from the last town of the next province to the site of the plant so odorous during the tomato season. This could have given the rural household especially the women a livelihood if they were taught how to process the low quality tomatoes that were not acceptable to the plant.

I remember that a university in the area tried to turn tomato into candy and had a study testing tomato pomace as feed to cattle. But did the results prosper into technologies for the people?

Was there a market for the product because if there was none, it would only frustrate the people. The other consideration could have been the utility of the processing plant for the whole year using other crops so it would be a better economic venture. Perhaps, they did all these but I had no more way of knowing it.

Old crops, new crops, new uses and markets. Yes, why not? But let utilization research discover these for us. There is a whole new world of possibilities out there. But systems and procedures are to be in place, capabilities are to be developed and courage to begin a passion. VAD

## Call for papers for the 15th National Research Symposium

We are inviting all Filipino researchers from NaRDSAF member institutions to submit published and unpublished research papers for the 15th National Research Symposium to be held on October 8-9, 2003 in Diliman, Quezon City.

### General Requirements for Participants to the Symposium:

1. The Symposium is open only to Filipino researchers/scientists from NaRDSAF member institutions.
2. Topics of research papers should be covered within the NaRDSAF agenda.
3. Unpublished papers must be results of research conducted in the Philippines and completed during the period July 2002 to June 2003.
4. Published papers must have been published in ISI-Current Content journals during the period July 2002 to June 2003.
5. Selected papers must be presented orally and in poster format during the Symposium.
6. All submitted papers must be properly endorsed by the head of agency/office

where researcher is connected.

### Format and style for Unpublished Papers:

1. Manuscripts must be double-spaced with one (1) inch margin on all sides, with pages numbered consecutively at the center of the bottom margin. Font size should be set at 12 (Times New Roman). Text should be typed on short white bond paper (8.5" x 11"), and should not exceed 30 pages (including Literature Cited, tables and figures).
2. The title page should contain the following:
  - ▢ title of the paper
  - ▢ full name of all the authors and their affiliations
  - ▢ complete mailing addresses and phone numbers
  - ▢ funding source and amount
  - ▢ Research Category (Basic or Applied)
  - ▢ at least four subject index entries (key words for indexing purposes)

- ▢ Date of completion of research project

3. The Abstract must not exceed 200 words and should include keywords.
4. Entry papers must follow the standard format for scientific papers.

### Submission of Entries:

For unpublished papers, five (5) hard copies of the manuscript and a copy in 3.5" diskette must be submitted to BAR. As for published papers, five clear reprints and a diskette copy of the abstract are required. All entries must be received not later than 15 August 2003 and addressed to:

**The Symposium Papers Committee  
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Bureau of Agricultural Research, 3rd  
fl. ATI Bldg.  
Elliptical Rd., Diliman, Quezon City**



# Water fleas: The ideal live food for freshwater fry

By: Junelyn S. de la Rosa  
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Water fleas (*Moina spp.*) are a good if not a better substitute for the popular live food, *Artemia nauplii* for freshwater fry or larvae. Water fleas are easy to culture, cheap, and as nutritious as *A. nauplii*.

In a related study, a team of scientists from BIOTECH-UPLB and the Institute of Biological Sciences, Selangor, Malaysia recommended *Moina spp.* after testing various kinds of live feed organisms as live food for river catfish larvae (*Mystus nemurus*).

*Moina spp.* are small freshwater crustaceans commonly called "water fleas" so named because of their short, jerky hopping movements in water.

Young *Moina* (less than 400  $\mu\text{m}$ ), are smaller than newly-hatched brine shrimp and are of the same size or slightly larger than adult rotifers. Hence, *Moina* are ideal for freshwater fry. Young freshwater fry like river catfish can easily ingest young *Moina* as their initial food.

Water fleas reproduce readily. At only 4-7 days of age, they can produce broods of 4-22 per female producing 2-6 broods during their lifetime. Broods are produced every 1.5-2.0 days, with most females producing asexually.

*Moina* has an average protein content of 50% of their dry weight. Adults normally have a higher fat content than juveniles. The total amount of fat per dry weight is 20-27% for adult females and 4-6% for juveniles.

## ***Moina* culture**

*Moina spp.* is easy to culture. Simply obtain a starter culture and a container. Containers can be aquaria, tanks, vats, or ponds. Initially, you need to disinfect the tank with 30% muriatic acid to prevent predators and algae later on.

In large containers, a half meter

water depth is recommended to allow more oxygen and light to pass through the surface for photosynthesis by phytoplankton. Outdoor cultures should be protected from rain.

Clean water is a must in the culture of *Moina spp.* since they are very sensitive to toxins such as pesticides and detergents. Ideal water temperature is 75-88° F (24-31° C). While *Moina* can thrive at temperatures in excess of 90° F (32° C) for short periods, low temperatures reduce production.

## **Feeding or fertilizing**

There are different mixtures of fertilizer materials that are good for *Moina* culture. These are:

A) yeast: 0.3-0.5 ounces (8.5-14.2 g) of baker's yeast

B) yeast and mineral fertilizer: 0.3-0.5 ounces (8.5-14.2 g) of yeast, and 0.5 ounces (14.2 g) of ammonium nitrate

C) alfalfa, bran and yeast: 1.5 ounces (42.5 g) of alfalfa pellets or meal, 1.5 ounces (42.5 g) of wheat or rice bran, and 0.3 ounces (8.5 g) of yeast

D) cow manure or sewage sludge, bran and yeast: 5 ounces (142 g) of dried manure or sewage sludge, 1.5 ounces (42.5 g) of wheat or rice bran, and 0.3 ounces (8.5 g) of yeast

E) cow manure or sewage sludge, cotton seed meal and yeast: Use 5 ounces (142 g) of dried manure or sewage sludge, 1.5

ounces (42.5 g) of cotton seed meal and 0.3 ounces (8.5 g) of yeast

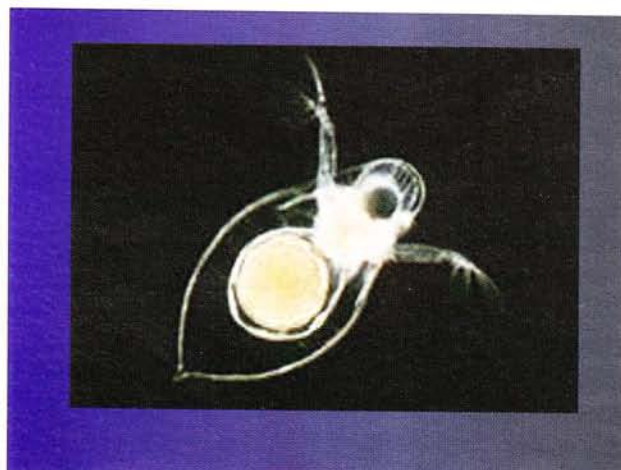
F) horse or cow manure or sewage sludge: 20 ounces (567 g) of dried manure or sewage sludge.

G) chicken or hog manure: 6 ounces (170 g) of dried manure.

H) yeast and spirulina powder: 0.2 ounces (6 g) bakers yeast, 0.1 ounces (3 g) spirulina powder. Add this amount for the first two days, and then every other day until culture is harvested. Add warm water to yeast and spirulina powder and let sit for 30 minutes. Using a brine shrimp net, pour the contents into the *Moina spp.* culture.

Each fertilizer mixture should be added initially for every 100 gallons (379 liters) of water. Additional feed or fertilizer, approximately 50-100% of the initial amount, should be added 5 days later.

Scientists recommend organic fertilizers over mineral fertilizers because organic fertilizers meet the nutritional needs of *Moina spp.* Organic fertilizers are rich in bacterial and fungal cells, detritus and phytoplankton- all of which are



Water fleas (*Moina spp.*)



## Water fleas...

excellent food for the Moina.

Fresh manures are also excellent choices since they have lots of organic matter and bacteria.

Another fertilizer mixture consists of yeast, alfalfa and bran. This mixture smells better than the other mixtures and is easy to prepare. Activated yeast (baker's yeast) and bran and alfalfa meal or pellets can be bought from livestock feed stores.

A very important feeding rule is to add small amounts of feed or fertilizer at frequent intervals and slowly increase the amount as you go along. Overfeeding can be a hassle as it can cause fungi to grow and affect the growth of the Moina.

Water pH should be maintained at 7-8 as high pH (greater than 9.5), due to a heavy algae bloom and un-ionized ammonia inhibits the production of Moina. The pH of the culture can be adjusted to 7-8 with vinegar.

### Harvesting

To harvest the young *Moina* spp., use a brine shrimp net or a filter to scoop out the culture as they concentrate in "clouds" at the surface. For semi-continuous culture, do not harvest more than a fourth of the population each day, unless you are restarting the culture. Harvest only small quantities at a time and transfer the Moina to containers with fresh water to keep them alive. Do not forget to stir the mixture occasionally to re-suspend food particles.

### Maintaining the culture

To save harvested *Moina* for several days, keep them in clean water in a refrigerator. They will resume normal activity when they are again warmed. To ensure the nutritional quality of refrigerated *Moina*, fertilize them with algae and yeast before feeding them to fish.

If you want to store *Moina* for long period, freeze them in low salinity water (7 ppt, 1.0046 density) or freeze-dry them. Both methods kill the Moina, so adequate circulation is required to keep them in suspension after thawing so they will be available to the fish fry. Frozen and freeze-dried Moina are not as nutritious as live animals and they are not as readily accepted by fish fry.

This means that local fish breeders can culture microworms at home instead of buying expensive fish feed or supplements and be sure that their grouper fry are getting the nutrients they need.

Indeed, fish breeders should try water fleas as a better alternative for freshwater fry. It is inexpensive, readily available and easy to raise and most importantly little fry love them.

#### Sources:

- 1) *Evaluation of different live food organisms on growth and survival of river catfish, *Mystus nemurus* (C&V) larvae*
- 2) *Culture Techniques of Moina: The Ideal Daphnia for Feeding Freshwater Fish Fry* by R.W. Rottmann, J. Scott Graves, Craig Watson and Roy P.E. Yanong; This document is Circular 1054, one of a series from the Department of Fisheries and Aquatic Sciences, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published: May 1992. Revised: February 2003. <http://edis.ifas.ufl.edu>.

