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www.saseahorse.com/species

Male seahorses give birth *(Story on page 11)*

What's inside

Editorial

BAR Today *is again changing*

When do we change?

A very simple question that can easily be answered! But I wanted to have my idea of change confirmed by the very people working on **BAR Today**. I asked the four (only) writers. But the question I asked is generic and can apply to anything in life. When is there a need for change?

Likha, who dabbles in science writing and interprets methodically the difficult to understand research results into something a little more understandable to a layman, says there is a need for change when one gets tired of the old one. I look at her quizzically and as if she understands what I am thinking of, she smiles and adds that if what one is doing (old way) does not work any more, then try a new one (an innovation).

Truly, there are reasons when something does not work anymore. One is, when conditions change. For instance, a fertilizer recommendation no longer produces the yield that a soil applied with it used to produce. This is because the fertility level has changed, thus the recommendation is not appropriate anymore. There are other reasons.

Junelyn, the magazine's managing editor, who writes interesting features out of the works of scientists, thinks there is a need for change when the person is no longer happy with what he is doing and does not look forward to do it the next day or the next time.

This happens when the work has become mechanical and there is no more challenge in the work. There is no more fire, no more passion. When these are lost there is no more soul in the output. Maybe it is time to exit or to vary the conditions?

When the strategies or approaches do not work anymore or the function is not what is intended for, then there is a need for change, says news and feature writer Rita, the dependable and ever ready staff who sees to it that the BAR Chronicle that she manages comes out close to the deadlines. Always cautious, she adds that the change should not be drastic, however.

With one of the only four people writing for two regular publications (one monthly and the other quarterly) and all other printed materials for the agency, aside from other assignments, Lizbeth who writes scientific findings interestingly adds that there is a need for change when the work is boring and too draining. Maybe, a change in environment like going to the field, interviewing the scientists or the farmers and fisherfolk at work can make her work not boring. Too draining? Writing four articles successively under pressure of time can really be draining. But in time, she will learn some techniques as she puts more years to her profession.

The **BAR Today** evolved into what it is today through the years that we handled it. It used to be a broadsheet of four pages that we found difficult to handle and file. Thanks to Dr. Eliseo R. Ponce, immediate past director of BAR, who found our suggestions legitimate and so we changed it to a magazine type and format increasing the number of pages to 24. We could do it because we had seven writers. (We could still do it with four writers but our work has become more difficult doing the work of seven.) We even changed the masthead and improved on the contents. We experimented on the cover and Dr. Ponce approved it to what we still maintain today. We get compliments now and then, food for the soul to sustain us.

BAR Today is again

➡ Page 19

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Silica gel from rice hull?

By: Ma. Lizbeth J. Baroña
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It comes with your new pair of shoes, inside your vitamin bottles, your new bag, and with just about anything new you buy. "It" would be that quaint little packet of "something" that accompanies your newbies, the silica gel pack. If you think the dry and exciting environment of your new buy is something that will not occur in the same thought as *rice hull*, think again.

Utilizing the potentials of an agricultural waste like rice hull as a component in silica gel is the objective of a study conducted by the Natural Science Research Institute(NSRI) and the Bureau of Agricultural Research(BAR).

Rice hull, an abundant agricultural waste, is usually burned in the field contributing to air pollution. With proper methods, however, this agricultural waste can be an effective energy source, and more importantly, can be a source of silica gel.

What is silica gel?

Not to be mistaken for a "silicon gel", the silica gel is not really a "gel" in form. It is in a porous, granular form of silica. Inside each small silica gel granule is a vast network of inter-connecting microscopic pores, which attract and hold moisture by processes known as *physical adsorption* and *capillary condensation*.

To graphically describe how silica gel works, a single teaspoon of hydrosorbent silica gel has an internal adsorptive area equivalent to a football field. Silica gel is inert, non-toxic and safe to use to protect foods, medicines, sensitive materials, electronics, films, etc., from humidity. Even when saturated with adsorbed moisture, silica gel looks and feels dry to the touch. It can also be "reactivated" after it is saturated with moisture so it can be used over and over again.

Most damage to stored valuables, like leather and pharmaceutical products, is caused by humidity trapped in the storage area. Humidity trapped within enclosed space undergoes undetectable condensation, which causes the damage. This damage comes in the form of rust, corrosion, oxidation, mildew, fungus, mold, odor, spoilage, shortened "shelf-life" of photographic film, batteries, and deterioration of foods and medicines.

Silica gel prevents these moisture-related problems, that's why manufacturers often include a small packet of silica gel in shipments of leather goods and pharmaceuticals. Silica gel creates a protective shield of dry air within any enclosed storage area and it remains the highest adsorbent capacity available today.

Waste not, want not

Scientists at NSRI burned rice hull resulting to high silica (87%) ash. The ash was used to prepare four samples of rice hull silica gel(RHSG). These four samples, a commercial silica gel, and silica gel prepared by the Industrial Technology Development Institute(ITDI) were compared and characterized for chemical and physical structure, drying properties, and elemental impurities. The first sample, RHSG 1, is composed of 21 g rice hull ash (RHA) boiled in 1 liter of sodium hydroxide, and was made into gel after 18 hours. RHSG 2 was made up of the same components like the first sample, except that the gel was aged for a week. RHSG 3 was of the same component as the first two samples, except that the resulting gel was soaked in hydrochloric acid overnight. The fourth sample was made of 16 g RHA mixed with 6.7g sodium hydroxide and 65.6 g water.

The study found that rice hull silica gels, RHSG 2 and 4, have properties comparable to the commercial silica gel, and the gel prepared by the ITDI. Depending on the method of preparation, the RHSG has dessicant properties, which can be applied in both high and low humidity environment.

The microstructure of the rice hull silica gel were also observed to have a more uniform particle size and distribution, compared to the commercial and ITDI manufactured silica gel samples. As for the RHSG elemental composition, results show significant lower levels of impurities for the RHSG samples compared to the commercial and ITDI samples.

Rice hull, even as it is regarded as agricultural waste, can be used both as energy source, and as silica gel component. Since the country imports most of the components in manufacturing silica gel, utilizing the potentials of rice

➡ Page 19

Harvest more rice with ratooning

By: Junelyn S.de la Rosa
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Farmers can harvest more rice and gain more income by ratooning or double harvest- an indigenous practice in rice farming that induces the formation of shoots or ratoons from the mother crop after the previous growth has been cut back.

Scientists from the Philippine Rice Institute (PhilRice) at the Science City of Munoz, Nueva Ecija found that ratooning resulted to higher gross returns at P36,550.00 per hectare. This is higher by P19,585.00 than that of the farmers' practice. The higher gross returns were attributed to higher yield and lower production cost. The experiment was conducted in a rainfed ricefield during the 2002 wet season.

The scientists also reported that hybrid rice *(Magilas)* was superior in terms of yield than other rice varieties- *Mestizo*, PSB Rc14 and PSB Rc12. *Magilas* yielded 13 tons per hectare followed by *Mestizo* at 10.3 tons per hectare to PSB Rc14 10.5 tons per hectare and PSB Rc12 at 9.2 tons per hectare.

What is ratooning?

Ratooning is a method of propagation that uses shoots (ratoons) of the mother crop as the planting material for the next planting season. Ratooning is a characteristic of rice and other members of the grass family (Graminae). When cut and exposed to the appropriate environment, the mother crop develops new sprouts with characteristics almost equal to its original form and capacities. The technology is widely used in the production of sugarcane, bananas and pineapples.

In January this year , the Department of Agrarian Reform (DAR) urged rice farmers in Region 3 to practice ratooning in their irrigated ricelands to get a better harvest. It is now being promoted by the DAR to contribute to the national goal of sufficiency in rice especially in its agrarian reform communities (ARCs).

The ratoon experiment

Conducted in a demonstration farm at PhilRice Batac during the 2002 wet season, the experiment used four rice varieties (2 inbreds and 2 hybrids). There were three cutting heights (5,10,20 cm) for each variety.

Two days before harvesting the main crop, fertilizer was applied at a rate of 47kg Nitrogen per hectare and then ten days after harvesting, the ratoon crops were top-dressed with 46 kg N per hectare.

To control leaffolders, the ratoon crops were sprayed twice with insecticides. Also, the plots were strictly maintained under rainfed condition with the stored water (in canals around the plots) maintained at 3-5 cm depth.

Benefits of ratooning

First, ratoooning maximizes crop residues and controls soil erosion by keeping the soil covered. However, it is important that the field is fairly clean of weeds and has a good plant density before deciding to ratoon. If there are too many weeds, ratooning is not a wise option since the weeds grow a lot faster than regrowth from the rice stubble.

Next, farmers can harvest more rice and thus earn more income if they ratoon. Scientists said that farmers can harvest twice - sometimes thrice - using the mother crop without using new seeds.

The ratooned crop matures in only about 70 to 75 days and requires lesser inputs such as time, labor, and cost for land preparation, seedbed preparation, pulling of seedlings, transplanting, water and weeding. Thus, farmers can save more if they ratoon.

To be successful in ratooning, farmers should practice a good water management system. Ratoon crops thrive well if there is abundant water supply. The scientists recommend that farmers store excess rainwater in canals within the field to ensure enough water supply for their crops.

