

Food Quality of Aquaponic Produced Nile Tilapia: A Potential Nutrition Source

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Introduction

Aquaponics is an emerging holistic technology that integrates recirculating fish farming system with high value vegetables production. The nutritional value of tilapia fish produced in US aquaponics system has yet to be extensively analyzed and compared with the imported fish produced in the conventional aquaculture systems. The present study was conducted to determine the nutritional quality of tilapia fish produced in aquaponics system as compared with commercially available tilapia fish in the US market in terms of proximate composition, protein, lipids and mineral contents.

Materials and Methods

- Tilapia (*Oreochromis niloticus*) fish were reared in 1 m³ tank in aquaponics system with lettuce in hydroponic bed
- Conventional tilapia fish imported from Bangladesh, China and Ecuador were collected from ethnic supermarkets.



Results

Proximate composition

- Tilapia fish produced in aquaponics (USA) have protein as comparable to that of conventional aquaculture fish (Fig 1A)
- Aquaponic tilapia has an optimum range of lipid content (Fig 1B)

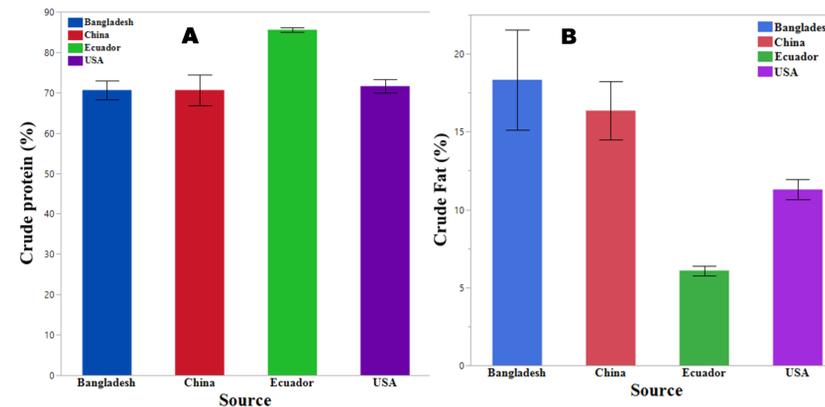


Fig.1. Crude protein (A) and fat (B) content (g per 100 g of dry sample) of fish from different sources

Amino acids

- All the amino acids observed in this study was found significantly different among tilapia fish of various sources (Fig 2)

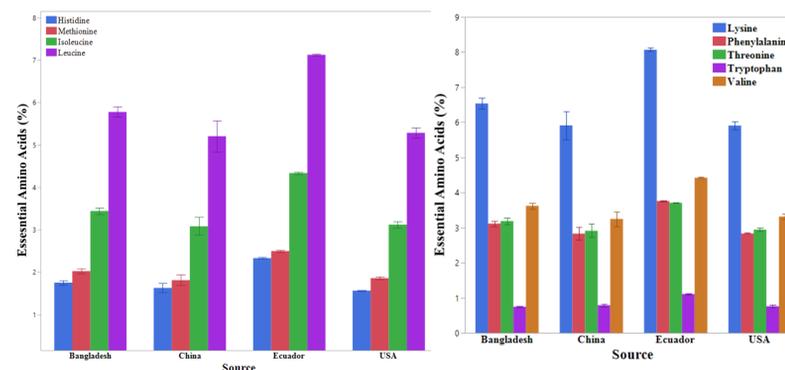


Fig.2. Essential amino acids concentration (g per 100 g dry of sample) of fish from different sources

Fatty acids

- Omega-3 fatty acids contents significantly exceeded in aquaponic fish (Fig. 3)

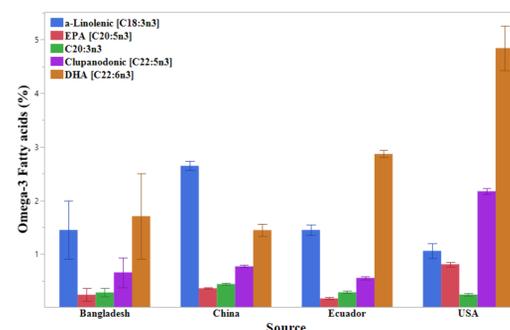


Fig.3 Omega-3 fatty acid profiling (expressed as percent of total fat) of fish from different sources



Mineral Nutrients

- Aquaponics tilapia fish showed significantly higher contents of all major minerals
- The micronutrients content of all groups of tilapia fish were statistically similar

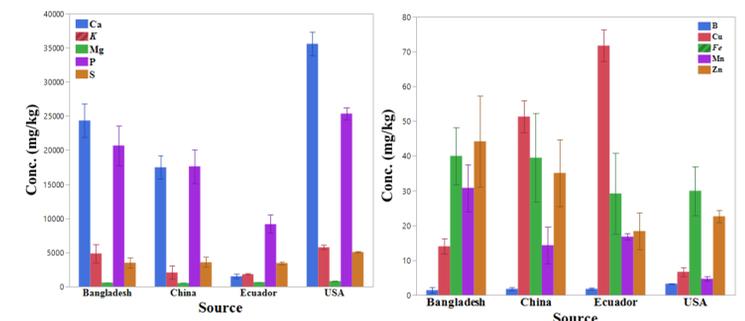


Fig.4. Macro and Micronutrients content (mg/kg of dry sample) of fish from different sources

Principal Component Analysis

- The PCA biplot depicts the clear grouping of tilapia fish from different sources based on essential amino acids and essential fatty acids (Fig. 4)
- Aquaponics (USA) fish are clustered around essential fatty acids indicating their good quality lipids and fish from Ecuador showed a well source of protein.

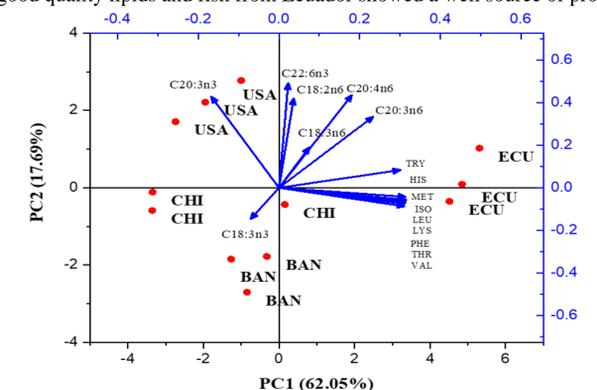


Fig. 5 Principal Component Analysis (PCA) biplot

Conclusion

- Protein and lipid contents of Aquaponics fish were comparable to those of conventional aquaculture fish.
- Docosahexaenoic acid(DHA) and eicosapentaenoic acid(EPA) contents significantly exceeded in Aquaponic fish.
- Overall, the results concluded that aquaponic fish is a good source of nutrition.