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On Site Training Reaches RP's Small Fishfarmers

Some 301 fish pond operators, government fishery workers, fishery teachers and students from Northern Philippines who participated recently in the mobile training courses on fish farming conducted by the SEAFDEC Aquaculture Department and the Bureau of Fisheries and Aquatic Resources lauded the efforts of these two agencies at bringing modern aquaculture technology to the farm sites.

For some, it was the first organized training program on fish culture they have attended. The programs were held in Aparri, Cagayan and Binmaley, Pangasinan from August 13 to 22. The training in Aparri was done in cooperation with the Cagayan Integrated Agricultural Delopment Project (CIADP) and BFAR. That in Pangasinan was held in cooperation with the Federation of Pangasinan Fishfarmers Associations headed by Dr. Saturnino Abesamis.

An innovative feature of the training was the involvement of the farmer-trainees in a case-analysis workshop in which they were divided into sub-groups and made to work on a plan for the development of one of the group member's pond. With the guidance of the trainors, the fishfarmers were able to come up with workable project development plans for their farms.

Cagayan has a potential area for aquaculture production of more than 2,000 hectares. Most of the province's milkfish farms however have a low annual average yields of 300 to 400 kilos per hectare, a far cry from even the current national average of 800 kilos a hectare a year and even more meager compared to current yields of Western Visayas milkfish farms.

(Continued on page 3)

New Zealand Ambassador to the Philippines Barbara Angus (left) enjoys an informal talk with AQD Chief Rogelio O. Juliano and AQD mollusc project team leader Wilfredo G. Yap while turning over some research equipment to the Department. Ambassador Angus visited the Department on August 2-3. The New Zealand government has continually provided financial and technical assistance to the Department's research program.

Training head J.A. Agbayani (right) and AIA deputy director H. Chaudhuri (middle) congratulate Yusuf Ardjadipura of Indonesia, one of 19 participants who finished the recently concluded Aquaculture Research Methodology training program. The trainees came from Brunei, Indonesia, Malaysia, Thailand, Nigeria, and the Philippines (Story on page 3).

Japanese nutrition scientist talks on directions and advances in feed and nutrition research

DR. KANAZAWA

World-renowned feed and nutrition scientist, Dr. Akio Kanazawa, has recommended that the SEAFDEC Aquaculture Department's research program on feeds and nutrition should now move from studies on growth and survival rates to biochemical analyses. Dr. Kanazawa, an associate professor of the Kagoshima University faculty of fisheries, has been working with SEAFDEC researchers Drs. Chhorn Lim and F. Piedad Pascual on studies in the nutrition requirements of prawn and milkfish. He stayed at the Department for a month as visiting scientist, his second stint with SEAFDEC, under the sponsorship of the Japanese International Cooperation Agency (JICA).

He revealed among other things the following findings and observations: (1) fatty acids are highly essential for bone development and air bladder opening and are critical from hatching to about one week after hatching; (2) brown mussel *(Modiolus metcalfei)* meat fed to prawn gave a high growth rate; (3) monosaccharides like glucose are not desirable for prawn while disaccharides such as maltose or fructose are; (4) there is an increasing trend towards the commercialisation of fish feeds in Europe, Japan and the U.S. although commercially prepared artificial feeds and feed supplements would still be an expensive proposition for fish culturists even in developed countries but especially more so in the developing ones like the Philippines; (5) a collaborative arrangement for the conduct of research on nutrition among scientists from different parts of the world would greatly facilitate the exchange of valuable information and the development of practicable techniques in this area of aquaculture work.

The professor himself has, over a period of ten years, conducted in collaboration with scientists from other countries like the U.K., Egypt, Germany, France and Mexico various studies mostly on feeds and nutrition; 105 of these have been published. He is also known for his pioneering work on microencapsulation of feed nutrients. Kanazawa discussed encapsulation techniques with SEAFDEC researchers. The work is still at the laboratory stage and would, if applied now on a commercial scale, prove to be quite expensive. ●

Farming lobsters in compartments

Scientists at a British government experimental marine research laboratory have solved one of the prime problems in the rearing of lobsters on fish farms - how to stop lobsters from tearing each other apart.

