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TOTAL HETEROTROPHIC BACTERIAL POPULATION IN THE BODY PARTS OF HEALTHY MUGIL CEPHALUS VS. TOTAL VIABLE BACTERIAL COUNT IN GILL, DIGESTIVE TRACT AND MUSCLE TISSUE

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Abstract: The abiotic and biotic factors, which activate the growth of bacteria in fresh water. The microbes, which are present in the gill, digestive tract soil and the tissues of Gray mullet, were studied. The total heterotrophic bacterial population in water and soil was more during summer than in winter. The percentage of bacterial flora was the maximum in the gill and minimum in the muscle tissues of Gray mullet. Vibrio spp, Pseudomonas spp and Bacillus spp were the major micro flora found in the gill, digestive tract and body tissues of Mugil cephalus followed by Micrococcus spp and Aeromonas spp. The polluted water of the pond appears to be the major source of fish pathogens.

Keywords: Gray mullet, Vibrio spp, Pseudomonas spp, Bacillus spp, Mugil cephlus

I. INTRODUCTION

Aquaculture is currently one of the fastest growing food production systems in the world, which is an industry and now possible to supply protein rich food throughout the world. According to Tacon (1996) the annual growth rate of global aquaculture at compound interest formula, is 9% per year. The world aquaculture production increased from 10.4 million metric tones (mmt) in 1984 to 22.6mmt in 1993.

The production from capture fisheries has almost reached its maximum of 100mmt and a remarkable increase may not take place in this sector in the coming years. By the year 2025, the world population would be 8.5 billion, which will leave a supply-demand gap of 62mmt of fishery products (Ganapathy, 1996). India with its vast stretches of fresh, brackish and marine waters can produce sizeable quantities of aquaculture products through farming.

China is the top most aquaculture producer, accounting to 58.7% of the total, which is followed by India (6.4%), Japan (6.3%), the Republic of Korea (4.6%) and the Philippines (3.4%). The total contribution of the above five countries formed 79.4% of the total world production in 1993 (FAO, 1995). Europe was the next largest aquaculture producer (5.3%) followed by North America (2.5%), South America (1.3%), the former USSR (0.8%), Oceania (0.4%) and Africa (0.3%). One noteworthy remark in the world aquaculture scenario is that, the production is growing at a much faster rate within developing countries and regions viz. Asia, South America, Oceania and Africa, then within developed regions such as North America, Europe and the former USSR. The share of aquaculture production of developing countries has been steadily increasing over the past decade; from 78% to 87% for the total farmed finfish and from 87% to 96% for total farmed crustaceans from 1984 to 1993 respectively (FAO, 1995).

Fisheries play a major role in India's economy, forming about 2 percent of the gross domestic product, and as the population is expected to rise substantially by the present millennium (2000 AD) the country will require 12.5 million tones of fish to meet the needs of the people (Prasad, 1996). Half of the projected demand will have to be met by brackish water fish production. The national plan is to meet the demand from marine and brackish water sectors. Conventional methods appear insufficient to produce the amount of fish required and brackish water fishery development has been slow owing to lack of technology.

India is the seventh largest fish producing country in the world (Fernandez, 1996) and Tamil Nadu, once a major contributor, presently occupies the third position in the country as far as the marine fish landings are concerned (Anon, 1995b). The district-wise marine fish landings in Tamil Nadu shows Kanyakumari district in the third place (16%) of the total landings during 1985-1989 period. According to Anon (1993) there are 5, 14, 526 fishermen along the coast of Tamil Nadu, of which a maximum of 25% (1, 27, 465) are in Kanyakumari district doing mainly fishing.

Developing brackish water fisheries has many objectives. They are: (1) increasing fish production; (2) increasing the export of high value fishery products; (3) generating employment opportunities in rural areas and (4) productively utilizing the otherwise unproductive coastal swamps and mangroves through aquaculture.

