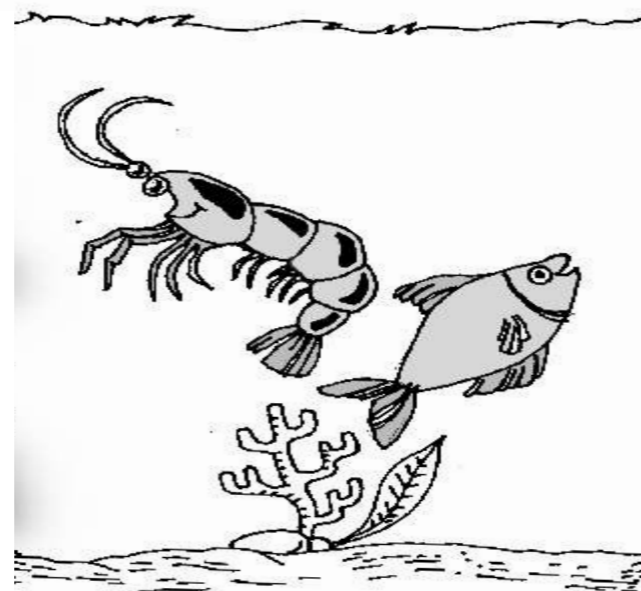


Pond with high pathogenic load



Pond after disinfection with chlorine dioxide

FORMALIN

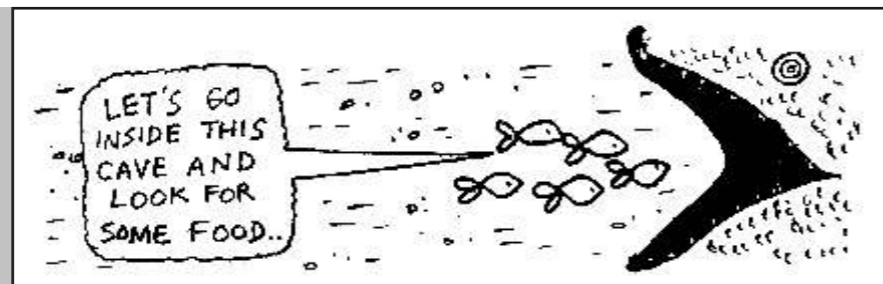
Formalin is a disinfectant used in aquaculture since ages. Infact it was the first disinfectant that got wide acclaim. Though corrosive, is very helpful in controlling pathogens under severe infections. Formalin is very effective in destroying spores and viruses. Formalin kills the pathogens by its corrosive effect. It effectively kills protozoans, metazoans and monogeneans. It also controls fungal infections. Formalin controls excessive algal blooms, macrophytes and tadpoles. During external infections it is useful in dip treatment.



Pathogen load can be kept under control by following simple preventive strategies.

- Filter the intake water with a fine mesh net to get rid of crustacean larvae, insects, floating debris etc.
- Disinfect the pond before filling and stocking by using a combination of lime and chlorine di oxide.
- Do not entertain technicians, consultants etc., visiting your pond site after visiting any other diseased ponds. Try to make your pond visit the first one by consultant.
- Maintain foot dips at the entrance of pond site.
- Farmers should plan in a co-operative way to have a central draining system to prevent cross contamination.
- Maintain water stabilization ponds to treat the water before releasing into creeks.
- Maintain water storage tanks to disinfect the water before pumping into the culture ponds.

AQUA
FUN



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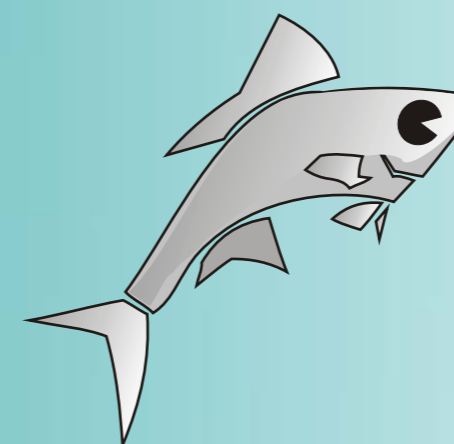
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Dear Reader,

I am pleased to know that the Inaugural Issue of Aquacare – Jalavikas has been received with full appreciation, judging from the response cards we received. In keeping with the aspirations of our respondents our experts are addressing the issue of Disinfection in Aquaculture, which perhaps is the Most Important aspect that would dictate Farm Profitability. I believe that a Clean Living Environment will lead to healthier Shrimps/ Fish and more profits to our farmers. I wish our Farmer Friends all the best in this Festival Season and the coming New Year.

Bharat Tandon
Bharat Tandon

DISINFECTION in AQUACULTURE



Aquaculture systems are diverse ecosystems influenced by various interacting factors. These pond ecosystems interact continuously with the outer atmosphere and soil beneath it. The water quality parameters like pH, alkalinity, hardness etc., are greatly influenced by the underlying soil so also the microbiota. Water in aquaculture ponds harbor microorganisms both from the soil and the others entering the system through inflow water. As a result of this the cultured animal shrimp/fish is always subjected to changing water parameters.

To maintain the cultured animal in healthy condition a fine balance between the health of the host i.e., cultured animal, pathogenic load in the system and the water quality parameters of the surrounding environment is very important. Any change in this balance leads to disease problems. There can be sudden increase in pathogenic load in the system due to influx of contaminated water etc., which can be controlled by application of disinfectants that bring down the pathogenic load drastically leading to a healthy pond environment. In order to make best use

of disinfectants it is important to know from where the pathogens enter the system and how preventive action can be taken to reduce pathogenic load in the aquaculture ponds.

