Management Practices in Preventing Fish Diseases in Freshwater Aquaculture with West Bengal Perspective

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Different types of fish diseases

Fish diseases are categorized into following groups :

1) Bacterial diseases

2) Viral diseases

3) Parasitic diseases

4) Fungal diseases

5) Environmental and nutritional diseases.

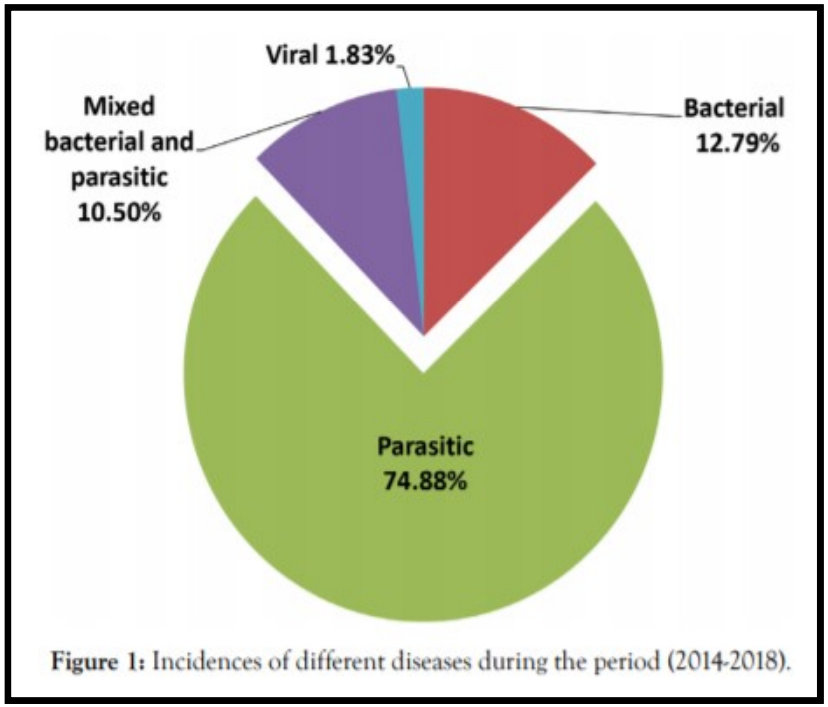


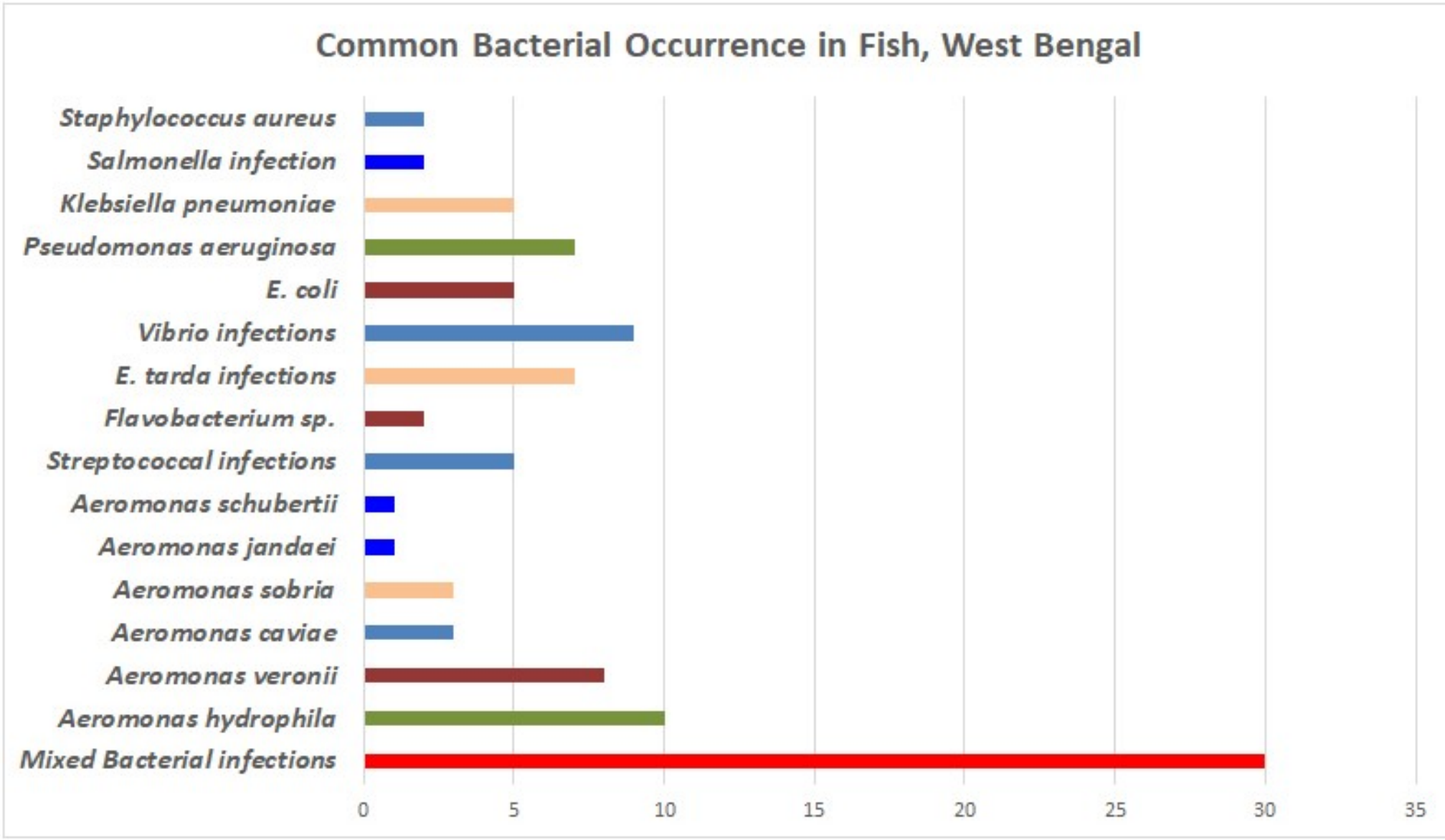
Figure 1: Incidences of different diseases during the period (2014-2018).

Sahoo *et al.*(2020)

Diseases that seriously affect the sector .....

1. **Bacterial diseases – Ulcer, Dropsy, Eye disease, Tail & Fin rot**
2. **Parasitic diseases – Argulosis, White gill spot, White scale spot, Ichthyophthiriasis**
3. **Viral diseases – Spring viremia of carp, Carp pox disease, CYH2, TiLV**
4. **Fungal diseases – Saprolegniasis, EUS, Branchiomycosis**
5. **Environmental and nutritional diseases – Scoliosis, Lordosis, Platyspondyly, Kyphosis**

COMMON BACTERIAL DISEASES AND IT'S REMEDIES


Common Bacterial Occurrence in Fish, West Bengal
Staphylococcus aureus
Salmonella infection
Klebsiella pneumoniae
Pseudomonas aeruginosa
E. coli
Vibrio infections
E. tarda infections
Flavobacterium sp.
Streptococcal infections
Aeromonas schubertii
Aeromonas jandaei
Aeromonas sobria
Aeromonas caviae
Aeromonas veronii
Aeromonas hydrophila
Mixed Bacterial infections
0
5
10
15
20
25
30
35


Initial stage of Ulcer


Haemorrhage

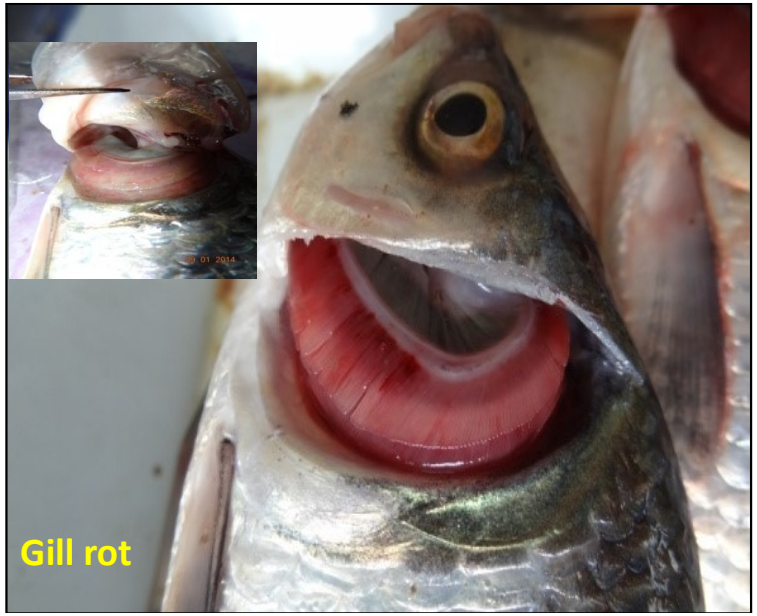

Deep ulceration


Deep ulceration


Bacterial Septicemia


Columnaris
A
B
C


Columnaris


Gill rot


Vibriosis
Dropsy in spawn
Dropsy
Hemorrhage
Eye disease
Ulcer
Ulcer
Ulcer


Ulcer


Tail rot and Fin rot


Tail rot and Fin rot


Tail rot and Fin rot

Common Medicines Used to Combat Bacterial Diseases

Vibriosis:

1) Feeding diet containing 0.02% furazolidane for two weeks,

2) 8-12gms/100 lb of fish/day Sulfamerazine for hatchery infection

Ulcer:

Oxytetracycline@ 25-75mg/kg of fish per day for 5 days.

or Enrofloxacin 3-4 gm /Kg feed for 5 days

Dropsy:

Treat the whole water body with 1ppm $kmno_4$

Eye Diseases:

1)$kmno_4$@ 1ppm i.e. 1mg/litre

2) Maintain dissolved oxygen level

Fin rot& Tail Rot:

Dip treatment:

a) 59 ml formalin in 113 lt. of water followed by 59 ml malachite green (1:40)

b) Addition of tetracycline in water @10-50 ppm for 5 days

PTO...

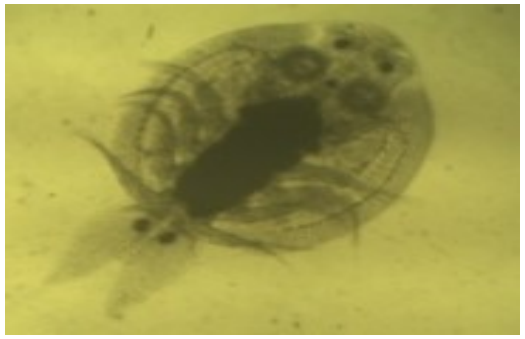
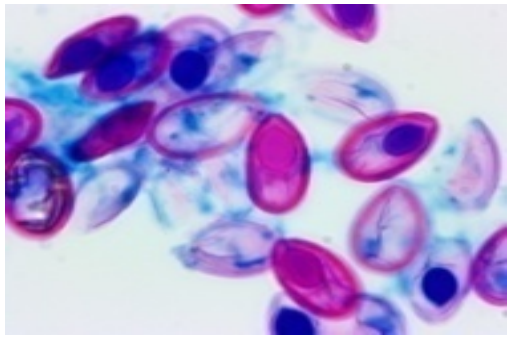
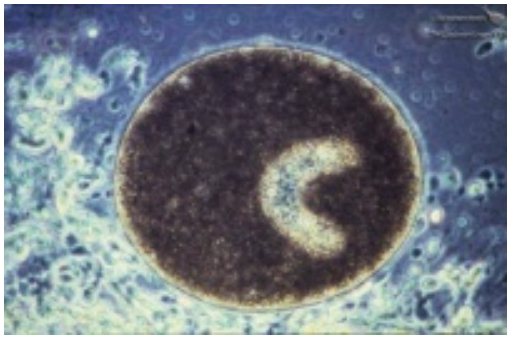
DRUGS TO COMBAT BACTERIAL DISEASES

Sl No	Drugs	Dosage
1.	ALICIN PLUS (Herbs and Spice Extracts)	At culture : 1 gm / kg. of feed. Apply for15 days at the time occurrence once daily.
2.	LIXEN Powder (Broad spectrum antibiotic)	For fish 3-5 g / kg feed
3.	ALL CURE (Herbal Anti Microbial Preparation)	100 g / ton of biomass for 5-7 days each time.
4.	CIPRO – M (Antibiotic Feed Supplement)	At culture : 5 gms., / kg. of feed with a suitable binder. At Feed Plant : 500 gms., / ton of feed.
5.	VITROCIN FG (Broad spectrum antibiotic)	5-10 gm per kg of feed for 5 days.
6.	BROMO-CLEAN (Disinfectant & Sanitizer)	5 litres/hectare – repeat the dose once in a month for better maintenance of pond. Double the dose if the pond pollution is high.
7.	AQUA AID-I (Antibacterial & antifungal specifically used against ulcer)	1-1.5 Lit / ha depends on pond condition.
8.	D-SEIZE Powerful and Fast acting Sanitizer	1 ltr. / acre
9.	P-LACT Plus (Antibacterial agent specifically for intestine bacteria of shrimps)	10-20 g / kg of feed

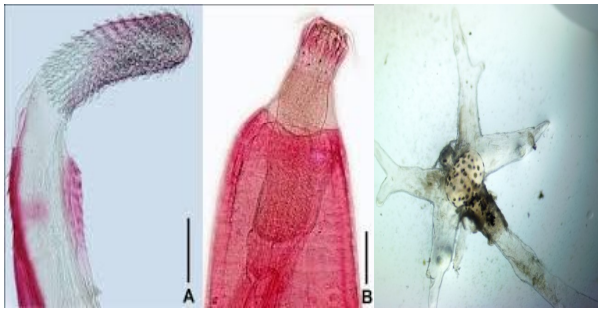
PTO...

