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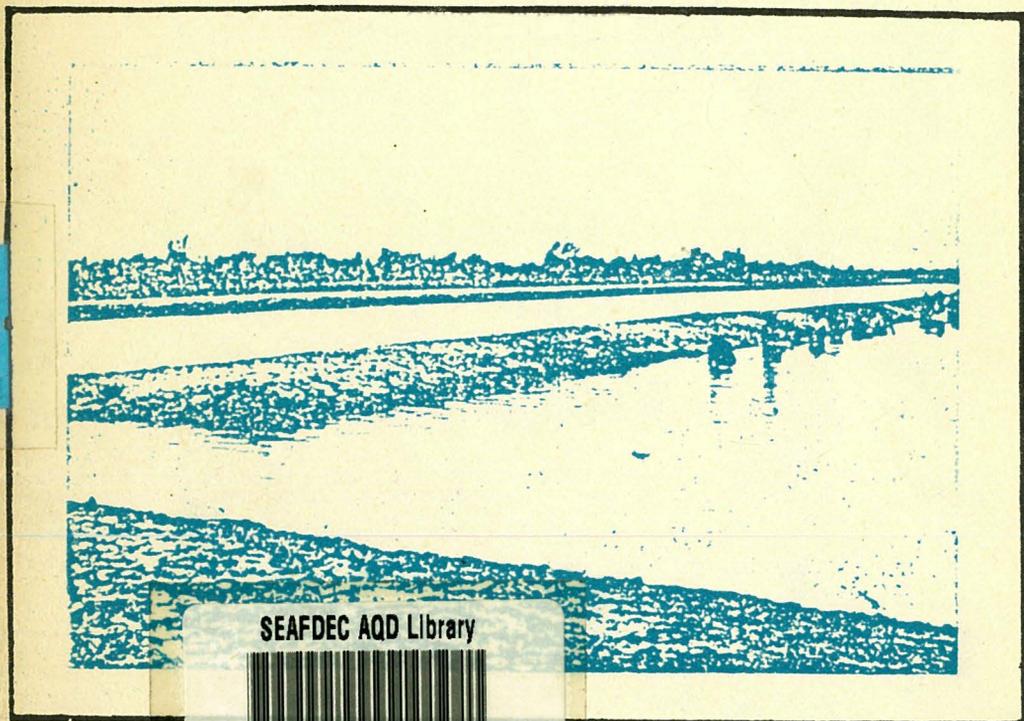
Southeast Asian Fisheries Development Center
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SHRIMP CULTURE



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by

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SHRIMP CULTURE

by

Vanich Varikul

Information and Publication Unit
Fishery Conservation and Extension Division
Department of Fisheries
Thailand

The Secretariat
Southeast Asian Fisheries Development Center
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This manual is a translation of the Thai information pamphlet entitled "*Kantham na krung*" published by the Department of Fisheries, Thailand in 1978. The translation was prepared by Mrs. Supranee Chinabut, National Inland Fisheries Institute (NIFI), Kasetsart University Campus, Bangkok, Thailand and adapted by the SEAFDEC Secretariat.

The Appendix is a translation of the Thai information pamphlet entitled "*Kanliang krung thalae baab hai phol phalit soong*" published by the Department of Fisheries in 1981. The translation was prepared by Mr. Vijai Srisuwantach, also affiliated with NIFI.

SHRIMP CULTURE

by

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INTRODUCTION

Marine shrimp, *Penaeus spp.*, are generally cultured in ponds located in coastal areas near rivers, canals or small creeks adjacent to the sea. Pond culture in such areas has been successful in many Asian countries.

Shrimp culture in Asian countries is reported to have originated in Sri Lanka and later on spread to India. The technique consisted in collecting post larvae from natural waters and stocking them in paddy fields. In Burma, post larvae were collected during high tide and then stocked in ponds. In the Philippines and Indonesia shrimp culture became a by-product of brackishwater fish culture when a large number of shrimp larvae were carried into ponds accidentally by the tide or when water was pumped into the ponds. These larvae grew very well and increased the revenue from brackishwater fish

culture. This led to the idea of brackishwater fish and shrimp polyculture, and finally to the present-day monoculture of shrimp.

The countries other than Thailand that have been successful in shrimp farming are the Philippines, India, Indonesia, Vietnam, Burma and Pakistan.