Lobsters are extremely aggressive and exist as "loners" in their natural seabed habitat, avoiding each other by living in separate hides. Efforts to rear the lobsters in captivity for fish farming have failed because once lobsters are put together in large tanks they attack each other fiercely.

The only apparent way of effectively preventing them damaging each other has been to put elastic bands round the claws - a time-consuming, expensive business. Scientists at the experimental marine station of the Ministry of Agriculture and Fisheries at Conway, north Welsh coast, were given a grant to study ways of rearing lobsters in captivity so they could be farmed.

The solution provided by the scientists was to reproduce the lobsters' seabed hides and cultivate lobsters in individual compartments of large tanks, gradually increasing in size as the lobsters grew to maturity. John Wickens, senior scientific officer in charge of crustacean culture at Conway, says that in "compartment culture" lobsters grow to marketable size in two to two-and-a-half years as opposed to five or six years in the sea.

The shallow tanks used at Conway were made of fibre glass and racked in two or three tiers. Four sizes of compartments were used in the experiments. The lobsters at a year old were move to their final maturing compartments, which measured 23 x 46 cms.

Lobsters used in the Conway experiments were British or European species. Mr. Wickens said that costs of the compartment culture were reduced because water in the systems was recycled to conserve heat and energy.

He added: "We think it is technically feasible to fish farm lobsters and it might well fill a gap in fishery stocks should landings from the sea decline. Lobsters could be fish farmed in compartments all the year round." ●

18 from Asia, 1 from Africa in aquaculture research methodology course

The three-month course in Aquaculture Research Methodology which started on June 16 was attended by 19 participants -- 1 from Brunei, 5 from Indonesia, 3 from Malaysia, 4 from the Philippines, 5 from Thailand, and 1 from Nigeria.

The trainees were: from Brunei, Ak. Sharrifuddin Ps. Hj. Yusof: Indonesia – Yusuf Ardjadipura, Julius Silaen, Sudjiharno, Ningrum Suhenda and Ketut Widana; Malaysia – Faazaz Bte. Abd. Latiff, Josephine Pang and Rosnie Sulong; Philippines -- Romeo C. Makinano, Ruben T. Rabe, Virginia P. Sison and Priscilla M. Torres; Thailand – Boonchai Chiampreecha, Arunee Chindanonda, Teera Lekcholaryut, Poonsin Parnichsuke and Thamnoon Rochanaburanon; Nigeria-Edward C. Shyngle.

This course was first instituted in 1976 and is reputedly the first of its kind in the Southeast Asian Region. It was first offered as a 10-month course in 1976-77 with 15 graduates, then as a 4-month course in 1977-78 with 14 participants.

Recently, 27 Filipino participants completed a one-week course on Prawn Culture, one of the many short courses being offered by the Department under the national training program.

Meanwhile, the five Cuban fishery officers who have been undergoing training at the Department's freshwater station have returned to Cuba after a successful three-month program in tilapia cage culture and fishpen engineering and management. They were among the first group of 14 Cuban fishery officers sent to train in aquaculture under a memorandum of agreement between SEAFDEC Aquaculture Department and the Cuban State Committee on Economic Cooperation. ●

IDRC grants 2 SEAFDEC research fellowships

The International Development Research Centre of Canada has awarded fellowship grants to two research workers of the SEAFDEC Aquaculture Department, Rolando L. Platon, leader of the small-scale hatchery research and development project of the Department and Angelito T. Vizcarra, assistant superintendent of physical plant. Platon and Vizcarra are engineers by training and are with the Department's aquaculture engineering research program.

They have enrolled starting this fall term at the University of British Columbia in Vancouver with Platon taking up a doctoral program in environmental engineering and Vizcarra a master of science degree, also in environmental engineering.