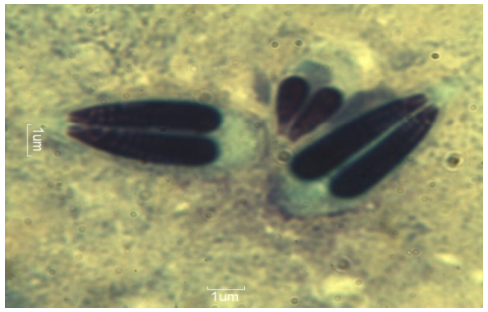
Sl No.	Drugs	Dosage
10.	GLADIATOR (Antibacterial and antifungal agent)	5-10lt/Acre with 1m water depth.
11.	AQUA CURE-FS (Broad spectrum antibiotic)	3-4 Kg/ton of fish biomass
12.	FISH CLEAN (Anti Parasitic & anti Bacterial)	1.5 to 2.5ltrs. / hectare
13.	AMGARCIN (Controls bacterial infections)	5-10 gm/kg shrimp feed,2-5 gm/kg fish feed
14.	BIOCID ULTRA (Ulcer treatment)	2 lit/acre
15.	BIONEX-80 (Effective against tail rot and gill rot)	375 to 650 ml/acre/meter water depth
16.	KLOSANT (Powerful antibiotic agent)	1 to 3 lit/ha
17.	SPARKDIN-20 (Concentrated iodine complex acts as powerful sterilizer)	100 ml to250 ml/acre
18.	BOTTOM-LACT (A Powerful Bio-degradant Bacteria)	10 kg. per the hectare (1mtr. Water depth.) once in 15 days or as advised by an aqua consultant.

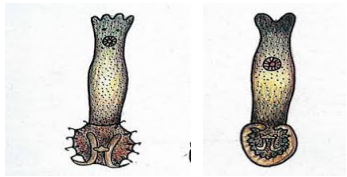
Source: VIRBAC, BIOSTADT, ALTECH, ZEUS, MARSCO, RR ANIMAL HEALTH CARE, VETQUINAL, GROWEL, PVS, ANAND, STATS, EXCELLAR, CP, APC, ALPA, HITECH etc.

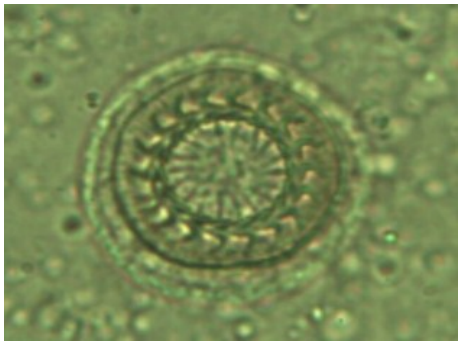




PARASITIC DISEASES

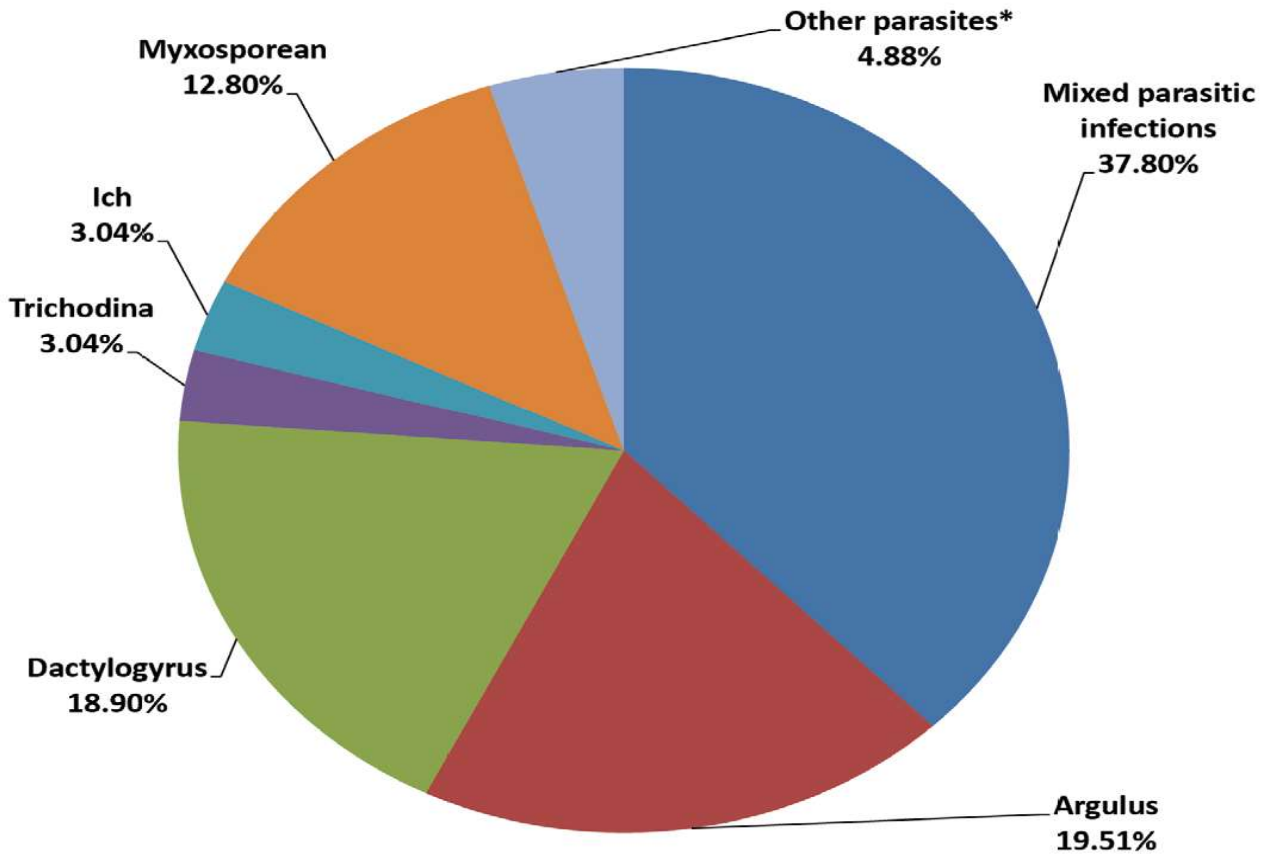





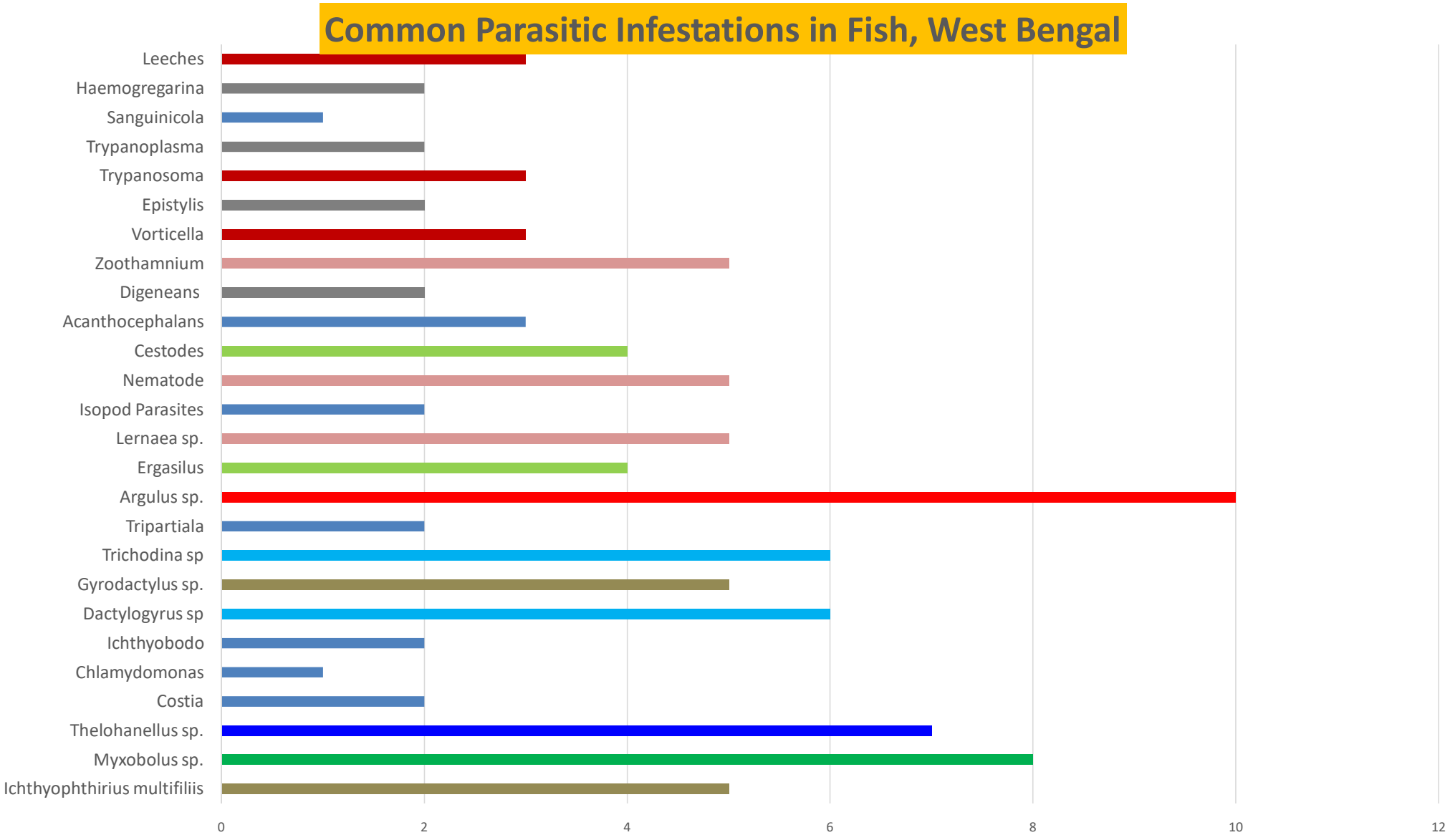




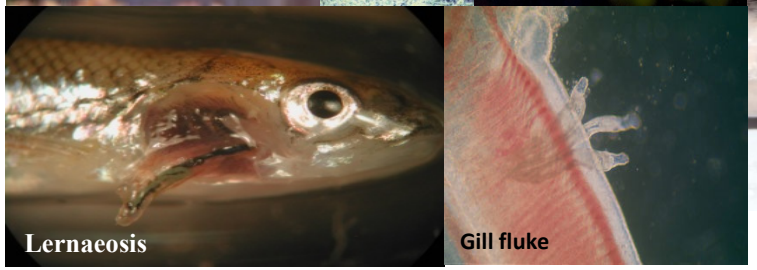
PREVALENCE OF DIFFERENT PARASITES IN EASTERN INDIA

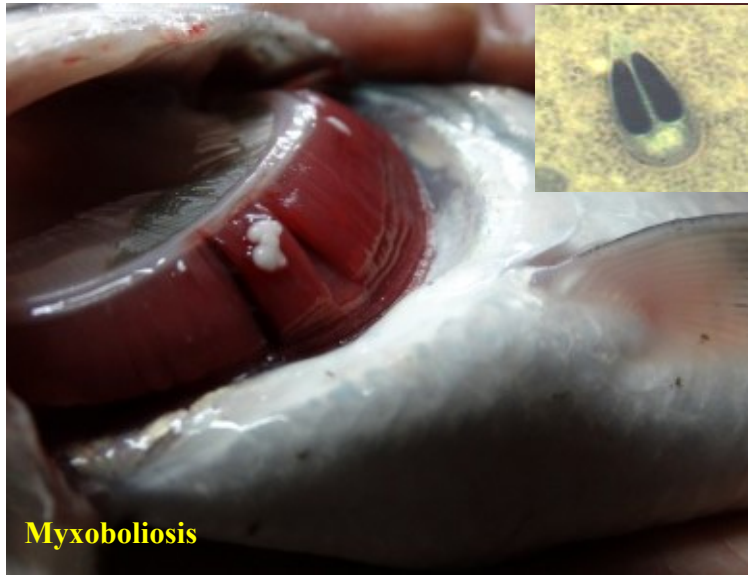


*Other parasites: Lernaea, Epistylis, Glossiphonia, Metanophrys, Zoothamnium spp.