HISTORY OF SHRIMP FARMING IN THAILAND

Shrimp farming in Thailand has been practised for the last 30 years. Originally, mangrove forests have been cleared for growing rice. The farmers observed that the post larvae that were carried into the fields during the high tide grew very well. They, therefore, became interested in farming shrimp as well as growing rice. In some areas, rice farming and shrimp culture can be done at different periods during the year. Rice is generally grown in the rainy season when the fields will not be flooded at high tides. Crop rotation system was applied to the paddy fields. This system was first practised in Samutprakarn province. Later on, this type of farm operation has been proved successful in the provinces of Chanthaburi, Samutsakorn and Samutsongkram.

SELECTING THE SITE FOR SHRIMP FARM

In selecting a site for shrimp farm construction, the basic requirements are the same as for the brackishwater fish farming system. The area should be tidal flat such as mangrove

forest along the coast. It should be fully flooded during high tide. The soil should be sufficiently fertile to provide the shrimp with highly-nutritive natural food. The following soil types and other characteristics of the farm area should be taken into consideration:

(a) Mud consisting of a clay-type soil that can retain water and well-packed in forming the pond dike is recommended. This soil type is usually organic-rich and fertile. Sand or sandy soils are not suitable for prawn farm construction.

(b) Water resource is very important for shrimp farming operations. Therefore, the farm should be located near the sea. There should be a canal or creek connecting the pond and the sea. This canal serves as a waterway through which the shrimp post larvae can be carried into the rearing pond.

(c) Good draining system is necessary for the shrimp farm. Water supply to the farm should easily be retained or drained while the pond is being cleaned.

(d) The farm area should be flat land, submerged to the depth of one metre during high tide. This should reduce the cost in constructing a pond dike or in dredging the pond. Prior to the pond construction, the abundance of the shrimp post larvae in the near-by sea should be investigated. This is to ensure the adequate post larvae supply to the ponds.

(f) The farm should be located close to a market to save on transportation costs. Another advantage is that the shrimp can be harvested and sold to the market in fresh condition.

POND CONSTRUCTION METHOD

The pond should be constructed as follows:-

1. Planning

After selection of the farm site, a construction plan should be drawn so that the dike, water gate, fence, etc., can be located at suitable points. Before commencing construction, the area must be marked off with lime, stakes or paint to indicate the location of the above-mentioned works.

2. Pond dike

Bushes and trees in the pond vicinity should be cleared prior to the construction of the pond dike. The soil is dug up for building the dike. The dike should be about 30 cm higher than the maximum level of the high tide to prevent overflow caused by waves during the monsoon season. The top of the dike should be approximately 1 m wide with an appropriate slope to its base.

3. Water gate

The water gate should be located at the point nearest to the sea in order to let in a maximum amount of sea water during the high tide. Another gate, for draining purposes, should be located at the deepest end of the pond. This gate is operated when shrimp are to be harvested or to remove bottom mud from the pond. The gate size varies in relation to the area of the pond.

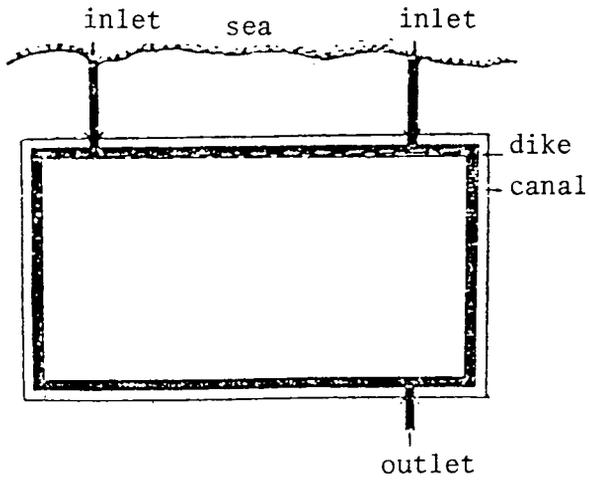
Normally, the drained gate is about 80 to 200 cm wide for a 25-rai pond. Two gates are generally sufficient but three to four may be necessary for a 50-rai or larger pond. The gate must be strongly built to prevent leakage. It is recommended that the gate floor be well packed by using rock or cement as a re-enforcement material.

