Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 4 Issue 12 December 2022

Opinion

Crucial Challenge in Pangasius Farming

Susitharan V*, Sathiya Kala A and Babitha Rani AM

ICAR-Central Institute of Fisheries Education, Mumbai, India

***Corresponding Author:** Susitharan V, ICAR-Central Institute of Fisheries Education, Mumbai, India.

Received: October 03, 2022

Published: November 06, 2022

Pangasius

Pangasius is mostly present in freshwater and also it can live upto 1ppt salinity, in pH>5 and 30°C. It has a streamlined body with silver belly, dark grey coloured back, a pair of barbels and wide mouth. Its rate of growth is high and it can live upto 20 years in the wild. It matures for the first time at 100 to 120 mm in length and 14 to 15 g in weight. After 6 - 8 months it will reach around 800 - 1,100 grams; best for harvesting. It has relatively low cost, good flavour and delicate which improved the consumption across the world.

Nutritional value per 100 grams

Energy	92 kcal
Protein	15g
Carbohydrates	0g
Fat	3.5g
Cholesterol	80 mg

Table 1

What are heavy metals?

Heavy metals are defined as any metal atom that exhibits a toxigenic effect on living species even at short exposure doses and has a relatively higher density [9]. However, a metal that naturally occurs with an atomic number larger than 20, has a density greater than 5 gcm-3, or has a density that is comparatively higher than water could be classified as a heavy metal. Accordingly, the most hazardous heavy metals are cadmium (Cd), lead (Pb), nickel (Ni), chromium (Cr), mercury (Hg), and arsenic (As). Actually, the non-biodegradability, persistence, and bioaccumulation of the metals leads to their toxicity to both human and animal health.

Common causes of heavy metals

Most heavy metals have a great affinity for sulphur atom. In enzymes, they form connections with sulphur and block enzymatic operation. Kidney disease may result from exposure to Cd. The immune system of a person who has been exposed to heavy metals like Lead and Mercury may develop auto immune diseases, a condition in which the body attacks its own cells. Autoimmunity can result in kidney, cardiovascular, neurological, and joint problems, such as rheumatoid arthritis, as well as damage to the developing foetus's brain. Different neurological and psychological consequences, including tremor, personality changes, restlessness, anxiety, sleep disturbances, and depression, are brought on by chronic exposure to inorganic Mercury. Arsenate prevents oxidative phosphorylation, shutting down life's fundamental method of generating energy.

Heavy metal contamination in aquatic ecosystem

A major public health concern is the heavy metal contamination of aquatic environments, which has the ability to bioaccumulate via fish to eventually humans. Urban and industrial pollution may directly cause heavy metal contamination of water and fish uptake of these pollutants. Extreme toxicity, renal and hepatopancreatic dysfunction, and even carcinogenicity of the human brain, prostate gland, and other organs are all results of both acute and sustained exposure to or contact with metallic elements. The amount of toxicity is currently actively regulated by a number of factors, such as the dose of metal exposure, the route taken, the chemical qualities, and the exposed person's specifics, such as age, gender, genetic tendencies, and nutritional deficiencies.

Trophic transfer of heavy metals

An important topic of environmental research is the trophic transmission of dangerous heavy metals and metalloids in food

chains and food Studies related to bioaccumulation of heavy metals in pangasius Several works have been published on bioaccumulation of heavy metals in pangas all over the world [8]. As a result of heavy metals being transported from the abiotic environment (water, sediments, and soils) to living things and building up in the biota, food chains become contaminated with these substances. In some instances, the trophic levels of food chains that follow are loaded with heavy metals, which causes biomagnification of these compounds in the food chains. Hazardous heavy metals and metalloids in food chains can be transferred, bioaccumulated, and biomagnified, which has significant effects on both animal and human health. Toxic non-essential heavy metals and metalloids can enter the body by a variety of means, including ingestion, inhalation, and dermal absorption.

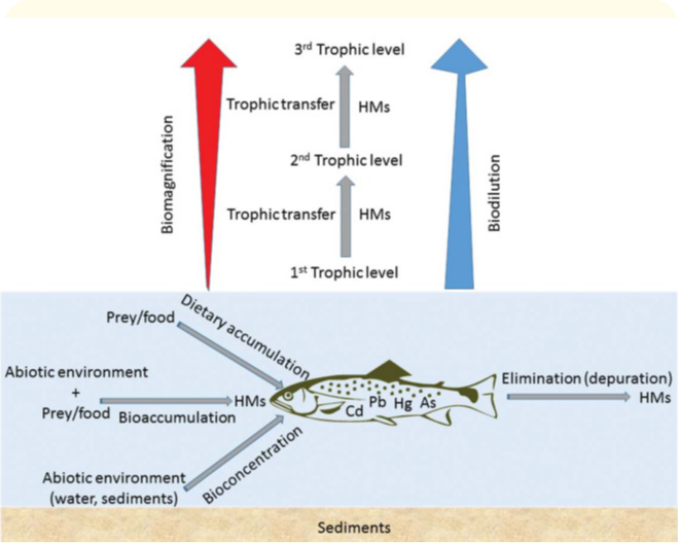

Figure 1: (Source: 5).

