

# Proline as a metabolic biomarker of heavy metal-induced stress in *Mytilus galloprovincialis* from the Cala Iris Sea, Moroccan Mediterranean coasts (Poster)

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## ABSTRACT

The *Mytilus galloprovincialis* is a popular edible bivalve collected from the coasts of Cala Iris (Moroccan Mediterranean coasts) in 2023, to determine the interactions between environmental factors, heavy metal contamination, and proline metabolism in *Mytilus galloprovincialis*, a sentinel species for coastal ecosystems. By analyzing seasonal variations, we found that metal and proline concentrations were higher in winter (3.64, 5.91 and 733.5 mg/kg dw and 87.08 mg/g, for Cr, Cu and Fe, and proline, respectively), whereas temperature and salinity reach significantly ( $p < 0.05$ ) their maximum in summer (20.29 °C and 39.60 PSU, for temperature and salinity, respectively). Positive correlations between proline and Fe ( $r = 0.628$ ) and Cu ( $r = 0.527$ ) suggest that the biomarker is more strongly bound to the metals. Proline, as a metabolic biomarker in *M. galloprovincialis*, emerges as a sensitive and integrated indicator of changing environmental conditions, reflecting the complex interplay between anthropogenic pressure, natural biological cycles, and variations in the abiotic environment. This spatio-temporal focus is indispensable to optimize environmental monitoring systems and perfectly interpret the biological responses of sentinel organisms in complex marine environments, subject to increasing anthropogenic pressure, as is the case in the studied area of the Moroccan Mediterranean coastline.

**Keywords:** Cala Iris Sea; Proline biomarker; *Mytilus galloprovincialis*; Environmental factors; Metal pollutants.