4. Drainage canal

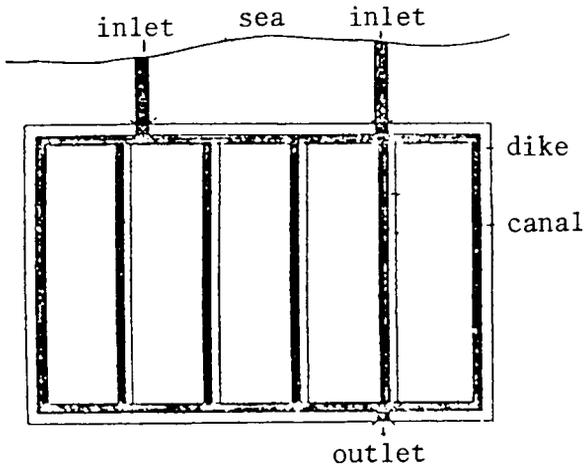
There should be a drainage canal on the inside of the pond running parallel to the pond dike. This canal should be 2 to 2.5 m wide and 1 m deep so that the shrimp can take refuge in the canal during the low water-level period or during the heat.

5. Pond size

There are, in general, two categories of ponds, those with and without drainage canals. Ponds with drainage canals usually measure about 25 to 50 rai. For ponds of these dimensions, it is recommended that the canals be 40 m apart, so that the shrimp, after feeding in the shallow portion of the pond, can move to the canals if the water level in the pond declines. There is no need to have a drainage canal for ponds measuring less than 25 rai.



Pond without parallel canals



Pond with parallel canals

OPERATION TECHNIQUE

The pond should be prepared by being completely drained to dry the bottom mud prior to the rearing period. Algae are allowed to grow on the bottom surface. Fertilizer should also be applied to the pond thereafter.

When the pond has been prepared, the water gate is opened during the high-tide period and closed after an adequate amount of water is obtained. The gate will be opened occasionally when the water-level outside is higher than that inside the pond. This will allow more post larvae to be carried into the pond.

It should be cautioned that the shrimp post larvae that were first carried into the pond are capable of swimming against the current in order to escape from the pond while water is being let in. Therefore, before opening the gate to let water in, one must ensure that the water level outside the pond is high enough to create a strong current to prevent the shrimp from swimming out of the pond. In case of polluted water and draining the pond is necessary, a fine mesh screen should be used to block the shrimp at the gate.

MAINTENANCE OF THE POND

1. Water gate

Leaks in the water gate should be checked periodically. The gate should be opened only when the water level outside the pond is considerably higher than inside the pond for the reasons given in the previous section.

2. Water quality

Good water quality is an important requirement in rearing shrimp. Thus water properties such as turbidity and other unusual chemical characteristics should be carefully investigated. Low salinity and high turbidity due to heavy rains often cause low shrimp' production. In such case, the pond should be drained and a new sea water supply should be introduced. Normally, the water should be changed once a week. If the water level outside the pond is not higher than that inside the pond, the water can be drained off through a mesh screen by pumping just before high tide. Thus the water level inside the pond is low enough for the sea water to flow in while opening the gate.

3. Predators

Fishes, such as needle fish, tarpon and tilapia, are natural predators of shrimp. They may get into the ponds with the sea water flows. They should be removed or prevented from getting into the pond. Fine mesh net or bamboo fences can be used to keep them out. Birds, snakes and frogs are also keen predators. Their populations within the pond must be controlled.

HARVESTING

The following techniques are used for harvesting shrimp:

(a) Standing bamboo trap

This is the best technique for harvesting shrimp since no loss of natural food from the pond will occur. Standing bamboo traps, together with bamboo fences, are set at various places within the pond. A lamp is usually hung on top of the trap to attract the shrimp to enter the trap.

(b) Bamboo trap with net

One end of the tube-like net about 1 to 2 m long is set at the outlet of the gate in a horizontal position, the other end being placed on the mouth of the bamboo trap. When the water is drained through the net, the shrimp are trapped in the bamboo cage. Shrimp can be caught in large quantity by this technique. However, nutrient loss also occurs while the water is drained out.