## Commercially...

seafoods for the export market are sea cucumbers that cost P310-375 per kilo, lobsters at P275 per kilo, and the abalones which cost P245 per kilo or even as high as P500 per kilo.

Species that are most threatened are the blue crabs and ear abalones. This is due to increased exploitation as shown by the presence of processing plants and several traders, as well as the use of some non-selective and

destructive fishing gear. Due to the profitability of marketing seafoods, more traders are engaging in this type of business.

The inventory and the information generated through this research could serve as an aid in making decisions as to what species to prioritize in scientific investigations especially for sustainable management and product development so that the Philippines could fully use and conserve these important species of the sea. These efforts could hopefully help in boosting the national economy.

For more information, please contact the Marine Laboratory, Institute of Tropical Ecology, Leyte State University, ViSCA, Baybay, Leyte 6521-A or call at telephone no. (053) 335-4007 or fax (053) 335-5621 or E-mail at [bpgermano@philwebinc.com](mailto:bpgermano@philwebinc.com)

Source: "Inventory of Commercially Important Invertebrates in Leyte and Samar" by Bernardita P. Germano, Senona A. Cesar, Analyn M. Mazo, and Jenny Lyn F. Melgo. Unpublished study. LSU: Baybay, Leyte. 2001.

## Brown rice...

mill and sell it to the public. This is also better for rice vendors since brown rice milling saves energy (about 65% less), therefore it has lower milling cost, lower selling price.

ARF claims that brown rice, particularly Los Baños Pinawa, can replace any dish where white rice is used. It can substitute white rice for our daily consumption.

#### References:

- 1) *Brown rice: beyond the color*. Asia Rice Foundation. <http://www.asiarice.org/sections/whatsnew/Bulletin.html>
- 2) *Brown rice versus white rice*. <http://www.lundberg.com/brownrice.html>
- 3) *Brown rice! Nutritionally superior to white rice*. Asia Rice Foundation brochure. For more information, contact Asia Rice Foundation through telefax: (+6349) 5362285 Email: [asiarice@laguna.net](mailto:asiarice@laguna.net)



# EXCEL: the hybrid tilapia

By: Rita T. De la Cruz  
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First, there was hybrid "mestizo" rice (PSBRc72H) that yields an average of 6.3 tons per hectare during the dry season and 25% higher than the best-inbred rice varieties used by farmers. Living up to the promise of an adequate, nutritious, safe food on the table of every Filipino, the agriculture sector is once again introducing another product that ensures affordable food and additional income to farmers. This time, it's EXCEL, the hybrid tilapia.

A product of genetic enhancement and cross breed from *Oreochromis niloticus* known for its fast growth, and *Oreochromis mossambicus* known for its resistance to salinity.

## Tilapia in the Philippines

Tilapia, referred to as St. Peter's fish, is one the most preferred fish among Filipinos. In terms of production, it outranks milkfish (*bangus*) as the top cultured fish in the country. There are three types of Tilapia: red, Nile, and Javanese. In the Philippines, Nile tilapia is the most common.

According to Dr. Crispino Saclauso, national team leader for the Aquaculture RDE Network coordinated by the Bureau of Agricultural Research (BAR), the culture of tilapia in the Philippines began as early as the 1950s with the introduction of *Oreochromis mossambicus* from Thailand. It did not do well during its early cultivation because many growers did not have sufficient information and knowledge on how to properly culture tilapia. Moreover, many growers considered it as nuisance because it competed for the food of milkfish, which at that time was considerably more profitable than tilapia.

In the 70s another Nile tilapia from Israel was introduced, this time with

promising characteristics. Through sex-reversal the commercial production of tilapia in the country boomed and the tilapia industry experienced a phenomenal growth.

In the 90s, there was an erratic production of tilapia due to fishkills and the vulnerability of the fish to various diseases. As the industry expanded, and so were the problems. This urged scientists and researchers to have a thorough examination of the industry and put emphasis on developing tilapia varieties that could adopt to certain difficult situations.

## The promise of EXCEL Tilapia

EXCEL tilapia- the fast-growing and high yielding strain, was recently developed by the National Freshwater Fisheries Technologies Center (NFFTC), the biggest fresh water fish hatchery of the Bureau of Fisheries and Aquatic Resources (BFAR).

The superior breed of tilapia dubbed "BFAR Get 2002 EXCEL Tilapia" is short for **EX**cellent strain that has **C**omparable advantage with other tilapia



**EXCEL tilapia**

strains for **E**ntrepreneurial **L**ivelihood, a project in support to aquaculture for rural development. It was introduced to the public late last year during the Fish Conservation and World Food Day. In February 2003, the DA launched the commercial production of EXCEL tilapia. This is a cheap source of animal protein for millions of rural and urban Filipinos.

EXCEL tilapia is 38% more efficient than the regular tilapia in terms of growth and yield of edible meat. It is 10% faster than the traditional tilapia. It is resistant to common stress and diseases and has better taste and good quality meat. It is also cheaper since it can be produced both naturally and artificially. It is an efficient food converter and can be raised four times a year unlike traditional tilapia, which can only be produced up to three croppings a year.

## Going global through skinned tilapia fillets

Aside from its profitability, tilapia has export potential. With the introduction of EXCEL tilapia, the big demand for this fish could be addressed. There might even be an over production of



# Commercially important seafoods in Samar and Leyte identified

By: Rita T. De la Cruz  
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Eating seafoods is almost synonymous to having a luxurious meal that would only come once in a blue moon for average Filipino families. A kilo of lobsters, for example, costs almost four times the prize of a kilo of round scad (*galunggong*).

Seafoods command a high price both in the local and world markets because of their exquisite taste and high demand, particularly by first world countries. Despite the big contribution of seafoods to the national economy, few studies have been conducted to assess the different species of commercial invertebrates found in the Philippines. Even fewer are investigations on the population, reproduction, and biology of these species to generate indicators for efficient and sustainable management.

The country's marine resources are dwindling mainly due to illegal fishing practices and overfishing. Marine scientists worry that there might come a time when major commercial invertebrate fisheries would collapse due to lack of attention given to the need to scientifically investigate and sustainably manage existing fisheries.

Researchers from the Institute of Tropical Ecology at Leyte State University (LSU) recently conducted a detailed investigation of the inter-island waters of Leyte and Samar to determine important sources and suitable sites for monitoring and field sampling of seafoods. Their main agenda was to come up with an inventory of commercially important marine invertebrates in Leyte and Samar. The inventory was completed using structured surveys and interviews in markets of different coastal barangays, municipalities, and cities throughout the region.

The researchers, headed by Dr. Bernardita P. Germano, used five criteria to determine which species are commercially important. These include commercial value,

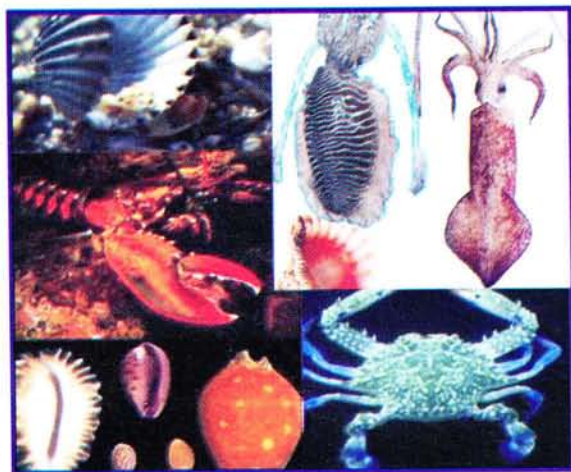
estimated volume of catch, threats, frequency in markets and source sites, and information availability. Meanwhile, three criteria were used to determine priority-fishing grounds for monitoring and field surveys: catch volume, number of commercial species present, and accessibility and safety.

The commercially important seafoods come from 15 fishing grounds of Leyte and Samar. The 15 fishing grounds are: Camotes, Ormoc Bay, Cabalian Bay, Sogod Bay, Biliran Strait, Leyte Gulf, San Pedro Bay, Carigara Bay, Visayan Sea, Surigao Strait, Maqueda Bay, Philippines Sea, Samar Sea, San Bernardino Strait, and Guiuan. The researchers then identified the three fishing grounds with the highest number of commercially important seafoods. These are: Samar Sea and San Bernardino Strait (with 24 species), Camotes Sea (with 22 species), and Guiuan (with 21 species).

There are 64 commercially important seafoods identified and the researchers ranked the 10 most commercially important seafoods, namely; blue crabs (*Portunus pelagicus*), ear abalones (*Haliotis asinina*), lobsters (*Panulinus sp.*), squid (*Loligo duvaucelii*), sea cucumbers (*Holothuria spp.* and *Stichopus horrens*), cuttlefish (*Sepia sp.*), top shell (*Trochus spp.*), pen shell (*Pinna sp.*), nylon shell (*Paphia textile*), and spider conch (*Lambis lambis*).

Approximately 89.4 tons of

these are being harvested every month (based on the average estimated catch per species in different fishing grounds). The top three most harvested species are blue crabs (32.4 tons), cuttlefish (12.5 tons) and squid (12 tons). They are also the most common seafoods found within the area of Leyte and Samar. Other species



like the pen shell and hammer shell are abundant mainly in Western Samar. The spider conch is rich in Eastern Samar while the nylon shell is harvested year-round in Leyte-Leyte.

The most expensive commercial invertebrates in the local market today are the large cowries (*Cypraea spp.*) especially the golden cowry (*Cypraea aurantium*) valued for its shell that sold up to P20, 000 a kilo (P3, 000 per piece). Other expensive species include lobsters, triton shell (*Charonia tritonis*) and ear abalones whose price ranged from P170 to 275 a kilo.

Meanwhile, the most expensive

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# Sinarapan swims home

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They are extremely small, fragile, and delicious: the very reasons why they are headed for possible extinction.

Sinarapan - scientifically known as *Mistichthys luzonensis* Smith - is the world's smallest commercial fish.

It is about 9-14 millimeters long or to be graphic, at least a thousand can be cradled in a single tablespoon. It is transparent with only its relatively large black eyes to indicate it's a fish. The tiny goby lives in Lake Buhi of Camarines Sur, where the water is about 10-20 meters deep. The goby likes to gather in swarms, a habit that makes their capture easier.

