Tiger shrimp (*P. monodon*) is able to survive and grow in wide range of salinity from 2 to 45 ppt. Therefore shrimp farmers can expand their farms extensively in different area/environment. However, extremely high or low salinity always causes more problems than the suitable salinities which range from 15 to 25 ppt. Culture in extremely high salinities over 30 ppt may cause disease problems, particularly white spot or yellow head virus and luminescent bacteria. Therefore, more shrimp farmers keep moving toward brackishwater or freshwater areas. In 1995, the author summarized the problems and solutions for *P. monodon* culture in freshwater area which some of you may have seen. Due to the increases and changes in knowledge and problems on shrimp culture in low salinity, the author has therefore compiled this information and re-summarized for consideration so that the farmers can find the suitable culture method for each environment and farming system. The major problems on *P. monodon* culture in low salinity areas include:

**Salinity**

The suitable salinity for seed stocking should not be lower than 7-8 ppt during the first month in order to reduce problems in acclimatization of postlarvae (PL) transported from hatchery. Then salinity can be gradually reduced but should not be lower than 2 ppt during the growth up to 10-12 gm. If salinity is lower than this, stunting or mortality may occur. If stunting or soft shell occur, it is necessary to add more saline water to increase pond salinity.

**Water management**

Farmers should have reservoir/treatment ponds or canals surrounding the growout pond for sedimentation of organic loads at least 2-3 days before recycling. Water recycling should start when pond water becomes a dark color and turbid and feed amount does not increase. Pond water should be drained for recycling in order to reduce accumulated pond waste when water filling alone is not sufficient for improving water quality. Surrounding canals or treatment ponds can also serve for sludge sedimentation of pond effluent during harvest. This 1.5 m depth canal should be wider than 5.0 m or large enough for stocking/recycling of water drained from 2 grow-out ponds.

**pH control**

Due to its minimal water exchange system, over-blooming of phytoplankton always occurs during the culture period, which will increase water pH and also cause pH fluctuation between day and night. Therefore phytoplankton growth should be controlled by occasional water exchange from reservoir/treatment ponds. The suitable pH should be 7.8-8.0 in the morning and not exceed 8.3 in the afternoon. If water exchange does not make any difference, formalin treatment at the rate of 6.25-31.25 l/ha/day for 3-5 days will help to reduce water pH. If water pH in the morning is higher than 8.0, application of any type of lime is prohibited.

**Alkalinity**

Alkalinity should generally be 50 ppm in bicarbonate form, which can keep water pH stable. Lime in the forms of calcium carbonate or dolomite should be applied before seed stocking. Application of sodium bicarbonate at the rate of 62.5-125 kg/ha also increases pond alkalinity. Then fertilization should follow because plankton growth can increase water alkalinity.

**Rough shell**

If pond alkalinity and pH exceed 150 ppm and 8.3 respectively, calcium will deposit on the shrimp shell, which consequently stunts shrimp growth. In order to solve this problem, water pH should be kept less than 8.3 and be followed by water exchange or formalin treatment.

**Shrimp mortality and cannibalism**

After 70-80 days in ponds where salinity is too low shrimp cannot molt properly and may have a soft shell which allows them to be eaten by stronger shrimp. If soft shell occurs, saline
Turbid water

Due to high stocking density (500,000 PL/ha) and closed system, ammonia levels in ponds can be very high. In conjunction, the increase of water pH also causes severe toxicity of ammonia. Therefore, farmers should reserve water in reservoirs or in recycling ponds for exchange and pH control.

Turbid water

For newly constructed or renovated ponds, water stays turbid for 40-50 days after seed stocking or water exchange. Shrimp may then be dark or red color in pond water or table salt should be added. After the bloom of newly introduced plankton, turbidity will disappear.

Slow growth or stunting

After 90 days culture period, farmers may observe stunting and reduced feeding of shrimp. Too low salinity or too much pond waste may cause this. These can be solved by drainage of bottom water and filling with saline water. In case of high stocking density, some shrimp should be transferred to other ponds.

The above problems are generally found in all shrimp farming areas. Farmers should carefully observe shrimp health and closely monitor water quality. For good production, proper treatment should be done urgently to prevent any loss.
5.usband's research on aquaculture

The research team, which included scientists from various disciplines, found that the use of specific bacteria in a particular environment could significantly increase the growth rate of aquatic organisms. The bacteria were identified as a key factor in improving the overall health and productivity of the aquatic species under study. The team's findings were published in a recent issue of the Aquaculture Asia magazine, which is available on CD.

6. Husband's research on climate and oceanography

Husband's research on climate and oceanography has received widespread attention. His team has discovered that changes in ocean temperature and salinity have a significant impact on marine ecosystems. These findings have important implications for the conservation and management of marine resources.

7. Husband's research on fisheries

Husband's research on fisheries has led to the development of new technologies for improving fish stock management. These technologies have been widely adopted by fish farmers around the world, resulting in increased fish yields and improved sustainability.

8. Husband's research on pollution

Husband's research on pollution has shed light on the devastating impact of pollution on marine ecosystems. His team has developed innovative solutions for reducing pollution and promoting the recovery of degraded habitats.

9. Husband's research on biodiversity

Husband's research on biodiversity has contributed to our understanding of the complex interactions between different species. His team's findings have important implications for the conservation and management of biodiversity.

Get Aquaculture Asia on CD and get NACA's other publications FREE each quarter! 

More information, lower price

- From January 2003 Aquaculture Asia Magazine will also be available on a business-card style CD, in PDF (portable document format).
- ALL other NACA publications produced in the preceding quarter are included at no extra charge
- A 15% introductory discount applies to CD subscriptions

System requirements

- Operates in standard CD drive
- Acrobat Reader version 4 and higher (version 5 included)

$US 15 / year**

Subscription enquiries

Contact publications@enaca.org, fax +66-2 561 1727 or post to NACA Publications, PO Box 1040, Kasetsart Post Office, Ladoyo, Jatujak, Bangkok 10903, Thailand

** Rate in NACA member countries, add $10 elsewhere
A well-balanced diet is essential for our health. Hence the saying "you are what you eat". However accurate this phrase may be, it does not cover the whole story. Because an important part of our daily diet is produced by animals. A diet for which fish and shrimp are of increasing importance. And, as you well know, their health also depends strongly on their diet.

In other words: the better the feed, the better the food. Therefore, we promote the production of prime quality fish and shrimp through improving the nutritional value and guaranteeing the safety of our feeds and concentrates. As our studies have revealed that this leads to less stress and diseases, in animals as well as in human beings. A result we always strive for. **Because we care.**