(c) Net trap

This technique is similar to the one described under (b) above, except that the entire trap is made of a sack-like net which is about 4 m in length and 4 m in diameter at the open end. The diameter of the open end of the trap is approximately 4 m or is as wide as the diameter of the drainage outlet. This trap net

was first used at Chanthaburi Fisheries Station. It was found that the net trap was one of the efficient fishing gears and was convenient to operate.

(d) Cast net

This technique is appropriate for a small quantity of shrimp such as for household consumption or when the water level is extremely low in the pond.

Shrimp are normally harvested at night in order that fresh, good quality shrimp can reach the market by the next morning.

ADVANTAGES OF SHRIMP CULTURE

Fishes, such as *Chanos*, *Lates* and *Mugil*, as well as other invertebrates such as crabs may find their way into the shrimp pond during the shrimp raising period. These animals are considered profitable by-products of shrimp farming.

After the shrimp have been harvested, the pond can be utilized for the culture of *Chanos* or *Mugil*. This crop rotation system will help farmers to increase their production and to maximize their use of the land.

SHRIMP RAISING PERIOD

The shrimp raising season varies from place to place.

Two crops a year are possible in the eastern coast of Thailand, as in the vicinity of Chanthaburi. The period of the first crop is from June to August, while the second crop is from November to February. Reconditioning of the ponds is undertaken during the other months of the year. Experiments in shrimp production carried out by fishery biologists indicate that a higher production of shrimp is obtained during the November to February period. This has been attributed to the adequate amount of sea water during this period. Low production during June to August is due to inadequate supply of sea water.

Shrimp culture can be carried out all the year round within the vicinity of Samutprakarn, Samutsakorn and Samutsongkram. As soon as the bottom mud has been removed, the new fresh supply of sea water is introduced into the ponds in early April. The first crop is harvested approximately one and a half month later. Harvesting is continued throughout the year with another high crop production in October. During October, the reconditioning of the pond is necessary. While removing the bottom mud, the water need not to be drained out completely. But the water level should be low enough for the pond reconditioning operation.

INTENSIVE METHODS FOR MARINE SHRIMP CULTURE

Information and Publication Unit
Fishery Conservation and Extension Division
Department of Fisheries, Thailand*

INTRODUCTION

In the past, marine shrimp farming in Thailand was termed natural farming, whereby rice fields or salt farms are converted to shrimp farms. The farmers trap shrimp seed in incoming sea water by opening the sluice gates or by using a water pump. The production therefore depends on the amount of seed introduced and also on the frequency of changing the water.

At present, many farmers are using new farming techniques to increase their production. Therefore, both old and new methods of culture are now in use. These can be categorized into the following three types:

1. Natural stocking method

The shrimp ponds are constructed in estuarine and coastal areas where there are wide tidal ranges and abundance of shrimp seed. The sluice gates of the pond should be able to control the inflow and outflow of water and also maintain the desirable water level in the pond. They are opened daily during high

* Translated by Mr. Vijai Srisuwantach, Senior Fisheries Biologist, National Inland Fisheries Institute (NIFI).

tide, allowing shrimp seed and other aquatic organisms to enter the pond. The shrimp can be harvested after one to two months of stocking. Harvesting is done repeatedly until there are no more shrimp in the pond. The bottom mud is removed afterward.

2. Integrated stocking method

This method is similar to natural stocking but applies additional techniques such as feeding, use of fertilizers, rearing of seed produced under controlled conditions together with natural seed, and change of water at least 20 days a month. The growing period is about two to six months and only one harvest is done. Production resulting from this method is higher than that of natural stocking.

3. Intensive stocking method

Shrimp farms operate with a supply of shrimp seed produced under controlled conditions. Pond management is similar to that practised in the integrated stocking method. The stocking density is about 16 to 20 individuals per square metre, depending on the species of shrimp cultured. The grow-out period is about three to six months. This type of culture in Thailand is now at an early stage of development.

The integrated and intensive stocking methods are presented in this manual.