In Tamil Nadu also there are a number of estuaries, extensive backwaters, lagoons and mangrove swamps available. The major rivers flowing in Tamil Nadu are the Cauvery in the Coromandel Coast and the Vaigai in the palk Bay coast. The Coromandel Coast, Gulf of Mannar and the southwest coast are characterized by heavy surf and turbulent conditions. Most of the bar mouths of estuaries in these sectors; tend to remain closed to varying periods in the year. In the Palk-Bay sector because of the calm nature of the sea, the bar mouth of estuaries remains open throughout the year. In all the other estuaries the bar mouth opens only for a minimum period. The total brackish water resource area in Tamil Nadu is 56,000 hectares. Among the various estuaries and backwaters, only a very few estuaries, namely Kottakudi estuary, pulicat lake and Killai backwater; have permanent connection with sea, but other estuarine bar mouths open during rainy season and during low tide season of the sea. In Tamil Nadu, pillay (1947) studied the major estuaries of North Tamil Nadu and Anon (1987) studied port novo waters. Studied the estuaries fishery resources in Tamil Nadu.

Among the freshwater fishes of the world, the family carangidae constitutes a major fishery in certain areas throughout the year. Several species of mugilidae are available in Thengapattanam and manakudy estuaries. Among them, Mugil cephalus known as Gray mullet occurs in enormous shoals and form regular fishery in the freshwater ponds.

The landing of Gray mullet along with other fishes during the various seasons in Kanyakumari District. Among the fresh water fin fishes Gray mullet has been identified for detailed study by earlier workers (John, 1955 patnaik, 1962; Luther, 1968; Hickling, 1970, Das, 1978). Gray mullet are widely used for freshwater, brackish water aquaculture in many regions of the world (Oren, 1981).

Mugil cephalus is one of cheap edible fish, and easy to culture all types of water bodies like fresh water, bodies rivers, ponds, shallow streams and estuaries. It has major productivity rural areas as in lagoons. The fish was yearly contain noted by micro-organism because majority of the water bodies are occupied by urbanization and accumulators of sewage disposal. The sewage disposal directly mixed with water bodies they also affect the fauna and flora. The major fishes are accumulated by bacteria flora.

The microbes easily contaminated the fishes. The catches of the fish quality regulated by the microorganisms. The regular fishery as well as productivity of ponds also affected by microorganisms..mugil cephalus were collected and the total heterotrophic bacteria were enumerated

II. MATERIALS AND METHODS

Culture Media Preparation

0.15 g of beef extract, 0.15 g of yeast extract, 0.5 g of sodium chloride and 0.5 g of peptone were weighed and dissolved in 100 ml of distilled water in a conical flask. To this dehydrated broth, 1.5 g of agar powder was added and boiled for 5 mtd till the agar became dissolved. The flask was plugged with cotton wool and sterilized at 15 lbs pressure for 15 minutes. After the nutrient agar medium was sterilized, it was gently swirled to disperse the agar evenly. It was cooled to about 45oC. From this, 20 ml of liquid agar was poured into a sterile covered Petri plate and allowed to solidify. Contamination was avoided to ensure aseptic conditions.

Isolation and Identification Heterotrophic Bacterial Flora of Fish

Morphologically dissimilar, well-isolated colonies were randomly selected and streaked on the nutrient agar plates. The selected colonies were sub cultured in nutrient agar slants. This was done after observing the morphology and pigmentation of the colony. The bacterial strains isolated from Gill, digestive and tissues of Gray mullet were identified up to the genetic level by employing the scheme of Gunasekharan (1995).

Three species of commonly cultured fresh fish samples (Clarias gariepinus, C. heterobranchus and Gray mullet sp.) were collected from two locations in Benin City; Benson Idahosa University fish farm and the Graduate Farmers Farm at Aduwawa. The fresh fish species were killed and macerated in a mortar and one gram of fish tissue was dissolved in a test tube containing 9 ml of sterilized distilled water to obtain a solution. Serial dilution up to 10-5 was carried out on extracts from the skin, gill and flesh. 1 ml of each of the samples from the 10-5 was transferred into petri dishes in replicates of two after which nutrient agar was added. This procedure was repeated for Macconkey and potato dextrose agar culture media respectively. The dishes were rotated by hand in a swirling motion so that the inoculum was uniformly dispersed in the medium. The agar was allowed to solidify and incubated at 370C for 24 hours. Microbial colonies counts were taken using a digital colony counter (LABTECH) after incubation for the identified bacteria and fungi species. Colonies of each suspected bacteria species were subcultured in fresh nutrient agar plates.