IDRC has provided the Aquaculture Department a grant of some $398,000 (Can) for the implementation of the second phase of the milkfish research and development project. One component of the grant is staff training for short term and graduate degree-oriented studies. ●

Update on lake farming

Modifications to the Sugpo Lake Farming procedure are based on results of pilot testing operations in the vicinity of Tapao Pt., FFS, SEAFDEC.

1. Minimal feeding consisting of chopped clams and trash shrimp is recommended during the first month to accelerate growth.
2. Frequency of feeding is increased to five times a day for optimum results.
3. Net profit before tax based on a 50% recovery during harvest of a 1/4 hectare farm is ₱61,000 which is 40% of profit over sales.

ERRATA

(a) For Tilapia Production, p. 6, paragraph 2, delete last two sentences (AA Vol. II No. 7).

(b) Freshwater research achievements, 2nd col., 5th paragraph should read (AA Vol. II No. 7):

"There is a direct relationship between fecundity and body weight. Of the 149 spawners collected from the wild, the lowest fecundity recorded was 15,000 and the highest was 88,000".

On site training...

(From page 1)

The main reason for poor yields cited by Cagayan pond raisers is the lack of appropriate technology abetted by lack of financing for aquaculture ventures.

The training held in Binmaley, Pangasinan attracted some 96 participants from all over Pangasinan and the Ilocos Provinces. While it was observed by the SEAFDEC training team, which was composed of researchers and training coordinators, that Pangasinan ponds have a fairly high natural soil and water fertility, the yields are still not at par with those of Western Visayas farms due to inadequate pond management practices and ill-designed and built ponds.

SEAFDEC's mobile training courses are done on a relay system; a trainor, after finishing his topic in one site proceeds immediately to the next site. For these two sites the training team was composed of SEAFDEC researchers Porfirio Gabasa, Eliseo Griño, Ricardo Esguerra, Flor Apud, Julia Pantastico and University of the Philippines Brackishwater Aquaculture Center researcher Virgilio Dureza. With the team were Dr. J.C. Madamba and training head J.A. Agbayani. The courses deal with milkfish and prawn culture in brackishwater ponds as well as freshwater aquaculture systems and pond management and construction.

Some General Guides and Cost Estimates for a Small-scale Prawn Culture Project

During the past 6 years, the SEAFDEC Aquaculture Department has made a significant headway in generating a technology for prawn culture, from the initial constraint of seed production to the final phase of harvesting giant tiger prawn, *Penaeus monodon,* known in the Philippines as sugpo.

The prawn culture technology is divided into three phases of culture systems, namely: 1) broodstock/hatchery system; 2) nursery system; and 3) grow-out pond system.

CULTURE SYSTEMS

Broodstock/Hatchery System

An integrated broodstock/hatchery system is essential in prawn seed production which is a prerequisite to the development of the prawn culture industry.

Choosing the site for the hatchery is very important. A survey may be necessary to select a suitable hatchery site taking into consideration the following criteria: 1) Abundance of wild fry and wild spawners; 2) Proximity to areas with potentials for prawn culture industry; 3) Accessibility and availability of electric power; and 4) Availability of freshwater.

For broodstock development, two ferrocement broodstock tanks, each of 4-meter diameter and 1-meter depth, are necessary. Each tank can accommodate 50 broodstock (25 males and 25 females) in one batch. At 9 batches per year, each tank can hold 400 broodstock per year, making a total of 800 broodstock for two tanks in a year. The broodstock may be obtained from harvests from ponds or caught from the wild. The broodstock system is capable of producing 120 spawners per year.

The hatchery system consists of 10 larval rearing tanks, each of 2-ton capacity, with support tanks for natural feed culture. The tanks are made of fiberglass. However, cost would be considerably reduced with the use of marine plywood. At an estimated survival rate of 20% from nauplius to P5, the hatchery should produce 2.4 million fry per year from 12 runs.

