

Level of polybrominated diphenyl ethers in sea bream (*Sparus aurata*) from Bizerte Lagoon, Tunisia

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Introduction :

Polybrominated diphenyl ethers (PBDEs) are a class of brominated flame retardants widely used in consumer products such as electronics, furniture, textiles, plastics, and building materials [1]. Because PBDEs are not chemically bound to these materials, they can gradually leach into the environment throughout the products' life cycle [2]. As a result, increasing levels of PBDEs have been reported in various environmental media, including soil, sediment, wildlife, and even humans [2]. There are multiple PBDE congeners present in the environment. These persistent organic pollutants are known to bioaccumulate in plants and animals and biomagnify through the food chain [3]. Human exposure primarily occurs through inhalation, ingestion, and dermal contact [2–3]. PBDEs are associated with harmful effects on the endocrine, nervous, and reproductive systems [3]. Due to their toxicity and persistence, commercial penta- and octa-BDEs were listed under the Stockholm Convention on Persistent Organic Pollutants in 2009, followed by deca-BDE in 2017, leading to their global phase-out. Nevertheless, due to their historical widespread use and slow degradation, PBDE contamination is expected to persist in the environment for decades.

In Tunisia, data on PBDE contamination in seafood remain scarce, underlining the need for further investigation. To address this knowledge gap, the present study assesses PBDE contamination in seabream (*Sparus aurata*), collected from the Bizerte Lagoon. Muscle tissues were extracted using Accelerated Solvent Extraction and analyzed by gas chromatography-mass spectrometry with negative chemical ionization.

Results :

The mean concentration of Σ 8PBDEs in fish from the Bizerte Lagoon was 74.3 ng/g lipid weight (lw), while samples from the Mediterranean Sea exhibited concentrations of 34.9 and 123.2 ng/g lw. Compared to reference site samples, mean PBDE concentrations in Bizerte Lagoon specimens were two orders of magnitude higher. Statistical analysis revealed a significant difference in Σ PBDE levels between the two sampling years ($p = 0.04$). PBDE congener profiles were similar across the two sites, with BDE-47 being the predominant compound in all samples. Its contribution to total PBDEs was 46.0% in Bizerte Lagoon samples and 51.0% in Mediterranean Sea samples. The predominance of BDE-47 is consistent with patterns observed in fish from other studies [3]. Overall, PBDE concentrations in *Sparus aurata* from the Bizerte Lagoon were

comparable to, or slightly lower than, levels reported in other fish species worldwide [3]. These results support previous findings that highlight the widespread contamination of the Mediterranean marine environment by PBDEs [3].

Conclusion :

This study provides critical baseline data for future monitoring efforts and emphasizes the importance of further research into the sources, distribution, and potential health and ecological risks associated with PBDE exposure in Tunisia's marine ecosystems.

PBDEs were detected in all *Sparus aurata* samples, demonstrating widespread contamination of the Bizerte Lagoon by these compounds.

The concentrations measured in *Sparus aurata* were comparable to or even exceeded those found in other marine species from various aquatic ecosystems around the world.

These findings confirm *Sparus aurata* as a reliable bioindicator, capable of reflecting varying levels of contamination, and valuable for monitoring the ecological quality of aquatic environments.

Références :

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