People within the goby's habitat have been catching this fish in enormous quantities in the 1940's to the 1960's, because aside from being world class in size, it is also exotic at the table. They are usually fried in oil or boiled with vegetables. Being a delicacy that it is, it was soon in demand in the markets of the neighboring towns in Albay and Camarines Sur. The commercialization of the *Sinarapan* contributed to its decline in number.

## Becoming extinct?

Not so, say experts from the Bicol University led by Professor Victor Soliman. Preventing the goby's extinction is the key objective of their research.

Decades of catching in huge quantities has taken its toll on the tiny goby. It is now threatened with extinction, a possibility that compelled scientists in the area to take steps in salvaging the remaining *Sinarapan* in the Lake Manapao Sanctuary of Buhi, the only natural abode for this minute fish, until 1998. From the *Sinarapan*'s heyday in 1979, over-fishing using a motorized *sarap*, - a triangular net made of a material from abaca fibers called *sinamay*, destroyed the breeding and feeding areas of the goby leading to critical decline in population.

This near total stock collapse of the species was unforeseen during the

species' prime years in the 1940's. Mismanagement caused by complacency, coupled with the species' inherent annual high mortality rate, led the species to a significant near total mortality rate.

According to a study made by Soliman and group in 1996, aside from being caught in huge numbers, the goby's threatened existence is caused by predation of Nile tilapia that are illegally stocked in net cages in the lake sanctuary. The natural coexistence of the Nile tilapia and *Sinarapan* has been altered in favor of the predator causing ecological imbalance. Fortunately, this threat was eliminated from the sanctuary when the *Sinarapan* Conservation Team of Bicol University, headed by Prof. Soliman, reported the sanctuary violation during an assembly of the Buhi Municipal Government.

## Helping hands

Experts saved the species through the *Sinarapan* Repopulation Strategy (SRS), a bid to revive the *Sinarapan* stock through live fish transfer. Some 120,000 live *Sinarapan* were transferred to Lakes Makuwaw and Katugday in 1999 to 2001 from their natural home of Lake Manapao in Buhi. Prof. Soliman came up with the strategy after a careful study and assessment of the biology of the fish and the suitability of the receiving lakes.

He has been studying the species for years, and was the one who warned the Local Government of Buhi of the species' dire condition in 1996, a

move that eventually brought the *Sinarapan*'s plight to the limelight.

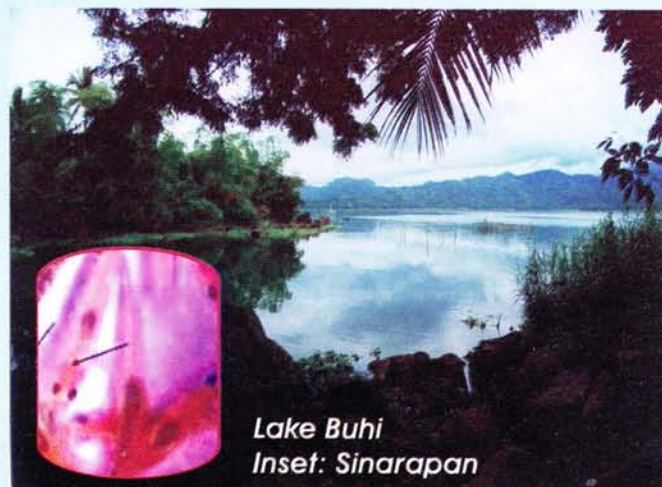
By virtue of the *Sinarapan* Conservation and Management Ordinance (Municipal Order No. 97-017), the *Sinarapan* Conservation and Management Council was formed in April last year. Studies on the ecology and biology of the fish by Soliman in 1994 and 1998 were the basis for putting together management schemes and legal mechanisms.

The SRS consists of integral steps to revive the stock: a) assessment of the suitability of the receiving habitat; b) analysis of the fish population and how the lakes will be able to contain the fish' population behavior; c) evaluation of fish stocking schemes; and d) encouraging involvement of local residents.

## Repopulation

The transfer of a number of live fish from one lake to another is what experts' term as "repopulation". Whether or not the receiving lakes are suitable habitats for the live fish was first determined, aquaculture activities, human

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Lake Buhi  
Inset: *Sinarapan*



# Bacteria in weed as biofertilizer for cotton

A team of scientists has discovered a species of bacteria found in the roots of *Cenchrus echinatus* L., (from the family of grasses) that can help in fixing nitrogen in the soil.

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We always thought that grasses are just pesky plants that keep on sprouting and competing with cultivated crops. But unknown to most of us, at the roots of some grasses beneath the soil there live some of the most beneficial microorganisms that can help farmers in their crops.

The team of Dr. Victoria B. Cosico, Magdalena C. Damo, and Victoria Puyot of the Cotton Development Administration (CODA) in Batac, Ilocos Norte has discovered a species of bacteria found in the roots of *Cenchrus echinatus* L., (from the family of grasses) that can help in fixing nitrogen in the soil. This bacterium is *Bacillus cereus*, a non-symbiotic biological nitrogen fixer that may provide crops like cotton the nitrogen requirements they need.

## Role of nitrogen

Why do crops need nitrogen (N)? This element is an essential nutrient for life because it is an important component of proteins, nucleic acids, and other cellular constituents of living and some non-living

(viruses, prions, etc.) organisms on earth. Although 78% of the atmosphere is composed of nitrogen ( $N_2$ ), organisms cannot use this in its gaseous form. Plants can only use nitrogen in the form of nitrate or ammonium ions and animals can only use it in organic forms, which they get by consuming plants or other animals. One way of converting nitrogen into usable forms is by the use of a microbial process called 'nitrogen fixation'.

According to Cosico, Damo, and Puyot, the discovery of symbiotic and non symbiotic biological nitrogen fixers (BNF) associated with some weed species led to the microbial formulations now commercialized for some crops. The research team also said that symbiotic (the intimate living together of two dissimilar organisms in a mutually beneficial relationship) BNF are commonly crop generic-specific while free-living BNF usually are within the rhizosphere (root zone) such that the biologically fixed N would be just close to the root system ready for use.

## *B. cereus* as nitrogen fixer for cotton

Generally, it was observed that agronomic and yield response of cotton to the application of organic fertilizers alone is inferior compared to that of the recommended inorganic fertilizer rate. However, the results of the combination of organic and inorganic fertilizer were comparable with the results of the inorganic fertilizer application, the researchers said.

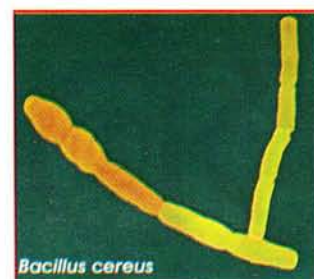
Many weed species in cotton production sites are associated with the

crop during growing season and the possible existence of BNF associated with the weeds can indirectly benefit cotton plants. The team studied this possibility so that this BNF can be used to enrich organic fertilizers with nitrogen to enhance crop performance. They were able to screen and identify the nitrogen-fixing bacteria associated with cotton weeds, which is *B. cereus*. They also enhanced the value of these bacteria as cottonseed microbial inoculants for early Seedling establishment.

The effects of the nitrogen-enriched organic fertilizer

was determined by the isolate (*B. cereus*) on the agronomic and seed cotton yield performance.

The results of this study showed that *B. cereus* isolated from the roots of the grass *Cenchrus echinatus* L. can be used as a microbial seed inoculant (the introduction of the bacteria in seeds) to improve seedling vigor. In an experiment conducted involving bio-organic fertilizer or BOF (prepared compost material biologically enhanced with a type of fungi, *Trichoderma* sp.), BOF with *B. cereus*, chicken manure, and BOF with *B. cereus* had germinated more seeds than other treatments in the sand boxes. As for the seedling vigor index (SVI), the BOF as carrier of the *B. cereus* showed the highest effect on the SVI. The bacteria



*Cenchrus echinatus*



→ next page



## Bacteria...

Also significantly affected fresh seedling weights of the cotton variety UPLC-2.

"If *B. cereus* is used to bio-enrich the organic fertilizer with nitrogen and combined with half of the recommended nitrogen fertilizer rate in cotton production, the quantity of substituted nitrogen is within the range of 37.5-65 kg/ha," the researchers concluded. In the screen house and field conditions, the bacteria combined with bio-organic fertilizer gave comparable agronomic performance and seed cotton yield. The cotton plants with this nitrogen enhanced BOF grew luxuriantly and developed minor fruit-bearing branches.

How could these bacteria help farmers? "In so far as our results are concerned, it would lessen the use of inorganic fertilizers, particularly nitrogen," Cosico said. According to the researchers, most formulations of BNFs can substitute 1/2 of the recommended amount of N of a crop since the N-fixing organisms provide the other requirements of the crop, like

cotton. The bacteria with organic fertilizer, applied with half of the recommended inorganic fertilizer rate, would supplement the requirement of N for plant use, given the proper soil environment, which is moist soil. Farmers would be able to save because they will apply less commercial inorganic fertilizers.

### Future studies

To make the *B. cereus* formulation easier to apply by farmers the work on this study should be continued. However, due to budgetary constraints, the project has been stalled for a while. A study is needed to make a better microbial formulation and that will make *B. cereus* easier to store and handle. The researchers suggested that *B. cereus* can be lyophilized (or freeze-dried) and formulated as powder or as a liquid concentrate since the bacteria can develop spores. "It can be applied through soil injections close to the root

system for more effective use of the nitrogen fixed by the organism," the team said. This can be possible if the bacteria are prepared as liquid formulation.

The researchers hope that, "there will be lesser use of expensive imported inorganic N fertilizer and *B. cereus* will also enrich the soil." In the future, this bacteria discovered from weeds could also be applied to other crops. Not bad, coming from weeds.

*References: Cosico, V.B., Damo, M.C., and Puyot, V. Bacillus cereus: A New Biological N<sub>2</sub>-Fixing Organism From the Rhizosphere of Cenchrus echinatus L. and its Utility as Biofertilizer in Cotton Production. Deacon, J. The Microbial World: The nitrogen cycle and nitrogen fixation. University of Edinburgh.*

<http://helios.bto.ed.ac.uk/bto/microbes/nitrogen.htm>

*The future of symbiotic nitrogen fixers in agriculture. <http://tornado.breward.edu/kroizsr/ecol350paper.html>*

## Sinarapan...

settlement, and socio-economic factors considered. Out of four lakes, Makuwaw and Katugday were chosen.

