COMPARED BIOACCUMULATION OF MERCURY BETWEEN THE MARINE PHANEROGAM *POSIDONIA OCEANICA* AND THE HERBIVOROUS FISH *SARPA SALPA* : PRELIMINARY RESULTS

Xavier BOUGEROL[1], Gérard PERGENT[1], Jean GIBERT[2]

[1] EP CNRS 0075, Ecosystèmes Littoraux, Univ. de Corse, BP 52, 20250 Corte, France
[2] Lab. Départemental d'Analyses Vétérinaires, rue F. Pietri, 20090 Ajaccio, France

Because of its high toxicity and its characteristic bioaccumulation properties, Mercury appears as one of the most watched substances when it comes to its discharge into the natural environment. In the Mediterranean, Barcelona Protocole (16-2-1976) places it fourth on the list of priority substances. Experimental results of bioaccumulation and mercury levels found in marine organisms within the natural environment agree to show a strong retention of mercury and of methyl mercury, by the biomass. Concentration levels in sea water vary between about 10^3 to 10^6 (COSSA *et al.*, 1990). Because of constraints linked to the direct analysis of levels of trace metals in sea water (variability in space and time, heterogeneity of concentrations of water masses) the interpretation of measurement of mercury concentration in sea water is not easily achieved. The use of characteristic live species (e.g. biological indicators), which integrate environment variations over much longer periods of time allows a better evaluation of contamination of the environment. Marine phanerogams such as *Posidonia oceanica* (L) Delile usually provide a good representation of mercury levels in sea water. Also, the analysis of mercury levels in various compartments of the ecosystem could provide some indications about bioaccumulation phenomena and generally speaking on the concentration and transfer of stable pollutants within a benthic food web in coastal areas.

In this first study, three sites, situated at equivalent -10 m depths, were selected :
- one site situated in the vicinity of the sewage outfalls of the Marseilles Depuration Station (Cortiou)
- two sites along the Corsican Coast : at Canari, situated near the waste water outfall of an asbestos mine, and at Calvi, which is a less developed area.

Three replicates of 15 bundles of *P. oceanica* were collected on each site in October 1992. In Calvi, five *Sarpa salpa* individuals were removed at the same time. *P. oceanica* leaves were separated according to the type of leaves (adult and intermediate *in* GIRAUD, 1977), their age (rank) and tissue (sheaths and blades). Three types of sub-samples were also taken from *S. salpa* : liver, gills and muscle. Mineralization of samples was realised in Nalgene FEP Teflon bottles, using the microwave method, in a mixture of sulfonitric acid and oxygenated water. Mercury measurement was realised with the help of a flameless atomic absorption spectrometer (MAS 50 of Perkin Elmer).

Mercury levels (in µg/g dry weight), in *P. oceanica* (Figure 1), showed :
(i) significant differences according to the studied tissue, sheaths presented the most contamination (0.098 ± 0.018 µg/g dw), whereas the blades of adult leaves showed a mean concentration of 0.026 ± 0.006 µg/g dw,
(ii) higher mercury levels in older tissues; concentrations were still more important in the blades of adult leaves (0.026 ± 0.006 µg/g dw) than in that of intermediate leaves (0.015 ± 0.005 µg/g dw).
(iii) except for adult sheath, no significant differences according to the studied sites.
In *S. salpa*, concentration was maximal in the liver (0.857 µg/g dw, Figure 2); the amount noted in the gills (0.090 µg/g dw) and the muscles (0.050 µg/g dw) being smaller, but still superior to that measured in the blades of *P. oceanica* in Calvi (0.015 µg/g dw).

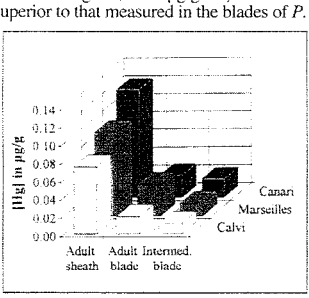

Fig. 1 : Mercury concentration in *P. oceanica* according to studied site and tissue

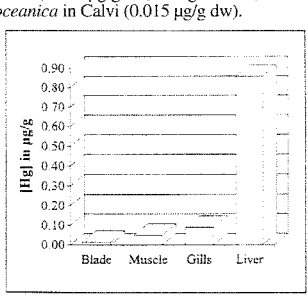

Fig. 2 : Mercury concentration in *P. oceanica* (blade) and *S. salpa* in Calvi.

Concentrations found in the various tissues of *P. oceanica* confirm that the distribution of pollutants generally varies according to the studied tissue. It appears that mercury accumulates preferably at the level of the sheath. As for the blades, mercury levels seem correlated to the age of the leaves (the older leaves being more contaminated); this corroborates the observations made on other phanerogams, which showed that accumulation depends more on the age of the leaves than on the variations of metal concentration in the environment (WARD 1987). Similar observations were demonstrated with radionuclides (CALMET *et al.*, 1991). Even though there appear to be not always significant differences between the sites (e.g. adult and intermediate blade), it must be noted that the lowest levels were found to be in the Calvi area, which is the less developed zone. Although the fish *S. salpa* is not an exclusive consumer of *P. oceanica*, this phanerogam constitute an important part of its diet. Thus, levels measured in different tissues of *S. salpa* can be compared in relation to those measured in the blades of *P. oceanica* leaves. Mercury accumulation is indeed maximal in the liver, storing up and metabolisation organ, with a concentration factor which appeared to be superior to 57. For the gills and muscles, it is respectively 6 and 3. In absolute numbers, mercury concentration in the muscles of *S. salpa* (0.05 µg/g dw, i.e. about 0.015 µg/g in fresh weight) is greatly inferior to the levels found in other sectors of the Mediterranean in this species (0.061 µg/g fw in UNEP,1987), which confirmed the choice of our reference site.

ACKNOWLEDGEMENTS. This study constituted part of the European Communities Commission (STEP C0063) and ANVAR programmes.

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