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TRACE METALS IN SOFT TISSUE OF MARINE BIVALVE NOAH'S ARK (*Arca noae*) FROM BIZERTE LAGOON (NORTHERN TUNISIA)

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INTRODUCTION

The Bizerte lagoon is one of the most studied coastal areas in Tunisia, and is used for shellfish production since 1964 [1]. It inhabits a wide diversity of marine invertebrates, among them the valuable shellfish Noah's ark (*Arca noae*). But like any benthic invertebrates, that mollusk may accumulate trace elements (TEs) whether essential or not, which cause toxic effects above threshold levels. This study aimed to monitor the bioaccumulation of five Traces metals (Zn, Fe, Cu, Cd, and Pb) in *A. noae* flesh. The Objective of this study is to assess the nutritional quality of this bivalve and to promote its consumption as marine resource in Tunisia. **To the best of our knowledge, this is the first work to monitor the bioaccumulation of trace metals on the soft tissue of Tunisian *A. noae.***

Fig. 1 *Arca noae*

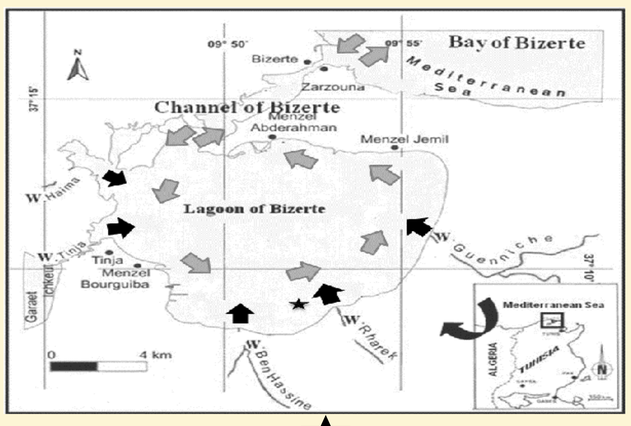

Fig. 2 Bizerte Lagoon ★ **Sampling site**

Fresh water Sea water

RESULTS & DISCUSSION

MATERIALS & METHODS

• Ten mature specimens of *Arca noae (*Fig. 1) (46.23-65.08 mm) were collected monthly from Bizerte Lagoon (Fig. 2) at a depth of 3 meters by scuba diving from October 2013 to September 2014. The sampling site is located far from urban and industrial sources of pollution but remained influenced by agricultural inputs [2]. The concentrations of Zinc (Zn), Iron (Fe), Copper (Cu), Cadmium (Cd) and Lead (Pb) were measured in the mollusk flesh by inductively coupled plasma mass spectrometry (ICP-MS).

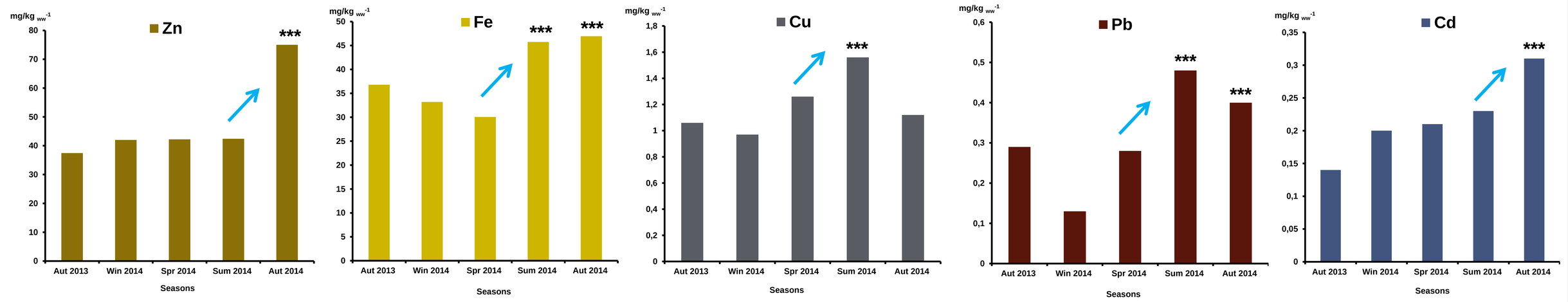

Fig. 3. Seasonal trace element (TEs) concentrations (mean ± SD, in mg kgww-1; n=10) in *A. noae* flesh sampled from Bizerte Lagoon.

