Studies on the Probable Sources of Fungal Infection and the Control Measures in a Fish Seed Farm

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The causes of mortality of fry of cultivable fishes in a fish seed farm were investigated. The mortality was due to fungal infection and the pathogen was *Saprolegnia* sp. The sources of infection were unhygienic breeding hapas, spawnery hapas in the cemented ponds, hatching jars and excess feeding. Application of one kg slaked lime followed by 75g of $CuSo_4$ (1-0.5 p.p.m.) and 150g of $KMno_4$ (2–1 p.p.m.) per each nursery (158m^3 water) controlled the pathogen.

With the increase of aquaculture activities throughout the world in the past few decades, the incidence of various diseases in the cultured organisms is also on the increase. Aquatic poikilotherms are much more affected by the environment than the terrestrial homoiotherms (Sniszko, 1972). Too often we focus on a search for pathogens, when the real cause may be environmental, nutritional or physiological with the superimposition of infection by facultative microorganisms on weakned or injured fishes (Sindermann, 1977). The present paper deals with diagnosis, probable sources of infection and control of diseases in a fish seed farm. Cultivable species included in this work are limited to those currently receiving significant attention in India, i.e. *Catla catla, Labeo rohita, Cirrhina mrigala, Hypophthalmichthys molitrix* and *Ctenopharyngoden idella.*

Materials and Methods

The present investigations were carried out at the Manchikalapudi Fish Seed Farm, Andhra Pradesh. It is fed by the Krishna Canal water. The farm consists of cemented and rivetted nurseries each measuring 24m x 6 m x 1.1m. The nurseries were limed at the rate of 200 kg/ha, manured with raw cattle dung 7500 kg/ha, groundnut oil cake 750 kg/ha and single superphosphate 250 kg/ha in two instalments. The water quality tests were made according to American Public Health Association (1975). The size of fry in the nursery ponds was 12 to 14 mm at the time of investigation. Fry from the nurseries were collected for close examination, immediately after the first mortality was observed in ponds 1 and 6 because every dead fish is a source of infection. Fungal infection was diagnosed by examining the affected organs with the naked eye and also by microscopic observations following the method of Lucky & Zdenek (1977). To locate probable sources of infection scrappings from the corners of breeding hapa, spawnery hapa and base of the hatching jars were taken and examined under microscope. The control measures adopted in ponds are discussed in the text.

Results and Discussion

The physico-chemical parameters (Table 1) were found to be normal as in any tropical fish seed farm. The disease caused was due to fungal infection and was observed first in nursery ponds 1 and 6 on the 7th day. The symptoms observed were exfoliation of the skin, exposure of the jaw bones, infection at the eye and congestion at the base of the fins. Further, tufts of minute white hair like outgrowths were also found in these parts. The fry in the ponds were affected by the most common pathogenic fungus, *Saprolegnia* sp.

Fig. 1 shows that more than 90 per cent of the stock was affected. It was found that the repeated use of breeding hapas without proper cleaning was the major cause of infection. According to Van Duijin (1956), nets used in catching diseased fishes

Table 1. *Physico-chemical characteristics of water*

Nursery ponds	Water temp. °C	Light penetration cm	Do_2 mg/l	Co_2 pp.m.	Co_3 p.p.m.	HCO_3 p.p.m.	pH	Total alkalinity p.p.m.
1	30	39	4.6	2.0	—	170	8.4	170
2	30	36	7.4	Nil	22	126	9.0	148
3	29	41	6.4	—	14	140	8.8	154
4	30	38	6.0	2.8	—	184	8.4	184
5	29	42	8.0	—	10	176	8.2	186
6	31	43	8.8	—	20	166	8.9	186
7	29	41	10.2	—	16	176	8.9	192
8	30	44	6.2	1.6	—	184	9.0	184
9	30	52	8.6	—	12	166	8.4	178
10	30	52	6.4	2.6	—	172	8.5	172

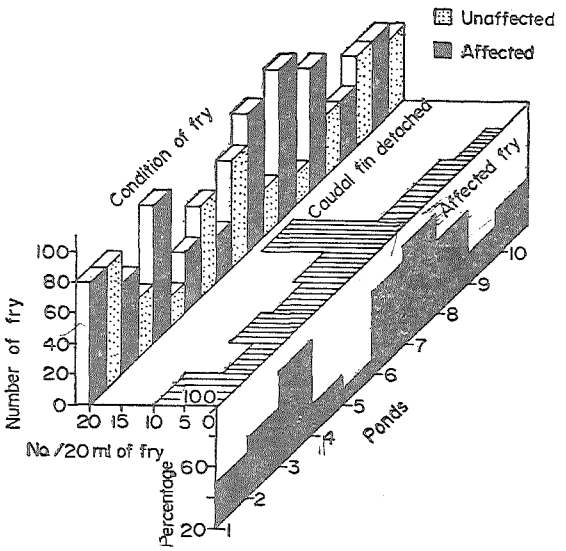

Fig. 1 Number of affected, unaffected and caudal fin detached fry /20 ml. of fry sample and the percentage of inafected fry

must be disinfected. The hatching jars employed repeatedly without proper cleaning was also responsible for the infections. Further there were chances of infections from the new cloth hapas coated with starch used in the spawnery. Another possible source of the infection was the excess artificial feeds which putrified in the ponds. Hygienic conditions of the water body and other breeding equipment are important especially in the case of bacterial and fungal infections since these organisms thrive in water that contains much organic material (Van Duijin, 1956). The rate of stocking of spawn was 10–20 million/ha and such a heavy stocking can cause the rapid spreading of the disease in the ponds. According to Jhingran (1977) infection is quick in ponds which are heavily stocked since congestion provide a favourable situation for rapid spread of the disease.

In order to control the disease, artificial feeding was first terminated. Then the suspended matters were removed by maintaining a continous flow of water through the overflow channels which were guarded with screens. After this, the water level of each pond was reduced by 0.5 m to 0.75 m and one kg of lime was applied in the form of an emulsion in two doses on alternate days. Along with this 75 g of copper sulphate (1.05 mg/l), and 150 g of potassium permanganate (2.1 mg/l) were mixed in a bucket of water (15 l) and spread over the surface of each pond on alternate days. Hora & Pillay (1962) and Gopalakrishnan (1963, 1964) suggested "treatment with copper sulphate to control fin rot." Then the water level in all the ponds was slowly increased to the maximum after 6 h. After one day the same treatment was repeated. On the third day of the final treatment fresh fry were collected randomly for examination. It was observed that nearly 75% of the fry recovered from the disease and there is reduction in mortality. Later, artificial feeding was restored in small quantities and fresh plankton of 100 ml was introduced in each pond. Finally, after 20 days when the fry were 20.2 mm in size all the nurseries were harvested. Further observations revealed that the fry were healthy and no symptom of fin rot could be observed.

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