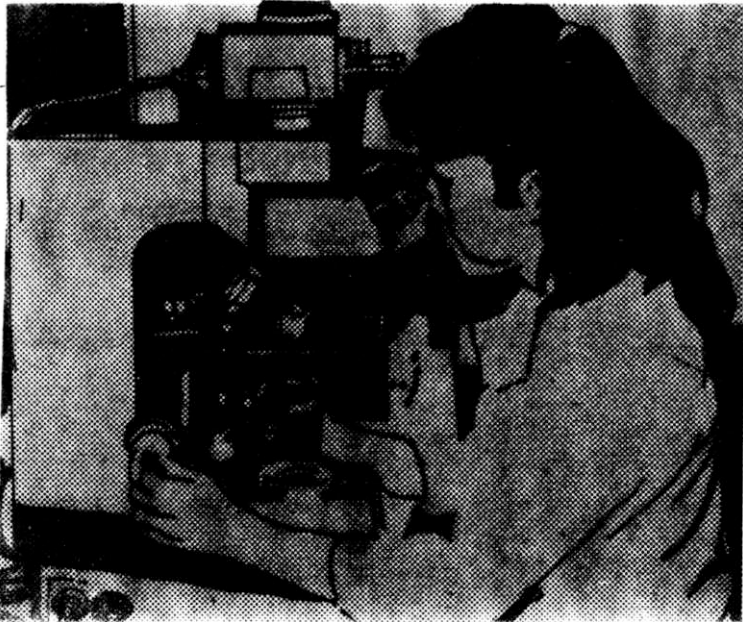


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Recommended practices for disease prevention in prawn and shrimp hatcheries

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RECOMMENDED PRACTICES FOR DISEASE PREVENTION IN PRAWN AND SHRIMP HATCHERIES

CONTENTS

INTRODUCTION	1
WATER	3
EQUIPMENT AND MATERIALS	6
PERSONNEL	6
FOOD, FEEDS	8
SPAWNERS	9
EGGS AND LARVAE	9
OTHER RECOMMENDATIONS	11
GLOSSARY	12
REFERENCES	13
ACKNOWLEDGMENT	14

RECOMMENDED PRACTICES FOR DISEASE PREVENTION IN PRAWN AND SHRIMP HATCHERIES

INTRODUCTION

Disease in prawn is any abnormal condition which may affect adversely the appearance, growth, and function of the animal. It may or may not result in mortalities. Disease outbreaks occur commonly in different culture systems such as hatcheries and grow-out ponds.