Finally, an effective integrated pest management system is a must since ratoon crops compete with more weeds and pests.

Source: "Increased hybrid rice production in rainfed ecosystem through ratooning (Double Harvest)" 2003 by Samuel Liboon, Reynaldo Castro, John de Leon and Edilberto Redoña of PhilRice Batac, Ilocos Norte and PhilRice Central Experiment Station Maligaya Science City of Muñoz Nueva Ecija

Agro-industrial waste enriches soil for corn

By: Rita T. de la Cruz
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There' s money in waste. This is an old adage but for the farmers living in Northern Mindanao, this statement becomes a turning point in their agricultural activities as researchers from the Northern Mindanao Integrated Agricultural Research Center (NOMIARC) developed the most recent and effective balanced fertilization program that could turn corn soil from infertile to productive.

Corn is one of the most important agricultural products in Northern Mindanao but due to the infertile soil, most corn growers have to resort to chemical fertilizers to provide the nutrient needed throughout the crop's growing period. These are expensive and destructive to health and the environment. Moreover, soil acidity has become the most serious constraints for corn growers in Northern Mindanao.

Balanced fertilization

Researchers from NOMIARC developed a sustainable corn production strategy for corn growers in the region using a balanced fertilization both from inorganic and organic sources. The main premise is to use different sources of organic fertilizers like agro-industrial wastes. There are two main reasons for this: to solve the waste disposal in the region and to replace expensive chemical fertilizers, thus minimizing their effect both to humans and the environment.

The balance fertilization program for corn used seven agro-industrial waste materials and chicken manure in combination with the inorganic fertilizer and evaluated their effectiveness in the different types of soil in Northern Mindanao. Among the seven agro-industrial wastes used include: coffee sludge, rice hulls, sawdust, corncobs, spent grains, bagasse, and carbide hydrate. A field trial was conducted for three years (2000-2003) in *adtuyon* clay soil.

Adtuyon clay is the most extensive soil type in Northern Mindanao. In cultivated areas, the layer is slightly heavier. It developed from volcanic lava or mudflows (lahar) composed of mixed boulders but chiefly *andesites* (fine-grained grayish volcanic rock) and *basalt* (hard, black volcanic rock). Since the texture of this soil is basically granular in nature, it promotes easy water movement in the soil

Bagasse

Coffee sludge

mass. Nevertheless, this type of soil is considered agriculturally dull and unimportant.

Promise of agro-industrial waste

The effectiveness of the different agro-industrial wastes in the *adtuyon* soil, was measured using the following parameters: grain yield, economic benefits and soil nutrient supplying capacity both during wet and dry seasons.

Among the industrial wastes tested, the coffee sludge gave the highest significant yield both during wet and dry seasons. The application of the agro-industrial waste showed increasing grain yield of more than 6 tons/ha after three years compared to that of the untreated soil, which is less than 5 tons/ha.

Economically, soils treated with chicken manure and coffee sludge gained higher net income and return of investment compared to those without any treatment or those treated with inorganic fertilizer alone.

As to the nutrient supplying capacity, the soil and its physical properties was improved and gained an increased value when applied with agro-industrial wastes and chicken manure. The application

next page

Feed pea (Pisum sativum)

Feed pea: Excellent protein source for juvenile shrimps

By: Junelyn S.de la Rosa
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There is good news for shrimp farmers who are looking for an alternative protein-rich feed for juvenile shrimps *(Penaeus monodon)*. Scientists have found that feed pea *(Pisum sativum)* can be a good substitute to the commonly used soybean meal.

Scientists from SEAFDEC in Tigbauan, Ilo-ilo reported that there were no significant differences in the weight gain, feed intake, feed conversion ration (FCR), and protein efficiency ratio (PER) of juvenile shrimps that were fed with feed pea at different levels of replacement.

What is feed pea meal?

Feed pea meal is a high energy, medium protein ingredient that has been widely used as a feed ingredient in Europe, Canada, Australia, and the USA. Round-shaped feed pea is an important pulse crop used as a source of carbohydrates, mainly starch and protein, for livestock feeds in these countries.

Feed pea is high in protein at 22-24% making it an ideal substitute for soybean. It also contains digestible energy (DE) of 14.3 kilojoules. Lysine is particularly high at 1.6% or over 7% of protein. Also, feed pea is easily handled, stored, and is processed well in compounded feeds.

At present, feed pea is being used as an ingredient in diets for fishes such as rainbow trout, silver perch, European sea bass, and blue shrimp.

Feeding trials and results

Twelve juvenile shrimps were placed in tanks with a flow-through seawater system. The shrimps were fed with the formulated diets at a daily feeding rate of 20 to 25% of their body weight for 90 days or approximately three months. The shrimps were fed three times a day at 0800, 1300 and 1700 hours. Relevant data were collected everyday. Their weights were recorded every 15 days and the amount of feed was adjusted depending on the shrimps' weight. The tanks were cleaned everyday before feeding the shrimps. Other data such as water temperature, salinity, dissolved oxygen and pH were also measured daily in all tanks.

Results of the experiment showed that feed pea is an ideal substitute for soybean as a protein source for formulated diets of juvenile shrimps. Based on results of the biological analysis, feed pea was utilized effectively by the shrimps for their growth and development. Scientists said that these results are excellent news for shrimp farmers and entrepreneurs who are looking for a cheaper protein alternative for their juvenile shrimps. More importantly, the scientists are optimistic that a cheaper alternative could translate into more profit for the average shrimp farmer.

Source: "Utilization of feed pea (Pisum sativum) meal as protein source in practical diets for juvenile tiger shrimp (Penaeus monodon)" 2003 by Myrna Bautista-Teruel and Perla Eusebio of the Aquaculture Department, Southeast Asian Fisheries Development Center, Tigbauan Ilo-ilo and Timothy Welsh of the USA Dry Pea and Lentil Council, United States of America.
Photo:http://post.queensu.ca/~forsdyke/images/pisumsa2.gif

Agro-industrial...

of carbide hydrate along with the chicken manure increased the soil pH and the exchangeable calcium available over time. It also increased the available phosphorus and exchangeable potassium in soil.

Another important benefit of this balanced fertilization program is, it could arrest the continuous depletion of soil due to the constant use of chemical fertilizers.

This three-year project is funded by the Bureau of Agricultural Research of the Department of Agriculture.

Source: "Evaluation of agro-industrial waste materials and chicken manure for balanced fertilization on corn" by Lorena V. Duna, Carmelito R. Lapoot, Juanita B. Salvani, Cora A. Dumayaca, and Lealyn A. Ramos of the Department of Agriculture-Northern Mindanao Integrated Agricultural Research Center (DA-NOMIARC).
Photo: www.ourschool/bytes.com and www.inet.gov

Abalone: Hungry and ready to get large

By: Ma. Lizbeth J. Baroña
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If there is one good thing starving does to a living organism, it is the growth spurt once it is given the normal food intake following a moment of starvation. Sometimes, this spurt causes an organism to exceed the normal weight and size it could have gained given normal food intake in a given time.

Numerous studies have been made on compensatory growth in cultured fishes, but there is little or no information on the growth compensation of gastropod mollusks, particularly the abalone.

The question of whether the abalone, *(Haliotis asinina)* exhibits such tendency, and if it can actually exceed its supposed normal growth after experiencing compensatory growth, is the subject of the study conducted by the Southeast Asian Fisheries Development Center(SEAFDEC) in Tigbauan, Iloilo.

What is "compensatory growth"?

The ability of an animal to show rapid growth when returned to a normal food ration after starvation is called compensatory growth. The growth spurt is caused by increase in food intake, and improved food conversion efficiency.

Compensatory growth is not only affected by starving the animal. This phenomenon is also affected by the food's dietary composition, the animal's reproductive state, or the favorability of the environment. It is also affected by the size and age of the animal in question.

In the case of the abalone, it feeds on algae. Studies have shown that abalones feed on at least two species of microalgae, and that the abalone grows slower when fed with single species diet, than when fed with different algal species. Since abalone depends only on drifting algae carried by currents as food, it is assumed that the mollusk has, at some point, experienced sporadic starvation. The ability of the abalone to control its appetite and growth as a response to changes in the availability of food has never been documented.

Can the abalone bounce back?

Thirty abalones were stocked in each of 12 plastic baskets with holes. These baskets were suspended in a 6-ton capacity cement tank, which was continuously supplied with seawater.

Before conducting the experiment, the animals were conditioned by feeding them fresh seaweeds for 10 days. Three feeding schemes were used with three replicates each. The first scheme, is continuous feeding throughout the 200-day trial period (control group), the second was 5-day starvation and 5-day re-feeding, and the third scheme was a 10-day starvation followed by 10-day re-feeding. The second and third schemes were done over 140 days. After this cycle, the animals were fed continuously for the remaining 60 days of the trial period.