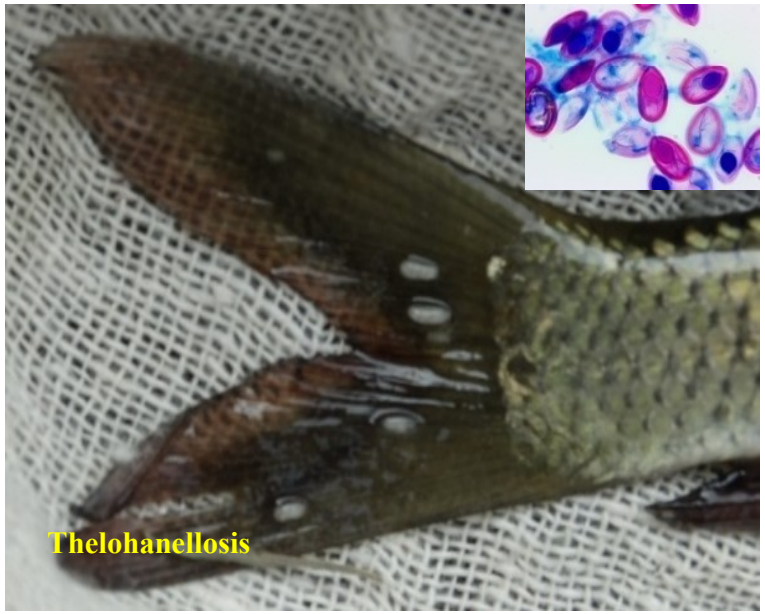

Common Parasitic Infestations in Fish, West Bengal
Leeches
Haemogregarina
Sanguinicola
Trypanoplasma
Trypanosoma
Epistylis
Vorticella
Zoothamnium
Digeneans
Acanthocephalans
Cestodes
Nematode
Isopod Parasites
Lernaea sp.
Ergasilus
Argulus sp.
Tripartiala
Trichodina sp
Gyrodactylus sp.
Dactylogyrus sp
Ichthyobodo
Chlamydomonas
Costia
Thelohanellus sp.
Myxobolus sp.
Ichthyophthirius multifiliis
0
2
4
6
8
10
12

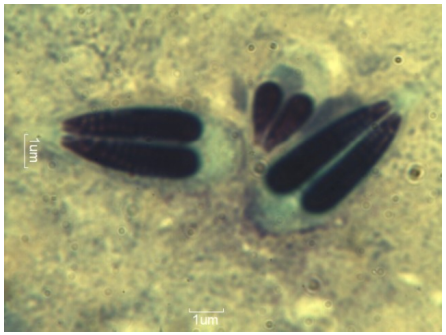

Ich


Lernaeosis
Gill fluke


Myxoboliosis


White gill spot
2012 09 14


Thelohanellosis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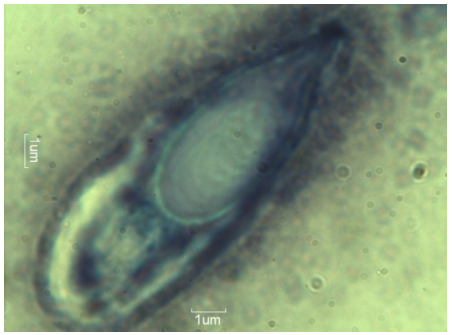
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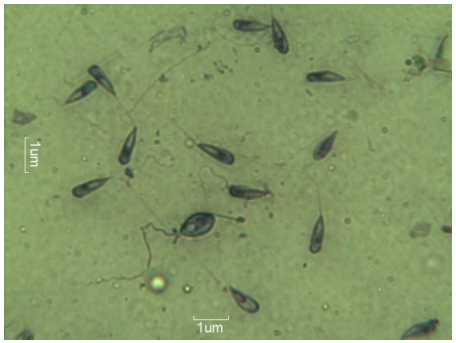
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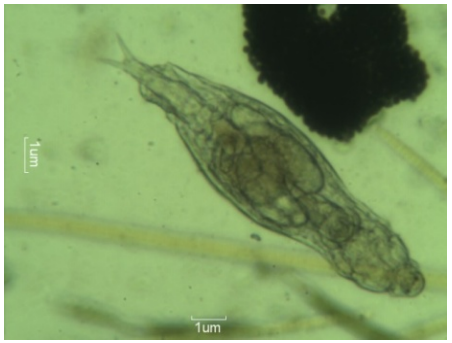
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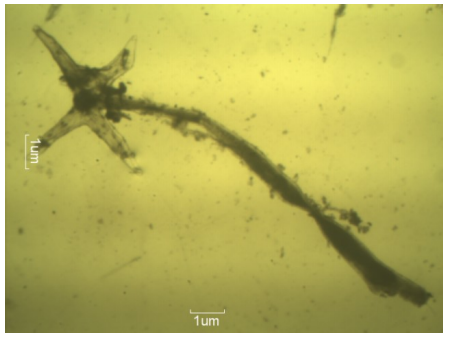
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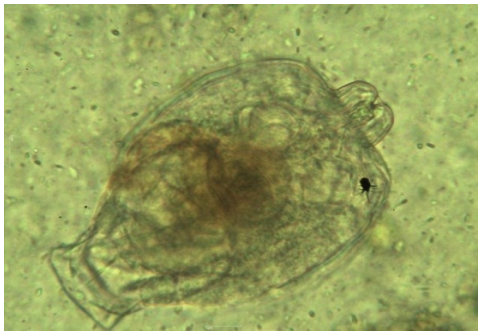


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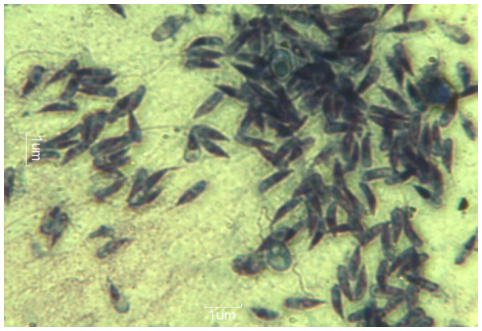
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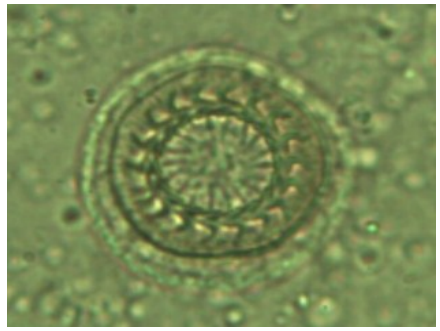
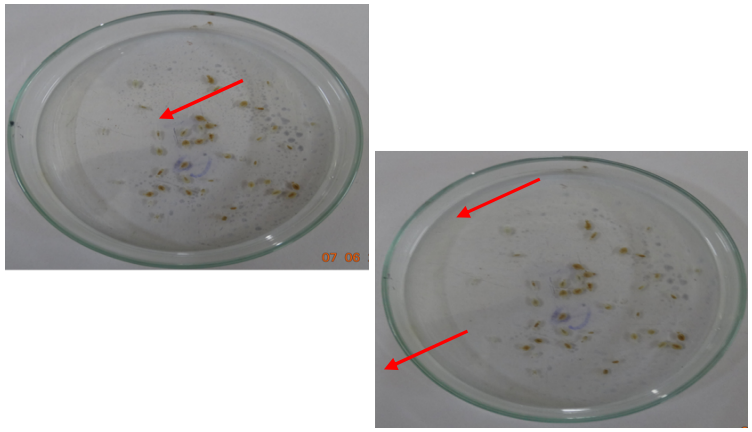
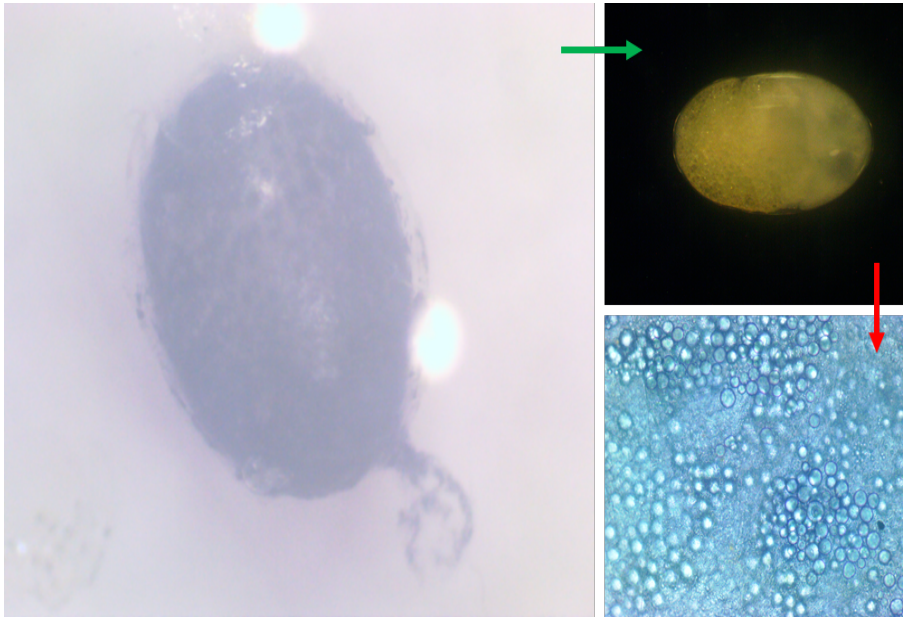




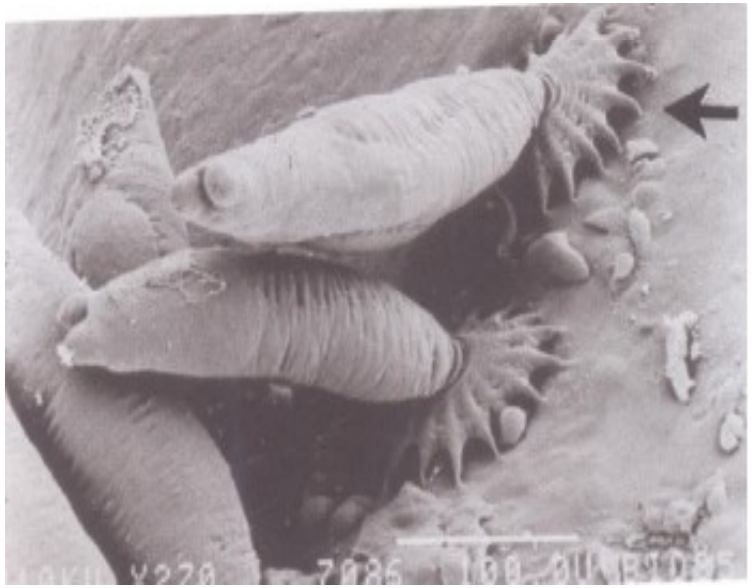
Argulus sp. from the body of *L. catla* from Amta-I, Howrah

Black ovoid patches throughout the whole body of *Labeo rohita*, from, Arambag, Hooghly

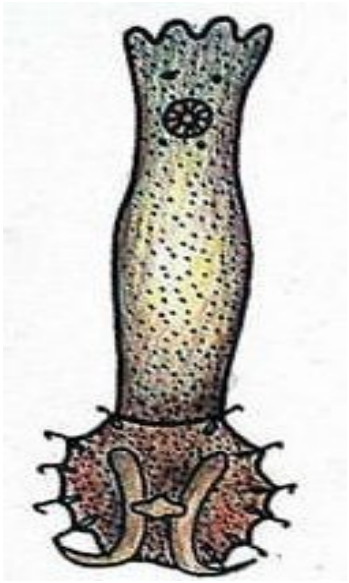


Microscopic view of the Black ovoid patches [Digenean eggs particularly cercaria and metacercaria stages] (a) 0.5 X (after collection from the skin) (b) 0.5 X (after removing the black patched membrane) (c) 10 X (after bursting the cyst)