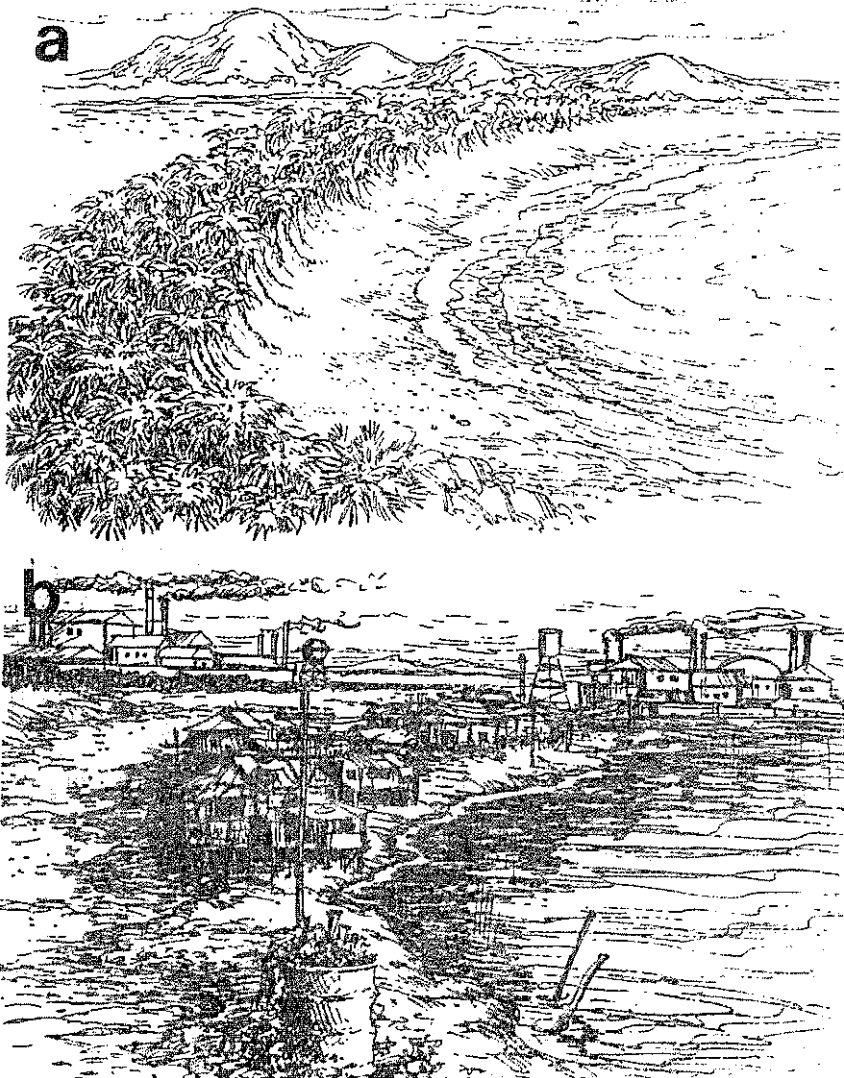
Disease develops through the interaction of the prawn (the host), the causal agent (the pathogen), and the environment. In the presence of a susceptible host, a pathogen and predisposing environmental conditions (poor water quality, inadequate food, frequent handling, overstocking), disease is very likely to occur. Improved environmental conditions, healthy prawns and absence of disease agents would therefore lessen the chance of a disease outbreak.

The causal agents may be pathogenic organisms (viruses, bacteria, fungi, protozoa, helminths, microcrustaceans) or non-pathogenic adverse environmental conditions (extreme temperatures, low oxygen levels, chemical poisons). Living disease agents cause infectious disease which generally result in gradual mortalities. Non-living disease agents cause non-infectious diseases that result in sudden mass mortalities.

The environment determines the balance between the prawn as host and the disease agent. Microorganisms are always present in the water and some of them cause disease only when the prawn has been weakened through exposure to stressful environmental conditions.

Hatchery personnel should realize that they themselves could transmit disease through their contaminated hands, clothing, and footwear. Equipment such as water pumps, blowers, pipes, and materials such as scoop nets, water hoses, pails, glasswares are also possible carriers of disease agents. Spawners, live natural food like diatoms, rotifers and brine shrimp, and artificial diets could also be vehicles of disease transmission.

The prawn culturist, thus, must be able to manage the environment and make it favorable for the prawn. Hatchery management should, therefore, include operation procedures that will reduce the possibility of disease development during larval rearing. This manual recommends practices for disease prevention to prawn hatchery operators and technicians.



WATER

- Ensure that the hatchery site is provided with an abundant supply of pollution-free seawater and freshwater (Fig. 1).
- Install at seawater intake sand filters which will allow back-washing (Fig. 2).

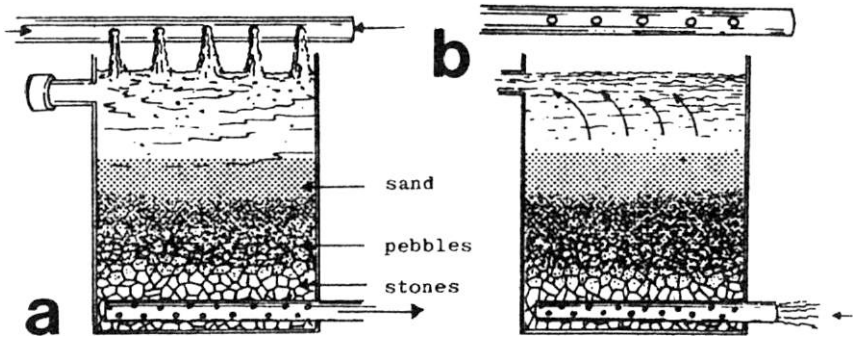


Fig. 2. Sand filter system showing operational inlet flow (a) and reverse flow or backwashing (b).