Since the fish is small and fragile, collecting the *Sinarapan* from the source lake was done carefully. They were collected using a manually operated *sarap*. The fish were then put in polyethylene bags cushioned by "buri" bags. Each bag containing 3000-5000 fish, were transported to the receiving lakes. Death among the fish was high during transport. As high as 70% of the fish die during transport. Stocking was done at the rate of 15,000 *Sinarapan* per month from late 1999 to early 2001.

Upon arrival at Makuwaw and Katugday, the bags containing the fish were floated on the water while they were carefully untied. This is to acclimatize the fish to the new environment. After 20-25 minutes, the fish were released and they swam to the shady part of the lake

where hyacinth and *kangkong* grow. Some 60,000 *Sinarapan* were transferred to Lake Makuwaw until May 2001, and another 60,000 to Lake Katugday in December 1999.

### They are reproducing!

Observations done in July 2001 found female *Sinarapans* carrying eggs. It was concluded that the females could not have been carrying the same eggs during the transfer because the eggs would have been spawned or hatched which would take about a month at most.

This means only one thing: that the transferred stock has been reproducing, evidence that the strategy is effective. This finding was further supported by observations done in September 2002. The success factors identified were: following the minimum number of fish to be transported per trip, and a consistent and sustained

coordination with stakeholders and the local government.

"From our experiences in Bicol Region, biodiversity conservation has been truly effective when the local community becomes a true partner in protective management, which is essentially the agreeable marriage of biology and social science," concludes Prof. Soliman.

*Sources: Successful Repopulation of Mountain Lakes Makuwaw and Katugday with Sinarapan *Mistichthys luzonensis*, the "World's Smallest Commercial Fish", and the Implications for Sinarapan Stock Revival in Bicol Lakes by: Victor S. Soliman, Bicol University, Tabaco Campus Tabaco City 4511 Contact through: [vss@digitelone.com](mailto:vss@digitelone.com) and 052-830-0012*

*Sinarapan Conservation Project at <http://www.geocities.com/RainForest/5520/sinarapan.htm>*

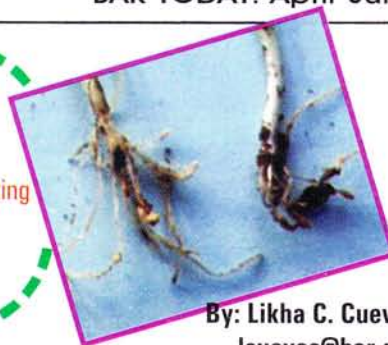
*Lake Buhi: Home to World's Smallest Fish at [www.naga.gov.ph/tourism/BuhiLake](http://www.naga.gov.ph/tourism/BuhiLake) Sinarapan, World's Smallest Fish at <http://www.aenet.org/mayon/sinarap/htm>*





Yes, worms attack onions, too.

These are the same worms that damage the rice field. These microscopic worms, which belong to the *Phylum Nematoda*, are left-over pests after the rice planting season and by the time onions are planted, these nematodes have increased tremendously, thus, causing problems to the crops.



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## Attack on the onion worms

Characterized by short and swelled or galled roots, *Meloidogyne graminicola* is the nematode that causes root-knot disease in rice. It reduces the food and water uptake of the affected plants. Since these abundant and persistent nematodes are microscopic, they are often not recognized until they have caused damage to crops.

### Farmers fight back

Farmers in return attack these pesky pests. The use of nematicides is one way of getting rid of the abundant worms but they are expensive, labor-intensive, and require special equipment. This makes nematicides not feasible for farmers in the Ilocos Region and Central Luzon, where 95% of the total hectareage for onions are located. These chemicals also pose human health hazards and environmental problems. Flooding the field is out of the question since it does not control *M. graminicola*; they survive in water-logged conditions. Farmers are not willing to change their cropping because onion growing is lucrative and 38% of these onions are exported to Japan, Indonesia, and Singapore. Physical soil heat treatment to kill nematodes has been reported to reduce nematode population and one form of this treatment is by rice hull burning.

Rice hull burning, practiced by farmers in San Jose, Nueva Ecija, with deep plowing and soil amendment with biofertilizer has been evaluated by Dr. Evelyn B. Gergon and her team of researchers from the Philippine Rice Research Institute (PhilRice) based in Nueva Ecija. The researchers determined

the effects of rice hull burning to nematode mortality. They also assessed deep-plowing as an alternative cultural practice as the smoke of rice hull burning may have hazardous effects on the environment. The PhilRice researchers also investigated the effect of deeper heat penetration by increasing the thickness of rice hulls on initial nematode density at different soil depths.

Farmers burn rice hull mainly for reducing weeds and increase crop yields. After the rice harvest is over, farmers cover their fields with rice hulls (up to 15 cm thick) and burn them for 4-5 days. Rice hull burns slowly. After burning and the ashes have cooled, the farmers plow the field to incorporate the ashes into the soil.

### Burn it

The results from the experiments made by the researchers in San Jose, Nueva Ecija in 1997-1998 and 1998-1999 onion-growing seasons showed that rice hull burning on the soil surface increased onion yields. "This yield increase appears to be due to a number of factors --- reduction of rice root-knot nematode, and reduction in weeds, increase in soil nutrients (particularly potassium and phosphorous) and improvement of soil conditions," Gergon and her team concluded.

The researchers found that burning rice hulls at least 15 cm deep is effective in increasing onion yield and reducing the initial populations of the root-knot nematode *M. graminicola*. This also prevents the build-up of *M.*

*graminicola* in this rice-onion cropping system, the team said. To increase onion yield and more bulbs of export quality, farmers must increase the thickness of the rice hulls to 30 cm deep. This yields 44.2% more than fields with no rice hull burned (and 11.9% more than those with 15 cm-deep rice hull) and 151.7% more large bulb for export compared to plots without rice hull burned (37.7% more compared to plots with 15 cm-deep rice hull).

The team found that deep plowing did not significantly affect nematode populations compared to normal field plowing. The number of nematodes in soil and roots did not also decrease with soil amendment with local compost (organic fertilizer) throughout the onion season. The same is true with the field that used inorganic fertilizer alone.

This rice hull burning technology is not only economical for farmers, but a means of managing rice production by-products that can be a part of onion culture in areas where rice hulls are abundant, Gergon disclosed.

From waste to aid, rice hull is another weapon against the destructive worms.

### References:

Gergon, E.B., Miller, S.A., Davide, R.G., Opina, O.S., and Obien, S.R..2001 Evaluation of cultural practices (surface burning, deep ploughing, organic amendments) for management of rice root-knot nematode in rice-onion cropping system and their effect on onion (*Allium cepa* L.) Yield  
What are nematodes?

<http://nematode.unl.edu/wormgen.htm>



# Brown is better

That's true, brown is better. It does not apply only to complexion but also to the rice that we eat.

"Brown rice? How weird," one might say. Do not judge it by its color, experts say. Even if the brown rice or *pinawa* is mistaken to be of poor quality due to its 'unpolished' look, it is loaded with lots vitamins (like Vitamin B-complex) and minerals (like thiamine, which is an important component in mother's milk) not available in white rice.

Aside from the nutrients found in brown rice, consumers also get fiber and essential oils. Fiber has been found to prevent gastrointestinal and heart diseases. The United States National Cancer Institute recommends 25 grams of fiber a day. A cup of brown rice gives nearly 3.5 g, while an equal amount of white rice not even 1 g. The essential oils, on the other hand, are proven to prevent heart disease because these help decrease serum cholesterol.

A cup of brown rice yields about 50 g of carbohydrate and it has been shown that diet rich in carbohydrates can be useful in weight control. US studies show that diets with the same number of

calories with one rich in fats and protein and the other rich in carbohydrate, the former tends to contribute to weight gain. Fats from foods that we eat are stored as fat while carbohydrates are used or stored in muscles for a period of time. Nutritionists advise that it is better to have a balanced diet low in fat and rich in complex carbohydrates, like what is found in brown rice.

Who says brown rice is only fit as animal feeds? On the contrary, eating brown rice has already become fashionable because only specialty shops like organic food shops and organic food restaurants found in malls (like in Robinsons Galleria) and upscale commercial centers serve and sell *pinawa*. Eating organically grown foods and special foodstuff like brown rice has now been associated with the rich health-obsessed urbanites and some *balikbayan* (who are eating brown rice in the US).

Younger generations might be surprised to know that until the early 1950s Filipinos were already eating brown rice. Our parents bought partially polished rice, produced by pounding the grains with the use of mortar and pestle or stone grinders. With the introduction

of milling machines, white rice was produced and the tastes and buying attitude of Filipinos shifted. We think that the whiter the rice, the better.

## Give me color

*Pinawa* may not necessarily be brown. Sometimes it's brown, red, and other times purple. In

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removing the husk or hull using mortar and pestle or rubber rolls, the bran layer of the grain is not stripped. This accounts for the color.

There are a lot of brown rice varieties but the preferred ones are MS8, IR841, Burdagol, IR64, C4, and Dinorado, which are classified as fancy rice. *Pinawa* also has a pleasant aroma and flavor different from white rice. It is packed and sealed in transparent plastic to preserve the aroma and prolong the good grain quality.

## Los Baños and brown rice

Los Baños (in Laguna) has its own *pinawa* variety, the Los Baños Pinawa, which is produced from MS8, IR841, and Burdagol. Cooking this *pinawa* variety does not require washing before cooking as this has been hygienically processed. For better eating texture, the brown rice is soaked in water for about 30 minutes before cooking and this reduces cooking time. The brown rice-water ratio is usually 1:2 (1 cup rice to 2 cups of water).

The Asia Rice Foundation (ARF), a regional non-profit organization with a national rice foundation established in Los Baños, Laguna in 1997, spearheaded the promotion of brown rice in the Los Baños science community. The organization aims to revive the interest in *pinawa* and with its partners, ARF campaigns for the popularization of brown rice in the whole country.

According to ARF, brown rice supply is currently confined primarily in Los Baños and in Tiaong, Quezon. It is the Foundation's hope that with the success of *pinawa*'s promotion, more people will buy brown rice that will encourage millers to

Brown Rice



Brown Rice Flour



# Between the Bt corn rows

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The debate over *Bacillus thuringiensis* (Bt) corn is gathering more heat as a series of events added more wood to an already growing blaze. This blaze is fanned by the commercialization of Bt corn, first Bt corn harvests in April, the month-long hunger strike, the numerous rallies by environmental activists and farmer groups, the media's bipolar convictions, the government's diplomatic dismissive, and the sermons by the clergy.