08 09 2014

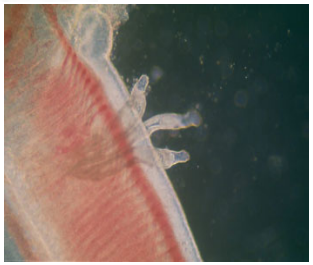


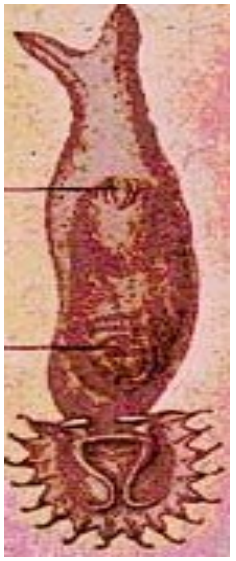

17 03 2015



Dactylogyrus sp

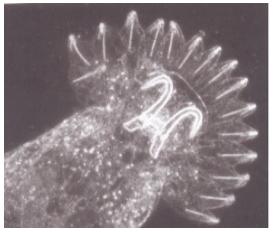
GILL FLUKE



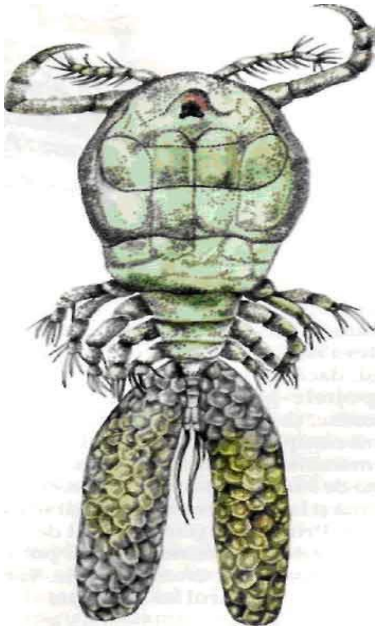


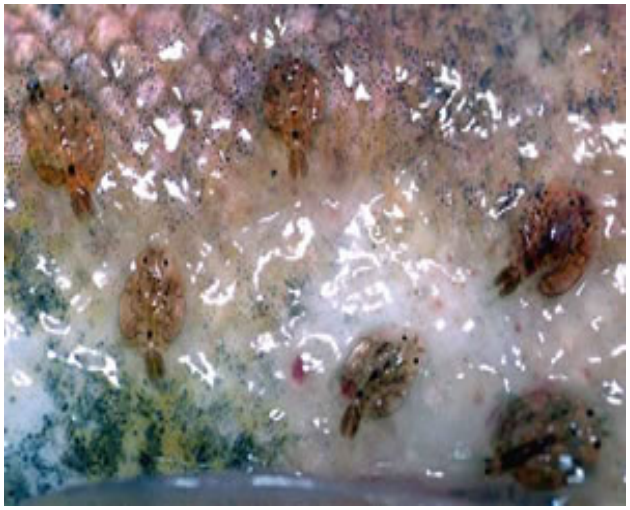
Gyrodactylus sp

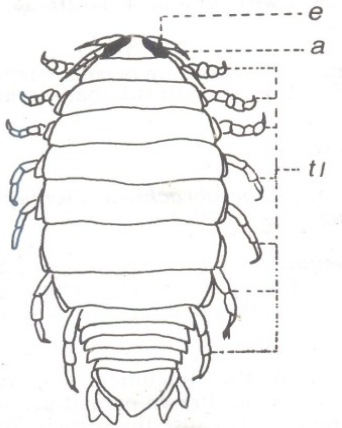
SKIN FLUKE



CRUSTACEAN PARASITES







Common Medicines Used to Combat Parasitic Diseases

ICH:

1) Hourly bath in 1: 5000 formalin(10 PPM) solution for 7 days.
2) Dip bath in 2 % NaCl solution for 7 days or more/ (10-12 Kg/Acre).

White Gill / Scale Spot disease:Bath treatment:

a) NaCl @ 3-5 % to destroy the spores and other developing stages. But the cysts can not be eliminated.
b) To eliminate the cysts - MOC and lime should be used at the time of pond preparation

Dactylogyrosis/ Gyrodactylosis

1) Sodium chloride bath treatment @3-5% for 10-15min
2) Formalin bath treatment @ 50mg/lit
3)Potassium permanganet treatment @ 4mg/lit

Argulosis:

1)Sodium chloride bath treatment @ 3-5% till the fishes are stressed.
2) Gamaxene/Lindane/Hexane treatment in the pond @ 4mg/lit.

Mechanical methods:

1) Hang bamboo mats or corrugated sheet at an interval of 10 ft in the Argulosis affected water areas and should be removed in every week.

Learneosis:

1) Potassium permanganet treatment in the pond @ 4mg/lit
2)Sodium chloride bath treatment @ 3-5%

PTO...

ANTI PARASITIC DRUGS

Sl No.	Common Drugs (Brand Names)	Dosage
1.	LICEX (Herbal antiparasitic)	500grams / ton of body wt. of fishes, continue upto 5 days
2.	ECTO MECTIN For Control Of External Parasites	Mix recommended quantity (0.2 mg/kg body wt) of Ecotomectin in feed or rice bran and make the premix. Mix the premix thoroughly in the whole feed. Repeat the next dose after 30 days
3.	HITEK Powder (Antiparasitic with recognition from FAO and CIFA)	10 grams of HITEK Powder for 1 ton of live fish Use continuously for 4 days. Repeat after every 3 months or depending on the severity of infection.
4.	LICID (Herbal antiparasitic)	100 grams per ton of fish body weight. Use continuously for 5 days.
5.	ARGUKLIN (Herbal antiparasitic)	250 grams/ ton of fish biomass for the 1st day and then continue with 125 gms/ ton of fish biomas for 15 days.
6.	CIPRO – M (Broad spectrum antiparasiticide)	5 grams / kg. of feed with a suitable binder.
7.	BROMO-CLEAN	5 litres / hectare – repeat the dose once in a month
8.	IVERMECTIN (Ectoparasiticide with least possible side effects)	0.2 mg/kg body wt of fishes (In feed Ration)
9.	ZOOTHAFIX (Antiparasite, antibacterial & antifungal with least side effects)	250 -500 ml. / hectare

PTO...

Sl No	Common Drugs (Brand Names)	Dosage
10.	MICRODINE (Broad spectrum antiparasiticide)	2-3 litres / hectare repeat the dose once in 3 or 4 weeks.
11.	FORMALINE (Antiparasitic, strong disinfectant)	10 to 15 ppm for ecto parasites.
12.	BENZ PLUS 80 (Anti Protozoan, Anti fungal)	2-4 litres per hectare once in 15 days. (If water depth is 1 m)
13.	I-20 (Anti Protozoan)	2 litres/ ha/ mt of water.
14.	RESTORE (Anti parasitic (mainly crustaceans))	10-20 grams / ton fish body weight, continue upto 5 days.
15.	**Helmistat (Natural parasiticide)**	**2-4 grams/ Kg feed {once daily for 20 or 25 days}**

FRESHWATER FISH PARASITE TREATMENTS

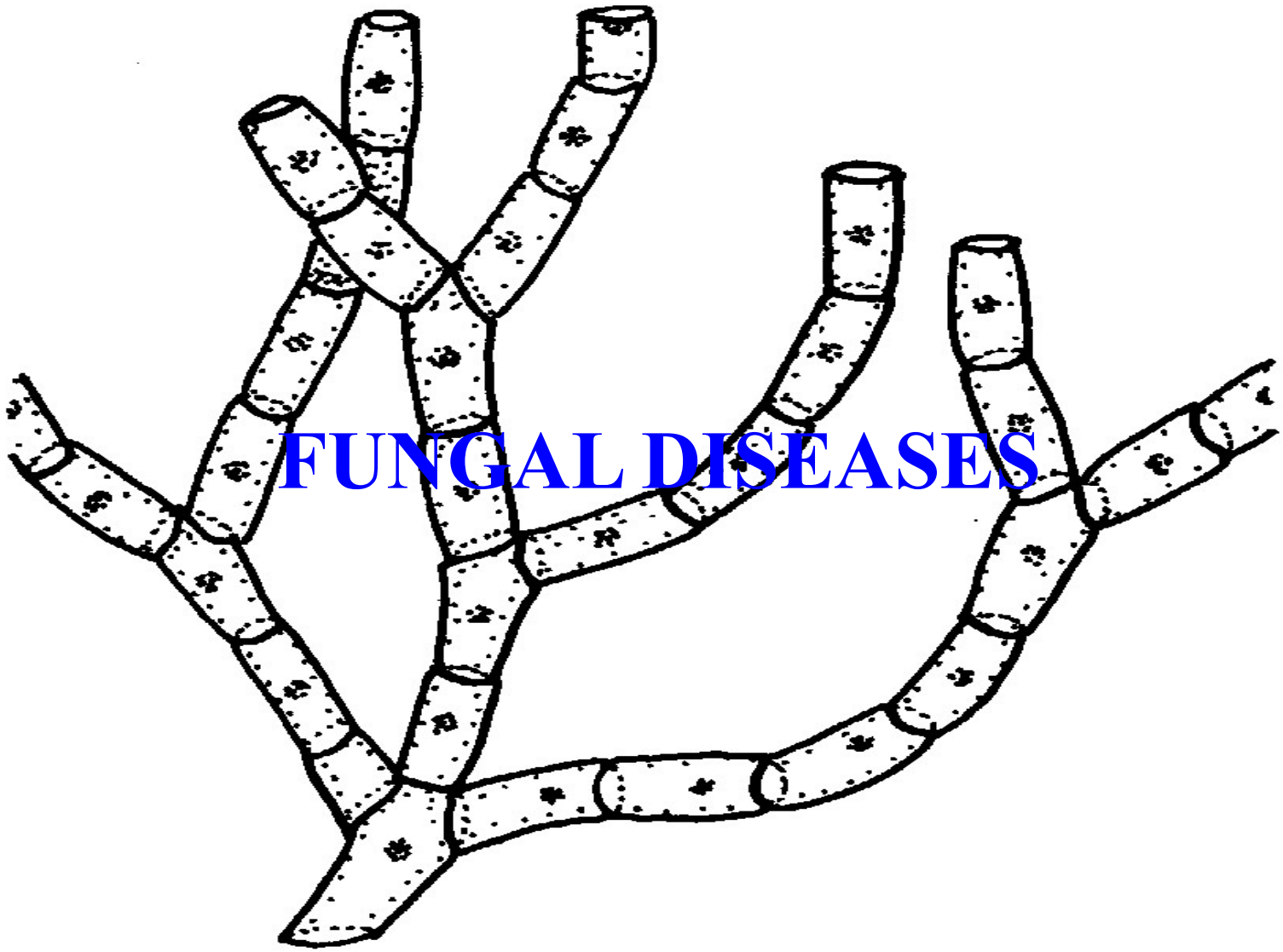
EXTERNAL PARASITES	TREATMENTS
Ich (*Ichthyophthirius multifiliis*), *Trichodina* , *Ichthyobodo* & *Tetrahymena*	Salt, formalin, malachite green, other commercial products
Gill flukes, skin flukes	Copper sulfate, malachite green, formalin, others
External protozoa, flukes	Malachite green and formalin, others
Velvet (dinoflagellates)	Antiparasite medication, salt, copper, inc. temp
Fish lice, gill maggots	Formalin, potassium permanganate, metriphonate, other commercial prod.
Anchorworms	Organophosphate, manual removal and then dab with antiseptic
Larval stage of digenetic fluke parasites	Organophosphate, other commercial products
INTERNAL PARASITES	**TREATMENTS**
Blood parasites	If flukes: Praziquantel, others difficult to treat
Nematodes (Thread worms)	Use of appropriate anthelmintic drug, eliminate IM host, remove dead fish, piperazine, Garlic oil (200 ml/l water), Levamisole, Mebendazole, flubendazole, parbendazole, netobimin, and nitroscanate. Trichlorphon , bath :4-7 PPM
Acanthocephalans : Spiny-headed worms	Appropriate anthelmintic, antidiarrhoeic drug loperamide : 50 mg per Kg feed for 3 consecutive days.
Cestodes: Tapeworms	Praziquantel
Digenetic flukes	Difficult to treat, praziquantel
Hexamita & Spironucleus	Metronidazole, other commercial products

Source: (Dash, .et al. 2008, Smith, 1972. Srivastava, et al. 1994 and Kabata,1985)

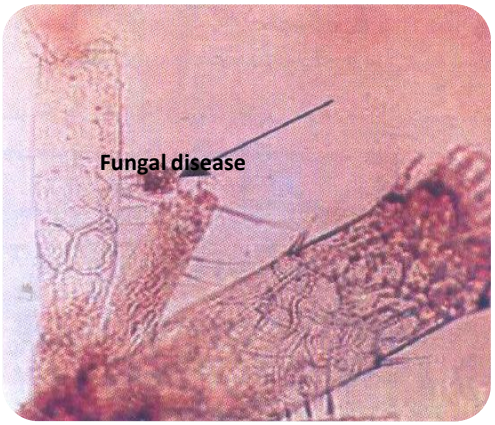
TREATMENT CHART FOR COMMON DISEASE CONDITIONS OF CARP REARING SYSTEMS

Disease agent	Chemical	Method	Concentration/time
1. Ectoparasitic protozoans			
a. Ichthyophthirius sp.	Formalin	Short bath	60-100 ppm for 30 minutes
b. Trichodina sp.	Formalin	Long bath	20-30 ppm
c. Epistylis & Vorticella	Formalin	Dip	200-300 ppm for 1 minute
d. Ichthyobodo sp.	Formalin	Dip	20-30 pm for 30 minutes
2. Monogenetic worms			
a. Dactylogyrus	Wormid	Pond treatment	50gms per ton body wt of Fishes up to 5 days
b. Gyrodactylus	Wormid	Pond treatment	50gms per ton body wt of Fishes up to 5 days
3. Crustaceans			
a. Lernaea	Licex, Arguklin	Pond treatment Through feed	500gms per ton body wt of Fishes up to 5 days 250gms/ton of fish feed for 1st day & then 125gms for 15 days.
b. Argulus	Licex, Arguklin	Pond treatment Through feed	500gms per ton body wt of Fishes up to 5 days 250gms/ton of fish biomass for 1st day & then 125gms for 15 days.
4. Endoparasites			
a. Sporozoans	Licid	Pond treatment	100gm /ton body wt of fishes continue up to 5 days
b. Cercaria and metacercaria of digenetic trematodes	Licid	Pond treatment	100gm /ton body wt of fishes continue up to 5 days
5. External Mycosis *Saprolegnia*	Malachite green Formalin	Dip Bath Dip Bath	60 ppm for < 1 minute, 1-2 ppm for 1 hr 50-75 ppm for 30 minutes 100-200 ppm for 1-3 minutes
6. Surface bacterial diseases	Proflavine Oxytetracycline & Furnace	Bath Short bath	20 ppm 1-5 ppm
7. Systemic bacterial diseases	Enrofloxacin Oxonilic acid Chloramphenicol	In feed In feed In feed	50mg /kg fish/day 10mg/kg fish/day 50 mg/kg fish/day