- Filter water with a fine net or cloth (Fig. 3) or cartridge filter before stocking in tanks. Clean filters regularly.
- Silt in water should be removed by sedimentation.
- Disinfect sand-filtered water with 5-20 ppm available chlorine for at least 12 hours. Calcium hypochlorite (powder form) or ordinary household bleach (Purex, Chlorox, etc.) may be used (Procedure 1; Tables 1, 2).
- Sand-filtered water may be sterilized also with ultraviolet light.
- Aerate rearing water properly.
- Change rearing water regularly (about 40-50% of total water volume daily) starting at Zoea I.
- Siphon off bottom sediments regularly to remove feces, organic debris, and unused feed and to minimize microbial multiplication.

Fig. 1. Ideal (a) and poor (b) hatchery sites; latter polluted with industrial and domestic wastes.

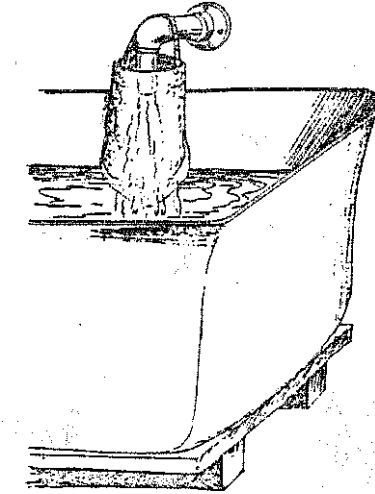


Fig. 3. Filtration of seawater using fine net.

PROCEDURE 1. Disinfection of rearing water using calcium hypochlorite (70% activity).

1. Using Table 1, determine the required amount of bleach powder for the volume of rearing water. Dissolve this amount first in a small volume of water (500 ml). For example, if the water volume is 0.5 ton or 500 liters and the desired concentration is 15 ppm, the amount of calcium hypochlorite needed is 10.8 g.

2. Fill the tank with the desired volume of water then add the calcium hypochlorite solution.

3. Allow chlorination of water for at least 12 hours and up to 24 hours, then check the residual chlorine level using portable kits available in the market. Neutralize remaining chlorine with equal amount of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$) before using the water.

4. For chlorination with ordinary household bleach (Purex, Chlorox, etc. with 5% available chlorine) use Table 2 to determine the amount of bleach to be used for a desired volume of water, then follow steps 2 and 3 above.

TABLE 1. Guide for determining the amount of powder calcium hypochlorite (in grams) to be used for water disinfection.

<i>Volume of water tons (liters)</i>	<i>Chlorine concentration</i>			
	<i>5 ppm</i>	<i>10 ppm</i>	<i>15 ppm</i>	<i>20 ppm</i>
0.25 (250)	1.4	3.6	5.4	7.2
0.50 (500)	3.6	7.1	10.7	14.3
1.0 (1,000)	7.1	14.3	21.4	28.6
2.0 (2,000)	14.3	28.6	42.9	57.1
3.0 (3,000)	21.4	42.9	64.3	85.7
5.0 (5,000)	35.7	71.4	107.1	142.9
10.0 (10,000)	71.4	142.9	214.3	285.7

The amount of calcium hypochlorite may be multiplied by different factors to obtain other chlorine concentrations.

Ex.: To obtain 400 ppm chlorine solution in 1 ton water, multiply 28.6 g by 20 or 14.3 g by 40.