While most of us stay in the sidelines on this issue, we cannot afford to stay long there since sooner or later we will be part of the action as consumers of products- GM-free or not. Let us review some of the most important issues surrounding the controversial Bt corn.

## Food safety

How safe is Bt corn? Would my family and I be at risk if we eat Bt corn? What is in Bt corn? How was it made and how does it work? Are Bt corn products less safe than normal corn? We need to ask these questions in order to decide whether anti-Bt corn groups are right in calling Bt corn- Frankenstein food or poison food.

The controversy about Bt corn stems from the fact that it has been added with a certain gene from *Bacillus thuringiensis*- a rod-shaped bacterium that occurs naturally in soils worldwide. This gene produces a protein called Cry protein that is lethal to corn borers, hence making the corn plant resistant to corn-borer attacks.

This protein is lethal to corn borers because they have a strong alkaline digestive tract (in contrast, humans and other animals have acidic digestive tracts) that dissolve the crystals that contain the proteins thereby releasing the proteins. These proteins disrupt the lining of the caterpillar's gut causing the caterpillar to starve and die eventually.

While Bt corn is still debated among Filipinos, it would be wrong to say

that we have not yet eaten GM products as Philippines imports corn and corn products from developed countries where Bt crops have already been commercialized since 1985. In the United States, for instance, at least 70% of their food products contain ingredients from GM crops.

The Department of Agriculture (DA) and the National Committee on Biosafety of the Philippines have been tasked to assess and monitor the field tests of Bt corn. Both have said that Yieldguard 818, Monsanto's approved corn variety has undergone strict testing and evaluation since 1996 before it was granted permit last December. Yieldguard 818 has the strain designed to kill the Asiatic corn borer which can cause up to 80% yield loss.

However, opponents to the technology are still challenging the testing process and are calling on President Gloria Macapagal-Arroyo to issue a moratorium and withdraw the commercialization of Bt corn.

## Bt corn's impact to the environment

Another issue is whether Bt corn is good or bad for the environment. Anti-GMO groups have fed the public's fear and doubts by saying that Bt corn which they call "Frankenstein food" will spawn mutant insects that will bring in the next apocalypse. While that is perhaps a result of watching too many sci-fi movies, it is important to ask two



Bt corn



Asiatic corn borer

questions:

## Will Bt corn cause resistance in target species?

Most scientists agree that there is potential for corn borer resistance to Bt corn but it is remote. Dr. Michael Cohen, IRRI entomologist, discussed the "refuge/high-dose" strategy and Bt plants that have two Bt toxins- both practical steps to sustain the Bt technology in the field.

He said that the refuge strategy involves maintaining "refuges" in the fields. Refuges are non-Bt crop plants that will maintain the population of Bt susceptible insects. "Refuges" can be fields of non-Bt plants or of non-Bt plants within fields. When the susceptible insects mate with the resistant insects, the offspring are usually susceptible. These insects will be killed if the Bt cultivars have a high dose of toxin. Therefore, the combination of refuges plus plants with a



## Between...

high dose of toxin can keep the population of resistant insects at extremely low numbers.

In the USA, the government has enforced the "refuge" system in the countryside. Farmers who plant Bt crops must allot 4-20% of their land to non-Bt crops and these refuge fields must be within approximately one kilometer of their Bt fields.

Here in the Philippines where the average landholding is less than a hectare, "refuges" should be planned and maintained by the community. The field of farmers who choose to grow non-Bt cultivars would also serve as refuges for their neighbors. The government should help maintain seed supplies of non-Bt cultivars.

Dr. Cohen explained that concerns on stemborer damage to likely increase in non-Bt fields is misplaced since moths could not detect whether the plant is Bt or non-Bt. "It is very likely that stemborer population in non-Bt fields will more likely decline than increase after introduction of Bt rice", he said.

Another strategy is to plant Bt rice cultivars containing two Bt toxins. Dr. Cohen said insects that are resistant to cultivars that contain two high-dose toxins will be extremely rare. And since resistant insects will be very rare then fewer susceptible insects will be needed to ensure that resistant insects do not mate with each other. Thus, smaller and fewer refuge fields are necessary to maintain the effectiveness of Bt plants.

### *Will Bt corn harm or kill non-target species?*

This issue took center stage when scientific journal *Nature* published an article saying that Bt corn pollen was found toxic to the larva of the Monarch butterfly. In a conference, entomologists concluded that 1) Bt corn pollen does have some toxicity to Monarch larvae, 2) toxic

levels of corn pollen do not occur far from corn fields, and 3) it is likely the Bt corn pollen is not a significant mortality factor to Monarch butterfly larva. Thus the Monarch butterfly issue was probably overblown in the press but there do appear to be some effects of the pollen on off target organisms.

### *Monsanto's monopoly of the technology*

Does the country want its corn industry and food security controlled by foreign companies, such as Monsanto that now propagates the Bt corn? Most anti-groups have strongly opposed Bt corn by underlining the ills of a foreign-owned technology. They argue that with the large overhead Monsanto incurred in developing the technology, naturally it would want to make as much profit now that its Yieldguard 818 has been approved for commercialization. This would mean farmers will not necessarily be better off even with the expected higher yields since they would have to pay more for the seeds and other inputs.

There are many other issues in the Bt corn debate. Do we need to label commercial corn even if the product only contains 1% Bt corn? If we ban Bt corn

now are we sacrificing what could be one of the best agricultural innovations in the 21<sup>st</sup> century? These are legitimate questions which we need to answer to make wise decisions later on. While most of us are still waiting in the sidelines on this issue, sooner or later we will have to make decisions when Bt corn products reach our local market. While debates will likely never be resolved, further research and testing may reveal whether the advantages and benefits of this technology outweigh its risks. One thing is certain: Bt corn has made its imprint on people from all walks of life and like other GMO crops will continue to play a critical role in bringing food to tables all over the world.

#### *Sources:*

1) *Bt rice: Practical steps to sustainable use* by Dr. Michael Cohen, 2002 Entomology and Plant Pathology Division, International Rice Research Institute; F. Gould, Department of Entomology, North Carolina State University and J.S. Bentur, Department of Entomology, Directorate of Rice Research, India E-mail: [m.cohen@cgiar.org](mailto:m.cohen@cgiar.org)

2) *The Philippines will harvest first Bt corn in April* by R. Sarmiento SEARCA Biotech News Updates March 18, 2003



*Food scientist Koushik Seetharaman says that in the worldwide debate over GM foods, scientific, political, economic, and even cultural factors need to be considered carefully.*

Penn State University



Sewers? One hardly gets away from the smell of the liquid waste underneath, as its odor forces its way out and into our nostrils. But a study conducted by the Sugar Regulatory Administration (SRA) of the Luzon Agricultural Research and Extension Center (LAREC) in Floridablanca, Pampanga says sugarcane growers will soon find something good from the repulsive smell.

also adds moisture to the soil- an extra help especially during dry seasons.

#### ***Sewage sludge and N fertilizer***

The scientists tested the effectiveness of the Nitrogen (N) fertilizer, combined with different amounts of the sewage sludge. They experimented on three main plots. On the first plot, they put no N fertilizer but the



Source: [www.ukrivers.net/sewage.jpg](http://www.ukrivers.net/sewage.jpg)

## **Sewage sludge: From stink to the sweet smell of profit?**

**The study yielded proof that the sludge, or mud from sewage water is a potential source of nutrients, which improves the fertility of the soil for sugarcane farming. Hence, the idea that it can be a suitable substitute for chemical fertilizer.**

#### ***An alternative to expensive fertilizers?***

Making up a large portion of the expenses in sugarcane farming is the cost of fertilizer. The soil needs to have enough nutrients for it to be productive, therefore, making fertilizer a necessity in the farm.

Scientists in LAREC believe an alternative to costly fertilizers is soon in place. After analyzing the chemical composition of sewage sludge, the scientist made notable findings: the sludge contains high amounts of nitrogen, iron, calcium, magnesium, phosphorous, and potassium, as well as small amounts of manganese, copper, sodium, and zinc. It also has neutral acidity (pH), and has a considerable amount of organic matter, having come from household wastes.

The sludge is the sediment formed at the bottom of sewage waters. Whether dewatered, meaning the sludge has been drained of its water content - or in liquid, muddy form, the sewage sludge's organic content improves both the nutrient structure and ability of the soil to hold water. The water in the liquid sludge

subplots were treated with different amounts of sewage sludge. This amounts are 0 t/ha, 40 t/ha, 80 t/ha, and 120 t/ha. On the second plot, they put 90 kg/ha of N fertilizer with subplots holding the different amounts of sludge mentioned. The third plot held 180 kg/ha of N fertilizer, tested again with the same set of varying amounts of sewage sludge.

To make sure that they are putting in reasonable amounts of N fertilizer on the plots, the scientists used the recommended rate of N fertilizer from LAREC. As for the amount of sewage sludge used, the Manila Water Co., the source of liquid sewage sludge, has no recommended rate of application for agricultural crops, therefore, they used varying amounts of the sludge.

The Phil 8583 variety of sugarcane was planted at 40,000 canes per hectare. After adding in the different amounts of sewage sludge in the plots, the scientists also put in the required amount of urea for sugarcane planting.

By: Ma. Lizbeth J. Baroña  
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They let the sugarcane grow for 10 months. After harvesting the 10-month old sugarcanes, soil samples were taken for analysis of pH, organic content, and presence of potassium and phosphorus and other heavy metals.

#### ***Measuring up***

It turned out that the height of the plant was significantly influenced by the combination of sewage sludge and the N fertilizer. Likewise, tillering also improved in the increasing amount of the sewage sludge at the 3 plots with different amounts of N fertilizer. It was also noted that applying sewage sludge notably improved early growth parameters of sugarcane.

The number of stalks, including how long they grow, was improved by the amounts of sewage sludge at the required amount of N fertilizer. Increasing the amounts of both the sludge, and the N fertilizer also increased in sugarcane yield. The highest amount of sugarcane harvest was seen at the 180 kg/ha N fertilizer and 120 T/ha sludge combination. Natural sugar content,

➔ next page



## Sewage...

though, was not influenced by any of the combinations.