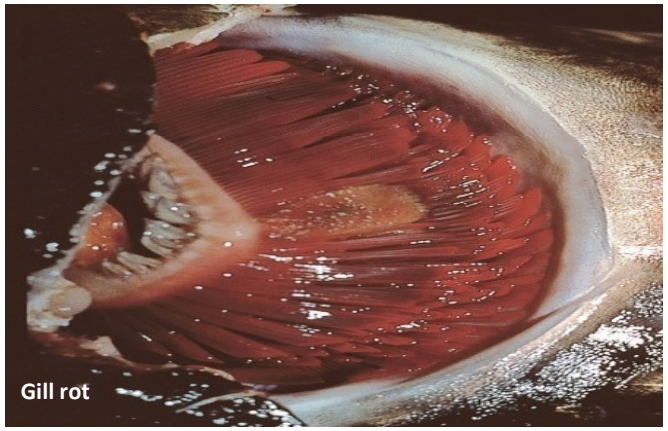
FUNGAL DISEASES



Cotton wool disease



Fungal disease

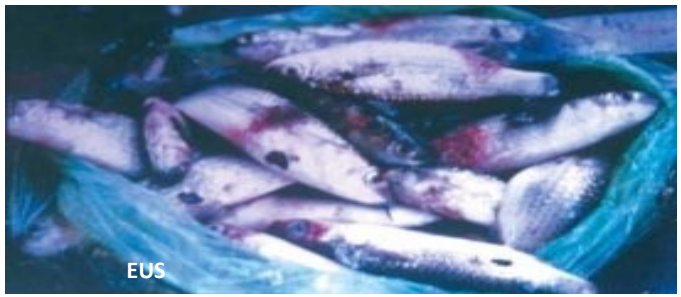


Gill rot

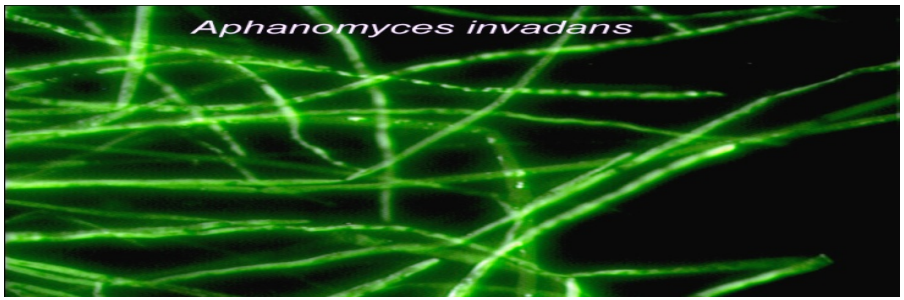
Rheo virus

EUS

Birnavirus



EUS



Aphanomyces invadans

Branchiomycosis in Gills

Common Medicines Used to Combat Fungal Diseases

Saprolegniasis: (Cotton Wool)

1) Give potassium permanganate (KMNO4) bath treatment @160mg/lit till the fishes are stressed. (for 5 days)
2) Give bath treatment of NaCl @ 3-4%.
3) Give bath treatment with Malachite Green @ 1-2 mg/lit for half an hour.
4)Ponds are to be treated with 20 mg/lit of formalin

Branchiomycosis: (Gill Rot)

1) Liming of the Pond @ 100-150 Kg/ha (3 Installments).
2) Give bath treatment of NaCl @ 3-4%.
3) Give bath treatment with Malachite Green @ 1-2 mg/lit for half an hour.
4)Ponds are to be treated with 20 mg/lit of formalin

Aphanomysis sp: (EUS)

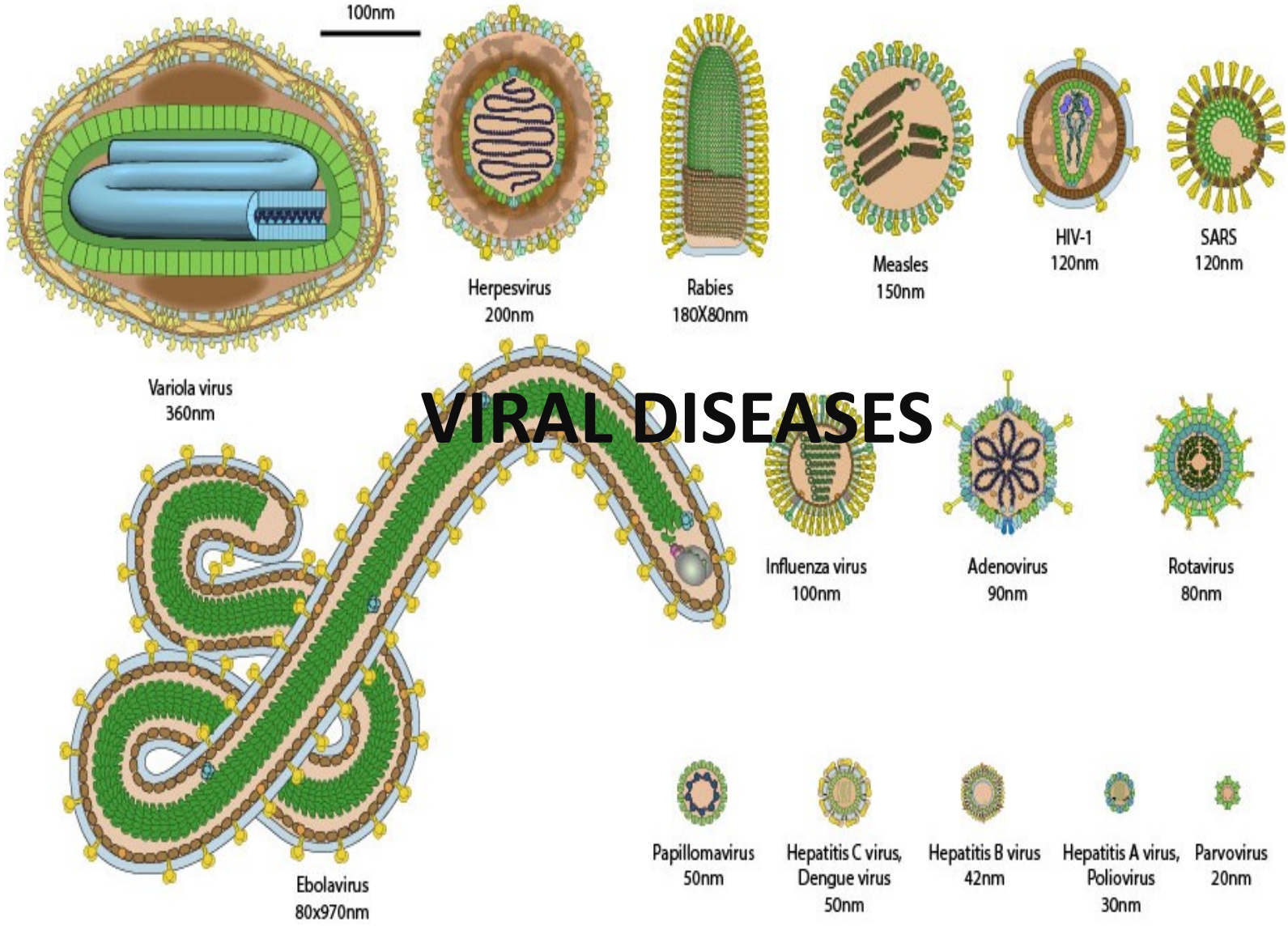
1) Apply lime (CaO) @ 100-150 kg/ ha
2) Bath treatment by NaCl (Sodium chloride) @ 3-4%m
3) Potassium permanganate (KMNO4) treatment:
a) Bath treatment: 1-6 ppm mg/lit
b) Pond treatment: 5-10 ppm.
3) Bleaching powder @ 1 mg/lit or 5-10 kg/ ha(At the time of preparation of pond)
4) Short dip bath - 50ppm formaldehyde solution followed by 0.1 ppm malachite green

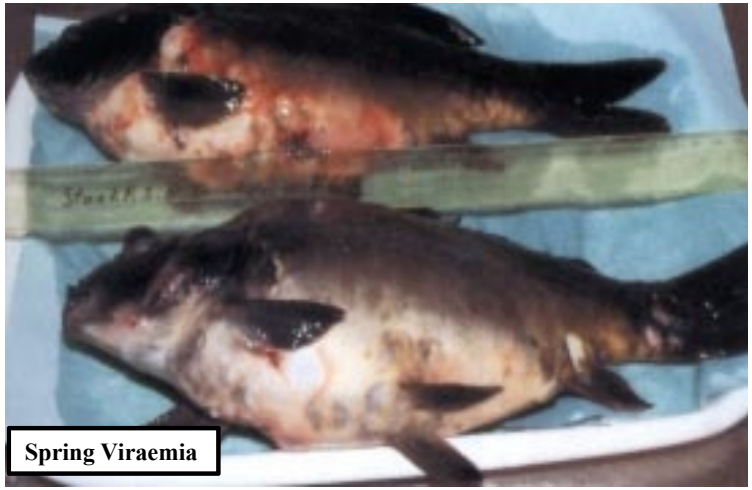
PTO...

DRUGS TO COMBAT FUNGAL DISEASES

Sl No.	Common Drugs	Dosage
1.	PRO-SQR	0.5 to 1 kg/ acre.
2.	**CIFAX**	**1 ltr/ ha mt water area**
3.	RESTORE	200-300 ml / Acre /mt of water. (Mix with dry sand & broad cast in pond water).
4.	BENZO PLUS 80	2-4 ltr. per ha once in 15 days.
5.	FISH CLEAN	1.5 to 2.5ltrs. / ha
6.	ANTIVIR	500 gm to 1 kg per acre. Use it once in 21 days.
7.	BROMOCLEAN	1 to 2 ltr/ acre