During the trial period, the starved abalones consumed 160 to 170 grams of food, as compared to those that are fed continuously, which consumed 307 grams. But after the starved abalones were fed *ad libitum* for 60 days, the starved grouped showed significant increase in daily intake, amounting to 8.5 to 9.7 g per day. This increase in intake, was greater than the daily intake of the control group, which was at 3.8g per day. The total seaweed consumed by the starved abalones ranged from 533g to 610g each. This was higher than the amount consumed by the control group, which was at 239g per abalone. It was observed, though, that the abalones on the control group showed a decreasing growth rate from the 140th day up to the 200th. The abalones in the second and third treatments' total weight gain was 392g to 465g, which has no significant difference from the control.

The results showed that abalones did exhibit compensatory growth. And the fact that abalones depend mainly on drifting macroalgae by water currents, the animal experiences slow growth, but are able to catch up with their growth when fed again continuously. As to the question with what extent of starving induces compensatory growth, the scientists believed that the five-day starving period in the second feeding scheme, has been sufficient to cause the abalone to catch-up on growth when fed regularly.

The results also showed that a complete or partial recovery from food deprivation also depends on

➡ Page 19

Saving the blue tang

By: Rita T. de la Cruz
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The blue tang (*Paracanthurus hepatus*) grows one foot long while in the wild and half of that size in captivity; has erectable razor sharp spines at the base of its body in front of its tailfin; it has an oval, compressed body and is blue, thus the name.

Blue tang is a high-priced marine aquarium fish in the Philippines. It belongs to the family *acanthuridae* that consists of 72 species of sturgeon fishes, lancet fishes and tangs. Like any acanthurids, the blue tang inhabits the rocky or coral reef areas and mainly feeds on zooplankton. Its population is distributed throughout the South China Sea and from the Indo-West Pacific to East Africa.

Its beautiful and contrasting color makes it a favorite fish among hobbyists and preferred for marine aquarium trade. But due to the emerging use of illegal fishing methods like sodium cyanide and dynamite, the wide population of the blue tang is threatened to extinction. There is a need to conserve this fish. To do this, a through study on the blue tang was conducted.

A group of scientists headed by Dr. Josefa D. Tan-Fermin of the Southeast Asian Fisheries Development Center (SEAFDEC) Aquaculture Department pursued this study. Their main objective is to present important aspects about the blue tang particularly its reproductive biology, embryonic development, larval morphology, and rearing process so that aquaculturists could develop artificial propagation techniques.

About the blue tang

P. hepatus comes under many common names: regal, flagtail sturgeonfish, hippo, or palette tang in the west. The blue tang (along with the yellow tang) is probably one of the most popular marine fishes in the country. Most hobbyists claim that they are easy to keep and are interesting to watch. Unlike most sturgeonfish, this one forages mainly on plankton in the open or far above the bottom of the reef. It has a wild swimming pattern both in the wild and under captivity (aquarium).

Young blue tang lives in free swimming groups (thus, the school of fishes seen underwater) and could be seen individually when they reach sexual maturity, catching zooplankton among corals. When threatened, they flee into the coral and press close to its branches.

In the wild, they feed on zooplankton but in aquarium they accept small, live shrimp and other food such as ground worms and flake foods.

Characteristics

How different is the male from the female blue tang?

In the study of Dr. Tan-Fermin, samples showed that males are generally larger than females. Other than that, not much of the behavioral instincts are discernable. The study also showed that spawning i.e., fecundity and duration is directly proportional with the age, broodstock diet, lunar periodicity, and temperature under captivity.

Nevertheless, the frequency of spawning is high during lunar phase. For example, the total eggs collected was consistently higher during full moon and last quarter. As to temperature, result showed that highest count of eggs was noted at 28° Celcius and fewer at 24-26° Celcius.

It was also noted that rearing water at salinities 24-28 ppt resulted to a high rate of hatching and survival rate of larvae.

Blue tang (Paracanthurus hecatus)

Source: "Reproductive biology, embryonic development, larval morphology, and larval rearing trials in the blue tang" by Josefa D. Tan-Fermin, Luis Maria B. Garcia, Gerald F. Quinitio, and Joebert D. Toledo of the Southeast Asian Fisheries Development Center-Aquaculture Department (SEAFDEC), Iloilo, Philippines.
Photo:http://www.bahamaswildlife.fsnet.co.uk

Helping the mangrove clam spawn

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With the destruction and overexploitation of mangroves that serve as its home, the mangrove clam *(Anodontia edentula)* or *imbao* has been declining in numbers. To solve this problem, a group of scientists from Southeast Asian Fisheries Development Center (SEAFDEC), Tigbauan, Ilo-ilo studied various techniques to help *imbao* spawn.

Among the techniques studied, the use of serotonin was the most successful at the rate of 94.38% successful spawns.

The mangrove clam

Belonging to the family *Lucinidae,* the mangrove clam buries itself in the mud of mangrove areas or in the adjacent mudflats. It grows to a maximum size of 8-9 cm shell length at 180-210 grams. It has an elongated adductor muscle, part of which is separate from the pallial line. The hinge is essentially toothless in the adult, hence it is also called the toothless clam.

The mangrove clam is a very interesting animal. It has sulphur-oxidizing bacteria in its gills from which it derives most of its nutrition. Because of this special ability, the mangrove clam and other lucinids have, therefore, lost their siphons and their ability to filter feed, and make connection with the outside world with their piston-like feet.

This clam is widely distributed in the Indo-West Pacific and in the Philippines. It can be found mostly in the Visayas and Mindanao where it is an important food and source of livelihood for many farmers. One of the popular shellfishes in the Philippines, the mangrove clam or *imbao* makes a delicious soup or grilled and is prized a little more than other shells at P5 to P8 per piece.

Inducing them to spawn

In the study by SEAFDEC, mangrove clams were collected from mangroves in San Roque, Estancia, Iloilo and Mambuquia, Sapian, Capiz using the "mata "system a non-destructive collection method. The researchers hired the services of skilled *imbao* collectors, people who can pinpoint the exact location of *imbao* through the opening of its siphon, or what is locally called "mata " (a reference to the hole or opening in the substrate). This method spares mangroves from damage caused by digging.

After cleaning the clams using a soft brush to get rid of mud and other debris, they were measured for shell length, width, and height using a Microstat caliper.

A biopsy was conducted to determine sex and the quality and quantity of gametes in stalked eggs or active/motile sperms. Mangrove clams are dioecious which means that while the sexes are separate these are not differentiated externally, hence the need for the biopsy.

Among the spawning techniques using chemicals such as hydrogen peroxide, ammonium hydroxide, serotonin, and temperature shock, the use of serotonin was the most successful with 94.38% successful spawns. Moreover, female and male adults were successfully induced to spawn using serotonin. Females that spawned ranged from 60 g, 57 mm shell length to 125 g, 73 mm shell length. The maximum number of eggs spawned by a 71 g female was one million.

Imbao or the mangrove clam

A new potential discovered

In another experiment, researchers from SEAFDEC are also studying the potential of mangrove clams to clean-up sediments and make polluted waters habitable again. The mangrove clam harbors symbiotic bacteria in its gills. This kind of bacteria can oxidize sulfur thereby cleaning the water of sulfur in the process.

Today, the scientists are looking into the potential of the mangrove clam as a sediment cleaner and the feasibility of its being raised in polyculture with shrimp. It is a fact that brackishwater pond sediments contain plenty of sulfide, particularly where cultured animals

➡ Page 22

Greenwater technology: A new shrimp culture technique

By: Junelyn S. de la Rosa
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A new and better technology to culture shrimps is being used by many enterprising shrimp farmers nowadays. Green water technology is a technique that cultures shrimps in water that is abundant in phytoplankton i.e. *Chlorella*, turning the water green hence, its name.

In this system, *tilapia* is also grown in the reservoir or net cages/ pens in the ponds. The green water produced from tilapia helps control the growth of luminous bacteria that is bad for the growth of the shrimps.

The green water technology consists of: pond preparation, water culture/fertilization, stocking and stock sampling, feeding management, water management and aeration, and harvest and post-harvest handling.

Pond preparation

To prepare the pond, it should be dried and drained of water for three weeks until the soil at the bottom is cracked. The muck or the black soil at the bottom of the pond should be scraped off. Then the ponds are flooded with water and dried for another week. Hydrated lime at a rate of 2 tons per hectare is applied before the final flushing and sun drying.

When the pond is clean and dry, double *hapa* nets (10x10x1.5 meters) should be installed at the center of the pond. Bamboo catwalks from the dikes to the pens should be installed to facilitate easy feeding and monitoring of fish.

Water culture/fertilization

After installing the pens, the ponds should be filled with seawater to a maximum depth of 1.0-1.2 meters and the gates should be sealed. The water depth should be maintained by installing a depth gauge. To make sure that the water is free from predators and other possible competitors, teaseed powder (20 ppm) should be applied. Fine mesh screens should be installed at each outlet of the flume to prevent predators from entering the pond during pumping.

Hapa nets; Inset: Penaeus monodon

Stocking and stock sampling

To check the growth and condition of the shrimps, the stock should be sampled after 30 days from culture and every 10 days thereafter. For tilapia, stock sampling should be done monthly.