Nursery System

From the hatchery, the fry are reared in nursery ponds for about one month before stocking into the grow-out ponds. Out of 2.4 million fry (P5), about 1.2 million juveniles (P35) can be produced per year from 6 nursery runs at an average survival rate of 50% from P5 to P35. These juveniles should be able to supply the seed requirement of 180 ha of grow-out ponds using the extensive method of culture. The juveniles can be sold at ₱0.25 each.

Grow-out Pond System

Four 3000-sq m grow-out ponds will be needed to rear juveniles up to marketable size (demonstration pond). These ponds can accommodate 60,000 juveniles at two runs per year. With this stock, about 1,500 kg of marketable prawns could be harvested which would give an estimated revenue of ₱52,500 per year at ₱35.00/kg. (US$ 1:₱7.30)

Polyculture of milkfish *(Chanos monodon* Fabricius) at different water ponds*

Abduri

ABSTRACT

A study was conducted on the polyculture of milkfish *(Chanos chanos* Forskal) and prawn *(Penaeus monodon* Fabricius) in nine 500 sq m earthen ponds of the SEAFDEC Leganes Station from November 12, 1978 to March 15, 1979. The different stocking combinations tested were: 2,000 milkfish fingerlings per ha (Treatment I); 2,000 milkfish fingerlings plus 4,000 prawn juveniles per ha

*Masteral thesis for M.S. Fisheries (Aquaculture), UP-SEAFDEC Graduate Program, July 14, 1979, Tigbauan, Iloilo, Philippines

COST OF SETTING UP THE CULTURE SYSTEMS

The total cost of putting up an integrated system of prawn production covering the three phases of culture systems is estimated at ₱767,000 – ₱596,000 for initial investment and ₱171,000 for operating expenses. (See table 1 for the details.)

Cost of Broodstock/Hatchery System

About ₱280,000 for the initial investment and ₱90,000 for operating expenses will be needed in setting up a broodstock /hatchery system consisting of two broodstock tanks and ten 2-ton tanks. Table 2 shows the breakdown of the cost.

(Continued on page 6)

NEXT ISSUE: **Cost Estimates in Setting Up the Nursery System**

hanos Forskal) and prawn *(Penaeus* stocking combinations in brackish-

I A. Eldani

(Treatment II); and 2,000 milkfish fingerlings plus 8,000 prawn juveniles per ha (Treatment III), with three replicates per treatment.

Results indicated that highest combined net milkfish and prawn production was obtained in treatment III with 492.1 kg per ha followed by treatment II with 404.1 kg per ha and then treatment I (milkfish only) with 280 kg per ha. The difference in combined net production between treatments III and I and between treatments II and I was statistically significant at the 5% level. Average net production of milkfish alone was also highest in treatment III followed by treatment II and then treatment I, although differences were not significant. For prawn, average net production was also better in treatment III than treatment II but the difference was not significant. However, mean weight of prawn was higher in treatment II compared to treatment III. The average survival rates of milkfish for all treatments were high ranging from 90 to 96%. In the case of prawn, average survival rates were low at around 50% for both treatments. There was no significant difference in the survival rate of milkfish among treatments. Likewise there was no significant difference in the survival rate of prawn between Treatments II and III.

The competitive relationship between milkfish and prawn were negative values as indicated by the competition index. The economic analysis indicated that polyculture was better than monoculture in terms of profitability. ●

Edible Crustaceans in the Philippines*

10. Charybdis feriata (LINNAEUS)

English name: Coral crab, Mask crab or Christian crab

Philippine name: Kasag (Cebuano), San Francisco (Cebuano), Corosan (Ilongo) or Lambay (Surigano)

The large males reach 10 cm in carapace length with one kg body weight. On the surface of the smoothly convex carapace there are usually seven longitudinal red markings of different pattern forming "+" and "y" shapes. The antero-lateral border is armed with six teeth characteristic of the genus *Charybdis* which are not pointed sharply. Chelipeds are strong: the inner border of the arm bears three large spines and outer border one spine. The ground color is reddish brown with several whitish mottles. A striking color pattern makes this crab easily identifiable.