Pathogens of concern in aquaculture include bacteria like *Vibrio harveyi*, *V. Parahaemolyticus*, *V. splendens*, *V. alginolyticus*, *Aeromonas hydrophila*. The viruses include white spot syndrome virus that has brought the industry to a standstill. Other viruses of concern include Baculovirus Peneaei (BP), Parvovirus and Yellow head virus. Protozoans include epicommensals like epistylis, Zoothamnium, that are responsible for death of shrimps due to incomplete moulting.

Aquaculture ponds being open ecosystems the entry of pathogens can be from various sources that includes

1. **Intake water** – It is the water that is pumped into the ponds from the creeks, rivers, bore wells etc. The water from creeks and rivers is bound to have high microbial load as they carry the microflora from their traversed path. The microbial load is high if the concentration of the ponds along the creek / riverbank is high.
2. **Infected seed** – The larvae of shrimp or fish that are stocked also harbor the native micro flora from its original source. If the seeds are transported in contaminated water then the seeds transfer the pathogens to new system and the same infects them.
3. **Bird Droppings** – Aquaculture ponds being open systems covering large areas, bird droppings cannot be avoided. Since the birds feed on dead shrimps and fish, they act as carriers and transfer pathogens from pond to pond.
4. **Personnel** – Farmers, Consultants, Technicians, who move from one pond site to other are also a source of pathogens and they are also responsible for carrying pathogens from one pond site to other.
5. **Carriers** – Many crustaceans like crabs, insects are carriers of deadly pathogens like viruses, which cause disease in the cultured animal. Their movement from creeks to cultured ponds and vice versa results in transfer of pathogens.

CHARACTERISTICS OF AN IDEAL DISINFECTANT

Performance under varying pH

Water pH influences the performance of the disinfectant considerably. Generally, water in aquaculture ponds has a pH ranging from 6.5 to 9.5. An ideal disinfectant should be able to act with highest efficiency between the above-mentioned pH ranges.

Interaction with Organic matter

Many disinfectants have the tendency to react with organic matter and lose its efficiency to eliminate pathogens. Aquaculture systems harbor high organic load in the form of dead plankton, left over feed, fecal matter etc. An ideal disinfectant for an aquaculture system should not react with organic matter.

Contact time

An ideal disinfectant for an aquaculture system should bring about the desired pathocytic effect with in a very short contact period. Enhanced contact time reduces the efficacy of the disinfectant in controlling pathogens.

Dosage

The disinfectant should be able to reduce pathogenic loads at very low dosages so that their concentrations do not affect the cultured animal.

Range of Actions

An ideal disinfectant should have a very broad range of action to take care of different types of pathogens present in the system. Aquaculture systems being diverse harbors all types of pathogens like bacteria, fungi, protozoan, viruses etc.

Cost

Not but the least, the disinfectant should be available to the farmer at affordable prices.

Effect on other micro biota

An ideal disinfectant should not affect other microbiota like phyto and zooplankton as this will change the nutrient balance of the ecosystem.

TYPES OF DISINFECTANTS

CHLORINE DI OXIDE

Chlorine di-oxide is a yellow to green colored gas with a distinct odor. It is a highly explosive gas and the technology to stabilize it in the form of liquid was not available for a long time. Now that the technology is available to stabilize it in liquid form it has become easy to handle chlorine di-oxide. Chlorine di oxide is soluble in water and like oxygen it exists as a gas in solution.

Mode of action: Chlorine di-oxide kills the pathogens by bringing about chemical oxidation. This chemical oxidation changes the configuration of the cell wall and hence death of pathogen due to osmotic imbalance.

Chlorine di oxide does not form any chlorinated organic byproducts. United States Department of Agriculture (USDA), Environment Protection Agency (EPA) and Food and Drug Administration (FDA) have approved chlorine di oxide as a safe disinfectant.

Stabilized Chlorine di oxide (KLENSOL) now comes in the form of a straw yellow colored liquid. It is extremely active against bacteria, virus, slime and protozoan. This stabilized liquid needs to be activated just before applications. This ensures that the chlorine di oxide is stable till it reaches the end user. The activated solution is available for action for more than 24 hours. Even after 8 hrs of activation the reduction in chlorine di oxide is less than 20%.

A good number of disinfectants are now available in the market. They are mainly Iodine compounds, Bromine compounds, and Hypochlorites and other Chlorine based compounds. Each of these compounds has their own positive and negative effects with specific mode of action. The recent introduction to this line is chlorine di oxide a highly potent disinfectant. It is known in the world as the best disinfectant available.

Using chlorine di oxide has various advantages over other commonly used disinfectants.

1. Chlorine di oxide is not toxic and non-corrosive.
2. It does not react with organic matter
3. It is effective against a wide range of pathogens.
4. It is 2.5 times more effective than chlorine.
5. No residual chlorine di oxide remains in the water as the excess gas escapes into the atmosphere
6. It does not impart any off color or flavor.
7. It is effective against a wide range of PH.
8. It does not combine with ammonia and form toxic byproducts.
9. It does not become inactive when it comes in contact with living tissue.
10. It is very effective at low concentration.

KLENSOL



Disinfectants are used at every stage in aquaculture from larval rearing in hatcheries to processing plants where the cultured animals are frozen and sold to the customer.

Not all the disinfectants available in the market can be used in hatcheries and processing plants. Only chlorine di oxide is a disinfectant that can be used at every stage without any harmful effects. It is an approved disinfectant for use in processing plants. Being a very effective disinfectant with no harmful effects is ideally suited for hatcheries. It does not harm the larvae unlike hypo chlorides. Chlorine di oxide completely dislodges the epicommensals colonised on the carapace of shrimps. As it does not leave any residues it is an ideal disinfectant for use in processing of shrimps.