Feeding management

For shrimps, they should be fed right after stocking. Shrimp feeds are broadcasted around the pond with a portion of the feeding ration left in the feeding trays. Four trays measuring 0.25 square meter should be installed to monitor the amount of feeds consumed everyday. During the first 30 days, blind feeding is practiced. About 200 grams of feed per 10,000 postlarvae is given. One to three hours after feeding, the trays are lifted and the amount of feed consumed is estimated. From 40 days of culture, the shrimps are fed five times a day, i.e., 6:00 AM. 10:00 A.M., 2:00 P.M., 5:00 P.M. and 10:00 P.M. at 20%, 10%, 10%, 35%, and 25%, respectively of the total feeding ration.

Tilapia are fed 5% of the body weight. They are fed twice a day at 8:00AM and 2:00 PM and the ration is adjusted based on the average body weight of the fish every sampling period.

Water management and aeration

After 30 days of culture, 10-20% of the water in the pond is drained and replaced with water from the reservoir ponds. It should

➡ Page 20

Red seaweed cleans up your tanks

By: Ma. Lizbeth J. Baroña
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Due to the fish food and fish wastes, your living room aquarium ends up getting dirty and murky after sometime. If you also end up getting tired of having to squeeze in cleaning the aquarium in your weekly schedule, you should know how water environment management is like in intensive aquaculture. But there is a phenomenon that can actually reduce, if not totally eliminate, that mundane yet taxing household job.

A study conducted by the Southeast Asian Development Center(SEAFDEC) examined whether a species of algae, *Gracilaria heteroclada*, can efficiently absorb nitrogen, and in the process improves the water quality in a recirculating system that supports fish life.

In intense cultivation of aquatic plants and marine life, the quality of the water environment usually becomes an issue. Excessive chemical input from feeds to the fishes' wastes, if not properly managed, leads to the deterioration of the water quality. The water becomes virtually toxic, which often leads to mass kills of the cultured fishes.

However, these waste materials also benefit some organisms. This is because the waste matters serve as nourishment for some filter feeding organisms like bivalves. These waste products usually nitrogenous like ammonium, nitrate, and nitrite, although toxic to some marine organisms, are beneficial to seaweeds.

The process of biofiltration uses microorganisms to break down organic compounds (or to transform some inorganic compounds) into carbon dioxide, water, and salts. Since nitrogen limits the growth of algae in marine and freshwater environments, some species of marine algae have been used as biofilter in wastewater treatment in aquaculture.

For example, sea lettuce, scientifically known as *Ulva sp.*, can remove as high as 90% of ammonium from fishponds. Red algae, or *Chondrus crispus,* remove 53% of nitrogen from wastewater, thereby improving the water quality. These results led to cultivation of seaweeds with fish species.

Red seaweed (Gracilaria heteroclada)

What is Gracilaria heteroclada?

Gracilaria heteroclada, or red seaweed, is a fast-growing plant in a natural environment. It has high gel strength, thus providing the plant a good environment for culture, that could result to good agar quality. Aside from its water filter capability, the *Gracilaria heteroclada,* was also observed for its agar quality when reared in a filter tank of finfish broodstock.

In a 500-ton capacity broodstock tank of grouper and milkfish, two 15-day culture trials were conducted. The broodstock tank passes through a sedimentation tank, then through a filter tank before it goes back to the broodstock tank.

The first run had the *G. heteroclada* stocked at 1.25 kg per square meter, while the second run had the species stocked at 1 kg/sq m. Water samples were collected from the sedimentation tank, which contained unfiltered water from the broodstock tank, and from the flume, which contained filtered water that passed through the filter tank containing seaweeds serving as biofilters. Growth and gel strength was measured in the first trial, while water was analyzed for nitrogen content in the second trial.

After 15 days of cultivating the seaweeds in the broodstock tanks, it was observed that growth rate in the first trial was slightly higher compared with that of the second run, at 12.25 and 9.4%, respectively. Gel strength in the two trials did not differ significantly.

The total ammonia-nitrogen (TAN) content in the sedimentation tank was at 0.06 and 0.33 mg, while the TAN in the filter tank was slightly lower at 0.03 and 0.27 mg. The total TAN removed for 15 days was 2.30 kg.

➡ Page 20

Starting a mud crab hatchery

By: Junelyn S. de la Rosa
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Today, more and more farmers are going into mud crab farming. Studies have shown that mud crab farming is a very lucrative business with a 1.54 return on investment in only 60 days. Scientists from the College of Fisheries and Ocean Sciences of the University of the Philippines in the Visayas (UPV) have prepared a guide in starting a mud crab hatchery.

Mud crab species

There are four kinds of mud crabs in the Philippines: the king crab *(Scylla serrata)*, the purple crab *(S. tranquebarica)*, the orange or red crab *(S. olivacea)*, and the rare green mud crab *(S. paramamosain)*. Among the mud crabs, the king crab is the most popular for its fast growth and flavor and is called an "export winner" for its high demand in the international market.

Hatchery/nursery facilities

Tanks for broodstock maturation, rearing, spawning, nursing, and for holding water should be constructed. They can be made of concrete, fiberglass or wood with dimensions of 0.5 to 1 cubic meter. The number of tanks should depend on the number of larvae and crablets that you are planning to produce.

Food production

Mud crabs feed on phytoplankton and zooplankton. Thus, in any hatchery one must learn how to culture phytoplankton to ensure that there is enough food for the mud crab juveniles. The first step to phytoplankton culture is obtaining an algal starter from laboratories or institutions that are selling them.

Chlorella, Nannochloropsis, and Tetraselmis are the common algae. You can start culturing them in one-liter capacity bottles. When the phytoplankton has bloomed and the density is 3 to 5 x 10^5 cells/ml, transfer them to ten-liter carboys. Upon reaching the same density, they should be transferred to a 0.5 to 1 ton- tanks where they will be allowed to bloom more.

In culturing phytoplankton, maintain the water temperature from 20-25 °C for indoor culture and provide good aeration to give enough supply of carbon needed for plant growth. And use boiled or filtered seawater with a salinity of 25-30 ppt for the culture and sterilize all the containers before use.

Also, for bigger culture, use urea (21-0-0) and ammonium phosphate (16-20-0) to supply the essential nutrients needed by the algae.

Broodstock management and spawning

The major source of broodstock is the wild-caught post juveniles or half-grown crabs while adult or berried female crabs are used as spawners. A minimum weight of 200 to 300 grams for broodstock and 450 grams for spawners are desired.

The king crab is sexually matured when the width of its carapace reaches 14 cm and it weighs 450 grams while the other mud crabs can spawn even if its carapace is still below 10 cm and weigh 300 grams.

"Clasping" mud crabs

As soon as the broodstocks and spawners of the king crab arrive at the hatchery- they place them in the tanks at 300 spawners per tank and 1000 broodstocks per tank with a 10 cm sand substrate at the bottom. Feed them daily with mussel meat *(Perna viridis)* at 5% to 10% of their biomass. Change the water (at least 30%), scrub the sides of the tank and remove excess feed daily.

Mud crabs become mature and mate when they are 4 months old. In ponds or tanks, male and female crabs clasp for 5 to 7 days to fertilize the eggs.

There are two methods of spawning: the natural and the induced. In the natural method, the mud crab is left in the tanks until they become sexually mature and spawn. For induced spawning, the most common method used is ablation where one (unilateral ablation) or both (bilateral ablation) of the mud crab's eye stalks are crushed or cut

➡ Page 20

Bountiful blooms from growth-enhancing fungi

By: Rita T. de la Cruz
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Fungi are one of the most important groups of organisms on earth but they are easily overlooked because most are hidden and their actions and growth are inconspicuous. They are important in a variety of ways. Fungi can can help us re-grow our forests and expand the root systems of the newly planted trees and give them protection under the soil. Fungal strains are excellent decomposers and can be harnessed to recycle wastes and help decrease pollution.

Biotechnology or the application of living organisms and their components to industrial processes is very promising both economically and environmentally and fungal research is leading the way.

In the orchid industry, fungi prove to be an important growth enhancer through the orchid mycorrhizal fungi (OMF), whose role has been practically overlooked by most plant researchers over the past years.

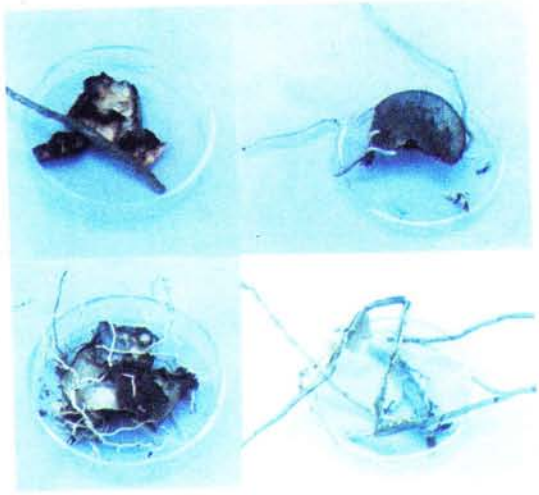
A recent study by the National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños (UPLB) led by Dr. Marilyn B. Brown proved that these organisms can do wonders in plants. Specifically, the study showed the importance of OMF in the increased survival and growth rate of *in vitro* cultured *Vanda*. *Vanda sanderiana* (Waling-waling) along with *Phaelonopsis* (Mariposa) are just two of the most popular orchids in the country whose production is hampered by their slow growth and the great amount of nutritional inputs needed throughout their life.