The crab inhabits the sandy shores during its young stage, but the adult selects its habitat in muddy off-shore areas.

This species was formerly called *Ch. cruciata* (HERBST), which is a synonym of the present species. It is mainly caught with commercial trawlers off-shore. It ranges from Hawaii, Japan, Hongkong to the Philippines, India Madagascar, and the East Coast of Africa.

The crab is often sold in fish markets at ₱20/kg.

* by H. Motoh, 10th in a series

Small-scale Prawn Culture ... *(from page 4)*

TABLE 1 **Summary of estimated cost and expected production in the various phases of prawn culture opeations.**

	Area requirement	Initial Investment (₱)	No. of runs on crops/year	Operating Expenses (₱)	Seed/stock Requirements	Production	Income p.a.
Broodstock	2 4-m. dia. tanks 50 sq m	280,000	9	90,000	800 broodstock/yr 400 males; 400 fem.	120 spawners/yr 14 spawners/run	
Hatchery	10 2-ton tanks 250 sq m		12		120 spawners/yr. 24 M eggs/yr 12 M naup/yr 1 M naup/run	2.4 P_5/yr 200,000 P_5/run	
Nursery	20 300-sq m ponds	168,000	6	38,000	2.4 M P_5/yr	1.2 M P_{35}/yr 200,000 P_{35}/run	₱285,000 (selling price of ₱0.25 each; excluding P_{35} used in demo. grow-out pond)
Grow-out	4 3,000-sq m ponds	148,000	2	43,000	60,000 P_{35}/yr	30,000 pcs/yr 1,500 kg/yr (at 20/kg)	₱52,500 ₱35.00/kg
		596,000		171,000			

Table 2. Cost of facilities and equipment for broodstock/hatchery system.

I. Cost of Capital Outlay

1.	Ten larval rearing tanks, fiberglass* (2-ton) at ₱6,000.00	₱ 60,000.00
2.	Support tanks	
	a) Nine **Chaetoceros** culture tanks, fiberglass* (1-ton) at ₱2,500.00	22,500.00
	b) Six **Tetraselmis** culture tanks, fiberglass* (1-ton) at ₱2,500.00	15,000.00
	c) Six **Brachionus** tanks, fiberglass* (1-ton) at ₱2,500.00	15,000.00
	d) Two **Chlorella** culture tanks, fiberglass* (1-ton) at ₱2,500.00	5,000.00
	e) Seven 200-liter tanks, fiberglass* at ₱800.00	5,600.00
	f) Ten 300-liter spawning tanks at ₱1,000.00	10,000.00
3.	Two air blower/compressor, 2 units	20,000.00
4.	Three water pumps	7,500.00
5.	Diatom pump	1,000.00
6.	One building	58,000.00
7.	Well point/water intake structure	4,000.00
8.	Air and water distribution lines, lighting	23,000.00
9.	Sand filter	1,000.00
10.	Reservoirs	10,000.00
11.	One Microscope, refractometer, balance	7,000.00
12.	Two broodstock tanks, 4 m dia (ferrocement)	16,000.00
		₱280,000.00

II. Operation and maintenance costs

1.	Salaries	
	a) Fishery Technician at ₱800/month	19,200
	b) Aides at ₱400/month (2)	19,200
2.	Supplies and materials	
	a) Fertilizers	665
	b) Brine shrimp	8,820
	c) Other materials (nets, tubings, hose, glasswares)	12,475
3.	Power and electricity	
	a) Water pump (4-hr operation per day)	316
	b) Air blower/compressor	9,750
	c) Lighting	4,415
4.	Spawners at ₱100 each	7,000
5.	Maintenance and repair of physical facilities and equipment (5% of initial investment)	
	Total	₱89,769
		say ₱90,000.00

*Costs would be significantly reduced with the use of marine plywood or cheaper substitute

SEAFDEC engineer designs efficient filtration-acclimation system

A freshwater fisheries research-assigned engineer has designed an efficient filtration-acclimation system which has greatly increased survival rate of *Penaeus monodon* fry being acclimated to freshwater. The filtration unit, by itself, can be applicable to any aquaculture purposes, says Enily Gayon, designer of the system.