The following species are profitable and suitable for culturing in Thailand:

- (1) *Penaeus monodon* Fabricus
- (2) *Penaeus merguensis* de Man
- (3) *Penaeus indicus* M. Milne-Edwards
- (4) *Metapenaeus ensis* de Haan

The Department of Fisheries has established shrimp hatcheries along the coast of Thailand. Farmers can obtain seed produced under controlled conditions from the following fisheries stations:

Fisheries Station	Species
1. Phuket	<i>P. monodon</i> <i>P. merguensis</i>
2. National Institute of Coastal Aquaculture (NICA)	<i>P. monodon</i> <i>P. merguensis</i>
3. Rayong	<i>P. merguensis</i>
4. Satun	<i>P. monodon</i>
5. Prachuap Khiri Khan	still in the process
6. Surat Thani	still in the process

INTENSIVE CULTURE METHODS

A. Site Selection Criteria

1. Location

The land elevation should be such that the highest tides flood the land about 0.5 to 1 m. The area should be easily flooded and properly drained. The water should be kept at a level to avoid the overflow over the dikes during floods or storms. The pond site should not be in the vicinity of industrial estates or a source of water pollution. The pond should be far enough from the river mouth to avoid freshwater runoff during the rainy season.

2. Soils

Clay or sediment with high clay content is appropriate for shrimp pond construction. Sandy clay is the best soil for dike construction, because it can hold water and does not erode. Types of soil also affect shrimp growth. *P. monodon* and *P. semisulcatus* prefer sandy clay, while *P. merguensis* and *M. brevicornis* prefer muddy clay.

3. Water quality

The pond should be in an area with easy access to sea water. It should also be capable of being filled or drained at any time. Fluctuations in salinity and temperature at different seasons of the year should be moderate. The water should be free from pollutants.

4. Availability of natural food

Natural food should be abundant at the pond site.

5. Social and economic factors

The provision of sufficient funds must be ensured. An effort should be made to understand the local people, as problems may arise, particularly if the activities of local people are disrupted.

6. Transportation

The pond site should not be far from the source of shrimp feed, nor from the market for ease of transport of the harvested shrimp.

B. Pond Construction

After site selection, the next step is to map out the design of the rearing pond.

The pond should be so located that its length is in the same direction as the direction of the wind. Shrimp ponds should have separate water intake and discharge canals. The canal for water intake should be wide and deep enough to retain sufficient water for changing about one-third of the pond water 20 days a month. The depth of the pond should be about 1.25 to 1.50 m.

It is recommended that the dike surrounding the pond should have a slope of 1:1 for clay soil and 1:2 for sandy clay. The size of the pond should be approximately 4,800 to 8,000 m². The following steps are suggested for pond construction:

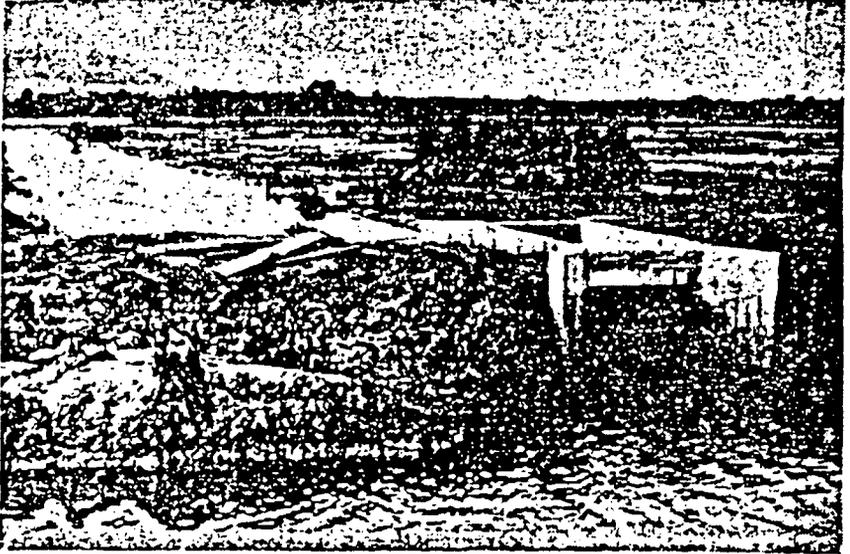
1. Layout

The location of the dikes, gates, and water intake and discharge canals should be carefully considered before construction begins.

2. Dikes

All trees and stumps must be cleared before dike construction is started because they might cause leakage. The bottom of each dike must be 30 cm below the level of the surrounding area in order to prevent water seepage under the dike. The dikes are built from the soil set aside from digging the trenches inside the pond. Their height should exceed the maximum water level by 30 cm. The width of the dikes should be about 3 to 4 or 5 to 8 m depending on the type of soil.