Heavy metals in the sewage sludge - at different amounts at ton/hectare - is significantly less than the limit given by the Department of Environment and Natural Resources (DENR) Administrative Order No. 29. The metal content of the sludge did not increase in the soil, and also did not contaminate the soil with toxic substances.

A slight improvement, though, on the acidity (pH), organic matter, and exchangeable potassium on the soil was observed after harvesting, the greater the amount of sewage sludge, the better the characteristics of the soil.

Although the coliform level of the soil after the application of the sludge was high, bacterial count was below the DENR standard limit, and the soil was negative of protozoans or helminthic parasites. Thus, the sewage sludge was not a health hazard.

### From stink to sweet

The profitability promise of the sewage sludge comes in the form of reducing the fertilization cost by almost 50%. Sugarcane yield after applying 80T/ha of sludge, on a plot with already a 90 kg/ha of N fertilizer, was comparable to the yield after applying 180kg/ha of N fertilizer, with or without sewage sludge. The cut on the expenses the farmer had to shell out by using 180kg of N fertilizer compared to using half of the amount of N, with the aid of the less costly sewage sludge is notable.

In addition, the choice of using sewage sludge is appealing considering the improvements in the soil properties after using sewage sludge. It ultimately left the soil environment less wanting of inorganic fertilizer.

Another advantage of the use of sewage waters as sugarcane farming fertilizer would be that it will significantly reduce the cost of liquid waste disposal.

Next time your nostrils tingle with *that* smell from underground, try not

to be too repulsed for all you know, your frozen delight could be another product of the promise it brought.

*Source: Productivity improvement of soils planted to sugarcane with liquid sewage sludge by Estanislao, EB; Manlapaz BG; Quilloy OT. Sugar Regulatory Administration, Luzon Agricultural Research and Extension Center, Floridablanca, Pampanga. Contact through: 045-970-0872 fax 045 970-0412, and email at [sralarec@mozcom.com](mailto:sralarec@mozcom.com).*

## EXCEL...

tilapia in the coming years but there should be no worry since it can be processed into other products like fillet.

There is already a big market for skinned tilapia fillets in the US, Brunei, and, Japan. The Philippines will be exporting its first shipment this year, according to BFAR Director Malcolm Sarmiento, Jr.

### Where can farmers buy EXCEL tilapia?

BFAR has designated various stations for growers who plan on engaging in tilapia production. Among these include:

- 1) DA-BFAR registered and certified private hatcheries
- 2) Regional and provincial fisheries outreach stations (13 multiplier stations all over the country)
- 3) BFAR-NFFTC (the national broodstock center of EXCEL tilapia)

For EXCEL fillet to be exported to the world market, there is a need to establish a pilot tilapia filtering plant. The DA has already approved the P10M initial capital outlay for the plant. BFAR will also establish 12 more tilapia hatcheries this year through the National Tilapia Development Program. BFAR is all set for a nationwide dispersal of EXCEL tilapia fingerlings.

We could also look forward to the Philippine tilapia becoming one of the country's major export commodities this year and the years to come.

*(For more information about EXCEL tilapia please contact the Department of Agriculture, Bureau of Fisheries and Aquatic Resources, Tilapia Science Center, Science City of Muñoz, Nueva Ecija or you may give them a call at telephone number (044) 456-0672.)*

Sources:

1. "Grows fast, more profit, and A-I Quality" **NFFTC brochure** on EXCEL Tilapia, published by BFAR.
2. "Headlines: RP tilapia penetrates US" <http://www.bfar.gov.ph/news>
3. "Tilapia center seen to boost local output" **The Manila Times**, Agribusiness Section, April 29, 2003
4. "The Catch from News Reports from Around the World" **Stream Media Monitoring Report**, November 2002.
5. "Tilapia Production in the Philippines" by Dr. Crispino Saclauso, 2003.

## Tree...

government's replanting program. These populations can provide 10% planting materials of the target or 5,000 hectares per year.

The researchers were also optimistic that other studies in other regions especially in the Visayas and Mindanao could be conducted soon to identify other sites as sources of indigenous planting materials to satisfy the government's replanting target.

Finally, the researchers proposed that an on-site or *in situ* program be established to conserve local indigenous coconut varieties and samples from these populations be collected and preserved in gene banks. These are steps to save the coconut or the famous "tree of life" - one of the most valuable plants to man and ensure that future generations will still benefit from them.

*Source: Potential of indigenous coconut genetic resources to secure the future of the coconut industry by JB Sangalang of the Department of Horticulture, C.E. Reano, D.A. Ramirez and R.B. Quilloy of the Institute of Plant Breeding, UP Los Baños, College, Laguna*



# Save your heart with nuts

By: Junelyn S. de la Rosa  
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The Roman emperors must have known that nuts are good for the heart since they were the first ones who declared the nuts off-limits to the commoner. In those days, the nuts were considered food for the gods and misfortune would strike anyone who dared eat them. Only the members of the royalty were given the privilege to partake of this tasty morsel.

Today, all kinds, shapes and brands of nuts line the grocery shelves- imported and local ones. Nuts have become popular because they are very versatile. They can be eaten as snack, as cheap *pulutan* or as part of a meal. They make tasty additions to fruit or vegetable salads, casseroles, baked breads or muffins, oatmeal, and meat dishes.

While nuts are very popular as snack- some people are not familiar with their health benefits.

**Nuts are very nutritious. They are one of the best plant sources of protein and do not have the dreaded cholesterol. They are also good sources of fiber; minerals; vitamin E, folacin and other B vitamins and fat.**

Also, fats or oils in nuts are primarily monounsaturated with some polyunsaturated. Recently, there is more interest and market for monounsaturated fats because of numerous studies saying that monounsaturated fats can help lower total blood cholesterol, especially when substituted for the saturated fat in meats or other foods.

These fats can also help lower bad cholesterol without lowering the good cholesterol. In fact, studies have indicated that people who eat nuts fairly often have a lower risk of heart disease than those who seldom eat them.

Recognizing the importance and health benefits of vegetable oils from nuts, scientists from the National Institute of Molecular Biology and Biotechnology (BIOTECH) at UP Los Baños, College, Laguna tested locally available nuts and

seeds for oil and the kind of fatty acids and triglycerides they contain. Triglyceride is a chemical compound formed from a molecule of the alcohol glycerol and three molecules of fatty acids.

The scientists reported that *pili* (*Canarium ovatum*), *talisay* (*Terminalia catappa* L.) and cashew (*Anacardium occidentale* L.) top the list of local nuts rich in vegetable oils.

Other nuts tested were: *Lumbang* (*Aleurites moluccana*), *Bunga de tsina* (*Veitchia mernilli*), and MacArthur palm (*Phytosperma macarthuri*).

To evaluate the quality of vegetable oils and identify other substances present in the extracted oil, the nuts were also tested for unsaponifiable matter, tocopherols, carotenoids, and sterols.



64%. Talisay and cashew have oil percentages comparable to other commercial sources while okra has oil content similar to soybean.

## Glyceride and fatty acid composition

To identify the kind of Triglycerides present in the oils extracted from the samples, the scientists used thin layer chromatography (TLC). Scientists found that most samples had 90% or more triglycerides while partial glycerides (diglycerides and monoglycerides) were in trace amounts.

These indicated that the oil content of these nuts were unsaturated and would not pose any health risks to consumers. It was also found that most of the oils contained high levels of unsaturated fatty acids, oleic and linoleic. This means that oils from these seeds and nuts are polyunsaturated which make them potential substrates for healthy oils.

If their potential is tapped, this would be good news not only to health-conscious consumers who cannot afford the expensive and most likely imported vegetable oil products found in groceries today but also to enterprising businessmen who are interested in investing on

Tocopherol is a fat-soluble oily compound with vitamin-E properties, present in vegetable oils which is important for growth while sterol is a waxy colorless organic solid containing an alcohol group and found in animal and plant lipids. Carotenoid is an organic chemical compound that gives a yellow, orange, or red color to plants.

## Percent oil composition

Oil was extracted from the kernel or pulp of the seeds and nuts using solvents. Kernels of *cashew*, *lumbang* and *talisay* were used and pulp for MacArthur palm, both pulp and kernel were for *pili nut* and *bunga de tsina* and seeds for *okra*.

Pili nut had the highest oil content at 68% followed by Lumbang at



As it is, acacia pod (*Samanea saman* L.) is already a good source of protein and energy. It contains 13.57% protein, 89.25% dry matter, 2.98% ether extract, 2.19% crude fiber, 0.23% ash, and 6.44% nitrogen extract. Its nutrient contents are almost comparable to corn. Aside from its nutrient content, acacia pod is the best alternative because of its availability, making it a cheap source of feeds.



Acacia pod

## Acacia pods to feed chickens

By: Rita T. De la Cruz  
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Roughages and fodder used in feeding farm animals during dry season are usually dry and lack enough nutrients, thus the industry rely mainly on other feedstuff like corn. Corn constitutes a big fraction in preparing chicken feeds. Due to its high demand in the livestock and poultry industry, corn supply becomes scarce particularly during dry season. Its unavailability makes corn an expensive component in rationing chicken feeds.

Prompted by this problem, Patricia Barcelo, researcher from Don Mariano Marcos Memorial State University (DMMMSU), Bacnotan, La Union thought of

substituting acacia pod for corn in chicken feeds. The main objective of her study was to determine if chickens (broilers) will gain weight and perform well if fed with acacia pod meal as main substitute to corn feeds.

She used 75 three-week old broilers and grouped them into three. Each group was fed with a certain percentage of acacia pod meal mixed in the chicken feed. To have a basis for comparison, the researcher used two additional groups, one as control (0% acacia pods) and another group fed with commercially produced mash. The researcher used four important parameters to determine the suitability of acacia pod meal as substitute for corn and as supplement. These are: gain in weight, feed consumption, feed conversion efficiency, and profit.

Results agreed with the researcher's earlier hypothesis on the effectiveness of acacia pod as substitute and supplement. Acacia pod meal is significantly comparable with corn feeds. It could substitute corn up to 35% in formulated ration.

