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Influences of Commercial Probiotics Lact Act on Physico chemical parameters of gold fish culturing Water

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Abstract: **The present study aims to find out the Influences of Commercial Probiotics Lact Act on Physico chemical parameters of gold fish culturing water. Probiotic bacteria used as feed additives seem to offer an attractive choice including health benefits to the host organism. The gold fish in the control tub was fed with prepared supplementary diet without commercial probiotics and the fish in the experimental tub was fed with supplementary diet mixed with commercial probiotics Lact Act. The experiment was carried out for 30 days and the physico chemical parameters of gold fish culturing water was recorded on 15th and 30th day of the experimental period. Results shows that commercial probiotics Lact -Act improves the water quality.**

Keywords: **Commercial probiotics, Lact Act, gold fish- *Carassius auratus*, Physico chemical parameters.**

I. INTRODUCTION

The probiotics are eco-friendly and it reduces the use of chemicals and antibiotics in aquaculture [1]. Probiotic feed gives protein and energy substances. In fish culture probiotics used either as nourishment or as water ingredients [2]. Application of probiotic bacteria to fish tanks increased the survival rate, size and growth performance [3]. In water environment, hosts and microbes share the common ecosystem. Surrounding bacteria are constantly ingested by the animal through osmoregulation and feeding .Aquatic probiotics can have the additional effects, including changes in the water quality and interaction with phytoplankton [4]. [5] reported the benefit of using *Lactobacillus* in enhanced fish growth. Apart from laboratory preparation, commercially available probiotics are also available. Commercial products are available in liquid forms or powder forms. The indiscriminate use of antibiotics and chemotherapeutants for improving the health and culturing water quality in fish has led to the development of drug-resistant strains of pathogenic microbes [6]. This paved the way for searching an alternative, which is the most widely accepted with increasing demand for environment-friendly aquaculture is the use of beneficial bacteria as the probiotic. It involves the addition of specifically formulated microorganisms to improve its microbial ecology in culturing water [7].

i. Ornamental Fish

Now a days, ornamental fish sector is one of the most economic and profitable area of fish farming activities. There is a commercial growing interest in the ornamental fish trade in Asia and all over the world. Ornamental fish are often called as 'living jewel" due to their colour, shape, behaviour and origin. They are peaceful, generally very small and available in attractive colours and capable of living in confined spaces. Recently, several useful works have appeared, facilitating a budding fish hobbyers to organise and maintains marine aquarium tank on scientific lines [8]**.** *Carassius auratus* is a gold fish belongs to Cyprinid family. Goldfish is a domesticated version of a less-colorful carp (*Carassius auratus*) native to East Asia. [9] studied the effect of Aquazyn-TM-1000, a probiotic on the water quality of *Cyprinus carpio* var. communis (L.). [10] demonstrated the beneficial effect of probiotic on larvae shrimp (*Penaeus vannamei*) based on water quality. [11] showed that the efficacy of probiotics in improving water quality and bacterial flora in fish ponds.

Assessment of probiotic application on natural food, water quality of saline tilapia *Oreochromis mossambicus* cultured in concrete tanks was reported by [12]. The use of a feed probiotic for improved health and reproductive performance has been well documented in ornamental fish [13,14] but research on the effect of commercial probiotics on the water quality in ornamental fish are lacking. Hence, the present study aims to find out the influence of commercial probiotic "Lact-Act" on temperature, pH, electrical conductivity, dissolved oxygen and ammonia level in the gold fish *Carassius auratus* culturing water.

II. MATERIALS AND METHODS

The experimental animals selected for the present investigation was healthy, Ornamental gold fish *Carassius auratus*. Fish with 1.53 gm weight were purchased from Selvam fish farm, Cudalore District, Tamil Nadu and acclimatized in laboratory conditions in a plastic tank (23^0 C/74^0 F, pH 7.0) with continuous aeration for two weeks prior to the commencement of an experiment. Stocked fish were fed with supplementary diet *ad libitum*.

i. Commercial Feed Probiotics

Commercial feed Probiotics "Lact -act" is a gut probiotic, purchased from Poseidon Biotech company, Chennai-37, Tamil Nadu..Each kg powder contains *Lactobacillus sporogens* (1500 million spores per gm), *Bacillus subtilis*, Yeast hydrolystate, Alpha amylase and Vitamin and mineral mix.

ii. Preparation Of Supplementary Feed

The ingredients used for the preparation of fish feed consist of dry fish meal (30g), rice bran (20g), groundnut oil cake (20g) and soya beans (13 g), wheat flour(15 g), vitamin and minerals (1g) and Lact Act (1g). The ingredients were mixed, ground well into fine powder. Weighed quantities of feed were mixed thoroughly with sufficient water to get smooth dough. The dough was cooked by steam for 30mts and then it was allowed to cool and then it extruded through pelletizer to make very small pellets. The pellets were dried in an oven at 60^0C and the dried pellets were stored in dry, air tight containers. The feed was prepared regularly and the proximate composition of the diet was analyzed according to the procedure[15].