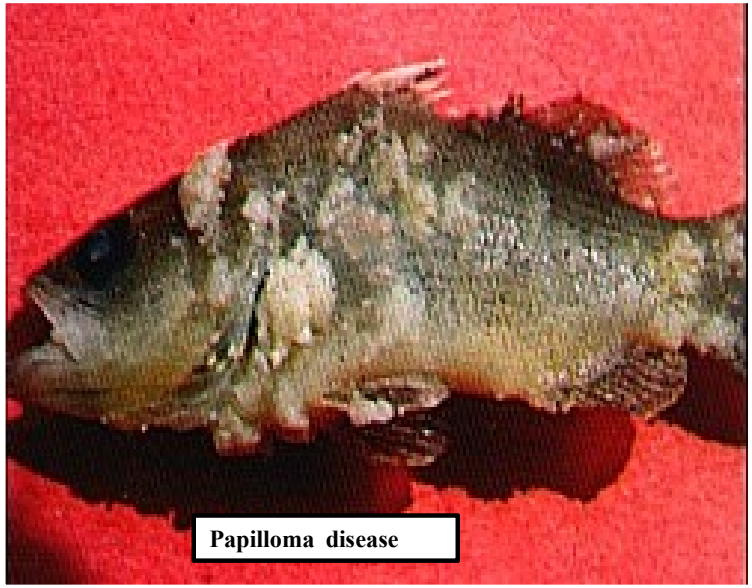
VIRAL DISEASES





Spring Viraemia

Carp pox Disease

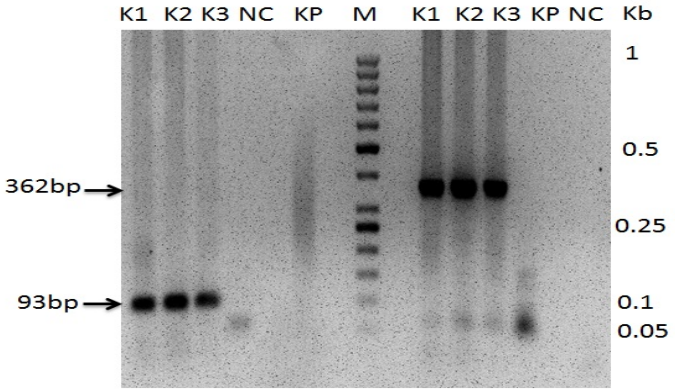


Papilloma disease

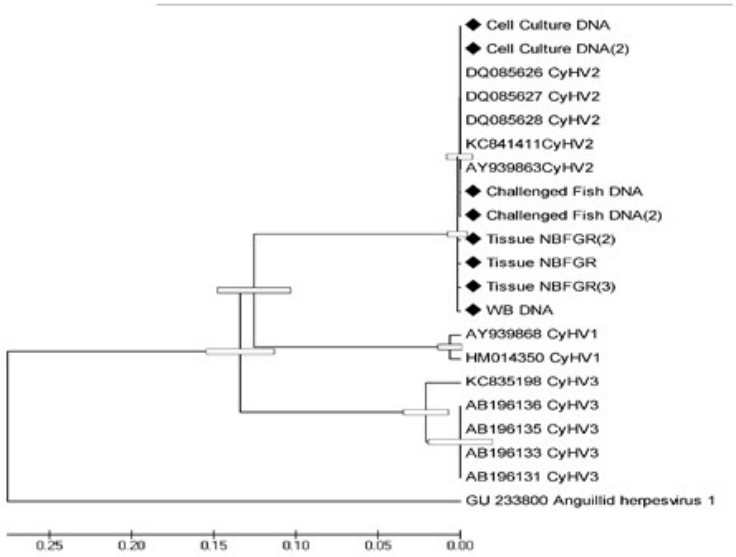
Carp pox Disease

Lymphocystis lesions Koi Fish

Cyprinid herpes virus 2

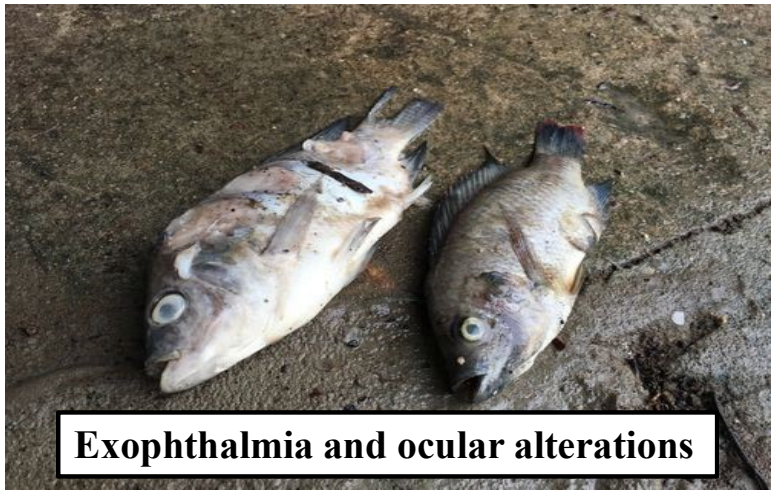


Samples amplified with Goodwin CyHv2 and pol CyHv 2 F/R primers. Expected product size of band obtained 93bp and 362bps respectively. K- Infected samples from kolkota; KP- Positive sample; NC- Negative control; M- Marker.

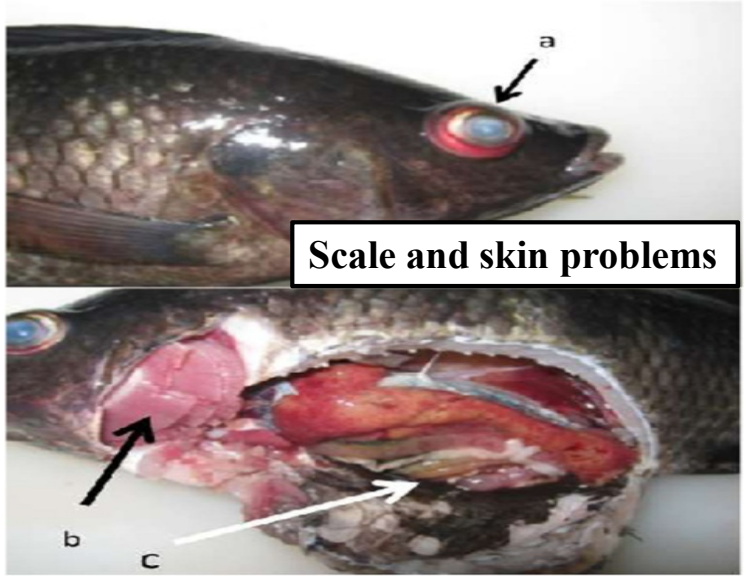


Tilapia Lake Virus (TiLV)

Darkening and scale protrusion



Exophthalmia and ocular alterations



Scale and skin problems

Large scale mortality observed

Tilapia Lake Virus (TiLV)

Common Medicines / Drugs to combat viral diseases

Attn.- There is no prescribed drugs or medicines for viral diseases.

SVC:

1) Mass vaccination by the immersion method.

2) Good nutrition may prove to be useful.

Carp Pox:

1) Mass immersion by immersing the stocking in the vaccinated solution.

NB.- Though some precautionary measures could be taken to check the occurrence of viral diseases, they can be the following:

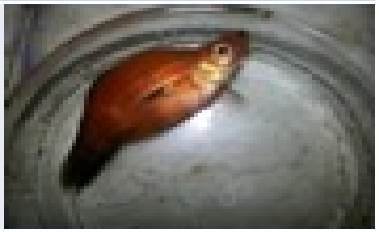
- Release of disease free seed.
- Adequate supply of nutritional feed to the fishes.
- Proper management of water bodies. (BMP)
- The infected fishes should be properly discarded like burning them or should be buried.

Sl No.	Common Drugs	Dosage
1.	SOCRENA- WS	1 to 4 ltr/ acre
2.	ANTIVIR	500 gm to1 kg/ acre (once in 3 week)
3.	N-CURE Natural Pond Sanitizer & Freshener	Normal Conditions : 5kg/ ha once in a month. During high pollutions : 10 k./ ha followed by 5kg./ ha on second day.
4.	VIRA- X (Broad Spectrum Virucidal disinfectant)	5-10 gm /ton of water(Hatchery),500 gm-2 Kg /ha (Culture Area)
5.	VIRANIL (Anti Viral)	500 gms to 3 Kg/Ha

The above mentioned drugs and medicines elicit good result in field during and after viral infections.

ENVIRONMENTALLY INDUCED DISEASES/ PROBLEMS AND NUTRITIONAL DISEASES

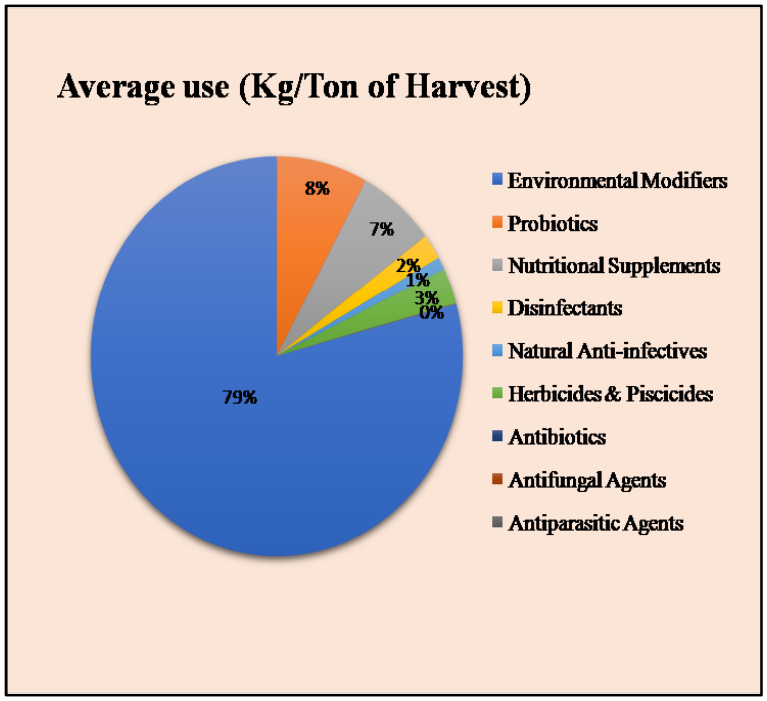
Dr Gadadhar Dash
9433326219 (M)

Vertebral malformation and other deformity in fishes of West Bengal	
Platyspondyly (Compression)	
Kyphosis (∧-shaped vertebral column)	
Lordosis (V-shaped vertebral column)	
Scoliosis (S- shaped vertebral column)	
Fish Opercula Deformity Syndrome (FODS)	

MASS MORTALITY

AQUA MEDICINES AND ITS USAGE IN INDIA

Average Usage of Aqua Medicine Categories in India (kg/t)



- The graph highlights the average quantity of various aqua medicine categories used in Indian aquaculture.
- The most extensively used group is environmental modifiers, such as lime and mineral treatments, crucial for maintaining water and soil quality.
- Probiotics and nutritional supplements follow, supporting gut health, immunity, and growth.
- Usage of therapeutics like antibiotics, antifungals, and antiparasitics is minimal, reflecting a shift toward preventive health practices and stricter regulations.

This data indicates a growing emphasis on sustainable and health-focused aquaculture inputs

DRUGS TO COMBAT ENVIRONMENTALLY INDUCED DISEASES

Sl No.	Common Drugs	Dosage
1.	O_2 MAX Tablets (Releases obnoxious gases from pond bottom)	Low Oxygen level: 1kg /ha of pond. O2 deficiency: 3-5kg /ha of pond.
2.	ECHO-MAX (Add micronutrients in the pond bottom)	40 tablets/ ha/ mt for 15 days of use .
3.	BIO MARINE (Releases obnoxious gases & add micronutrients in the pond bottom)	➢Fill the pond water up to 30 cm to keep the soil wet. ➢Add 8 lit of Bio marine & 20-40 lit of molasses in 200 lit of water. Mix together until homogenizes (10 min.). ➢Spray the mixture thoroughly all over in 1 ha. Pond. ➢Maintain wet condition up to 2 weeks. ➢Reuse the same mixture 3 days before stocking.
4.	DE ALGAE (Maintains plankton growth)	2-3 Lit/ ha/ mt.
5.	Bind gel (Binder)	20-30 g/ kg of feed
6.	BIOKLEEN (Pond water treatment)	5 lit/ha/metre
7.	BROSPARK (Pond water treatment)	(Juveniles) 1 lit/acre, (Adults) 2 lit/acre
8.	TETRASAN (Pond water treatment)	10 to 15 lit/ha/metre

PTO...

Sl No.	Common Drugs	Dosage
9	AMSORB (Control abnoxious gases & odour)	500 gm/acre (Shrimp), 250 gm/acre (Fish) once in 15 days.
10	Y 30 (Ammonia Eliminator)	150-250 gms per Acre (By thoroughly mixing with sand and sprinkling water evenly)
11.	OXY PLUS TAB / GRAN (Oxygen Booster for aqua World)	1-2 Kg/ acre (shrimp), 3-5 Kg/ acre (Fish)
12.	STIMMUNE (Stress Reliever)	5 gm per kg feed
13.	ZEOKLEAN High Quality Zeolite with high CEC.	50Kg/Ha (pond prepn , 25 Kg/ha –during culture.
14.	PROCURE (Unique blend of beneficial bacteria for bloom management)	30 to 50 gm/acre (during culture)
15.	YUCCAZOL-K (Reduces ammonia nitrate and toxic gases and oxygen enhancer)	100 gm/acre

SOME BRANDED PROBIOTICS AND FEED SUPPLEMENTS

Sl No.	Common Drugs	Dosage
1.	MINO AQUA (Mineral supplement)	5 kg per ton of feed (Once daily)
2.	NUTRIMIN-R (Feed Supplement)	15 to 20 gms/ kg fish feed
3.	GEOMIX (Mineral supplement)	20 to 25 kg/acre
4.	NUCLEOSAC (Probiotic)	1Kg per tonne feed
5.	Q-BAC (Probiotic)	500 to 1500 gms/ha
6.	TERRAGARD-SP (Probiotic)	2 to 3 kg/ha
7.	ULTRAZYME-P-FS (Probiotic)	3 to 5 gm/ kg feed
8.	YEASTPLUS^{++} (Probiotic)	1 to 2 kg/ ton of feed
9.	SPARK-PS (Probiotic)	2 to 3 lit/ha
10.	HUMIGARD (Probiotic)	12 to 18 cakes/acre

PTO...

