

Population and Ecology Symbiosis – Wetland, Macrophyte and Fish

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The research story jotted below is a narration of a laboratory attempt to eradicate predicament of a fish population utilising the other entities in its own inhabiting environment. The work aims towards a transformation from harmful synthetic aqua-framing to sustained organic aqua-farming with an effort to reduce the discharge of toxic chemicals into the environment.

Aquaculture is one of the foremost and broadest economic sectors of India, contributing 1.1% to the total GDP and 10% to the total exports of the country which accounts for 6.3% of the global fish production. Wetlands are distinctive and awfully productive aquaculture ecosystems which are inundated by water permanently or seasonally. There are usually multiple numbers of flood plain wetlands in the lower delta of river Ganga, structured with hydric soil and harbouring unique flora and fauna. Parallely, this water bodies also bears ample responsibility for adverse environmental cause and impact linearity. Demands for high yield impels fisherman to use extensive synthetic chemicals which not only causes numerous pathogenic outbreak in wetland fisheries but also exerts detrimental health concern to producers as well consumers.

Holding this preview, the therapeutic traits of a well known wetland macrophyte *Ipomoea aquatic* Forssk. (Hindi : कलमीसाग) was evaluated towards fin and tail rot disease of a cat fish, *Pangasiushypophthalmus*, commonly known as Pangus fish (Hindi : पंगासमछली).

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The lyophilized and powdered leaf of *I.aquatica* was defatted and subjected to partition chromatography using organic solvents from low to high polarity. Finally the aqueous extract was obtained from the Methanol residue isolated from Chloroform : Water:: 4:1. The fractions were eluted through silica column and crystallized which was further flushed through Petroleum Ether : Chloroform 1:1.

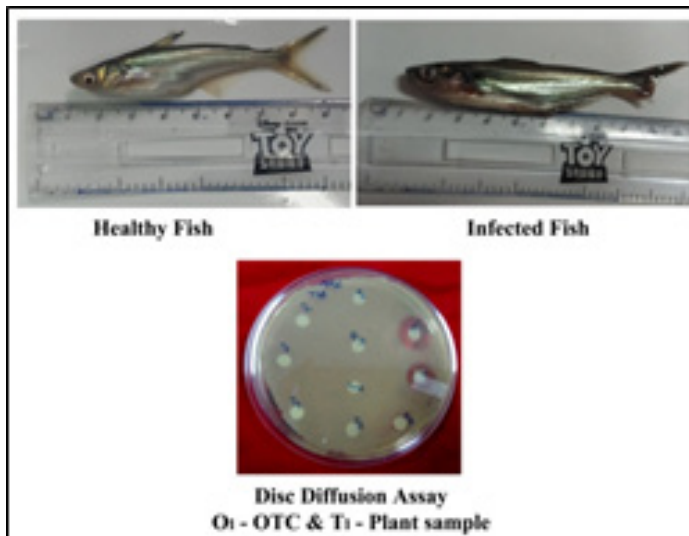
The fish was obtained from Akaipur wetland, West Bengal. While still on stocking tank for acclimatization, the Pangus fish shoal was seen infected with fin and tail rot (पंख और पूंछ गलन). Though we had a preparation for fish challenge with different concentration of bacteria to optimise the LD50 but there could be no better experimental resource than the infected fish which carried the infection right from its natural habitat. One of the most commonly seen disease symptoms rendering to high mortality in Indian fisheries is witnessed due to fin and tail rot which is largely caused by *Aeromonas* species viz; *A. hydrophila*, *A. veronii*, *A. popoffi* and sometimes by *Edwardsiellatarda* where again *A. hydrophila* mostly causes secondary infection by gas formation. These are gram-negative and mostly water-borne bacteria. In-order to confirm the bacterial strain, the infected parts were wiped with alcohol and tethered to streak on Muller Hilton Agar (MHA) plates followed by 16S rRNA sequencing which confirmed it to be *A.veronii*.

Before going into In-Vivo assay, disc diffusion assay was performed on MHA plates where a zone of inhibition of 14 mm was obtained (T_1).

The crystals obtained from Ipomoea leaves were hygroscopic in nature which aided to blending with commercial fish feed using egg white as binder and fed twice a day for seven days. A control group of infected fish was maintained which was fed with normal feed with egg white. Initially the results were very much promising but in latter days it did not show any curative effects and the overall experiment to use *I.aquatica* leaves as a therapeutic source was not satisfactory or rather unsuccessful. Literature survey had plentiful studies on the prophylaxis trait of Ipomoea against cancer and some other diseases. Hence a remake of the previous experiment was deliberated in the simplest way possible to check its prophylaxis property instead of therapeutics, against fish disease. Fresh fish were segregated into two sets, one fed with the Plant sample + feed + egg white and the other group fed with normal feed + egg white each for 14 days then both the groups challenged intraperitoneal (IP) with the previously isolated and freshly sub - cultured bacteria (0.5 McFarland; 10 μ l/gm body weight) using insulin injection. The results were inferred with fresh uninfected fish.

Technically better results were observed than the previous trial and the clinical symptoms for the disease appeared after almost 17days for the first group fed with plant sample as compared to 54hrs 100% mortality for the second group. To understand the differences better, the liver and kidney histopathology of the normal, infected fish fed with feed + Plant sample and infected fish fed with normal feed was compared in Haematoxylin eosin stain after 54 hrs.

The liver histopathology (Figure: 1) reveals the normal liver section with intact portal triad, distinct bile duct and proportionate hepatocyte and panceroocyte (A); the infected fish fed with plant material had almost the same histopathology like the normal with only exception of cytoplasmic



vacuoles (B); the infected fish with normal feed showed disintegrated portal triad, disintegrated hepatocyte and (C) dissociation of the hepatocyte & pancerocyte.

The kidney histopathology (Figure: 2) reveals the normal kidney section with intact Bowman's capsule with Glomerulus with intact proximal tubules (A); the infected fish fed with plant material also was seen with prominent Bowman's capsule but some tubules were seen dilated (B); the infected fish with normal feed (C) showed disintegrated Bowman's capsule and the sloughing of the epithelial lining of the proximal and distal tubules.

The economical affairs of these researches are fairly cheap and within the periphery of the fish farmers which can serve as a convenient solution of problems faced by them or at least lend them some time to treat the diseased fishes by delaying natural mortality. We have also taken up three more floodplain wetland macrophytes in this aspect and expecting to find further worth mentioning results. Way forward to participatory rural appraisal towards efficacy of aquatic macrophytes in fish health.

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