

## Water hardness effects on survival rate of ornamental fishes

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### Abstract

The present study was conducted to determine the effect of water hardness on survival rate of ornamental fishes in aquarium fishes. Water quality determines to a great extent the success or failure of aquaculture operation. The ornamental fishes were kept in well water and tap water separately in aquaria. The fishes kept in tap water survived for longer time whereas fishes survived in well water shown shorter period. Certain parameters viz., hardness, alkalinity, calcium and magnesium fluctuations determined survival rate in aquaria fishes.

**Keywords:** Ornamental fishes, aquaria, hardness, alkalinity

### Introduction

Ornamental fishes are attractive colorful fishes of various characteristics, which are kept in homes in confined space of an aquarium or a garden pool for fun and fancy. 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, Goldfish, Goldfish black moor and Puntius 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.

Water hardness is the 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 little dissolved lime. Such water is sometimes amber colored, having filtered through peat beads. Each type of water has place in the freshwater aquarium and if necessary, the aquarist can make adjustments. Domestic water softness should be used with caution, as they sometimes introduced 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.

### Methods and materials

There are two ways to be measured basic water quality whether it is acidic or alkaline, and whether it is hard or soft. In market, inexpensive kits are available to ascertain the waters exact quality- pH kits and hardness kit.

For the present study, ornamental fishes Goldfish, goldfish black moor and Puntius selected and were procured from Green world aquarium house, Buldhana. Only healthy fishes used after 7 days acclimatization to laboratory conditions. The fishes maintained in the aquaria with all the ideal conditions with respect to light, temperature and food. Physico-chemical analysis of tap water and well water was carried out using standard methods (APHA, 1998). Mortality data was recorded after 30 to 60 days.

### Result and discussion

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

The aquaria with tap and well water show below in figure no.1.



Fig 1: Aquaria with tap water and well water

The physico-chemical parameters of well and tap water are given in Table No. 1 and also with that data of mean survival of fishes is shown in Table No. 2. The well water

shows higher values of hardness, alkalinity, calcium and magnesium contents as compared to tap water.

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

Parameters	0 Hours		30 Days		60 Days	
			Water			
	Tap	Well	Tap	Well	Tap	Well
Water (liter)	100	100	100	100	100	100
Light (Watt)	50	50	50	50	50	50
Temperature ( $^{\circ}$ C)	28-28 (27 <sup>0</sup> )	27-27 (28 <sup>0</sup> )	28-29 (28 <sup>0</sup> )	28-28 (28 <sup>0</sup> )	27-27 (27 <sup>0</sup> )	27-27 (27 <sup>0</sup> )
pH	7.80-7.90 (7.84)	7.82-7.86 (7.83)	7.84-7.90 (7.84)	7.80-7.86 (7.83)	7.39-7.80 (7.58)	7.78-7.84 (7.82)
1 Hardness (mg/l)	132-124 (126)	312-322 (319)	132-144 (139)	236-272 (252)	136-170 (156)	214-252 (236)
2 Magnesium (mg/l)	21.31-22.72 (22.06)	65.10-66.51 (65.805)	22.92-25.11 (26.015)	44.61-55.97 (51.88)	23.81-29.04 (27.400)	41.10-50.52 (46.60)
3 Calcium (mg/l)	36.01-38.41 (38.20)	44.01-48.01 (44.29)	37.68-40.37 (38.024)	41.61-52.16 (50.80)	37.61-50.50 (42.050)	44.01-44.82 (44.30)
4 Chloride (mg/l)	88.46-91.38 (91.30)	31.24-32.66 (31.42)	99.4-106.5 (100.90)	35.5-36.92 (35.79)	96.56-120.7 (110.60)	42.60-49.7 (48.10)
5 Alkalinity (mg/l)	174-185 (178.6)	371-383 (378)	185-202 (192.4)	280-323 (302.9)	191-237 (212)	254-299 (275.6)
6 Phosphorous (mg/l)	0.130-0.138 (0.132)	0.152-0.221 (0.1964)	0.136-0.153 (38.20)	0.112-0.193 (0.1624)	0.142-0.178 (0.162)	0.152-0.172 (0.1678)
7 Aerations (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 value from 5 sets of aquaria.

**Table 2:** Mean survival of fishes in aquaria

Survival	Tap water (Days)	Well water (Days)
00	11	11.00
30	09	08.00
60	08	05.00

## References

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