3. Water control gates



A sluice gate should be located near the water source in order to take in water during high tide. Another sluice gate is located at the opposite end of the pond. The gates should be about 1 to 2 cm. thick. The number of gates depends on the size of the pond, i.e., two gates for a 4 ha pond and three to four gates for an 8 ha pond. The gates should be watertight and have a strong foundation in the form of a cement base.

4. Trenches inside the pond

The width of the trenches used for harvesting should be 5 to 6 m with a depth of 1.5 m.

5. Size and type of pond

There are two types of shrimp pond: with sub-trenches and without sub-trenches. The sub-trench type is used for ponds with an area exceeding 4 ha. The sub-trenches should be positioned parallel to each other at 40 m intervals across the breadth of the pond. An integrated shrimp pond should be approximately 1.5-3.5 ha.

6. Nursery pond

The nursery pond should be adjacent to the rearing pond. A pen constructed in the rearing pond may also be used. Prior to stocking, it is essential to eradicate undesirable fishes and other predators in the nursery pond. Tea-seed cake has proven to be the best poison for use in shrimp ponds because it kills fishes only and has no effect on shrimp.

7. Intensive stocking methods depend mainly on shrimp seed produced under controlled conditions. Each pond is approximately 0.5 ha with trenches 15 m. wide. The width of the dike should be 3-4 m.

C. Nursery Pond Operations

In integrated farming, the farmer needs to nurse the seed prior to releasing it into the pond. Shrimp seed produced under controlled conditions and distributed by fisheries stations are within the range of 1.2 to 1.5 cm in length and weigh 20 to 50 mg at the age of 35 to 40 days. The larvae should be kept in the nursery pond for one month until they reach a length of 5 to 7 cm. They are then released into the pond together with natural seeds. The farmer will thus get shrimp that are both healthier and big enough to escape predators.

The following steps are recommended for the nursing of shrimp:

1. Preparation of nursery ponds

Farmers should get rid of predators, remove the mud at the bottom and let the pond dry out for 1 to 2 weeks before pumping in water. The water taken in must be filtered with a screen to keep predators out of the pond. The water level in the nursery pond should be about 1 m in depth. Cages or pens constructed in the rearing pond may be used instead of a nursery pond.



Screen to prevent predators from entering the pond.

2. Fry Transportation

The following precautions should be taken when transporting shrimp fry: the length of time spent for transportation and the temperature, which should be controlled at 16 to 20°C. It is best to make shipments at night when the temperature is easier to control.

Two methods for fry transportation are commonly used:

(1) Shrimp fry in plastic bags filled up with oxygen are placed in a container which is tightly sealed by using banana stem

strippings for the inner seal and a mixture of sawdust and ice for the outer seal. The ratio of sawdust to ice should be 2:1 for less than 10 hours' transportation and 4:3 or 1:1 for 10 to 15 hours' transportation.

(2) For transportation exceeding 15 hours, air-conditioned vans or refrigerator trucks are commonly used.

3. Stocking of fry in nursery ponds

To prevent death or injury from shock caused by a sudden change in temperature, the bags in which the fry have been transported should be floated in the pond water for 15 to 20 minutes to acclimatize the fry. The bags should then be filled with pond water and the fry released into the pond.

4. Feeding

Feed for shrimp fry 1.2 to 1.5 cm in length should be ground or finely chopped. Minced molluscs or fish can be used as feed. The feeding rate should be 100 per cent of wet body weight. The fry should be fed twice a day, morning and afternoon. Farmers should monitor the amount of feed in the pond whether there is any left over. If some feed is left over, the amount of feed should be reduced by 10 per cent and checked frequently.



Preparation of shrimp feed

Careful attention should be given to feeding adjustments. Since shrimp fry are carnivorous, they are liable to eat each other if they do not find enough food. However, overfeeding easily deteriorates the water quality. This may cause low oxygen concentration in the pond. After they have been nursed for one month, shrimp will reach 5 to 7 cm in total length.

D. Rearing Pond Operations

1. Stocking Rate

In the integrated stocking method, an estimate of the number of shrimp from the wild should be made prior to the stocking of hatchery-produced fry. The stocking rate of shrimp 5 to 7 cm

in length is about 10 to 20 individuals per square metre. In the intensive stocking method, the hatchery-produced fry 1.5 cm in length can be stocked directly in well-prepared rearing ponds. The stocking rate is 16 to 20 individuals per square metre. The water temperature and salinity in both the hatchery pond and rearing pond should be adjusted prior to stocking.