Bioaccumulation in pangas

Pangas having voracious feeding habits so it could ingest all the wastages in pond eco system via skin, gills and alimentary tract. Nowadays farmers are taking advantage on this, dumping the contaminated waste materials like chicken offal, moribund chicken meat, disease attacked chicken etc. Apart from this some of the inland fish farmers are using pesticides and banned antibiotics. During the monsoon period agriculture run off and river or stream run off leads to contaminate the fish culture pond. Several studies have been proved the bioaccumulation of heavy metals present in pangas above the human risk. So proper farm management has to be taken to minimize the bioaccumulation of heavy metals and human health risks.

Studies related to bioaccumulation of heavy metals in pangasius

The bioaccumulation of heavy metals in pangas has been the focus of several heavy metal polluted area in worldwide [8]. When it rises beyond the acceptable limit, it is an issue because it directly affects human health. The liver was estimated to have significantly higher Pb, Cu, and Cr contents than other organs, while Cd and Ni were found in muscle. Pre-monsoon levels of Cd, Ni, and Cu were much greater than post-monsoon levels.

Standard permissible limit of heavy metals in fish (FAO/WHO (1989), USFDA (1993), WHO (2011))

- Cadmium - 0.5 mg/kg
- Pb - 0.5 mg/kg
- Ni - 80 mg/kg
- Cu - 30 mg/kg
- Cr - 0.05 mg/kg

How to overcome

- Avoid use of pesticides and insecticides
- Avoid dumping contaminated wastes as feed
- Avoid use of antibiotics
- Farming with good quality fish feeds
- Proper purification of water used for farming
- Protect farm premises from agricultural run-off and rain run-off
- Avoid use of heavy metal polluted water for farming
- Stocking of bivalves, which help to reduce level of heavy metals
- Addition of acetic acid to fish tissue
- Controlling industrial discharges and anthropogenic activities.

Conclusion

A rise in anthropogenic sources and input of heavy metals into the environment has been brought on by industrialization and urbanisation. Due to their toxicity, endurance, and bio accumulative characteristics, heavy metals are typically considered to be dangerous to the environment. The physiologically optional elements Cd, Pb, Hg, and as are typically regarded as the most dangerous for

living things. In polluted habitats, these heavy metals are exposed to both aquatic and terrestrial creatures. These substances are bioaccumulated and occasionally biomagnified in the food chains as a result of their transfer from the abiotic environment to living species. The health of these fish must therefore be improved using a scientific detoxification technique in any stressful environmental conditions. Additional studies on removal techniques [1-7,10-14].

Bibliography

1. Ali H and Khan E. "Environmental chemistry in the twenty-first century". *Environmental Chemistry Letters* 15.2 (2017): 329-346.

2. Ali H and Khan E. "Bioaccumulation of non-essential hazardous heavy metals and metalloids in freshwater fish. Risk to human health". *Environmental Chemistry Letters* 16.3 (2018): 903-917.

3. Ali H and Khan E. "What are heavy metals? Long-standing controversy over the scientific use of the term 'heavy metals'–proposal of a comprehensive definition". *Toxicological and Environmental Chemistry* 100.1 (2018): 6-19.

4. Ali H and Khan E. "Assessment of potentially toxic heavy metals and health risk in water, sediments, and different fish species of River Kabul, Pakistan". *Human and Ecological Risk Assessment: An International Journal* 24.8 (2018): 2101-2118.

5. Ali H and Khan E. "Trophic transfer, bioaccumulation, and biomagnification of non-essential hazardous heavy metals and metalloids in food chains/webs—Concepts and implications for wildlife and human health". *Human and Ecological Risk Assessment: An International Journal* 25.6 (2019): 1353-1376.

6. Baatrup E. "Structural and functional effects of heavy metals on the nervous system, including sense organs, of fish". *Comparative Biochemistry and Physiology Part C: Comparative Pharmacology* 100.1-2 (1991): 253-257.

7. Cruz CCEV., *et al*. "Heavy metal levels in mud crabs (*Scylla* spp.) from East Bataan Coast". *Environmental Science and Pollution Research* 22.8 (2015): 6359-6363.

8. Elnimr T. "Evaluation of some heavy metals in Pangasius hypothalmus and Tilapia 672 nilotica and the role of acetic acid in lowering their levels". *International Journal of Fisheries and Aquaculture* 3 (2011): 151-157.

9. Fergusson DM., *et al*. "Early solid feeding and recurrent childhood eczema: a 10-year longitudinal study". *Pediatrics* 86.4 (1990): 541-546.

10. Maruf MAH., *et al*. "Assessment of human health risks associated with heavy metals accumulation in the freshwater fish *Pangasianodon hypophthalmus* in Bangladesh". *Exposure and Health* (2021): 1-23.

11. Nguyen V. "Measurement of heavy metals (cadmium, mercury, manganese, phosphorus, lead, and zinc) in Basa fish (*Pangasius hypothalmus*) and fresh water fish (*Tilapia nilotica*)".

12. WHO. "Guidelines for Drinking Water Quality". Recommendation WHO 1, Geneva (1985): 130.

13. WHO. "WHO Guidelines for Drinking Water Quality, fourth ed". WHO Publications, Geneva, Switzerland, (2011): 307–340.

14. USFDA. "Food and drug administration Guidance document for arsenic in shellfish". DHHS/PHS/FDA/CFSAN/Office of Seafood. Washington DC (1993).