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ASSESSMENT OF MINERAL SUBSTANCES PROFILES IN WILD VERSUS FARMED CATFISH

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Abstract: This study presents a comparative analysis of the mineral composition in wild and farmed catfish (*Silurus glanis*), aiming to evaluate differences in micro- and macro element profiles that may influence nutritional quality and consumer health. Samples from both environments were analyzed using X-ray fluorescence (XRF) spectroscopy to quantify essential minerals. The results revealed significant variations in mineral concentrations between wild and aquaculture-sourced catfish, with wild specimens generally exhibiting higher levels of certain trace elements. These findings underscore the impact of habitat, diet, and farming practices on the nutritional value of fish and provide valuable insights for consumers, nutritionists, and aquaculture professionals seeking to optimize dietary recommendations and production strategies.

Key words: catfish, mineral substances, farm fish, wild fish, spectrometric techniques.

• Introduction

Minerals are essential for human health, and their content in fish depends on species, environment, and diet. Catfish (*Silurus glanis*), whether wild or farmed, exhibit different mineral profiles. Comparing these differences allows for the assessment of the impact of habitat and aquaculture practices on the nutritional value of the fish. The results provide valuable information for consumers, nutritionists, and aquaculture professionals, supporting dietary recommendations and production strategies.

• Material and method

In this study, samples of catfish (*Silurus glanis*) from both wild and aquaculture environments were analyzed to compare their mineral composition. Samples were collected from different tissues (liver, muscle, skin, bones, fins, and head), then dried and homogenized prior to analysis. The determination of micro- and macroelement content was performed using X-ray fluorescence (XRF) spectrometry. The results were expressed in ppm and compared between the two groups.

• Results and discussions

Table 1. Mineral composition of liver wild catfish and aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Liver of wild catfish	34303	1487	1491	45	14	220	41	ND	9	0.3	ND	ND	-	18
Liver of aquaculture catfish	36153	883	8815	56	10	276	36	-	-	2.2	19	0.4	-	18

Table 2. Mineral composition of bones wild catfish and aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Bones of wild catfish	13870	83624	305	-	8	116	-	ND	3	1.7	ND	0.3	-	-
Bones of aquaculture catfish	20922	61833	368	ND	5	96	ND	ND	-	1.5	ND	0.5	ND	-

Table 3. Mineral composition of head wild catfish and aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Head of a wild catfish	28983	3931	-	13	12	156	-	ND	3	3	3	3	ND	5
Head of aquaculture catfish	41335	2701	-	ND	6	146	-	ND	4	2.3	ND	ND	-	3

Table 4. Mineral composition of skin wild catfish and aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Skin of a wild catfish	10881	1204	363	24	20	164	ND	-	6	2.8	ND	0.9	0.9	4
Skin of aquaculture catfish	10986	1033	408	22	12	244	41	-	5	2.8	15	ND	ND	4

Table 5. Mineral composition of muscle wild catfish and aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Muscle of wild catfish	56914	2763	-	ND	11	77	-	-	ND	2.7	-	-	0.1	6
Muscle of aquaculture catfish	48489	2185	-	-	6	76	ND	ND	6	2.2	2	ND	-	5

Table 6. Mineral composition of fins wild catfish aquaculture catfish (ppm)

Element	K	Ca	Fe	Cu	Mo	Zn	Co	Cr	Pb	Hg	Cd	U	As	Se
Fins of wild catfish	5299	43092	256	25	11	203	-	ND	ND	2.1	ND	0.5	1	- ⁶
Fins of aquaculture catfish	5411	47344	412	ND	9	210	ND	ND	-	2.6	ND	0.5	0.2	3

The mineral composition analysis (Tables 1–6) revealed distinct differences between wild and aquaculture catfish. Higher concentrations of K, Ca Fe, and Zn were observed in the liver, bones, skin, and fins of aquaculture catfish, whereas wild catfish exhibited elevated levels of K, Ca and Zn in the liver, bones, head, and muscle tissues.

Conclusions

The study highlighted notable differences in the mineral composition of catfish between wild and aquaculture specimens, with significant variations among the different tissues analyzed. The results provide a detailed overview of the distribution of chemical elements within the catfish body, contributing to a better understanding of its mineral profile.