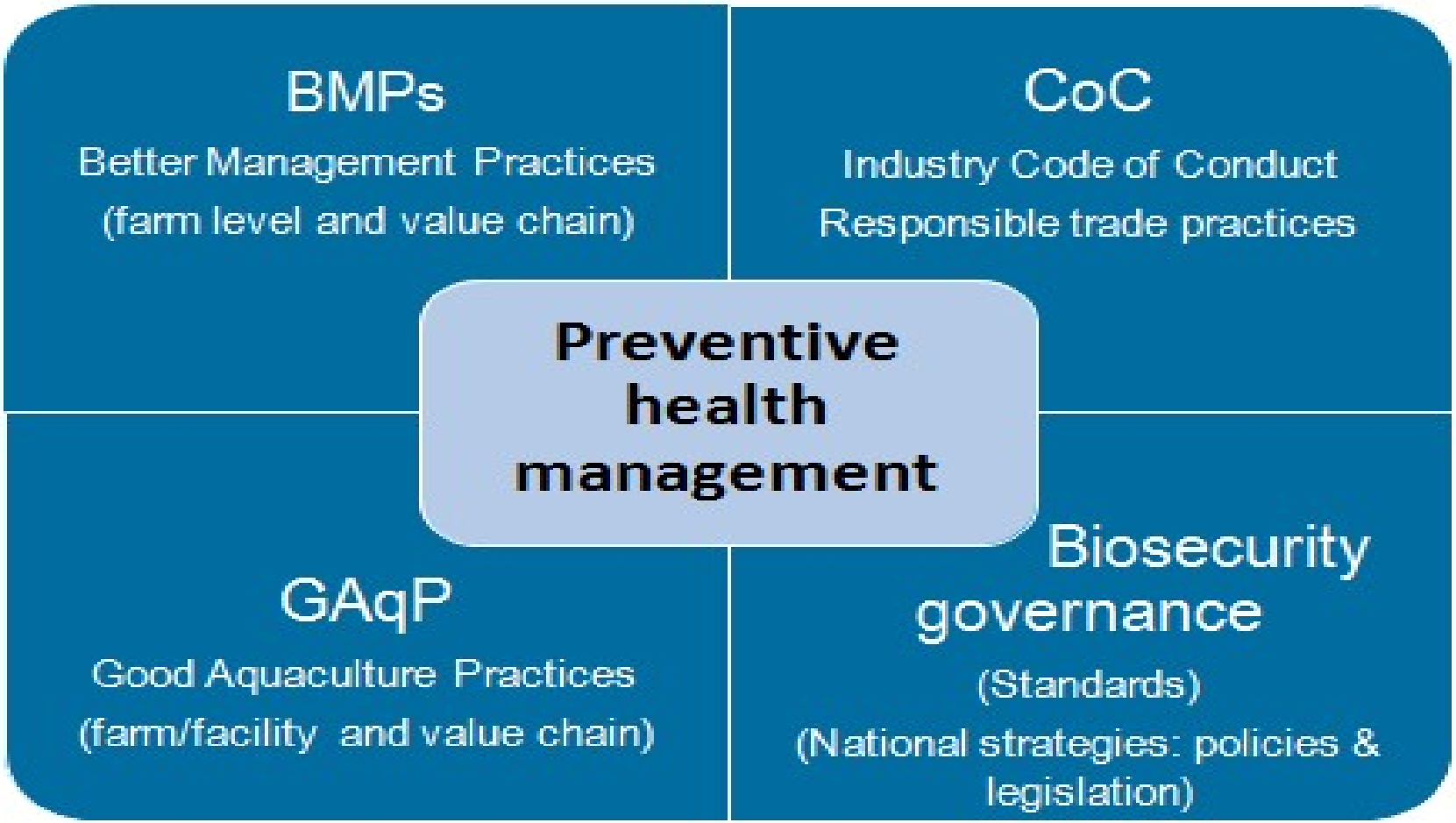
Sl No.	Common Drugs	Dosage
11.	SLUDGENIL (Probiotic)	12 to 24 cakes/acre
12.	PROBIOPOND (Probiotic)	5 kg/acre
13.	ASCOSOL-C (Probiotic)	0.5 to 2.0 gms/kg feed
14.	POWERMIN (Multi mineral supplement)	(Pond Preparation) 20 to 30 kg/ha, (Culture) 10 to 20 kg/ha, (Feeds) 10 kg/ton
15.	XTRA-M&G (Mineral supplement)	5 to 10 gm/kg feed
16.	MINPURE AQUA (Essential minerals)	20-30 Kg /ha (Before stocking), 10-20 Kg/ha (during culture)
17.	AMPROGUT (Balances gut microflora)	5-10 g/Kg feed
18.	C BOOSTER (Stable Vit-C)	0.5 gms-2 gms /Kg feed
19	Y30 (Probiotic)	150-250 gms per Acre

MANAGEMENT OF COMMONLY USED CHEMICALS IN AQUACULTURE

DO'S/ DONT'S

CHEMICALS	HAZARDS
Alum	Higher Dose cause mild irritation to skin/eyes or inhalation. pH of water falls drastically.
Bleaching Powder	Highly corrosive to skin and eyes.
BKC	BKC will turn toxic when used in combination Malachite Green (MG).
$KMNO_4$	High dose kills phytoplankton & leads DO depletion.
Iodine-20	It will not be effective in high pH of water.
Formaldehyde	It will not be effective when used in night time. Because day time formaldehyde turns to para-formaldehyde which is more toxic to protozoans.
Malachite Green	Toxic and Carcinogenic , Use should be restricted.
Zeolite	It is less effective in salt water/brackish water.

Preventive Health Management



Prevention strategies for Better management-
The ultimate way to stop an outbreak

- Hatchery accreditation for better seed certification-SPF/SPR
- Seed disinfection-$KMnO_4$ dip, Salt dip, Quarantine
- Pond sterilization (Pre and post-stocking)-CaO, Bleaching powder
- Diligent Surveillance-Routine Health checkup& Prompt diagnosis.
- Pond water corrections-Optimum water quality
- Appropriate Stocking and feeding-10000 fingerlings/ha for carps
- Training of farmers and mid workers
- Prevent stressful situations

  Proper stocking situations ,Proper management practices & Ideal water treatment

FISH SEED CERTIFICATION AND ACCREDITATION

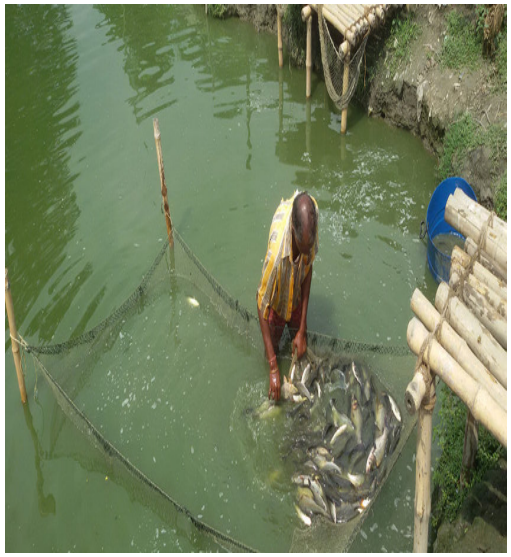
CERTIFIED FISH SEEDS

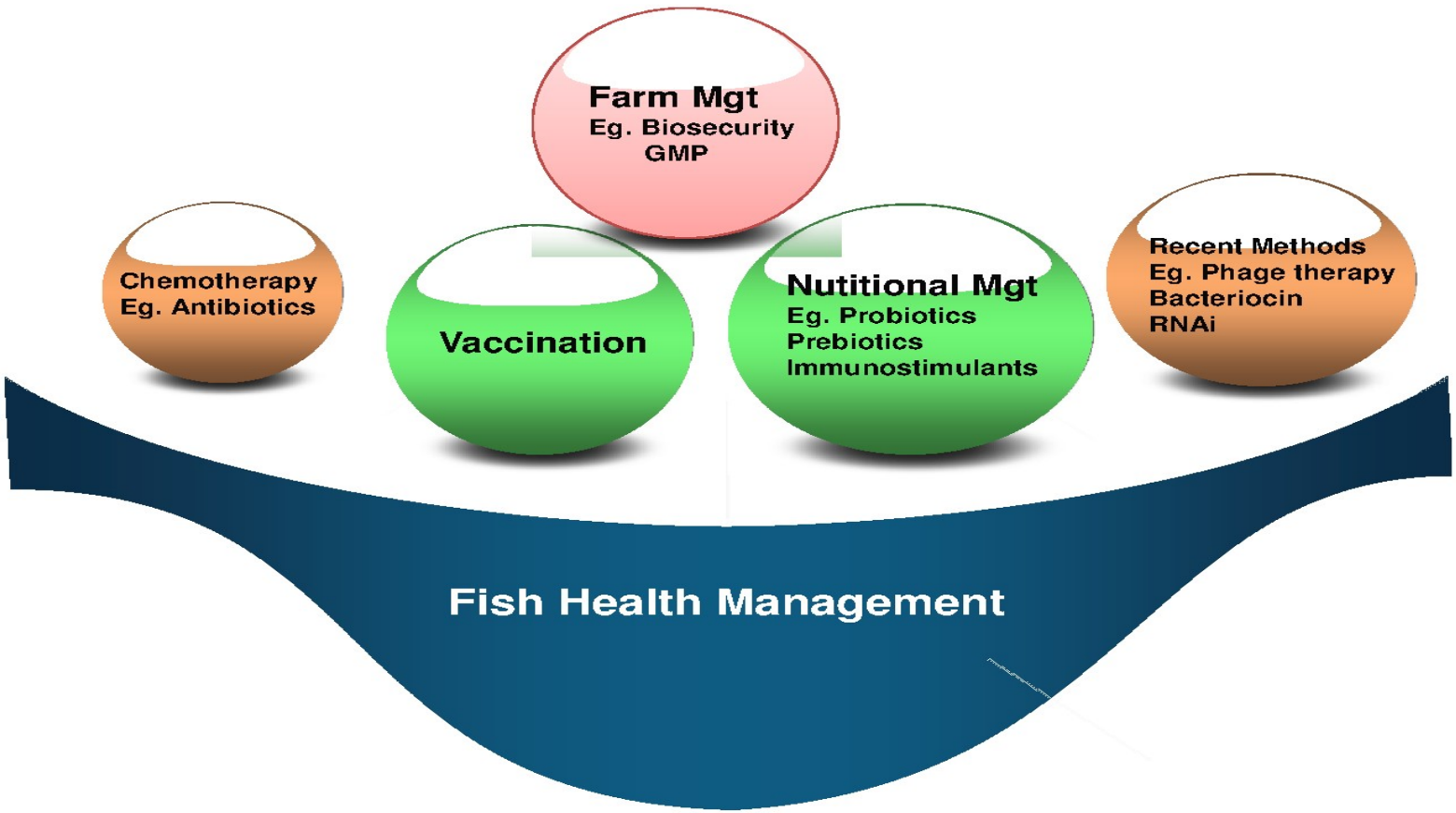
THE NEED OF HOUR

(FISHMARK)

REGULAR STOCKING & REGULAR HARVESTING

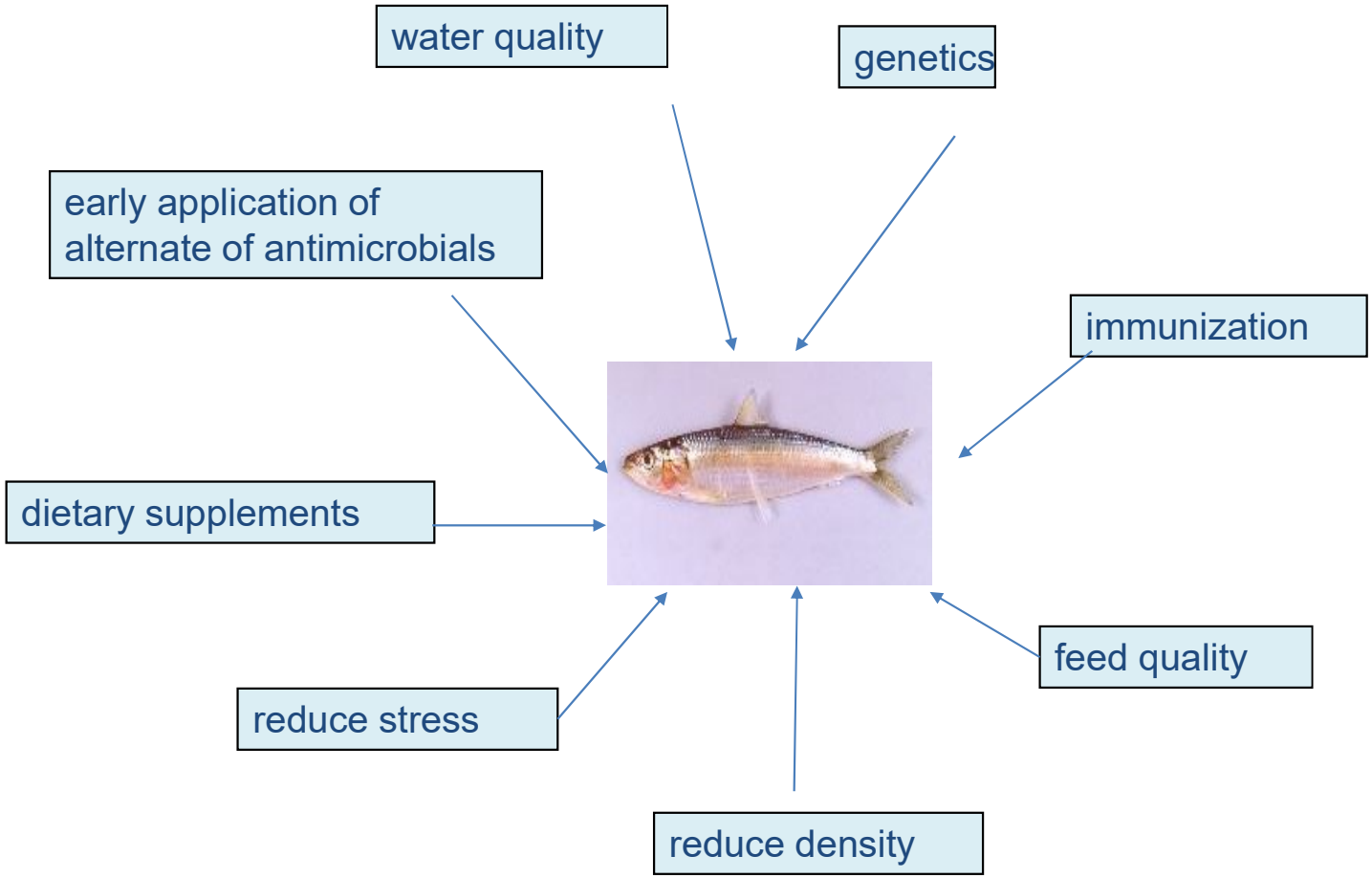
UNIQUE SYSTEM OF
FISH FARMING




Farm Mgt
Eg. Biosecurity
GMP
Chemotherapy
Eg. Antibiotics
Vaccination
Nutitional Mgt
Eg. Probiotics
Prebiotics
Immunostimulants
Recent Methods
Eg. Phage therapy
Bacteriocin
RNAi
Fish Health Management