iii. Experimental Design

Gold fish (*Carassius auratus)* with similar weight (1.53gm) were chosen for the present experiment. One plastic tubs with the capacity of 15 liters was kept as control (C) and another tub was kept as Experimental (E). The initial weight of the fish was recorded and twenty fish were introduced into each tub. The fish in the control tub were fed only with prepared supplementary diet (without probiotics) and fish in the experimental tub were fed with prepared supplementary diet mixed with commercial probiotics in the morning at 6.30 am. Each treatment had three replicates. Experiments were carried out for 30 days and water samples were collected in between 7 am to 8 am and the physico chemical parameters such as temperature, pH**,** Electrical conductivity, dissolved oxygen and ammonia levels were analyzed on 15^{th} day and 30^{th} day of an experimental period.by the standard methods [16].

iv. Statistical Analysis

The results were presented in Mean ± SD differences were analyzed by One way analysis of variance (ANOVA) and statistical analysis was carried out by using SPSS software (16 versions).

III. RESULTS

The physico chemical parameters of gold fish rearing water such as water temperature, pH, electrical conductivity, hardness, dissolved oxygen and ammonia were analyzed on 15^{th} day and 30^{th} day of an experimental period and results were presented in tables and figures. The water temperature in the control tub was recorded as 30.01± 2.85 ^{0}C on 15^{th} day and 30.33 ± 2.82 ^{0}C on 30^{th} day of the experimental period whereas water temperature in experimental tub was recorded as 30.33 ± 1.41^{0}C and 30.39 ± 1.96 ^{0}C on 15^{th} and 30^{th} day of the experimental period respectively(Table 1 & Fig 1). More or less the same temperature with little fluctuations maintained throughout the experimental period in both control and experimental water.

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TABLE 1: Effect of commercial probiotics 'Lact-Act' on water temperature

EXPOSURE PERIOD (Days)	TEMPERATURE (^{0}C)	
	Control	Experiment
15	30.01± 2.85	30.33 ± 1.41
30	30.33 ± 2.82	30.39 ± 1.96

Values are in Mean ±SD

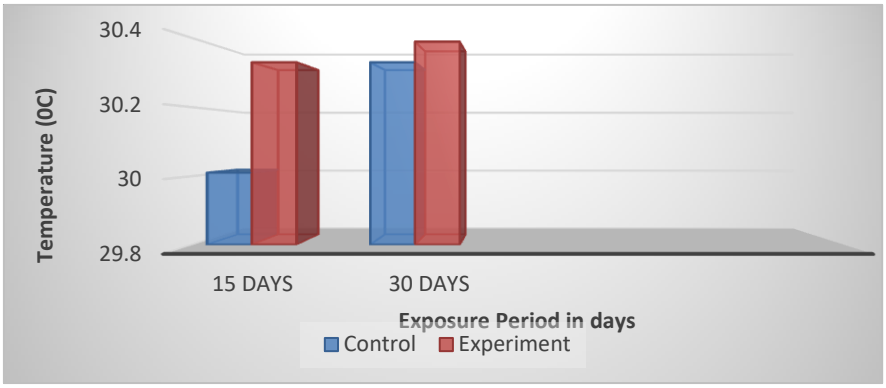

Fig 1: Effect of commercial probiotics Lact-Act on water temperature

The water pH recorded in the control water as 7.91 ± 0.83 and 7.93± 0.46 on 15th and 30th day of the experimental period where as, the slightly decreased pH was recorded as 7.87± 0.52 on 15th day, 7.8 ± 0.70 on 30th day of the experimental period (Table 2 & Figure 2). Slightly decreased pH was recorded in experimental water than the control water.

TABLE 2: Effect of commercial probiotics ' Lact-Act' on water pH.

