Implication of Distillery Spentwash on the Sustainability of Common Carp (Cyprinus carpio) Fishes

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Abstract

Background: Management and conservation of common-carp fishes was made with different concentration of primary treated spentwash (PTSW) (0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9%, 1.0%, 1.1% and 1.2%) in water. Spentwash was analyzed for its physico-chemical parameters. Finger link fishes were obtained from V.C. Farm, Mandya, and Karnataka. They were divided into 13 groups (G1 to G13) of 10 each and keeping G1 as 'control unit', G2 to G13 were exposed to different concentrations of primary treated spentwash for a period of 6 days in different aquariums of 36"x15"x18"size.

Results: It was found that all fishes behaved normally up to 0.9% spentwash, but at higher concentration, the fishes behaved abnormally and there after, could not sustain for longer time and eventually died. By this, it is presumed that insufficient DO for natural respiration at higher concentration of spentwash in water was the cause. The ‘mortality rate’ (MR) was 100% in G13 (1.2% spentwash) after 12 hr exposure, in G12 (1.1%spentwash) the MR was 17% after 7 hr in G11 MR was 8% after 24 hr and in G10 to G2 MR was '0%' respectively after exposure of 6 days.

Conclusion: The study emphatically verdicts that the un-sustainability was due to insufficient DO for respiration at higher concentration of distillery spentwash. Higher the contamination of distillery spentwash into water bodies results deleterious effect on the life of common carp (cyprinus carpio) fishes.

Introduction

Molasses (one of the important by-product of sugar industry) is the chief source for production of ethanol by fermentation method. In this chemical process with every liter of ethanol production emerges out 8 liters of waste water called as ‘raw spent spentwash (RSW)’, this raw spentwash is potentially embodied in high BOD (5000-8000mg\L) and COD (25000-30000mg\L), undesirable brown color and foul odor, besides a number of pathological pollutants. The chief among the notable pollutants, is melanoidin pigment which is brown in color that stains the superficial water sheet and in turn cuts off the light rays and dulls photosynthesis while raw spentwash is let into water bodies (tanks, lakes, channels, Ponds,etc). The brown ting of melanoidin pigment is the out come of ‘mailard reaction’ between sugar and amino compounds super added to the above are there to the raw spentwash contains pyrogenic compound like polycyclic aromatic hydrocarbons (PAHS) and benzo (a) pyrene, a known environmental carcinogen.

Some varieties of common carp are called mirror carp, leather carp, koi, and Israeli carp. Cyprinus carpio Cyprinus is Greek and carpio is Latin; both words mean carp. Common carp is in the family Cyprinidae (minnow and carp family). Cyprinus carpio is easily identified by two pairs of barbells on each side of the upper Jaw. These bronze, brassy or yellow fish have serrated dorsal and anal fin spines. Common carp is one of the largest members of the minnow family. Most of these heavy bodied fish are from 1 to 10 pounds and 12-25 inches in length. The world record catch for common carp is from Romania; that fish weighed just over 83 pounds! The Indiana State record common carp is 43 pounds and 4 ounces. There are many varieties of common carp found throughout the world. Carp that are partially scaled along their sides are called mirror carp. Some common carp have few to no scales and are termed leather carp. Koi is a fancy breed of the common carp that are popular in small ponds and water gardens. While many people believe that the Goldfish is a young carp, goldfish and common carp are actually two distinct species.

Materials and Methods

Physico chemical parameters of PTSW (100%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9%, 1.0%, 1.1% and 1.2%) were analyzed by standard methods (Table 1).
Table 1: Physico-chemical parameters of different dilutions of spentwash.

PTSW —Primary treated spentwash.

One hundred and fifty six common carp finger link fishes (Cyprinus carpio) Obtained from V.C.Farm, Mandya Karnataka and segregated into 13 groups, G1 to G13 and were set in aquarium of 36” X15” X18”size and exposed to different concentration of PTSW (0.1% to 1.2%) providing with normal feeding, keeping G1 as control unit. The mortality rate (MR) was noted in each case up to 6days of exposure and recorded (Table 2).

Table 2: Mortality rate (%) of fish exposed to different dilutions of spentwash.

PTSW —Primary treated spentwash.

Results and Discussion

In G13 (1.2%PTSW) the MR was 100% after 12hr exposure, in G12 (1.1%PTSW) the MR was 17% after 7 hr exposure, 8% in G11 after 24hr exposure. It was found that MR differs for G13, G12 and G11 whereas in G1 to G10 the MR was zero even after exposure of 6 days (Fig 1).
Conclusion

The higher MR was noticed in G11, G12 and G13 at higher concentration of PTSW with in sufficient DO. But in G1 to G10 DO was sufficient for respiration of the fishes as such they behaved normally. To say in conclusion that this experimental verification declares that the discharge of distillery spentwash into water bodies at higher concentration leads to deficient of sunlight into water (due to brown color) and further the distillery spentwash promotes mucus formation on the gills of the fishes. So, there will be a reduction of oxygen tension in gills of fishes, which makes them behave abnormally due to insufficient dissolved oxygen.

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References