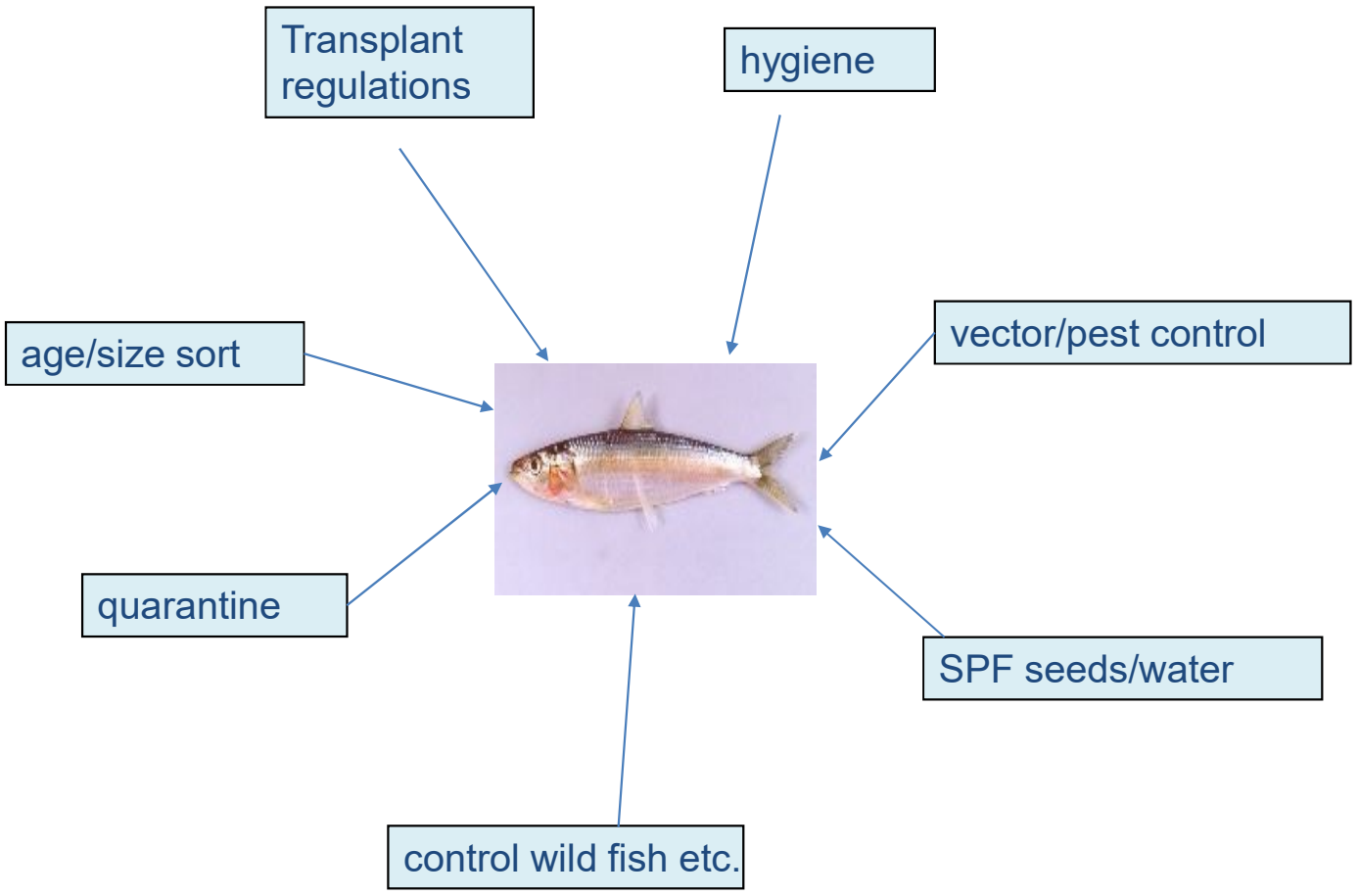
Preventative measures

Avert the threat before it occurs



Protective measures

The next step and usually takes over if **prevention** fails



Regulatory
Authority

National Regulatory Authority (NRA):

•**CDSCO:** (Central Drugs Standard Control Organization) is responsible for regulating the quality, safety, and efficacy of drugs, including those used in aquaculture. Monitoring the use of antibiotics and other chemicals

Specific to Aquaculture: Other Relevant Bodies:

•**Coastal Aquaculture Authority (CAA):**

•**Ministry of Agriculture & Farmers Welfare: (DAHD)**

•**Export Inspection Council (EIC):**

•**Food Safety and Standards Authority of India (FSSAI):**

•**Marine Products Export Development Authority (MPEDA):**

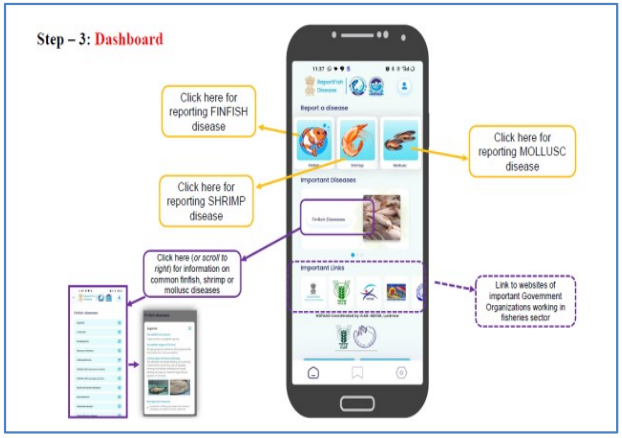
•**State Governments**

•**International Regulations:**

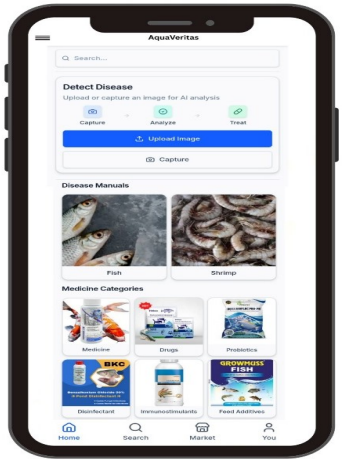
•While not specific to India, the U.S. Food and Drug Administration (FDA) also regulates aquaculture drugs (Approves & Monitor) in the United States, particularly through its Center for Veterinary Medicine (CVM).

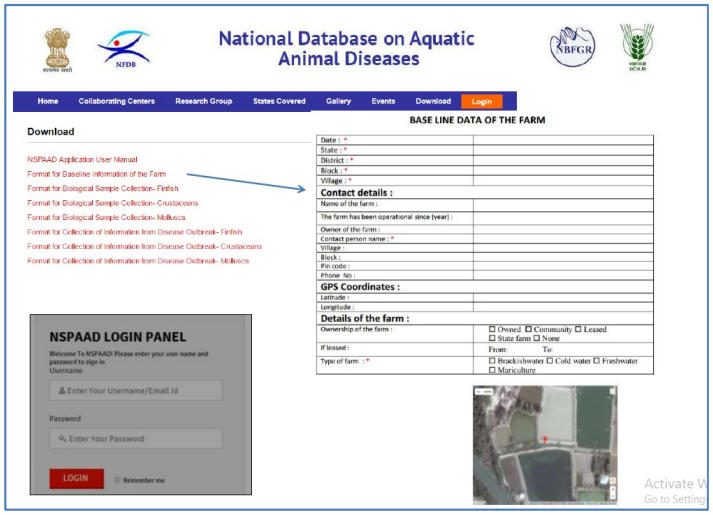
DIGITAL PREVENTIVE MEASURES

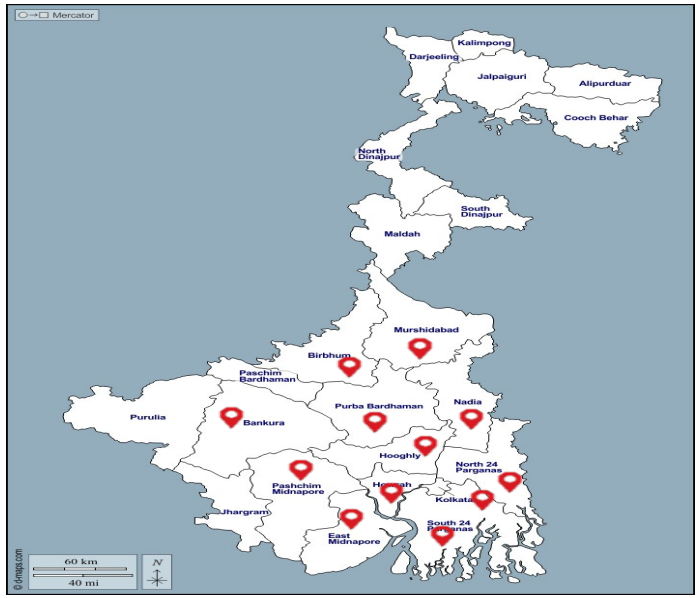
ReportFish Disease App (RFD)



Aquaveritas App







Products Used by the Shrimp/ Fish Farmers

Probiotics

Soil Probiotics:
1.5 Kg /Acre or 10 Kg/Ha (100Kg/Ha in a total culture period). Depending on Conc. of beneficial Bacteria &Sludge Condition. [Varies from one company to other]

Water Probiotics:
Initial start-up dose followed by weekly doses up to end of the culture recommended by company to company basis and also as per the product specification
Dose: 0.5-1.0 kg/ha/week (powder)
0.5-2.5 liters/ha/week (liquid)

Feed Probiotics:
Administrated through feed on a daily basis from day 1 of culture till harvest. mostly once a day (peak meal)
Dose: 0.01-0.4 g / kg feed with a suitable binder

Continued…….

Herbs/Herbal Products

Types: Turmeric powder (*Curcuma longa*), Tamarind water (*Tamarindus indica*), Thankuni leaves (*Centella asiatica*) paste, Garlic paste (*Allium sativum*), Neem (*Azadirachta indica*) etc.

Immuno-stimulants

Types:

- **Beta Glucans: 100 mg/Kg feed or 2-5 Kg/ ton of feed**
- **Levamisole: 5-10 mg/ Kg body weight.**
- **Lentinan, Polysachharides,Oligosachharides**
- **Schzophyllan, Vit-C & E, Chitin, Chitosan**

Medicines commercially used by the farmers

1. Alicin plus 1150gm/1000 mt^2 2) Probiopond 250gm/ 1000mt^2
3. Helmistat 2gm/ kg feed 4)WS Sokrena 5)B Ultra 6) Klosant

Juicing : For Increasing the water Productivity

Ingredients Required: (for 1 Kg Juice)

GOC :350 gm + Molasses/ Jagree :300gm + Rice polish : 250gm
Yeast: 25 gm + Minerals : 25 gm + Salt: 50 gm

IMPROVEMENT OF BROODERS FOR DISEASE RESISTANCE

1. Selective breeding

2. Development of disease resistant stocks (SPF/SPR/SPT)

SPF

SPR

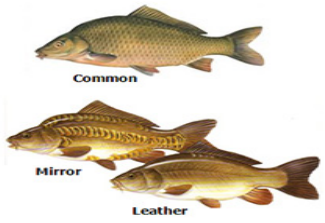
SPT

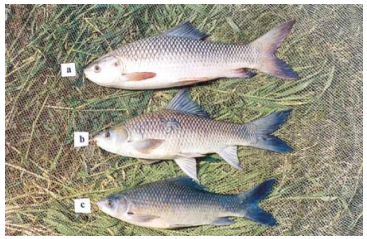
3. Transgenesis (GMO)

Tilapia

Rohu

4. Hybridisation & Cross breeding (Hybrid vigour)





5.Booster dose of Ovaprim/ Ovatide @ 0.2ml per kg to female brooders during January (Winter).

6. Development of Brood Bank (NFDB- Near CIFA, Kausalyagang,Odisha)

7. Proposal for Seed Bank in line with PHILIPPINES BAYAWAN FISH SEED BANK

Where the Farmers can go for help???

- AOC- Aqua One Centers (NFDB)
- Field Schools (NFDB)
- NASCA: National Centre for Sustainable Aquaculture (MPEDA)
- Fisheries Colleges /ICAR Institutes/KVKs/ RRS/ State Govt. laboratories (Blocks/District Offices)
- Private Clinics owned by Fisheries Professionals (Salem Groups, Virbac, Biostadt, CP, Growel, Marsco , RRH etc)
- Websites to Follow: www.caa.com
  www.mpeda.gov.in
  www.dahd.nic.in
  www.dof.gov.in
  www.fassai.gov.in

"Let us join hands together for enriched health, wealth and safe environment while developing the aquaculture……"

LET'S RELEASE HIGH HEALTH SEEDS & PRACTICE SCIENTIFIC FISH CULTURE FOR SUSTAINABLE PRODUCTION

Prof. Gadadhar Dash,
9433326219