As it is, acacia pod (*Samanea saman* L.), is already a good source of protein and energy. It contains 13.57% protein, 89.25% dry matter, 2.98% ether extract, 2.19% crude fiber, 0.23% ash, and 6.44% nitrogen extract. Its nutrient

contents are almost comparable to corn. Aside from its nutrient content, acacia pod is the best alternative because of its availability, making it a cheap source. Pods can be collected and processed into meal during dry season when the acacia tree bear fruits.

Acacia is abundant in the Philippines and grown mainly as shade for farm animals. Its wood is also used to produce furniture and its branches as firewood.

Acacia pods are green when raw and has 16.70% protein content. It eventually turns black when fully ripe. Its sticky pulp around the seed is sweet making it more palatable for animal feeding. These are sundried for one month then grounded. Other farm animals like pig, sheep, goat, and cattle eat ripe acacia pods as it is. It is rich in starch and sugar.

Animal nutritionists say that to discover equally high-grade protein stuff, as substitute is already a triumph, but to find an equally nutritious and cheap substitute is already good luck.

Source:

"Potential of Acacia Pods as feeds for Broilers" by Patricia M. Barcelo, Don Mariano Marcos Memorial State University, Northern La Union Campus, Bacnotan, La Union. Unpublished study.

### Eat nuts...

products that are good for consumers' health.

Hopefully, vegetable oils from our local nuts like pili, talisay and cashew will find their way to our local stores in a couple of years and save more than a couple of hearts.

Source: "Lipid molecular species and fractions of the oil from local seeds and nuts and their potential applications" by Laura J. Pham, Emmanuel D. Revellame, Precy M. Rasco and Adora B. Maligaya of the National Institute of Molecular Biology and Biotechnology (BIOTECH) at UP Los Banos, College, Laguna at Tel No. 049-536-2725



# Tree of life Needs saving



By: Junelyn S. de la Rosa  
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Called a "sunset industry", the coconut industry is besieged by a new biological setback. This time it is not the unseen viruses nor the dreadful diseases but a ticking biological clock or simply- old age. Most of the coconuts in our plantations are 60 years old and above and while coconuts can live up to 100 years- they are less productive as they grow older.

Recently, the United Coconut Associations of the Philippines (UCAP) reported that production has significantly decreased in two successive years. This year's copra production forecast is 2.11 million MT- an 8.4% decrease from last year's output of 2.3 million MT and an 18.6% drop from the 2001 record harvest of 2.83 million MT.

To revitalize the industry, the government recommended a 50,000-hectare-per-year replanting scheme to ensure the sustainability of good quality coconut by-products in the years to come in local and international markets. From 1990 to 1999, the Philippines supplied 63% of the world's coconut oil.

The government's replanting effort has focused on the use of hybrids since their copra and nut yield are much higher than that of the indigenous local varieties. For instance, studies showed that hybrids increased productivity by 106

% (copra) and 92% (nut) yield per hectare compared to the local tall varieties.

However, a perfectly high yield is not always enough to ensure adoption of a certain technology. Some farmers refuse to plant hybrids in less suitable environments. Aside from performing poorly hybrids are

in these areas, susceptible to

strong winds, pests and diseases, produced small nuts and required high levels of inputs like fertilizers. These reasons have prompted farmers to plant local indigenous varieties instead of hybrids.

Another setback that limited the government's 50,000-hectare-per-year target is the lack of enough hybrid materials set at 10 million seednuts annually. Scientists said that the current production capacity could only accommodate 10,000 hectares per year.

Also, hybrids cost more than the local varieties at 33 pesos per piece compared to only 6 pesos for the local varieties. Only the large-scale owners can afford the hybrids. Farmer-adopters said that they would not plant hybrids if they had to pay for the total cost of the planting materials.

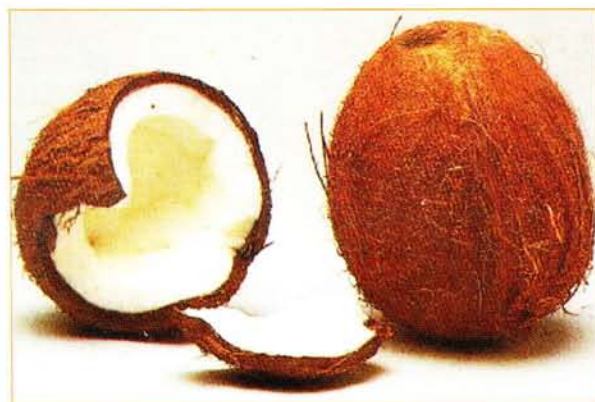
A related three-year study by Dr. Juanito Sangalang and his team from the Department of Horticulture at the University of the Philippines in Los Banos (UPLB) explored the potential of the local tall varieties as sources of planting materials. Local coconut varieties were evaluated and ranked based on certain morphological characteristics and copra

selected as outstanding with an annual copra yield ranging from 2.5 to 3.4 tons per hectare and an annual nut yield of 9,400 to 12,700 nuts per hectare.

The indigenous tall varieties selected were: Taywanak, Sta. Catalina, Reserva, Bagupaye, Nieva, Bannawag, Laray, Magsaysay, Calicanto, Quipot, Cambuga, Ipil, Ajos and Bitin.

Among the selected indigenous varieties, the "Taywanak" population in Sariaya, Quezon is a top yielder at 3,827 kg of copra and 13,222 nuts per hectare per year. Next is the "Sta Catalina Norte" population in Candelaria, Quezon with yields of 3,795 kg of copra and 14,177 nuts per hectare per year. The 11<sup>th</sup> population is the Quipot 2 at 2.5 tons copra and 9,400 nuts per hectare per year.

Six of these populations are in



Quezon province, three in Batangas and two in Aurora. The scientists estimated that the combined nut production capacity of these populations could supply planting materials for 5,000 hectares per year.

They also reported that all eleven populations yielded more than 2.5 tons in at least 2 out of 5 sampling periods. The data, according to the scientists indicate that these populations are "stable yielders".

With these promising results, they recommend that the selected

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# WINNER: tobacco farmer's champ to productivity

By: Rita T. De la Cruz  
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High yield, high quality, resistance to pest and diseases, and higher nicotine-content. These are the qualities that tobacco farmers look for in a "superior" flue-cured tobacco variety.

For years, researchers mix-and-match different genes possessing important qualities that would make up a hybrid and improve traditional varieties long grown by farmers. Researchers look at the importance of developing superior varieties of tobacco as one technology component that farmers could easily adopt and benefit from.

The Research Department of the National Tobacco Administration (NTA), the sole government agency that oversees and manages the production of tobacco in the country, has recently developed the first anther culture-derived variety of Virginia tobacco.

There are four types of tobacco traditionally grown in the Philippines. These are: Virginia, Burley, Turkish or aromatic tobacco, and native/dark tobacco. These are grown in 23 tobacco-growing provinces of the country, four of which are in Region I. They are growing the Virginia tobacco, which is most popular for blending in local manufacture of cigarette and for export.

Researchers who developed the new flue-cured Virginia tobacco dubbed it as *Phil FC6*, but farmers who adopted the variety baptized it *Winner*, attesting to the qualities that they look for in a superior tobacco variety.

*Winner* is a hybrid of *Balikhayan* and *Reams 266*. *Balikhayan*, the most popular flue-cured tobacco variety, is of medium height and known for its high-yielding ability. *Reams 266* is a variety introduced from the US and known for its high nicotine-content and resistance to blank shank disease (*Phytophthora nicotianae*), the most common infectious disease in tobacco.

Unlike the other tobacco varieties, *Winner* flowers late. It blooms 104 days after transplanting. This is advantageous to the farmers because by the time *Winner* blooms, the leaves are already harvested, thus no longer prone to pest attack. It also prevents the upper leaves of the tobacco from the infestation of the budworm.

*Winner* has better leaf physical quality. Its medium height and upright leaves make it convenient among farmers during harvest period. The leaves are harvestable and ready for curing 56-60 days after transplanting. *Winner* has more harvestable and better quality leaves compared to varieties usually grown by farmers. Compared to its parents, *Winner* produces less harvestable leaves but they are wider and longer.

The nicotine content of *Winner* is 197% higher than *Balikhayan* and 56% higher than *Reams 266*. *Winner* is an efficient fertilizer user. Under the Ilocos condition, the optimum NPK fertilizer requirement of *Winner* is 42-46-85, which is not different among fertilizer rates in other parts of the region. It does not need additional nourishment in areas with different soil texture.

True to its name, the newly developed variety is a real champ for farmers' profitability. According to the researchers, farmers are receptive and

eager to try the new tobacco variety because they saw its performance in the eight verification trials conducted in farmers' field.

*Winner* outyielded the usual varieties that most farmers are producing. Its crop value is determined both by the yield and the quality of the leaves, in which *Winner* was proven to be the best.

The adoptability of *Winner* among farmers is surprisingly higher compared to other hybrid variety introduced to them. According to Lusveminda Truong, supervising science research specialist of the Research Department of NTA, before its evaluation was finished, farmers already started planting *Winner*. This, says Ms Truong, indicates the readiness of the Filipino farmers to participate in technology evaluation even in disciplines as basic as plant breeding.

Due to its growing acceptance among the farmers in Ilocos, *Winner* will soon be registered as a commercial variety.

For more information, contact the Research Department of the National Tobacco Administration, Batac 2906, Ilocos Norte, Philippines or call (077) 792-4505

Source: *Winner: A New Flue-cured Tobacco Variety* by Luzveminda Truong, Luz Fiesta, Nelly Castro, Amparo Tumbaga, and Jessica Domingo of the Research Department, NTA, Batac, Ilocos Norte. Unpublished paper.





The packed, ready to cook vegetables found in local and supermarkets, a product of the ingenuity of our local wet market *suki*, cuts down preparation time by a considerable amount. For most people caught in the rush of the daily grind, it's supposed to be heaven-sent. However, a study at the Postharvest Horticulture Training and Research Center (PHTRC) in the University of the Philippines Los Banos says if not properly treated, the packed vegetables can pose risks.

## Ready-to-cook vegetables: How safe are they?

By: Ma. Lizbeth J. Baroña  
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It will help to ask a question like: how long have the sliced and packed vegetables been sitting on the market stand? The longer the time between slicing, packing, and actual cooking, the bigger the chance for the packed vegetables to deteriorate, and therefore, not safe to eat. Here's why:

### *Changes after 'wounding'*

Before cooking, vegetables are usually peeled, cut, sliced, or trimmed. The scientists term this actions as "minimal processing". What we do not know is that by doing so, we are actually making a "wound" on the vegetable. This "wound" causes changes inside the vegetable that speeds up its decay.