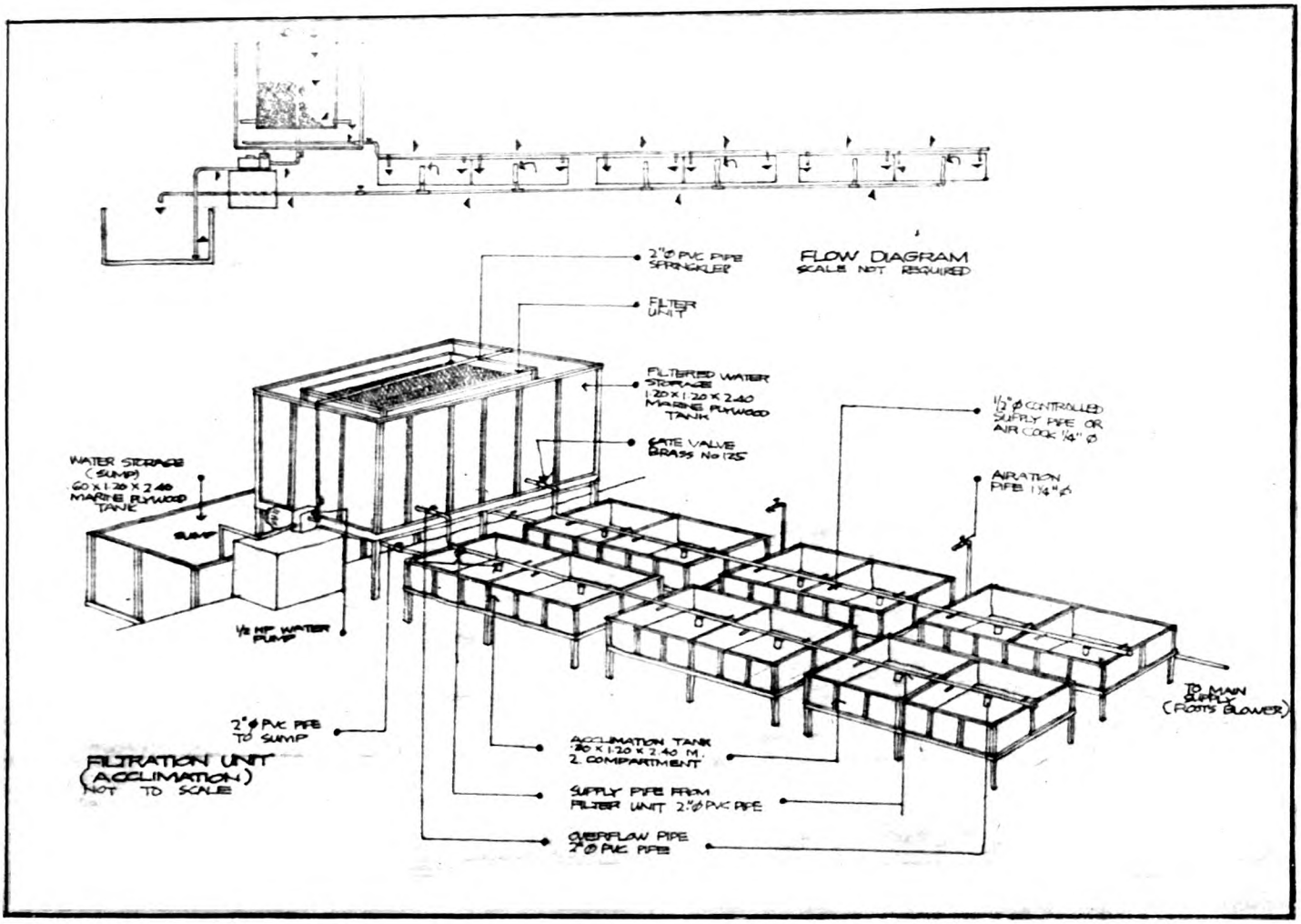
The complete system has the following parts (see schematic diagram below): 2-tonner marine plywood collection (sump) tank; I l/2 hp water pump; and a series of I50-liter wood tanks in two rows of seven each.