Result of the study showed that the orchid mycorrhizae had greatly increased the survival and growth rate of the seedlings that originated from the embryo or tissue cultured like what the researchers did with the *Vanda*. It was observed that weeks after bottled seedlings were contaminated with the fungi and were transferred in *vivo* conditions, the orchid plants grew faster an estimated to be 50% growth compared to the uncontaminated seedlings.

According to the group of Dr. Brown, the effectiveness of orchid mycorrhizal fungi as growth enhancer is good throughout the whole life cycle of the orchid hosts. The orchids continue to bloom in bounty at a faster rate. As a result of this, more yields are obtained in just a short period of time.

Plants inoculated with OMF continued to grow more rapidly and looked more healthy: they have more roots, and more vigorous-looking and bigger leaf area index.

This study has a great impact in the orchid industry particularly because the embryo and tissue cultured orchid species like *Vanda* are slow growers. Moreover, application of large amount of inorganic fertilizers is a continuing process throughout the life of orchids and fungicides for controlling rot diseases. With the mycorrhizal fungi, application of fertilizers and fungicide is minimized. It acts not only as a growth enhancer but also as biocontrol agent of root diseases, thus survival rate is increased. Mycorrhizal fungi in orchids have no detrimental effect to the environment and are much cheaper if used as supplement or substitute to inorganic fertilizer and pesticide.



Roots of mycorrhizal orchids

Vanda sp.

Source: "Harnessing orchid mycorrhizae for growth improvement of selected species of Vanda" by Marilyn B. Brown, Estrella H. Lales, Christopher S. Escaño, Arnel M. Perez and Adora M. de Castro of the National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños, College, Laguna.

Disease-free potatoes?

By: Likha C. Cuevas
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Potato microtubers

You like potato chips and fries?

Ever wondered how these junk foods were before they are brought to the processing zones? Some of the potatoes are sourced locally and thus making the tuber one of the popular and economically important crops in the country. In fact, the potato is identified as one of the promising high value crops in Bukidnon and in the highlands of Misamis Oriental.

The Northern Mindanao Integrated Agricultural Research Center (NOMIARC) in Dalwangan, Malaybalay City, Bukidnon has used stem cuttings in propagating this crop. However, this technology does not insure high quality and disease-free planting materials, which are factors in expanding potato production.

Usually, potatoes are propagated through the use of *tubers*, the underground stems of the plant. Using the tubers, however, makes the crop vulnerable to pathogens like fungi, bacteria, and viruses. This in turn result to low yield and poor quality of harvest.

To address this problem, Fe Abragan, Lucille Minguez, Juanity Salvani, Cleofe Apiag, and Josephine Abalde of NOMIARC decided to use micropopagation in seed potato production.

Micropropagation is a technique in tissue culture wherein a tissue from a plant *(explant)* is isolated to create a sterile culture of that species *in vitro* (an artificial environment outside the living organism). Once a culture is stabilized and growing well *in vitro* (it can be in a test tube or bottle), multiplication of the tissue or regeneration of entire plants can be carried out. Shoots and leaf pieces are usually used but cultures can be generated from many different tissues of the plant. This method of cultivation of plant material is used for: rapid and large-scale year round production of desired horticultural varieties, propagation of plant species that are difficult to grow from seed, production of genetically uniform plant material (or clones), development of plant culture systems that can be used for genetic transformation like introducing disease resistance in a plant.

The NOMIARC team of researchers used the potato microtubers in the production of disease-free plant material through micropropagation. "Microtubers can be harvested *in vitro* conditions, stored, shipped, and planted conveniently," the researchers said. Microtubers can be produced throughout the year and can be planted inside the greenhouse for producing mini-tubers.

The researchers identified the varieties with high microtuber production and good agronomic characteristics. They also determined the usable and non-usable microtubers and made a cost and return analysis if micropropagation is used.

Results of the study showed that the production of the microtubers depends on the variety used. The promising varieties for microtuber production are: Solibao, Igorota, Granola, Raniag, Franze, and Columbus. Solibao obtained the highest return on investment (39.405), followed by Granola (38.10%) and Igorota (36.80%).

The researchers recommended that further studies that focus on the maturity index of the evaluated varieties be conducted. This is important in improving the size of the microtubers produced. Microtubers that are harvested prematurely do not produce sprouts and are prone to desiccation.

With this technology, hopefully, we will never run out of locally produced potato chips and French fries to munch in front of the TV.

Reference:
"Evaluation of 11 promising potato cultivars/varieties through microtuber production" by Abragan, F.N., Minguez, L.T., Salvani, J.B., Apiag, C.T., Abalde, J.I. of the Department of Agriculture Regional Field Unit 10, Northern Mindanao Integrated Agricultural Research Center (NOMIARC), Dalwangan, Malaybalay City, Bukidnon.
Micropropagation@http://catf.bcresearch.com/biotechnology/tissueculture_research.htm
Photos: www.sciencetown.or.kr and www.fibkh.serpukhov.su

A million and one ways of planting *ube*

By: Likha C. Cuevas
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Ube (Dioscorea alata)

Farmers always thought that planting *ube* (*Dioscorea alata* L.) can only be done by using the head of the tuber (or the top with buds). There are times when farmers use the whole *ube* tuber when planting. Other times the tubers are cut into 2-3 seedsetts.

Unknown to farmers, only one or two sprouts usually come out of the tuber when its head is left intact. According to studies, when the head is removed, sprouts appear at different parts of the *ube*. Many auxillary buds may be induced to grow from one tuber at the same time given the right conditions.

This is what Dr. Marcelo Quevedo of Leyte State University (LSU) and Dr. Ofelia K. Bautista of University of the Philippines Los Baños (UPLB) had studied. They investigated the etiology (the study of causes or causes of diseases) of *ube* sprouts so that the technology for propagating the tuber through increased sprouting can be done.

The purple yam

Why bother with propagating yam?

Imagine Filipino life without *ube*. Ice cream won't be the same without *ube* or *ube-macapuno* flavors. Halo-halo without *ube* on a hot summer day is not a refreshment. It's not only Pinoys who crave for the purple yam. Processors in the Philippines demand as much as 49,000 metric tons a year and 13,000 tons of this goes abroad.

The supply could not keep up with the demand for this dollar earner as quality and yield for purple yam is low. How come? *Ube* farmers have limited supply of planting materials. Usually 20%-50% of harvested *ube* become planting materials for the next cropping season. Just imagine how many of these tubers are not sent to the processing zones and are rather sent back to the soil. The bulk of these planting materials also add transportation cost, which makes replanting the tubers expensive.

Budding is the key

When moisture content of the tubers is reduced to 60%, the researchers discovered, the sprouting is faster as soon as they mature. The size of the seedsett (cut portion from the tuber) that have 100% sprouting is about 50 g while the 10 g. seedsett has 43% sprouting rate (which is quite acceptable according to the Quevedo and Bautista). "Sprouts always emerge at the upper 1/3 of the seedsetts, regardless of the portion of the tuber from which they were cut," they observed. One kilo *ube* tuber can be divided into 112 seedsetts, 8-10 g each.

Quevedo and Bautista observed that, "no matter how many seedsetts are produced from one tuber, sprouts in each seedsett always emerge from the topmost part." The *ube*'s growth promoter, *auxin* (which moves from the tip to the base), is initially present at the uppermost part when the tuber is cut. The more the tuber is cut, the more auxin moves downward, and thus promote growth of more sprouts.

Cutting tubers into smaller ones solves the problem

The researchers concluded that any part of the tuber can be used as planting material. "Seedsetts should not be less than 10 g when cut longitudinally; seedsetts of 5 g can be prepared as long as they are cut crosswise to ensure emergence of sprout."

Quevedo and Bautista recommended the use of fungicides since smaller seedsetts are more susceptible to disease than larger ones. "Tubers that are to be used as planting materials should be harvested immediately upon reaching maturity, usually at 7 months after planting," they added.

The problem of bulk and quantity of *ube* planting materials has been solved. However, further studies are needed in terms of nursery management, adaptability in the field, and the yield using these small planting materials.

References:"Etiology of sprouting in purple yam (Dioscorea alata L.) tubers" by M.A.Quevedo and O.K. Bautista, Published in The Philippine Agricultural Scientist. Vol. 85. No. 4, 350-356. Dec 2002. Email: rootcrop@mozcom.com; telefax: (053) 335-2616
www.hyperdictionary.com

Madre de cacao and *ipil-ipil*: Cheap feast for hungry sheep

By: Rita T. de la Cruz
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Raising sheep, although not as common and as popular as raising goats, in the Philippines has been gaining the attention of smallhold raisers due to its manageability. In most cases, sheep is considered more compatible than goats by some farmers not only due to its profitability but because it could easily be integrated in smallholder farms. Sheep is less destructive to intercropped trees and food crops in the farms and is more docile, easier to handle and more adapted to existing local conditions.

