

Effect of Water Hardness on the Survival Rate of Ornamental Fishes, in Nanded City

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ABSTRACT

Water quality index is considered as one of the most effective to communicate information on water quality trend to policy makers and general public. Since aquaria have become a very popular interior decoration for medium and higher class society and their increasing use at commercial places like hotels and restaurants it has become essential to aware the people about the safe use of water for aquaria.

Freshwater animals can tolerate the changes in water however it creates a lot of problem for sensitive animals like ornamental fishes kept in aquaria.

In the present study the ornamental fishes, Black molly, Blue guramii and Tiger barb were kept in well water and tap water separately in aquaria. The fishes kept in tap water survived for longer time. Hardness, Alkalinity, Calcium and Magnesium content are the important parameters which determine the survival rate in aquaria fishes.

INTRODUCTION

Water quality index is considered as one of the most effective ways to communicate information on water quality trends to policy makers and general public. It gives an exact idea on the extent of pollution and current qualitative status of the water body. Water being a solvent for several minerals and solutes, its quality changes time to time posing harmful effects on the fauna and flora living in it. Freshwater animals can tolerate the changes in water, however, it creates a lot of problems for sensitive animals like ornamental fishes kept in aquaria, as the water hardness, alkalinity and extent of chloride and fluoride content in water may lead to physiological changes in the animals or even may lead to death.

Since aquaria have become a very popular interior decoration for medium and higher class society and their increasing use at commercial places like hotels and restaurants, it has become essential to aware the people about the safe use of water for aquaria.

Basic water quality can be measured in to two main ways – whether it is acidic or alkaline, and whether it is hard or soft. There are many fish that are tolerant to a wide range of water hardness values. Water hardness is a measure of the amount of dissolved

lime and other minerals. Tap water from limestone areas is normally very hard, as it evaporates it leaves white lime deposits. Where water is drawn from granite areas it is very soft, that is , it has very little dissolved lime. Such water is sometimes amber-coloured, having filtered through peat beds. Each type of water has a place in the freshwater aquarium and, if necessary, the aquarist can make adjustments. Domestic water softness should be used with caution, as they sometimes introduce other materials.

Unfortunately, very limited scientific reports are available on ornamental fish rearing in aquaria with respect to water quality and hence it was thought to study the effect of various water parameters on the survival of the selected aquarium fishes.

MATERIAL AND METHODS

Basic water quality can be measured in to two main ways – whether it is acidic or alkaline, and whether it is hard or soft. Inexpensive test kits are available to ascertain the water's exact quality – pH kits and hardness kits.

The ornamental fishes, Black molly, Blue guramii and Tiger barb were selected for present study and were procured from Hiramoti Aquarium House, Nanded. Only healthy fishes were used after 7 days of acclimatization to laboratory condition. The fishes were maintained in the aquaria with all the ideal conditions with respect to light, temperature and food. Physico-chemical analysis of tap and well water was carried out using standard methods (APHA, 1998). Mortality data was recorded after 30 and 60 days.

RESULTS AND DISCUSSION

Hard water (>200ppm) is high in calcium and magnesium, while soft water (50 to 100ppm) is suitable values for most ornamental fishes ranges between 100 and 300ppm. As an aquarist, you should seek to provide a healthy aquarium environment by duplicating the water conditions of the natural habitats of your fish. In a home aquarium, select fish with in the same region so that the pH values are relatively similar.

The physic-chemical parameters of well and tap water are given in Table:1 and data of mean survival of fishes is shown in Table:2.

The well water shows higher values of hardness, alkalinity, calcium and magnesium contents as compared to tap water. On the other hand, the tap water showed higher chloride contents. After 30 and 60 days of experimental period the well water in aquaria exhibited decreasing trend in alkalinity, hardness and ionic contents. While the tap water in aquaria showed significant increasing trend after 30 and 60 days of exposure of fishes in aquaria.

The present results also showed more mortality of fishes in well water than tap water. It may be because of the higher concentrations of calcium and magnesium on

Table 1 : Physico-chemical parameters of tap and well water used in aquaria.

Parameter		0 Hrs		30 Days		60 Days	
				Water			
		Tap	Well	Tap	Well	Tap	Well
Water (lit)		100	100	100	100	100	100
Light (Watt)		50	50	50	50	50	50
Temperature (°c)		28-28 (28°)	27-27 (27°)	27-29 (28°)	28-28 (28°)	27-27 (27°)	27-27 (27°)
pH		7.80-7.90 (7.85)	7.81-7.86 (7.83)	7.81-7.90 (7.85)	7.80-7.86 (7.83)	7.37-7.80 (7.58)	7.80-7.83 (7.81)
1.	Hardness (mg/l)	132-124 (128)	312-322 (317)	132-144 (138)	236-272 (254)	136-170 (153)	214-252 (233)
2.	Calcium (mg/l)	36.01-38.41 (37.21)	44.01-48.01 (46.21)	37.68-40.37 (39.025)	41.61-52.15 (46.88)	37.61-50.50 (44.055)	44.01-44.81 (44.41)
3.	Magnesium (mg/l)	21.31-22.72 (22.05)	65.10-66.51 (65.805)	22.92-25.11 (24.015)	44.61-55.97 (50.29)	23.81-29.04 (26.425)	41.10-50.52 (45.81)
4.	Chloride (mg/l)	89.46-91.38 (90.42)	31.24-32.66 (31.95)	99.4-106.5 (102.95)	35.5-36.92 (36.21)	96.56-120.7 (108.63)	42.60-49.7 (46.15)
5.	Alkalinity (mg/l)	174-185 (179.5)	371-383 (377)	185-202 (193.5)	280-323 (301.5)	191-237 (214)	254-299 (276.5)
6.	Phosphorus (mg/l)	0.130-0.138 (0.134)	0.152-0.221 (0.1865)	0.136-0.153 (0.1445)	0.112-0.193 (0.1525)	0.142-0.178 (0.160)	0.152-0.175 (0.1635)
7.	Aeration(hrs)	24 hours	24 hours	24 hours	24 hours	24 hours	24 hours
8.	Quantity of Food (gm)	0.5/2 times in a day	0.5/2 times in a day	0.5/2 times in a day	0.5/2 times in a day	0.5/2 times in a day	0.5/2 times in a day

Figures in parenthesis are mean values from 5 sets of aquaria

Table 2: Mean survival of fishes in aquaria.

Survival	Tap Water (Days)	Well Water (Days)
00	12.00	12.00
30	10.00	09.00
60	09.00	06.00

well water and the duration of storing well water in aquaria affecting the hardness and alkalinity which might not have tolerated by the aquarium fishes. The mean chloride content in tap water ranged between 89.46 to 91.38 mg/l at the start of exposing the fishes which further increased to 120.7 mg/l after 60 days. This increase in chloride contents was found to be the cause of mortality in the aquaria having tap water.

Thus the present results indicate that the fluctuations in calcium and magnesium contents are more important parameters of water, which affect the mortality of ornamental fishes in aquaria in addition to the chloride contents. Further, it is desirable to change the aquaria water after every 30 days if the water is very hard to avoid the mortality. Further work is going on to find out the clinical cause of mortality in fishes due to lowering down of hardness in stored water.

REFERENCE

1. APHA, 1998, Standard Methods for Examination of Water and Waste Water, American Public Health Association, Washington DC.