INTRODUCTION

In France, almost yearly since 1988, Intense summer blooms of Alexandrium tamarense are responsible for PSP toxin accumulation in bivalves along North Brittany coasts N.E.Atlantic.

For the first time, during the autumn of 1998, a bloom of another species of the genus Alexandrium was involved in shellfish toxicity in Thau lagoon Mediterranean coast. Plankton samples indicated that cells of the genus Alexandrium, up to 85000 cells L−1, were almost exclusively present.

In fact, positive toxicity tests were encountered with a toxicity up to 862 µg STXeq. 100g of mussel meat, according to AOAC method. Closure of this shellfish breeding area had an economic impact, since it provides around 10% of the local market yearly.

Several open-type stations were monitored during 1998, especially during the bloom period. Spatio-temporal distribution of toxicity was monitored for three different shellfish species: mussel, oyster and carpet shell.

High toxicity levels encountered in mussels were observed with relatively low levels of cells in seawater, contrary to observations with A. minutum blooms.

Main objectives of this study were:

- To identify the species of the genus Alexandrium involved.
- To determine toxicity profiles for plankton and shellfish samples.
- To confirm that identified species was the causative agent for observed shellfish toxicity.

Material and Methods

Shellfish samples

3 shellfish species were sampled : mussel (Mytilus edulis galloprovincialis), Japanese oyster (Crasostrea gigas) and carpet shell (Ruditapes decussatus).

Plankton samples

Plankton samples, collected in sub-surface water, were examined under inverted microscope using Utermöhl method. Concurrently, large volume of seawater were collected and filtered onto 10µm mesh net. This fraction was stored at 4°C in 0.1% Acetic acid until LC/FD analysis.

Mouse bioassay for PSP toxins

Sample preparation consisted of a boiling acid extraction (0.1 N HCl), 190 ml of 100 g of whole shellfish tissue and the subsequent injection of 0.5 µl tissue equivalents into each 20g mouse (AOAC International, 1999).

Liquid chromatography-fluorescence detection (LC-FD)

Analysis of the main PSP toxins was performed using the post column oxidative fluorescence method (Carey et al., 1995) with slight modifications. Toxins were separated by reversed phase chromatography using a C8 silica column (5 µm, Develosil, 4.6 mm i.d. x 250 mm) with a flow rate of 0.8 ml min−1.

Toxins were quantified in duplicate with certified toxin standards (PSP-1B) provided by the NRC (Institute for Marine Biosciences, Halifax, Canada).

Two Gonyaulax (B1, B2) and B+C toxins were detected and quantified using acid hydrolysis (H2O 4:0, 97°C, 5 min.) as indicated by Franco & Fernandez 1993.

Phytoplankton monitoring

Spatio-temporal distribution of toxicity was monitored for three shellfish species: mussel, oyster and carpet shell.

Discussion

Studies to identify phytoplankton species and the toxin profile were performed mainly on samples obtained between November 3 and 12 (molluscs bloom). Microscopy studies showed the presence of cells likely to form short chains (2-4 cells).

In France, almost yearly since 1988, Intense summer blooms of Alexandrium tamarense are responsible for PSP toxin accumulation in bivalves along North Brittany coasts N.E.Atlantic.

The overall results obtained allowed us to confirm the involvement of A. tamarense in this new episode of autumn shellfish toxicity on the Mediterranean coast. Its complex and highly toxicogenic toxin profile can now explain high toxicity encountered despite low cell density.

Conclusion

The mastery of mass culture of the toxic strain will facilitate future investigations of the contamination-decontamination process through performance of complementary laboratory experiments.

References:


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