Two of the most pressing problems now in sheep raising particularly those smallholder raisers are the scarce feed supply and the poor quality of available feed resources. This is particularly true during the dry season where grasses are dry and feed sources are in high demands. As a result, animal performance becomes generally poor due to the low voluntary ingestion of food and the lack of nutrients intake.

This problem prompted a group of scientists from the Small Ruminant Center of the Central Luzon State University (CLSU), Philippines and the Laboratory of Animal Science of the Shimane University, Japan to introduce the use of multi-purpose tree specie (MPTS) in livestock feeding. According to their study, in order to achieve certain level of livestock productivity, feeding strategies must be effective enough to increase voluntary intake among sheep, to eventually level up their performance.

Actually, the idea of introducing MPTS as alternative to expensive concentrate feed is not new anymore in the field of animal nutrition. It is just a matter of choosing which among these tree species entices voluntary feeding among farm animals while ensuring an improvement in their performance. According to the two lead researchers, Drs. Edgar A. Oden of CLSU and Toshiyoshi Ichinohe of Shimane University, tree legumes like madre de cacao (*Gliricidia sepium*) and ipil ipil (*Leucaena leucocephala*) provide high quality forage for animals raised under various types of livestock farming systems. Moreover, the forage from the MPTS are sources of protein-rich supplements and have good digestibility ensuring optimum dry matter intake that eventually could improve the productivity of animals given the low quality feeds.

Madre de cacao

Ipil-ipil

Madre de cacao is a nitrogen-fixing tree. In some areas, it is referred to as a *quick-stick* due to its characteristic of growing almost right away just by cutting it and directly planting it in the ground. It is a fast growing tree with a maturity height of 10 meters (33 feet). it is adaptable to almost any soil environment, including infertile soils. It is tolerant to salt spray and water logging. It can tolerate drought for up to 6 to 8 months. This tree can be potentially weedy, but rarely causes a problem. Its ubiquitous characteristic makes it a good alternative for feeds due to its availability in almost all areas in the country.

Ipil-ipil is widely regarded as one of the most versatile of all tropical multipurpose trees because of its exceptionally high rates of growth, ability to fix nitrogen, relative disease- and pest-resistance, and high nutritional value as food for livestock. More widely-known as the "leadtree," it is valued as an excellent protein source for cattle fodder, consumed as grazed or harvested, mature or immature, green or dry. The nutritive value is equal to or superior to alfalfa. It has gained a favorable reputation in land reclamation, erosion control, water conservation, reforestation and soil improvement programs, and

next page

Madre...

is a good cover and green manure crop. The leaves, used as mulch around other crops significantly increases farmers' yield.

To determine the effect of tree legumes in the voluntary intake and level of performance, 24 native sheeps, distributed in three treatments, were fed with ammoniated rice straw supplemented with either *ipil-ipil* or *madre de cacao*. The supplements accounted for 20% of the sheep's daily matter intake. Results showed that while the consumption of the ammoniated rice straw remained the same among the treatments, the addition of *ipil-ipil* and *madre de cacao* increased the total dry matter consumption of the sheep that eventually resulted to higher level of performance and more efficient feed utilization.

After 90 days of feeding the sheep, heavier lambs were observed in the forage supplemented group. This was mainly due to the efficient utilization of feeds. Drs. Orden and Ichinobe emphasized that the faster outflow rate of the forage increased the influx of digestible organic product and microbial protein supply in the small intestine of the sheep. This contributed to the higher consumption and better growth performance in the sheep supplemented with *ipil-ipil* and *madre de cacao*.

Source: "Effects of Leucaena leucocephala and Gliricidia sepium supplementation on outflow rate, microbial protein yield and growth of sheep fed with ammoniated rice straw" by Edgar A. Orden and Emilio M. Cruz of the Central Luzon State University and Toshiyoshi Ichinobe and Tsutomu Fujihara of the Shimane University. Ipil-ipil photo: www.rspg.thaigov.net

Is your tuna safe?

By: Likha C. Cuevas
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We have lead and cadmium in our food? Yes, and our food like canned tuna that we export and rice must be analyzed to determine if they contain these contaminants. Dr. Evangeline C. Santiago of the Natural Sciences Research Institute (NSRI) at the University of the Philippines Diliman (UPD) has discussed this topic in the seminar on, "Identification and Initial Validation of an Analytical Method for the Determination of Lead and Cadmium in Fish (Canned Tuna) and Rice Samples to be used for Monitoring and Regulatory Purposes," on August 6, 2003 at the Bureau of Agricultural Research (BAR) CERDAF Conference Room. This seminar was organized by the Product Quality Systems Network (PQSN) and co-sponsored by BAR.

According to Dr. Santiago, cadmium and lead are metals with no known role in metabolism but have been involved in historic poisoning episodes of human populations and wildlife resulting from contaminated food and prey. They are introduced to the environment by human activities usually from mining and metal industries and from leaded gasoline. These metals that are released into the atmosphere may settle with dust particles on plants and crops or may find their way to the soil and coastal and river waters and sediments.

Cadmium may be present in elevated amounts in soil treated with sewage sludge as fertilizer. The toxicity of cadmium includes the direct binding of this contaminant with the negative groups of DNA to produce precursors of tumors. Lead, on the other hand, is deposited on and retained by crops, particularly leafy vegetables and fruits. Shellfish and fish are also contaminated by lead that range from 0.1 ppm up to 0.8 ppm for shellfish. Canned goods are also contaminated from leaching of lead solder in cans and others get contaminated from lead glazes in pottery and ceramic ware. Lead accumulates in the body over a lifetime and the body releases it slowly, so over time even in small doses, this can cause lead poisoning and one of its effects is the impairment of the nervous system. To prevent these things from happening to consumers, monitoring contaminants in food for trade and regulatory purposes has to satisfy the criteria for data quality set by CODEX. CODEX specifies a set of criteria for acceptability of the method in analyzing a specific contaminant in a particular matrix.

The study that Santiago and her team of experts regarding lead and cadmium contamination analysis

➡ Next page

Is your...

validated an analytical method that meets the CODEX criteria for analysis of lead and fish and cadmium in rice in three selected local laboratories under a supervised inter-laboratory analysis program. The supervised laboratory program would then use a set of documented test procedures and test materials to eliminate as much variability between laboratories.

The study showed that the analysis of cadmium in rice using the standard AOAC procedure involving dry ashing and direct aspiration in Atomic Absorption Spectrophotometry (AAS) for monitoring and regulatory purposes can be done at the Institute of Chemistry (IC) at UP Los Baños (UPLB), Philippine Institute of Pure and Applied Chemistry (PIPAC) in Ateneo de Manila University, and the Research and Analytical Services Laboratory (RASL) of NSRI. However, Santiago's research team concluded, the analysis of lead in canned fish in these local laboratories using standard AOAC method does not satisfy the requirements of CODEX/EU for the detection limits and precision of the analytical method for the specified regulation level of 0.5 mg/kg lead. On the other hand, Santiago said, "the laboratory at NSRI showed that modification of the method by *chelation* (the process of forming a ring by forming one or more hydrogen bonds with the use of organic chemical that bonds with and removes free metal ions from solutions) of the digests before AAS analysis can satisfy the requirements on the detection limit and precision. Full validation of the modified method is recommended before it can be used to analyze lead in tuna."

The full validation of the modified method is recommended before it can be used to analyze lead in tuna. "It will all depend on the funds given by the Department of Agriculture. Since AAS is a common instrument and is available on laboratories, BFAR is already training their analysts on this method," Santiago added. There is no reference laboratory yet for this method. Can local laboratories comply with the requirements for trade exports? For the meantime, Santiago explained, local laboratories are using the AOAC method. When questioned, their methods will not be acceptable (in international standards) since unspiked tuna samples analyzed would have no lead detected because AOAC has a low od detection level.

Tuna industries do not support the analysis of lead and rather they proposed the removal of the regulation level but they cannot do that since it is required in the international trade, Santiago said. Since CODEX wanted to lower the regulation level of lead in tuna (2 ppm for trace metals), the formation of a reference laboratory for trade export is subject to the technical capabilities of analysts.

Source: "Identification and initial validation of an analytical method for the determination of lead and cadmium in fish (Canned Tuna) and rice samples to be used for monitoring and regulatory purposes" 2002 by E.C. Santiago of the Research and Analytical Service Laboratory, Natural Sciences Research Institute (NSRI), University of the Philippines, Diliman, Quezon city, email: ecs@nsri@upd.edu.ph

Silica...

hull will also lessen the economic burden brought about by importation.

Sources:
"Silica gels from rice hull: Structure, composition and water vapor adsorption behavior" 2002 by Leni Quirit and Elma Llaguno, Natural Sciences Research Institute (NSRI), Diliman, Quezon City.
www.dehumidity.com/FAQ.html
www.howstuffworks/science/questions20
Photo: www.dehumidity.com

Abalone...

the age of the animal. A previous study showed that larger animals have greater ability to store energy than smaller ones, thus having higher resistance to starvation.

This study offered implications especially on open sea cage culture, or sea ranching of abalone where feeding is far apart. The animals can compensate for the weight not achieved during food deprivation once they are fed sufficiently.