Ground feed consisting of trash fish and rice bran

2. Feeding

The feed for shrimp fry exceeding 1.5 cm in length consists of trash fish, rice bran, dry shrimp shell, crabs, molluscs or chicken feed. These feed types must be minced before use. Feed should be given twice a day, morning and afternoon. The amount of feed in the initial period should be 100 per cent of wet body weight. The feed ration should be adjusted by observing whether or not feed is left over. If there is, the ration should be reduced not exceeding 10 per cent each time. During the first month, shrimp of 1.5 cm feed continuously. But during the second month, their demand for food decreases to approximately 10-15 per cent of the body weight. But during maturation in the third month, the feed ration should be 20 per cent of body weight. The simplest way to determine whether the feed is sufficient is to examine the shrimp abdomen. A continuous black line (stomach and intestine) suggests enough feed. On the other hand, a discontinuous black line indicates insufficient feed.

The feed is placed on trays measuring about 1 m² and lowered to a depth of about 30 cm under the water surface. These trays are submerged either along the sides of the pond or in a central area, with 1 to 2 m between each tray. Feed should always be given at the same places.



The feed for shrimp is placed on trays

HARVESTING

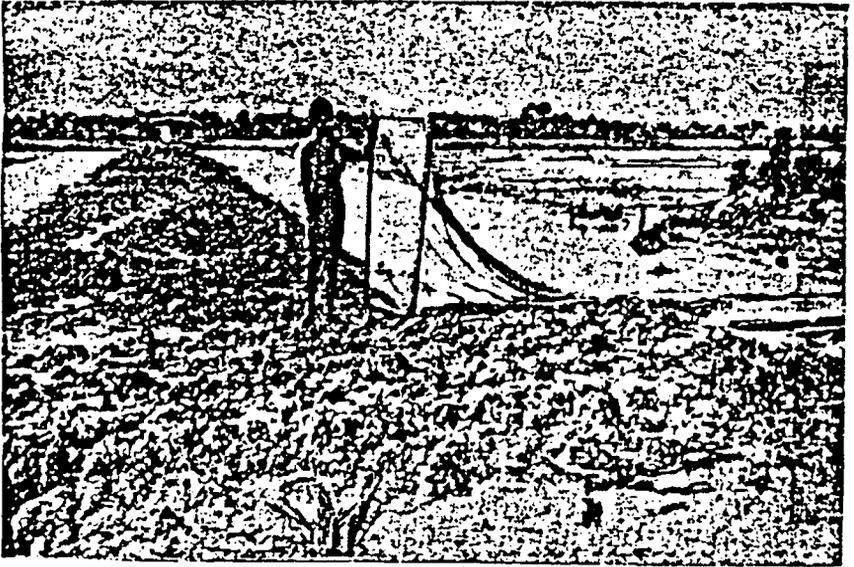
After a growing period of three to six months, depending on the species, the shrimp will reach marketable size and will be ready for harvesting. The most common harvesting methods are:

1. Traps

The trap should be set at night. A small lamp is placed on the top of the trap to attract the shrimp. The trap is emptied every day until only a small number of shrimp are left in the pond. The pond is then drained. The advantages of using traps is that this method allows selective cropping of the larger shrimp and ensures their good condition.

2. Bag net in sluice gate

A bag net is about 4 to 5 m long with a 1 cm mesh size. A wooden frame is fixed at one end and placed across the sluice gate. The best time for this type of harvesting is at night during low tide. The water is drained until water remains only in the trenches or the harvest basin and then the sluice gate is closed. Usually, harvesting will take about 7 to 10 days to complete. Final harvesting is by hand after all the water has been drained from the pond.



Harvest bag net with wooden frame

3. Cast net

A cast net is used to harvest a small number of shrimp. One harvest is usually carried out in the intensive pond. The water is drained out from the pond by opening the sluice gate. A bag net with wooden frame is placed across the sluice gate to trap the shrimp from the outflow.

PREDATORS AND COMPETITORS

1. Predators

Carnivorous fish, e.g., sea bass, tassel fish, crescent grunter, and spotted scat, as well as snakes and frogs, have been identified as important predators in the shrimp ponds.