TABLE 2. Guide for determining the amount of bleach solution (in milliliters) for water disinfection.

<i>Volume of water (tons)</i>	<i>Chlorine concentration</i>			
	<i>5 ppm</i>	<i>10 ppm</i>	<i>15 ppm</i>	<i>20 ppm</i>
0.25	25	50	75	100
0.50	50	100	150	200
1.0	100	200	300	400
2.0	200	400	600	800
3.0	300	600	900	1,200
5.0	500	1,000	1,500	2,000
10.0	1,000	2,000	3,000	4,000

- A flow-through water system may be adopted.
- Monitor regularly rearing water quality parameters such as salinity, pH, dissolved oxygen, ammonia, and temperature (Table 3).

TABLE 3. Recommended safe levels of selected water quality for shrimp and prawn larvae.

<i>Parameter</i>	<i>Safe level</i>
Salinity	30-35 ppt
pH/alkalinity	7.3-8.3
Dissolved oxygen	3.5 ppm (lower limit)
Ammonia (NH ₃)	0.02 ppm (upper limit)
Temperature	27°-30°C

EQUIPMENT AND MATERIALS

- Provide properly labelled materials like beakers, scoop nets, pails, etc. for exclusive use in individual tanks.
- Materials like brushes, pails, scoop nets, water hoses, and glasswares may be disinfected in between use in different tanks by dipping in 400 ppm chlorine (Procedure 1) followed by a thorough rinse with clean freshwater.
- Coat wooden and concrete tanks with non-toxic epoxy paint.
- Disinfect tanks in between rearing periods (Fig. 4) (Procedure 2).
- Use PVC or non-toxic plastic pipes, pails and equipment parts.
- Backwash or clean filters regularly.
- Maintain equipment properly to prevent oil spill and contamination with corrosive metals.

PERSONNEL

- Wash hands with soap and water before preparation and administration of feed and before other jobs are undertaken.
- Place disinfection rugs and trays for footwear or feet at the entrance of hatchery facilities using 200 ppm chlorine

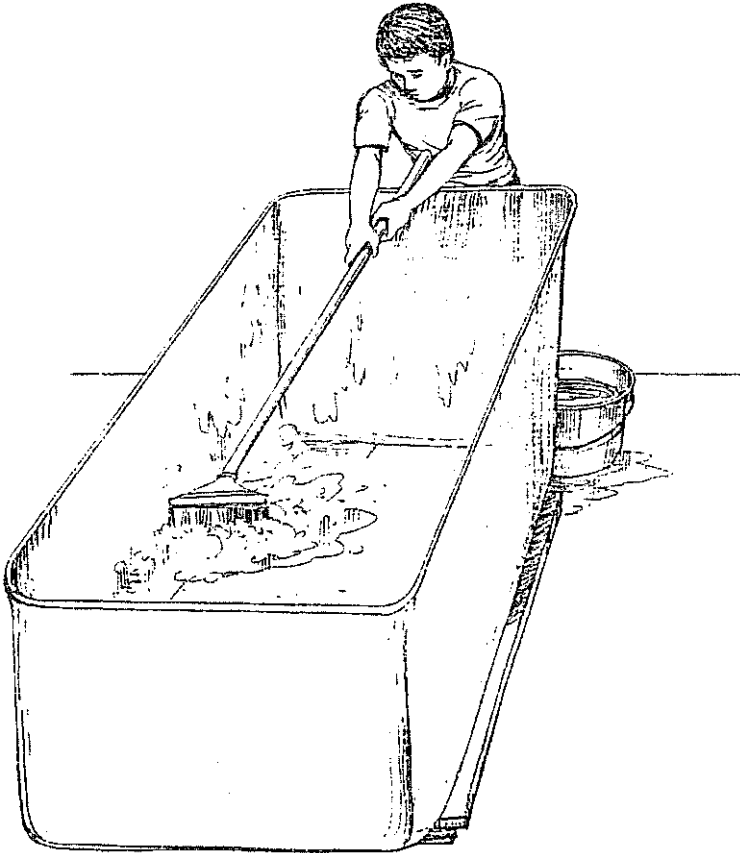


Fig. 4. Thorough cleaning of rearing tank with stiff brush.

solution (4 ml bleach per liter solution) or 3% lysol solution (30 ml per liter solution) (Fig. 5). Wash rugs and change disinfectant regularly,

- Minimize entry of unauthorized personnel into hatchery premises.