• Trace element (TEs) concentrations in mg/Kg wet weight decreased in the following order: **Zn > Fe > Cu > Pb > Cd** (Fig. 3).

• Essential (e.g. **Zn, Fe**) trace elements were accumulated at higher levels than non essential toxic ones (e.g. **Pb, Cd**) (Fig. 3).

• Significant differences ($p < 0.05$) were observed between mean seasonal TEs concentrations in *A. noae* flesh. The highest values of all trace elements were recorded during summer 2014 and autumn 2014 (warmer compared to autumn 2013) and the lowest ones during winter 2014 (Fig.3, 4).

• The winter period in Bizerte Lagoon is characterized by the increase of provision in rainwaters washing out the agricultural bordering lands and enriching the lagoon on various pollutants (pesticides and chemical) [3]

• We assume that the strong surface water currents specific to Bizerte lagoon rapidly diluted and exported TEs brought through water runoff and river discharge that were consequently not bioaccumulated at higher levels in *A. noae* flesh.

•The food standards for bivalves set by the FAO [4] are 10.0-30.0, 40.0-100.0, 2.0 and 1.0-6.0 mg kg_{ww}^{-1} for Cu, Zn, Cd and Pb, respectively. The derived wet weight based-concentrations of all metals in *Arca noae* from the present study were well below their respective food standards.

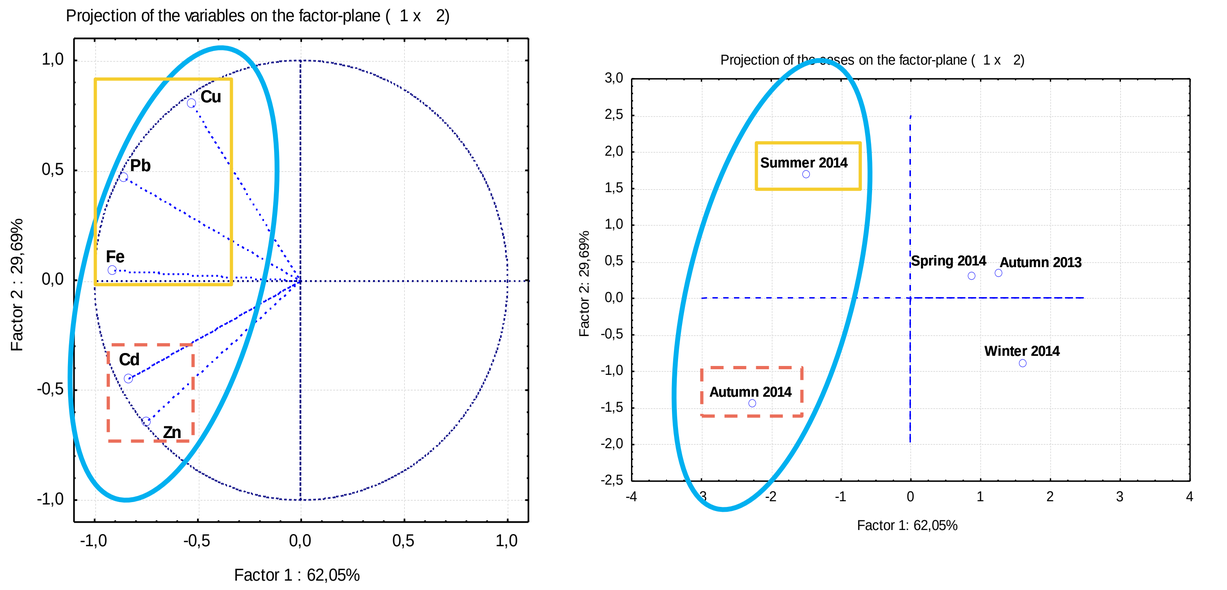

Fig. 4. Principal component analysis (PCA) based on trace elements levels in the soft tissue of *A. noae.*

CONCLUSIONS

✓ The levels of all trace metals analyzed in *Arca noae* are below maximum admissible level which makes this species a healthy and safe food for human consumption.

✓This result is very encouraging from an economic point of view to enable future commercial exploitation of *A. noae* in our country.

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