2. Competitors

Harbivorous fish, e.g., mullet, *Tilapia mossambica*, *T. nilotica*, milkfish, as well as snails, compete for food in shrimp ponds.

Notes on Improving Production

1. Low pH in the pond water may have a direct effect on shrimp. The optimal pH range required for shrimp culture is from 6.5 to 8.5. The problem of lower or higher pH can be solved by discharging about 10 per cent of the total volume of the bottom water and taking in a new supply of water. Changing the water can be done every day until the pH of the water reaches an appropriate level.

2. To ensure that the temperature of the pond water does not become too high, a sufficient water depth should be provided. The minimum water depth should be such as to enable adequate mixing of the water by the effect of wind action.

3. Accumulated mud and organic debris must be removed at least two to three times a year. The trenches inside the pond also need cleaning out and deepening. This may reduce the production of hydrogen sulphide (H_2S) and harmful substances formed during anaerobic reduction of the organic material when the pond is full of water. It is also necessary to let the pond bottom dry out after every harvest.
4. It is recommended that the water level be kept no lower than 30 cm because lab-lab shows good growth at low water levels from 10 to 20 cm.
5. Close attention should be given to any sign of change in shrimp activity.
6. To maintain adequate dissolved oxygen in the pond water, change of water is required by letting a new supply of water into the pond.
7. The condition of the dikes should be frequently examined for any leaks. Damage should be repaired immediately to prevent shrimp escaping from the pond.

LIST OF SAFIS EXTENSION MANUALS

- SEC/SM/1 Khumua liang pla namcheut (Freshwater Fish Farming: How to Begin)-- in Thai
- SEC/SM/2 Oyster Culture
- SEC/SM/3 Mussel Culture
- SEC/SM/4 Ang pagpuna ug pagtapak sa pukot (Net Mending and Patching)-- in Cebuano-Bisaya
- SEC/SM/5 Mussel Farming
- SEC/SM/6 Menternak Ikan Airtawar (Freshwater Fish Farming: How to Begin)-- in Bahasa Malaysia
- SEC/SM/7 Makanan dan Pemakanan Udang Harimau, *Penaeus monodon* (Nutrition and Feeding of Sugpo, *Penaeus monodon*) -- in Bahasa Malaysia
- SEC/SM/8 Macrobrachium Culture
- SEC/SM/9 Selection of Marine Shrimp for Culture
- SEC/SM/10 Induced Breeding of Thai Silver Carp
- SEC/SM/11 Culture of Sea Bass
- SEC/SM/12 Smoke-Curing of Fish

- SEC/SM/13 Cockle Culture
- SEC/SM/14 Net Mending and Patching
- SEC/SM/15 Kanliang hoy malangphu (Mussel Farming)-- in Thai
- SEC/SM/16 Nursery Management of Prawns
- SEC/SM/17 Culture of Sultan Fish (*Leptobarbus hoevenii*)
- SEC/SM/18 The Use of the Traditional Drying Method and Solar Drier for Croaker, Mullet and Herring
- SEC/SM/19 Shrimp Culture

SAFIS

0 What is SAFIS?

SAFIS is the Southeast Asian Fisheries Information Service. It is a project of the SEAFDEC Secretariat set up to provide extension materials for small-scale fishermen and fish farmers in the region.

0 What are its objectives?

The immediate objectives are to collect and compile fisheries extension manuals, brochures, pamphlets and related aids for small-scale fisheries development, and to translate selected literature into local languages for distribution to fisheries extension workers in Southeast Asia.

0 What services will SAFIS provide?

SAFIS will attempt to provide information and publications such as:

- lists of available texts in fisheries extension services,
- translation of suitable manuals,
- manuals of appropriate technologies,
- photocopies of appropriate fisheries extension literature,
- a current awareness service of regional fisheries.

0 How much will these services cost?

A nominal cost of US \$0.15 per page will be charged for photocopying, handling, and surface mail. Airmail costs will be extra. The publication cost per manual will vary according to the book.

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SAFIS is the Southeast Asian Fisheries Information Service. It is a project of the SEAFDEC Secretariat set up to provide extension materials for small - scale fishermen and fish farmers in the region. For additional information, contact the Project Leader of SAFIS

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