EXPOSURE PERIOD (Days)	pH	
	Control	Experiment
15	7.91± 0.83	7.87± 0.52
30	7.93± 0.46	7.8 ± 0.70

Values are in Mean ±SD

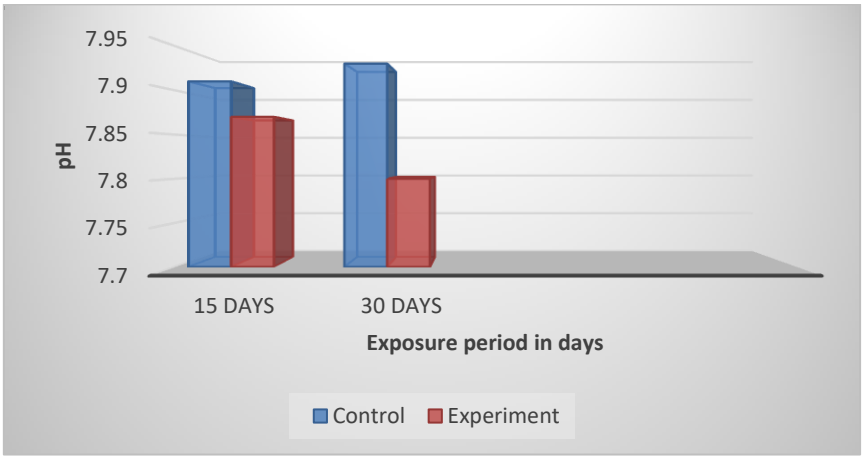

Fig 2: Effect of commercial probiotics 'Lact-Act 'on water pH

The electrical conductivity in the control tub was recorded as 1796 ± 2.82 mhos/cm (15th day) and 2103 ± 4.24 mhos/cm 930th day).Increased electrical conductivity was recorded in the experimental tub as 2196 ± 1.41mhos/cm on 15th day and insignificantly increased to 2206 ± 2.82 mhos/cm on 30th day of the experimental period. Decreased electrical conductivity was recorded in the experimental water than control water (Table 3 & Figure 3).

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TABLE 3: Effect of Commercial Probiotic 'Lact-Act' on Electrical Conductivity of Water.

EXPOSURE PERIOD (Days)	ELECTRICAL CONDUCTIVITY(mhos/cm)	
	Control	Experiment
15	1796 ± 2.82	2196± 1.41
30	2103 ± 4.24	2206 ± 2.82

Values are in Mean ±SD

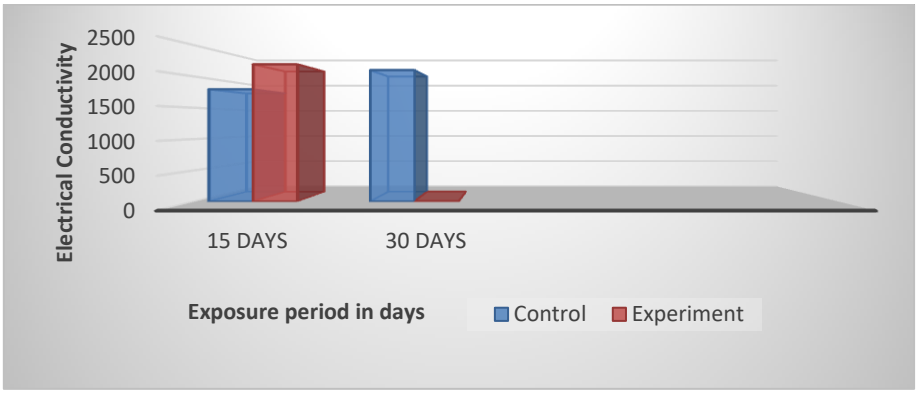

Fig 3: Effect of Commercial Probiotic 'Lact-Act' on Electrical conductivity of water.

The dissolved oxygen level in the control tub was recorded as 3.5 ± 0.70 mg/l on 15th day and 4.1 ± 1.13 mg/l on 30th day and significantly increased dissolved oxygen level was noted as 3.6 ± 0.84 mg/l on 15th day and 4.8 ± 1.27mg/l. on 30th day of the experimental period. (Table 4 & Figure 4).

TABLE 4: Effect of commercial probiotics 'Lact-Act' on dissolved oxygen level of water.

EXPOSURE PERIOD (Days)	DISSOLVED OXYGEN (mg/l)	
	Control	Experiment
15	3.5 ± 0.70	3.6 ± 0.84
30	4.1 ± 1.13	4.8 ± 1.27

Values are in Mean ±SD

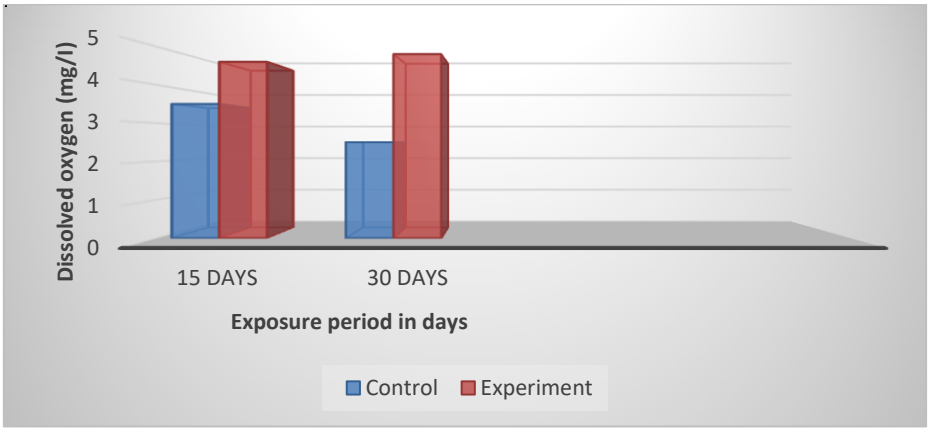

Fig 4: Effect of commercial probiotics 'Lact-Act' on dissolved oxygen level.