Biochemical tests like catalase, coagulase, oxidase, indole, urease, citrate and methyl red were carried out well as morphological characteristics like Gram staining and motility test were used to properly confirm identification of microbial isolates. of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

III. RESULTS

The total results of heterotrophic bacterial populations present in the gill, digestive tract and muscle tissue of healthy Gray mullet were studied and are presented in table. The heterotrophic bacterial population in the gill region ranged from 4.4 x 105 to 10.3 x 105 CFU/g of gill with an average of 7.8 x 105 CFU/g. In the digestive tract and muscles tissue, it ranged from 1.35 x 105 to 5.8 x 105 CFU/g and 0.98 x 105 to 4.02 x 105 CFU/g with an average of 3.9 x 105 CFU/g in digestive tracts and occurrence of various bacterial genera present in gill, defensive tract and muscle tissue in gray mullet are shown in fig. In general the result indicated that Vibrio spp was the major microflora which was followed by Pseudomonas spp and Bacillus spp. A small percentage of Micrococcus spp and Aeromonas spp were also present in the gill digestive tract and the muscle tissues of Gray mullet.

Total Heterotrophic Bacterial Population in the body parts of healthy Mugil cephalus vs Total viable Bacterial count in Gill, Digestive tract and Muscle tissue

sino	Gill	Digestive Tract	Muscle Tissue
1.	7.10 x 105	3.20 x 105	2.20 x 105
2.	5.80 x 105	2.75 x 105	1.50 x 105
3.	5.20 x 105	1.35 x 105	1.01 x 105
4.	4.40 x 105	1.95 x 105	0.98 x 105
5.	7.30 x 105	2.80 x 105	1.30 x 105
6.	8.80 x 105	3.90 x 105	2.20 x 105
7.	6.20 x 105	5.20 x 105	2.80 x 105
8.	9.60 x 105	5.43 x 105	3.20 x 105
9.	10.30 x 105	4.90 x 105	4.02 x 105
10.	9.80 x 105	5.20 x 105	3.85 x 105
11.	9.20 x 105	5.80 x 105	3.00 x 105
12.	9.80 x 105	5.10 x 105	3.40 x 105
Average	7.80 x 105	3.90 x 105	2.50 x 105

IV. DISCUSSION

The present study noticed that the percentage of bacterial flora was maximum in the gill and minimum level in muscle tissues. Water in which the animal lives appears to be the major source for the fish pathogens. This provided an increasing concentration of bacterial numbers in different body parts of Gray mullet (pal, et al., 1992).

The presence of these bacterial and fungal isolates in fresh fish spoilage is indicative of public health risk in contacting diseases associated with these organisms. Compliance with standard microbiological measures to prevent contamination by these organisms becomes very necessary and should be ensured. Lack of proper storage facility after capture and insanitary conditions during processing are the major sources of contamination identified in this study. In view of the findings of this research work it is therefore recommended that good hygienic conditions and use of clean water during processing should be strictly adhered to after harvest, fresh fish should be properly stored at low temperatures so as to inhibit survival of mesophilic bacteria microorganisms such as bacteria, yeast, mycelium fungi and microalgae are probably the most effective producers of organic matter in nature. E. coli which are one of the very fastest growing microorganisms can, in theory, produce 72 doublings in 24 hours. If we start with one bacterium one evening, the next evening we may have 272 bacteria.

V. CONCLUSION

The total heterotrophic bacterial flora was maximum in gills and hepatopancreas tissue of Mugil cephalus. Vibrio spp, Pseudomonas spp, Bacillus spp were dominant and the polluted water of the estuary contains major source micro flora.

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