Source: "Effects of alternate starvation and re-feeding cycles on food consumption and compensatory growth of abalone, Haliotis asinine (Linnaeus)" 2001 by Armando C. Fermin, South East Asian Development Center Aquaculture Department (SEAFDEC/AQD), Tigabauan, Iloilo, Philippines.
Photo: http://www.fishtech.com

Editorial...

changing. The masthead will be different next issue. When I broached the idea to Director William C. Medrano, he is supportive and volunteered to give a P2000 prize to the winner of the contest that we launched.

Yes, there is a need for change when the name of the magazine is not appropriate anymore. The contents are popularized researches and technologies that Philippine agricultural scientists have discovered and therefore the name of the magazine should reflect it.- VAD

Greenwater...

be noted that the water from the reservoir ponds should be allowed to stay for at least 4-5 days before they are used to replenish the water in the shrimp rearing ponds.

The ideal amount of dissolved oxygen is maintained by using six paddlewheel aerators. In the first 60 days, only four aerators are alternately operated for 24 hours. Another aerator is installed in each tilapia pen to increase the circulation of water and phytoplankton in and out of the pens.

Harvest and Postharvest handling

Shrimps are harvested when they weigh at least 30 grams. Harvesting is done by draining the water and collecting the shrimps using a harvest net installed at the pond gate. The collected shrimps are placed in water with crushed ice to maintain their quality. The shrimps are then sorted according to size and placed in boxes with crushed ice to be shipped to shrimp processing plants where they are packed for export purposes.

Source: "Green Water Technology" 2003 by Mr. Valeriano L. Corre, Jr. of the University of the Philippines in the Visayas, Miag-ao, Ilo-ilo

Red...

The total nitrogen absorbed by the seaweed for 15 days was 220.38 g. This was measured by getting the difference of the total nitrogen content of the seaweed before the experiment, which was at 30.72 g, and after, which was 251.10 g.

The proponents of the study recommended that *Gracilaria heteroclada* may be used as natural biofilter in an aquaculture environment.

Source:"Growth and agar quality of Gracilaria heteroclada Zhang et Zia grown in filter tank of the finfish broodstock tank" by Ma. Rovilla J. Luhan, Aquaculture Department, Southeast Asian Fisheries Development Center (SEAFDEC), Tigbauan, Iloilo.
www.hyperdictionary.com
www.pesticideinfo.org
www.rcf.usc.edu/~bfilter/biofil.html
Photo:http://falklandconservation.com/seaweed/html

Helping...

are fed protein-rich diets. Scientists are optimistic that the in the near future, the mangrove clam will not only continue to delight many a Filipino palate but can be used as an effective helper in cleaning our ponds and sustaining an environment-friendly aquaculture.

Source: "Induced spawning and larval development of the mangrove clam, Anodontia Edentula". Ma. Junemie Hazel Lebata, Jurgenne Primavera, Jon Altamirano, Ellen Flor Doyola and Liliane Gustilo of Southeast Asian Fisheries Development Center (SEAFDEC), Aquaculture Department, Tigbauan Ilo-ilo
Photo: http://shell.kwansei.ac.jp

Starting...

The advantage of unilateral ablation is that the mud crab can spawn again while in bilateral ablation the mud crab dies after hatching the eggs. In both cases, observe the mud crabs closely until the eggs fill the abdominal flap.

Since ablation increases the appetite of the mud crabs, feed the mud crabs more until the eggs are hatched. Incubation ranges from 7 to 13 days. At this time, the berried (pregnant) crabs should be transferred to another tank without the substrate. Expect the eggs to hatch when the eggs turn from light orange to dark grey.

After the eggs are hatched, transfer the larvae into the large tanks filled with 5-10 tons of filtered seawater with 34 ppt salinity. Add algae and rotifer at a rate of 5 x 10 (3) cells per cubic meter and 25 ind/ml, respectively. Yeast-grown rotifer may also be added at 5 ind/ml. Give supplemental diet of 6 grams/ton/day and feed them at 6AM, 12 NN, 6 PM and 12 MN.

Rearing of larvae in nursery

Line the nursery tanks with soil (10 cm thick) inoculated with *lab-lab*. For large tanks, line them with mud substrate that has been seeded with lab-lab. Apply lime and chicken manure at 2 kg/ 10-ton tank and ammonium phosphate at 500 grams per tank. After fertilization, transfer the megalopae at a density of 20,000 to 30,000 per cubic meter. Apply organic fertilizer to encourage the lab-lab to bloom.

For those using hapa nets as nurseries, use hapa nets with a mesh size of 1 mm and a dimension of 1m x 1 mx 1.5 m. Install the nets in a canvass-lined earthen pond. Line the hapa net bottom with 3-5 cm thick mud substrate. Apply chicken manure and inorganic fertilizer (16-20-0) at a rate ot 20 g to 500 g /cubic meter. Fill the pond with water until a depth of 20 cm to promote growth of microbenthic algae that will serve as food for the larvae. Other organisms such as bloodworms, oligochaetes could also serve as food for the larvae. Harvest by totally draining the pond.

Source: "A guide to hatchery and nursery production of mud crab (Scylla serrata) juveniles" by Romeo Fortes, Juliana Baylon, Evelyn Marasigan, Allan Failaman, Gerome Genodepaz, Sol Garibay and Gisela Ann Mamon of the College of Fisheries and Ocean Sciences at the University of the Philippines in the Visayas, Miag-ao, Ilo-ilo.
Photo: www.todayaqua.com

Getting a head start in the battle against soil erosion

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Aside from having to deal with the innate problems in farming, like high production input costs, calamities, and insect pests, our farmers have one more dilemma to face: soil erosion.

There is more in the attempt to understand soil erosion than meets the eye. It is a complex process that integrates different factors like climate, terrain, and the sideway, or lateral interaction of the piece of land with its adjacent lands. The latter, was studied by the Central Luzon State University(CLSU) and the University of the Philippines Los Baños (UPLB) using Geographic Information System(GIS) technology. Specifically, the study conducted by Drs. Nenita dela Cruz and Eduardo Paningbatan, sought to validate the positive paybacks to using GIS technology in predicting catchment's runoff and soil erosion.

Soil erosion

Although soil erosion can be considered a natural process, the negative effect of this phenomenon on human livelihood and on the environment must be studied. But time and time again, it has proven itself to be a natural occurrence that we have to contend with. The Food and Agriculture Organization (FAO), of the United Nations estimates that the global loss of productive land through erosion is 5-7 million ha/year.

Erosion removes the topsoil first. This is where most of the soil nutrients are entrenched. Once this nutrient-rich layer of soil is gone, few plants will grow in the soil again. This soil becomes desert-like and unable to support life - this process is called desertification. It is difficult and often impossible to restore desertified land.

Heavily-eroded soil

Can GIS help?

Simply, GIS combines layers of information about a place to give you a better understanding of that area. What layers of information can be combined depends on the purpose, finding the best location for a new store, analyzing environmental damage, or viewing similar crimes in a city to detect a pattern.

In the case of mapping soil erosion and runoff, the study tested the accuracy of a GIS-based soil erosion model, the PCARES or *Predicting Catchments Runoff and Soil Erosion for Sustainability*. This model can describe and integrate the different hydrological and biophysical processes occurring in a watershed.

The study focused on an intensively farmed area in one of the micro catchments of the Mapawa watershed located at Barangay Sungco, Lantapan, Bukidnon. The watershed was characterized in terms of soil characteristics, river and tributary system, climate, topography, slope, land use, cropping pattern, and cropping system.

Testing the PCARES was done through computer simulation using three actual major rainfall events which generated a major stream flow in the Mapawa creek. These rainfalls occurred within the duration of the study. To measure the capability of PCARES, the "predicted values", or the simulation inputs were compared to the actual observed values.

The three rainfall events considered in the study were on July 14, where the rainfall lasted for 183 minutes with 46mm; July 18 which lasted for 120 minutes and produced 134 mm; and the August 13 rainfall event that lasted for 50 minutes producing 39 mm.

The July 18 rainfall gave the highest peak of predicted runoff depth, and the highest simulated volume of runoff water. This prediction decreased in the August 13 event. This variation in runoff volume is explained by the varying antecedent soil moisture regime as a result of the varying intensities of rainfall.

The same trend was observed in soil loss. The highest value of soil loss at 23,052 kg was

➡ next page

Getting...

predicted in the July 18 rainfall. The prediction for July 14 was 20,947 kg, and 17,185 kg of soil loss was predicted for the August 13 rainfall event. The predictions of the model were found to be accurate after they were compared to the actual observations.

As to predicting the erosion hotspots, it was found that the areas in the steeper slopes, agricultural lands, and areas with less vegetation are considered prone to soil erosion. The areas in the catchments where erosion was minimally expected were on the vegetation areas. The ability of the PCARES to predict soil erosion is one of its main features. Given the accuracy of the predictions of the model, pointing out the areas where measures can be made to avert soil erosion is almost guaranteed.

The study showed that PCARES is a useful tool in accurately predicting the runoffs, soil loss, and erosion hotspots. In the process, one can zero in on the high-risk erosion spots with precision, and at the same time, can prepare for possible magnitude damages from soil loss and water run-off in the event of a torrential rainfall.