Ammonia level was recorded in the control tub as 49±5.65 mg/l on 15th day, suddenly increased ammonia level was recorded as 61 ± 4.24mg/l on 30th day of the experimental period. Decreased ammonia level was noted as 55 ±2.82 mg/l on 15th day and 47 ± 2.82 mg/l on 30th day of the experimental period (Table 5 & Figure 5).

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TABLE 5: Effect of commercial probiotics' Lact-Act' on ammonia level in the water

EXPOSURE PERIOD (Days)	AMMONIA(mg/l)	
	Control	Experiment
15	49± 5.65	55± 2.82
30	61 ± 4.24	47 ± 2.82

Values are in Mean ±SD

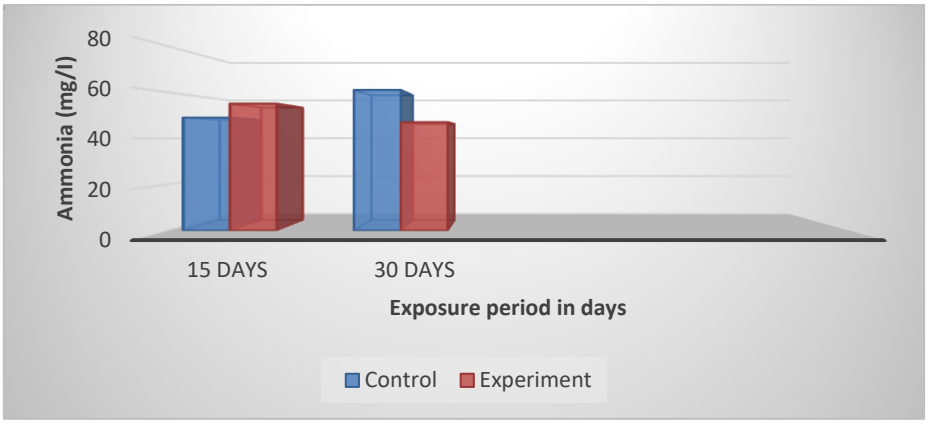

Fig 5: Effect of commercial probiotics 'Lact-Act' on ammonia level in the water.

IV. DISCUSSION

Probiotic bacteria are known to improve water quality in many ways, Incorporation of *Bacillus* Spp. in the fish culture could improve water quality by influencing the microbial population of water and by reducing the number of pathogens [17]. As fish are poikilothermic, the water temperature affects the metabolism, digestion, growth, survival, maturity and reproduction. A rise in temperature of water accelerates chemical reactions, reduces solubility of gases and elevates metabolic activity of organisms. Application of probiotics in fish culture is a method for controlling illness, upgrading immune response, giving nutritional and enzymatic contributions to the digestion of the host, and enhancing water quality [18]. The water temperature was maintained more or less same in both control and experimental water may be due to probiotic effect played by the bacteria. The pH of natural water ranges between 5- 10 [19]. Higher pH is responsible for fish death. The observed pH range may be due to its optimum concentration of Carbon di oxide (CO_2), carbonates and bicarbonates level in the water**.** Heterotrophic bacteria necessitating some organic sources of carbon in addition to inorganic forms for growth have a significant role in the decomposition of organic matter and production of particulate food materials from dissolved organics [20].

Dissolved oxygen is the most important environmental factor in an aquatic environment and two main sources of water oxygen through the diffusion of air water interfaces and photosynthetic activity of algae [21]. The dissolved oxygen level of the present study was found to be increased in experimental water may be due to the beneficial effect of probiotic bacteria which favored the mineralization of organic matter [22]. Presence of heterotropic bacteria *Bacilli* have chemical reaction such as nitrification and phosphate mineralization they could decompose the excreta and remaining food materials and organic matter to nitrate and phosphate which results in decreased ammonia level [23,24,25]. Decreased ammonia level in the present study may be due to nitrification and phosphate mineralization by the nitrifying bacteria.

V. CONCLUSION

The commercial probiotics bacteria plays a major role in improving the water quality throughout the entire culture period of gold fish *C.auratus* which inturn results in better growth and good health of gold fish.

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