

Valorization of Underutilized Fish Species Through a Multidisciplinary Approach

Authors : Tiziana Pepe, Gerardo Manfreda, Adriana Ianieri, Aniello Anastasio

Abstract : The sustainable exploitation of marine biological resources is among the most important objectives of the EU's Common Fisheries Policy (CFP). Currently, Europe imports about 65% of its fish products, indicating that domestic production does not meet consumer demand. Despite the availability of numerous commercially significant fish species, European consumption is concentrated on a limited number of products (e.g., sea bass, sea bream, shrimp). Many native species, present in large quantities in the Mediterranean Sea, are little known to consumers and are therefore considered 'fishing by-products'. All the data presented so far indicate a significant waste of local resources and the overexploitation of a few fish stocks. It is therefore necessary to develop strategies that guide the market towards sustainable conversion. The objective of this work was to valorize underutilized fish species of the Mediterranean Sea through a multidisciplinary approach. To this end, three fish species were sampled: Atlantic Horse Mackerel (*Trachurus trachurus*), Bogue (*Boops boops*), and Common Dolphinfish (*Coryphaena hippurus*). Nutritional properties (water %, fats, proteins, ashes, salts), physical/chemical properties (TVB-N, histamine, pH), and rheological properties (color, texture, viscosity) were analyzed. The analyses were conducted on both fillets and processing by-products. Additionally, mitochondrial DNA (mtDNA) was extracted from the muscle of each species. The mtDNA was then sequenced using the Illumina NGS technique. The analysis of nutritional properties classified the fillets of the sampled species as lean or semi-fat, as they had a fat content of less than 3%, while the by-products showed a higher lipid content (2.7-5%). The protein percentage for all fillets was 22-23%, while for processing by-products, the protein concentration was 18-19% for all species. Rheological analyses showed an increase in viscosity in saline solution in all species, indicating their potential suitability for industrial processing. High-quality and quantity complete mtDNA was extracted from all analyzed species. The complete mitochondrial genome sequences were successfully obtained and annotated. The results of this study suggest that all analyzed species are suitable for both human consumption and feed production. The sequencing of the complete mtDNA and its availability in international databases will be useful for accurate phylogenetic analysis and proper species identification, even in prepared and processed products. Underutilized fish species represent an important economic resource. Encouraging their consumption could limit the phenomenon of overfishing, protecting marine biodiversity. Furthermore, the valorization of these species will increase national fish production, supporting the local economy, cultural, and gastronomic tradition, and optimizing the exploitation of Mediterranean resources in accordance with the CFP.

Keywords : mtDNA, nutritional analysis, sustainable fisheries, underutilized fish species

Conference Title : ICFCTC 2025 : International Conference on Food Safety and Toxic Components

Conference Location : Tokyo, Japan

Conference Dates : May 27-28, 2025