Sources:
"Guaranteed catchment runoff and soil erosion using Geographic Information System (GIS)-assisted soil erosion model" by Nenita de la Cruz and Eduardo Paningbatan, Jr of Central Luzon State University (CLSU) and University of the Philippines at Los Baños (UPLB)
www.botany.uwc.ac.za
www.gis.com

Extraordinary...

the brood pouch in the males . The brood pouch is visible at 8-10 cm body length and sex differentiation occurs when seahorses reach 4-6 cm in length. Sexual maturity occurs when they reach 11-15 cm in both males and females.

The brood pouch does not make the reproductive system any different from other animals and therefore, the researchers concluded, that it is only a secondary sex character. During pregnancy, the gradual structural and histological (tissues) changes happen like formation of crevices where embryos stay until birth. Outer skin layer of the embryos develop during the early-term pregnancy and middle and inner skin layers of the embryos change during the mid-term stage. Before birth or near-term, the embryo's yolk is all used up and the fully formed embryo is quiet and in inactive restfulness.

Histological changes in the pouch are similar to those animals that have embryos that get nourishment from their mothers (euviviparous). This indicates that embryos get their nourishment from the yolk and from the nutrients provided by the pregnant father through cell diffusion. The ultrastructural study revealed the absence of placenta between the embryo and the capsules formed by the pouch wall. After giving birth, the male seahorse's pouch returns to its original form.

Future breeding programs

The results of this study, especially on histological development of the seahorse sex organs, "could have a significant bearing on the proliferation of the species or on the size-specific induction of artificial mating as one of the existing breeding programs for endangered species like the seahorse," the researchers said.

Reference:
1)"Histo-physiology of male pregnancy and embryogenesis in the seahorse, Hippocampus barbouri Jordan and Richardson 1908" 2002 by Oconer, E.P. and Herrera, A.A. of Mindanao State University, General Santos City. Institute of Biology, UP Diliman, Quezon City.
2) Seahorses and pipefishes.
www.starfish.ch/reef/seahorse.html
3) Seahorse/Busch Gardens Animal Bytes.
www.seaworld.org/AnimalBytes/seahorses.html
4) South Australian Seahorse Marine Services.
Photo: www.saseahorse.com/species

JANUARY

BAR evaluates policies, refines targets

The Bureau of Agricultural Research (BAR) held its annual evaluation and planning workshop at the Development Academy of the Philippines, Tagaytay City, January 27-29, 2004. Director William C. Medrano, in his opening remarks, provided policy directions by presenting again his seven-point agenda.

AFRDIS strengthens Cagayan Valley's knowledge management

The National Research and Development System for Agriculture and Fisheries (NaRDSAF) member-institutions, the Bureau of Agricultural Research (BAR), launched the Agriculture and Fisheries Research and Development Information System (AFRDIS) Cagayan Cluster. This was held on 9 January 2004 at the Isabela State University (ISU) Campus, Echague, Isabela. The launching started with a ribbon cutting ceremony led by BAR Director William C. Medrano and ISU President Miguel Ramos. It was followed by a tour of the new ICT facilities and short demonstrations on browsing the Internet, sending e-mail, and videoconferencing.

2004 is International Year of Rice

This year marks the *International Year of Rice* (IYR). Its celebration is organized by a group of government and international organizations led by the United Nations (UN) Food and Agriculture Organization (FAO).

Advisory Council approves OPAPA two-year workplan

The Open Academy for Philippine Agriculture (OPAPA) technical working group (TWG) had a workshop meeting on January 13-14, 2004 at the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCCARD) Headquarters in Los Baños, Laguna. During the workshop meeting, a two-year workplan (2004-2005) was developed for the operation of the Open Academy. The TWG also drafted the organizational plan for the management of OPAPA.

FEBRUARY

S&T in agriculture: strategy for hunger-free Phils FAO

One of the key action plans components in achieving the vision of a hunger-free Philippines is through science and technology (S&T) in agriculture. This was stated during the round-table discussion on "Strategy Towards a Hunger-Free Philippines" held on February 11, 2004, 9 am at the Apacible Hall, Department of Agriculture, Diliman, Quezon City. Guest speakers were Dr. saifullah Syed, Policy Assistance Branch Chief of the Food and Agriculture Organization (FAO) Regional Office for Asia (RAP), and Dr. Donato b. Antiporta, Senior Policy Adviser of FAO-RAP.

Natl. convergence team consults with 3 major islands

The Department of Agriculture (DA)- Department of Science and Technology (DOST) national convergence team on research, development and extension (RDE) conducted an RDE planning and consultative workshop by major island groups for the agricultural sector on March 18-19 for Luzon, March 29-31 for Mindanao, and April 5-6, 2004 for Visayas.

Sweet Elena is identified as best mango variety

Two researchers from the Ramon Magsaysay Technological University, San Marcelino Campus (RMTU-SM)- Dr Ester Mariñas and Prof Remedios Lim reported in their comparative study that Sweet Elena is the most superior compared to other four leading mango varieties- Guimaras' *Talaban* and *Fresco*, Ilocos region's *MMSU Gold*, and Zambales' *Lamao*. Sweet Elena was found superior in terms of weight, sweetness, soluble solids, edibility of flesh, and physical appearance.

Farmers' field day showcases hybrid corn technologies

To encourage more farmers to plant hybrid corn in the region, the Bicol Integrated Agricultural Research Center of the Department of Agriculture (DA-BIARC RFU-5) held a Farmers' Field Day to showcase hybrid corn technologies and a technology forum on 15 February in Burocbusoc, Buhi, Camarines Sur.

The activity was attended by agrarian reform beneficiaries, representative from private seed and chemical companies, and representatives from the Local Government Units (LGUs). DA-regional office and the Bureau of Agricultural Research (BAR).

DEBESMSCAT hosts Bicol's first white corn research review

Held on 17-18 February2004 at the Dr Emilio Espinosa Sr Memorial State College of Agriculture and Technology (DEBESMSCAT), the first white corn research review presented last year's on-farm research (OFR) results, identified relevant problems and issues, and drafted an action plan for white corn RDE.

NEWSBITS

RP Pres gets FAO medal for modernizing agriculture

President Gloria Macapagal-Arroyo became the first Filipina to receive the Ceres medal of the Food and Agriculture Organization (FAO) of the United nations in recognition of her efforts to modernize agriculture to attain food security, social equity, and greater job opportunities in rural areas. FAO Director-General Jacques Diouf presented the Ceres Medal to President Arroyo at a simple ceremony on 20 February 2004 at Malacañang Rizal Room.

Lessons from a peri-urban agri project

A new peri-urban vegetable production project by the Asian Vegetable Research and Development Center (AVRDC), Central Luzon State University (CLSU), and Technical University of Munich (TUM) was conducted to teach farmers to plant *pak-choi* and tomatoes using technologies developed by CLSU.

DA-BAR, Worldfish Center collaborate on aquatic resources systems projects

The Department of Agriculture- Bureau of Agricultural Research (DA-BAR) and the Worldfish Center signed a Memorandum of Understanding (MOU) on 22 march 2004 at the Office of the Secretary (OSEC) to develop cooperative and collaborative projects and activities for the sustainable management and development of aquatic resources.

Luzon RDE agencies commit to converge

Luzon RDE agencies pledged to commit in seeing to it that convergence efforts succeed. The Department of Agriculture (DA) through the Bureau of Agricultural Research (BAR) and Agricultural Training Institute (ATI), and the Department of Science and Technology (DOST) through the Philippines Council for Agriculture., Forestry and national Resources research and Development (PCARRD), held the national research, development, and extension convergence consultation workshop for agriculture with its regional partners in Luzon in Angeles, Pampanga on 18-19 March 2004.

Convergence initiatives move southward

Two weeks after the inter-agency working committees consulted with the regional partners in Luzon, the national organizers went down south to Mindanao, the "food basket" of the country to consult and get the support of regional partners. The consultation was held at the Grand Regal Hotel in Davao City, 30-31 March 2004.

BAR with NGOs propose projects for EC grant

The Bureau of Agricultural Research (BAR) and two non-government organizations- the Palawan NGO network and the Bohol-based FCB Foundation submitted two projects to the European Commission (EC) for the Euro 1.5 Million grant for programs on environment and tropical forests.

DA trains on GIS databasing

The Department of Agriculture (DA) under the Office of the Assistant Secretary for Operations and the bureau of Agricultural Research (BAR) spearheaded a DA-wide geospatial database workshop. It was held on March 3-5, 2004 at the Philippine Rice Research Institute (PhilRice). Resource persons for the workshop were: Mr Ricarte Castro, Engr Winston Tabada and Mr Joel Abunda from BAR and Ms Renalyn Asuncion and Ms Bess Lim from the DA-Field Operation Service (FOS).

BAR updates commodity-based researcher in the Philippines

Assessing the state of knowledge of the commodity-based researches in the country and identifying research gaps to recommend research priorities particularly on swine and citrus, the Bureau of Agricultural Research (BAR) through the Policy, Planning, Monitoring and Evaluation Division held a seminar- workshop on 31 March 2004 at the BAR-CERDAF Conference Room.

BAR Today

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