PROCEDURE 2. Disinfection of tanks.

1. Drain and rinse tank.
2. Scrub tank bottom and sidewalls using powdered detergent and plastic brush.

3. Rinse thoroughly to remove soap suds and loosened contaminants.
4. Disinfect with 200 ppm chlorine for 1 hour or 100 ppm (see Tables 1, 2). Scrub tank bottom and sidewalk again.
5. Rinse several times with clean freshwater.
6. Allow to dry under the sun and let stand for 1 or 2 days.

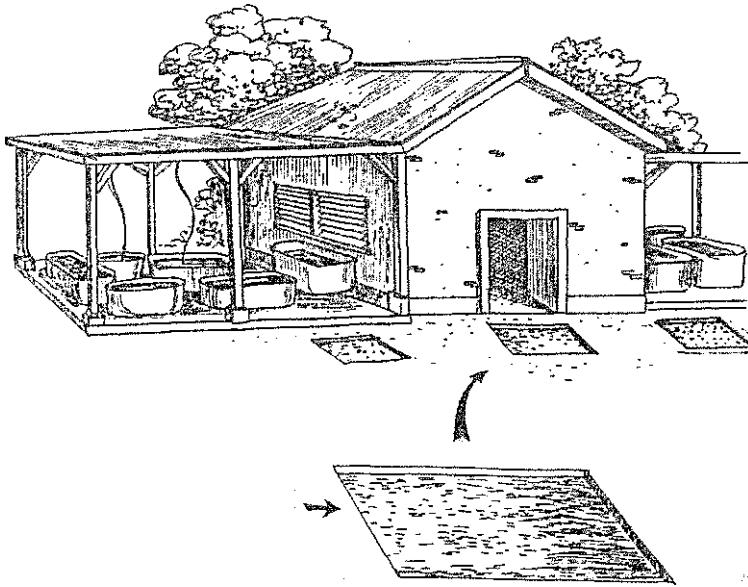


Fig. 5. Disinfection rugs and trays at entrances of hatchery facilities.

FOOD, FEEDS

- Use pure culture of the specific natural food for feeding.
- Do not use collapsed or old cultures for feeding.
- *Artemia* cysts may be decapsulated in chlorine solution.
- *Artemia* cysts may be disinfected in 10 ppm formalin (Table 4) or 30 ppm chlorine (Tables 1, 2) bath for one hour just before hatching.
- Store commercially prepared diets and other feeds (egg-yolk, mussel meat, etc.) in the freezer.

TABLE 4. Guide in the preparation of formalin solutions.

<i>Formalin concentration (ppm)</i>	<i>Volume of formalin solution (ml)</i>	
	<i>per 10 liters</i>	<i>per 100 liters</i>
10	0.1	1.0
100	1.0	10.0
500	5.0	50.0

A 37-40% formalin solution should be considered as 100% stock. If a white precipitate forms, filter the formalin stock before use. Dilute the solution in seawater.

SPAWNERS

- Use healthy spawners.
- Handle spawners with care.
- Provide flow-through water before spawning to remove surface contaminants.
- Spawn broodstock in individual tanks.
- Remove spawners immediately after spawning.
- If spent spawners are to be kept for rematuration, maintain these individually for at least two weeks before stocking in broodstock tanks for quarantine purposes.