The main line is provided with 4 units of brass faucets with a maximum volumetric flow rate of 7 L per faucet. The main supply lines have an optimal flow rate of 50 L/min. Each acclimation tank is provided with a stand pipe of 2" Ø PVC and connected to a central collection piping system.

Collected water is drained by gravity to the sump tank and pumped up to the filter tank. The pump can supply a maximum of 200 L/min and the filter system can filter water at a relative rate of 50 L/min.

Water is jetted out of the supply pipe into the filtration box which makes use of successive layers of gravel, corraline sand, and charcoal, in varying degrees of fineness. Jetting out the water helps remove a large part of the ammonia in it while corraline sand tends to neutralize water acidity.

This set up has been installed at the Freshwater Fisheries Station in Binangonan. Rizal and, Gayon says. given highly, satisfactory performance. ●



From IDRC

Oyster Farming on Film

The International Development Research Centre has announced the availability – for loaning or purchase – a 29 min 16 mm color film on *Oyster Farming in the Tropics*. The film focuses on oyster culture research projects underway in Sabah (East Malaysia), and Sierra Leone. It ranges from the traditional harvesting wild oysters from canoes in the mangrove swamps of Sierra Leone to the intensive, semi-mechanized oyster industry in Japan. The film also explains the biology of the oysters and describes the stages in the culture process -- from spat or seed collection through harvest to preparation for market. Different culture systems are demonstrated, illustrating how farming techniques can be adopted to local condition and resources. Problem that may hinder operations are pointed out.

Scientific as well as entertaining, *Oyster Farming in the Tropics* lends itself to classroom use and to educational programming on televisions. It can be a valuable tool for briefing decision-makers and researchers on the potential for oyster culture in tropical regions.

The film was produced in April 1979, for IDRC, by Neill McKee.

For loans, inquire with:

1. Communications Division
   IDRC, P.O. Box 8500
   Ottawa, Canada K1G 3H9
   Telex: 053-3753

2. Associate Director (Fisheries)
   IDRC, 5990 IONA Drive
   UBC
   Vancouver, B.C. Canada V6T 1L4
   Telex: FRB VAN 045 5211

3. IDRC Regional Office for Asia
   Tangilin P.O. Box 101
   Telex RS 21076

Purchases:
Graphic Films Ltd.
19 Fairmont Ave.
Ottawa, Canada K1Y 1X4
Telex: 053-3622

All Set for 2nd World Aquaculture Meet

The second international aquaculture convention and exposition will be held from March 5 to 8, 1980 at the New Orleans Hilton in Louisiana City, U.S.A., the sponsors announced recently. The meeting is being sponsored by the World Mariculture Society, Catfish Farmers of America, U.S. Trout Farmers Association and the Fish Culture Section of the American Fisheries Society.

Dubbed as AQUACULTURE/NEW ORLEANS/'80, it is expected to be the largest aquaculture meeting ever held in the world.

The organizers expect attendance of some 1,500 persons and participation in the exposition of 75 to 100 companies. Exhibitors will include manufacturers of aquaculture equipment and suppliers of netting, rope and twine, fishing and feeding equipment, pumps, compressors refrigeration systems, formula feeds, aeration and water monitoring systems, chemicals and medications. Also participating in the exposition are aquaculture producers, colleges and universities, experimental stations, marketing organizations and trade publications.

For information on registration, trade show exhibits and presentation of papers, contact: Marty Lindsey, Aquaculture/New Orleans/'80, P.O. Box 2451, Little Rock, Arkansas 72203, (501) 376-1921. ●

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