

## Essential role of minerals in fish nutrition

**Kouberi Nath**

ICAR-Research Complex for Northeastern hill Region, Tripura Centre, Lembucherra

(Tripura) India

(kouberi914@gmail.com)

Minerals are a diverse group of inorganic compounds required in considerable and lesser quantities for essential functions in the body. Micro-minerals (trace minerals) are required in small amounts as components in enzyme and hormone systems. Fish can absorb many minerals directly from the water through their gills and skin allowing them to compensate to some extent for mineral deficiencies in their diet. Minerals are important in many aspects of fish and shrimp metabolism.

### Functions of minerals :

- Constituents of the exoskeleton (Provide strength and rigidity to bones and exoskeleton of crustaceans)
- Balance of osmotic pressure (involved in body fluids mainly with the maintenance of osmotic equilibrium with the aquatic environment and in the nervous and endocrine systems)

- Structural constituents of tissues (components of enzymes, blood pigments and other organic compounds).
- Essentially involved in the metabolic processes concerned with energy transport
- Transmission of nerve impulses
- Muscle contractions
- Served as essential components for enzyme, vitamins, hormones, pigments
- Serve as cofactor in metabolism, catalyst and enzyme activators.

The mineral nutrition in fish has been fairly investigated but some information on their major function and deficiency are studied. The article is aimed to highlight on the different essential minerals and its function and deficiencies based on literature survey (Table1).

**Table 1: Different mineral function and deficiencies**

Minerals	Function	Deficiencies
<b>Macro(mgkg<sup>-1</sup>)</b>		
Calcium	-Component of skeleton, scales,teeth exoskeleton etc. -Roles in physiological process including metabolism, nerve and muscle function, osmoregulation.	-Reduce growth and poor feed conversion, anorexia, reduced bone mineralization
Phosphorus	-Component of bones and scales of fish and exoskeleton of crustaceans. -Role in metabolic reactions. -Constituent of many important molecules such as ATP and phospholipids.	Reduced growth, anorexia, poor feed conversion, reduced bone mineralization, skeletal deformity, cranial deformity, curved and enlarged spongy vertebrae, increased visceral fat.
Potassium	- Appropriate levels of these ions needed for proper functioning of cells in maintaining ion gradients between the	Anorexia, Convulsion, tetany, mortality
Sodium	inside and outside of cells and maintaining nerve function	-
Chlorine		-
Magnesium	-Component of skeletal tissue -Important cofactor in a number of metabolic reactions -Important in maintaining muscle tone.	Reduced growth, anorexia, sluggishness, nephrocalcinosis, convulsions, cataracts. Degeneration of muscle fibers and epithelial cells of pyloric cecum and gill filaments, reduced bone mineralization, skeletal deformity
Sulphur	-Required for the synthesis of the amino acid cysteine.	-

Table 1 : Condt.....

**Table 1 : Contd**

Micro(mgkg <sup>-1</sup> )		
Iron	-Constituent of hemoglobin and cytochromes (proteins) important in energy metabolism.	Reduce growth and poor feed conversion, hypochromic microcytic anemia, low hematocrit and hemoglobin levels
Zinc	-Important components of a number of metalloenzymes involved in a wide variety of metabolic process.	Reduce growth, anorexia, short body dwarfism, cataracts, fin erosion, skin erosion
Copper	Approximately 20 different enzymes have been found to contain zinc.	Reduced growth, cataracts, reduce liver cu/zn superoxide dismutase
Manganese	Important cofactor in a number of metabolic reactions Important in maintaining proper nerve cell function	Reduce growth loss of equilibrium, cataracts, high mortality, poor hatchability of eggs, abnormal tail growth.
Nickel	-	-
Cobalt	Component of vitamin B <sub>12</sub>	-
Molybdenum	-	-
Iodine	Important component of thyroid hormones Important in growth regulation	Thyroid hyperplasia
Selenium	Imparts protective effect against toxicity of heavy metals.	-
Chromium	Important in normal carbohydrate and lipid metabolism	-

(Source, Halver and De silva)

**Conclusion :**

The minerals are essential chemical elements involved in the normal metabolism of fish. The information currently available is very patchy. The detailed on mineral requirements of different species during various developmental stages need to be worked out. Therefore, more research has to be carried out on requirements, the uptake, function and biological availability of different essential minerals. The minerals are required only in trace amounts and under experimental conditions it is difficult

to maintain with formulated diets. Investigations also should include deficiencies or retention of minerals during food-processing, dietary interactions, disease conditions and for any genetic disorders.

**Reference:**

**Halver, J.E. and Hardy, R.W. (2002) *Fish nutrition*.** In: Sargent, J.R., Tocher, D.R. and Bell, G, Eds., *The Lipids*, 3<sup>rd</sup> Ed., Academic Press, California, 182-246.

Received : 06.04.2018

Revised : 21.05.2018

Accepted : 31.05.2018

RNI : UPENG/2011/37255      ONLINE ISSN : 2231-640X      ISSN : 0976-5603

# ADVANCE RESEARCH JOURNAL OF CROP IMPROVEMENT

Accredited by NAAS :  
NAAS Score : 3.86      *Internationally Refereed Research Journal*

Visit : ..... [www.researchjournal.co.in](http://www.researchjournal.co.in); [researchjournal.co.in](http://researchjournal.co.in)