EGGS AND LARVAE

- Collect eggs using a fine-meshed (0.25 mm) nylon screen, then rinse in several changes of clean water.
- Separate healthy nauplii from unhatched eggs and weak nauplii. Healthy nauplii are attracted to light (Fig. 6).
- Avoid overcrowding of larvae in rearing tanks. Optimum stocking density is 50,000 to 100,000 nauplii per ton and 10,000 to 30,000 postlarvae per ton.
- Monitor larval condition daily by visual and microscopic examination.

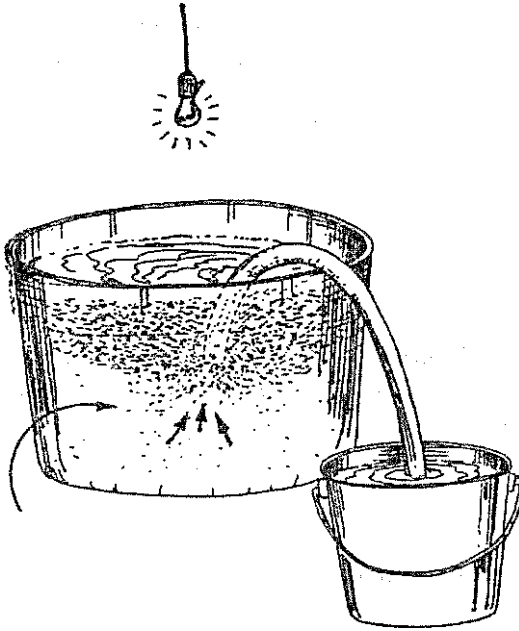


Fig. 6. Healthy nauplii attracted to light.

- Eggs may be disinfected with 20 ppm laundry detergent (Table 5) for 2-4 hours, rinsing thoroughly with complete water change before hatching.

TABLE 5. Guide in the preparation of 20 ppm laundry detergent (Tide).

<i>Volume of rearing water (liters)</i>	<i>Amount of detergent (grams)</i>
1	0.02
5	0.10
10	0.20
100	2.00
500	10.00
1,000	20.00

Dissolve the detergent in a small amount of fresh water, add to the egg culture tank, and mix gently.

OTHER RECOMMENDATIONS

Disease prevention is a primary and cost-effective method in prawn health management. The recommendations above should reduce the possibility of disease outbreaks if followed strictly in hatchery operations. Should a disease outbreak occur, affected stocks, tanks, and materials used must be isolated. Diseased stocks are disinfected with 400 ppm chlorine before discarding.

Disease cases should be referred promptly to persons or institutions* capable of handling disease diagnosis. Use of drugs for the treatment or control of a disease condition without correct identification of the causative agent is generally discouraged. Bear in mind that what is effective against bacteria may not be effective against fungi or protozoa, or vice versa. Besides, some drugs pose health hazards to the user, hence adequate advice on the proper precautions in handling them is necessary.

*Example:

Fish Health Section
Aquaculture Department
Southeast Asian Fisheries Development Center
Tigbauan, Iloilo
Tel.: 7-66-42

GLOSSARY

Backwash	: to clean by reversing water flow
Carrier	: one that transmits disease germs
Cartridge filter	: tubular filter device made up of spun polypropylene material inserted inside a filter housing case
Cross-contamination	: transmission of disease or disease (agent from one tank to another)
Debris	: organic waste from dead cells or unused food
Diagnosis	: the act of identifying the disease and its cause
Host	: organism (animal or plant) on which another organism depends for subsistence
Infectious	: transmissible from one diseased individual to another; contagious
Larvae	: newly hatched shrimps or prawns
Microorganism	: germ or organism that cannot be seen unless a microscope is used
Pathogen	: any disease-producing microorganism
ppm	: parts per million or milligrams per liter or grams per ton
ppt	: parts per thousand
Precipitate	: amorphous or crystalline solid that separates from the liquid
Quarantine	: isolation of material or animal

	to prevent the spread of infectious disease it carries
Residual	: remaining
Spawner	: adult female prawn capable of producing eggs
Susceptible	: easily affected by disease
UV	: ultraviolet radiation

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