At the PHTRC, a group of scientists made a study to determine the effects of peeling, cutting, and packing on the vegetables. The scientists also determined which packing material holds off decaying longer and how temperature helps in keeping the vegetables fit for eating. The materials tested are polyethylene (PE) polyvinylchloride (PVC) bag. The PE bags are the plastic bags we commonly use in packing sugar and other food products, while the PVC bag is the plastic material used in wrapping food on a Styrofoam tray.

Scientists observed two main factors that change inside the "wounded"

vegetable: the respiration rate, and the ethylene production. The faster the respiration rate, the shorter the shelf life of the vegetable. Ethylene is a natural plant hormone, or substance, that is responsible for the vegetable's ageing. These two factors determine how long a produce can be stored.

### *Putting the veggies to the test*

To determine how wounding would later have an effect on a stored vegetable, they cleaned and disinfected samples of sayote, bell pepper, cabbage, carrot, radish, eggplant, sitao, kangkong, squash, and ampalaya at 20°C. Later, they were dried, cut and stored at 5°C.

Ready-to-cook mixed vegetables packed were samples of three popular dishes: *chopsuey*, *sinigang*, and *pinakbet*. The vegetables were cut, packed, and sealed in PE bags, or in Styrofoam trays wrapped with PVC plastic. They are stored in 5 and 15°C. This is how wet markets and supermarkets pack the vegetables they sell.

### *Changes from within*

Compared to vegetables which have not been cut or peeled, or those that remain whole, the sample vegetables which were peeled, cut and stored, produced more ethylene, the substance



that makes them age. Therefore, the peeled and cut vegetables age faster.

The ageing of the cut vegetables slowed down when it was transferred from a storing place of 20°C to 5°C. This led the scientists to believe that storing the cut vegetables in a chilled place slows down the ageing substance from being produced.

The same effect was observed in the cut, mixed vegetables packed in PE and PVC bags. Likewise, the vegetables produced more ageing substance after they were cut slowing down only when the packed vegetables were transferred to 5°C.

The scientists also observed a lower level of oxygen in the vegetables packed in PE bag as compared to the vegetable packed using PVC bag. They believed it was because the PE bag was sealed tighter, as it was electronically sealed. The PVC bag was sealed using a

→ next page



## Ready...

packing tape. Changing levels of oxygen and carbon dioxide increase respiration rate inside in the vegetable causing diseases to develop in the vegetable.

The study concludes that deterioration of the vegetables can also be caused by it losing moisture, which sometimes depends on the kind of vegetable, and on how thick or thin they were cut.

### What you can do

Deterioration in fresh produce is inevitable, even without interference. Regardless of how it was cut or sliced, minimally processed peeled, trimmed, and cut - vegetables or fruits showed hastened signs of decay as compared to the whole or intact vegetables.

The key to a safer and longer shelf- life of a produce, as recommended by the study, is proper temperature and packing treatments. Vegetables like sayote, sitao, eggplant, squash and ampalaya the vegetables which showed higher ethylene production - should be packed 3 hours after cutting when the production of ethylene, the substance causing ageing, has declined.

While unpacked, cut vegetables should be stored at 5°C to arrest moisture loss, ageing, and breaking down. If stored at 15°C, you can still hope to treat your family to a dinner of *sinigang* even at 5 days after packing. Even better if held at a chilled temperature of 5°C, your packed *chopsuey* will still be toothsome after 14 days.

Next time you drop by the market, you might want to take a closer look at the packed vegetables sold. With this know-how in mind, you are assured of an instant, worry-free dinner.

*Source: Physiological and microbial changes of packed ready-to-cook vegetables during storage by: Noida B. Flor, Gladys S. Ocfemia, Elda B. Esguerra, Gloria D. Masilungan and Ofelia K. Bautista of Post Harvest Training and Research Center, University of the Philippines Los Banos, College Laguna. For more information, contact: 049-535-3138; 536-2444; fax 049-536-3259*

## Newsbits

### April

#### DA creates open academy for Philippine agriculture

The establishment of an open academy for Philippine agriculture was the main agenda of the conveners dialogue held on April 10, 2003 at the CERDAF Conference Room. The creation of an open academy is in line with the thrust of modernizing the agriculture sector by empowering farmers and fisherfolk with the latest technology developed through research and development (R&D). The open academy will be made possible through information and communication technologies that enable distance education and strong linkage with important sectors in agriculture possible.

#### PCA collaborates with international institutions to unravel coconut genome

The European Commission (EC), under its program in international Cooperation with Developing Countries (INCO-DC), has been funding an international project on coconut and oil palm technology since 2001. The project's components are: 1) construction of high-density DNA marker maps on coconut and oil palm, and QTL analyses on characters of economic interest; 2) physical mapping; 3) synteny studies; 4) establishment of field trial systems consisting of several populations to be used for future marker-assisted breeding; and 5) bioinformatics and biotechnology transfer through internet and international workshop/laboratory courses.

#### BAR joins Asia IT and C workshop

The Bureau of Agricultural Research (BAR) Information and Communication Technology Section (ICTS) participated in the InterSard

workshop on, "Asia IT and C: Sharing Local Knowledge and Innovations at the International Institute of Rural Reconstruction (IIR), Y.C. James Yen Center, Biga, Silang, Cavite.

#### Philippine agri'l eng'g standards launched

The Philippine Agricultural Engineering Standards were launched and discussed during the 53<sup>rd</sup> Philippine Society of Agricultural Engineers (PSAE) National Convention held at the Waterfront Hotel, Davao City on April 21-25, 2003. The standards was recently adopted by the Department of Agriculture (DA) Administrative Order No. 10 (Series of 2002) and was promulgated by the Board of Agricultural Engineering of PRC through Resolution No. 5 (Series of 2002).

### MAY

#### Stakeholders sign pact on rice sufficiency

Rice farmers from 73 rice-producing provinces in the Philippines and key officials from the Department of agriculture (DA), Department of Agrarian Reform (DAR), the National Food Authority (NFA), Philippine Rice Research Institute (PhilRice), and the International Rice Research Institute (IRRI) drafted a 'rice pact' to push for reforms in promoting rice sufficiency in the country while protecting the welfare of the rice farmers.

#### BAR, PCARRD tackle decreasing R&D budget

The Bureau of Agricultural Research (BAR) and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) met with the presidents and heads of various scientific and professional organizations on May 29, 2003 at the CERDAF Boardroom to discuss and immediately address the decreasing R&D



## Newsbits...

investments in the country. The meeting was an offshoot of the recent 60% drop in BAR's budget, which deferred various agriculture and fisheries R&D projects.

### **Medrano keynotes this year's PHILARM convention**

In the absence of Department of Agriculture (DA) Secretary Lius Lorenzo, Jr., Bureau of Agricultural Research (BAR) Director William Medrano delivered the keynote message during the 13<sup>th</sup> National Convention of the Philippine Association of Research Managers, Inc. (PHILARM) held on May 11-13, 2003 at the Prominence Inn, Singcang, Bacolod City. Medrano is currently the vice president of PHILARM and according to the Association's bylaws, he will succeed the present president in 2004.

### **BAR strengthens OFRs**

Despite the recent 60% cut-off in the R&D budget, Bureau of Agricultural Research (BAR) Director William Medrano announced that the Bureau will double the 2003 budget for on-farm research (OFR). The announcement was made during the 2<sup>nd</sup> Quarter Regional R&D Meeting on May 14, 2003 at the Alhambra Hotel, Bacolod City. The increased appropriation for OFR is part of the seven-point agenda of Medrano, which he laid down when he took over the Bar directorship in February 2003.

### **Philippine agriculture open academy kicks off**

As a start-up activity to generate awareness, appreciation, and understanding on the use of ICT and distance learning in Philippine agriculture, the "Leapfrogging Research-extension-Farmer Linkages for Agricultural Modernization in the Philippines" seminar-workshop was held at the Philippine Rice Research Institute (PhilRice) Science City of Muñoz, Nueva Ecija on May 8-9, 2003. The workshop-seminar laid the groundwork

for the establishment (through a series of capacity-building activity) of an Open Academy for Philippine Agriculture.

### **Visayas sustainable agriculture workshop held**

The Visayas-wide Consultative Workshop on Philippine Sustainable Agriculture program was held at the Agricultural Training Institute (ATI), Banga, Aklan on May 28-29, 2003. This is the second regional consultation workshop on sustainable agriculture. This is part of a series of consultative meetings on the Philippine Sustainable Agriculture Program (PSAP) proposed by the Task Force on Sustainable Agriculture.

### **JUNE**

### **BAR, NTLs deal with budget adjustments**

Adjustments to the budget cut were the main agenda of the 2<sup>nd</sup> Quarterly National Team Leaders (NTL) meeting at the BAR Conference Room on June 27, 2003. BAR had to make its own budget adjustments affecting the ongoing projects for year 2002 to 2003. The National Programs Section's (NPS) budget was cut down from P102.4 M to P33M.

### **Lorenzo impresses agri world conference**

Agriculture Secretary Luis P. Lorenzo, Jr. won the heart of more than 180 agriculture ministers and secretaries when he championed their

cause during the plenary of the Ministerial Conference and Expo on Agricultural Science and Technology in Sacramento, California, USA on June 23, 2003. Arguing for the prioritization of resources for agricultural research and development in favor of the developing countries, Lorenzo delivered a frank assessment of the factors favoring and impeding technology dissemination.

### **DA-GMA Corn Program sets action agenda**

The Department of Agriculture *Gintong Masaganang Ani* Program (DA-GMA Corn Program) held its Technical Working Group (TWG) meeting at the NAFC Luzon Conference room on June 23, 2003 to present the Corn Program's action agenda in meeting production goals for the next cropping season.

### **First nat'l confab on fisheries**

The National Fisheries Postharvest and Marketing RDE Sub-network (FPHMSN) held its first national conference on the "Assessment of Technologies and Information in Fisheries Postharvest and Marketing" at the Bureau of Soils and Water Management (BSWM) Convention Hall, Diliman, Quezon City on June 11, 2003. The participants exchanged research results and other information on fisheries postharvest and marketing.

**BAR**  
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