THE EFFECT OF SALINITY ON THE ACUTE TOXICITY OF COPPER AND CADMIUM IN EUROPEAN SEA BASS *Dicentrarchus labrax L.*

sphere | Systemic Physiological & Ecotoxicological Research

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INTRODUCTION

Heavy metal pollution in aquatic environments is a concern due to increasing human activities over the last decades. Moreover, productive areas such as estuaries have been even more affected because their complex interaction between fluvial and marine processes.

European sea bass *Dicentrarchus labrax l.* is a euryhaline species that withstands large variations in salinity and is considered as a bioindicador due to their economic and ecological importance.

Copper as essential micronutrient has important roles in cellular, enzymatic and protein mechanisms but is potentially toxic when its concentration increases above a certain threshold, and cadmium is an ubiquitous and extremely toxic element, that does not have any functionality for living organisms; hence it is good indicator of pollution.

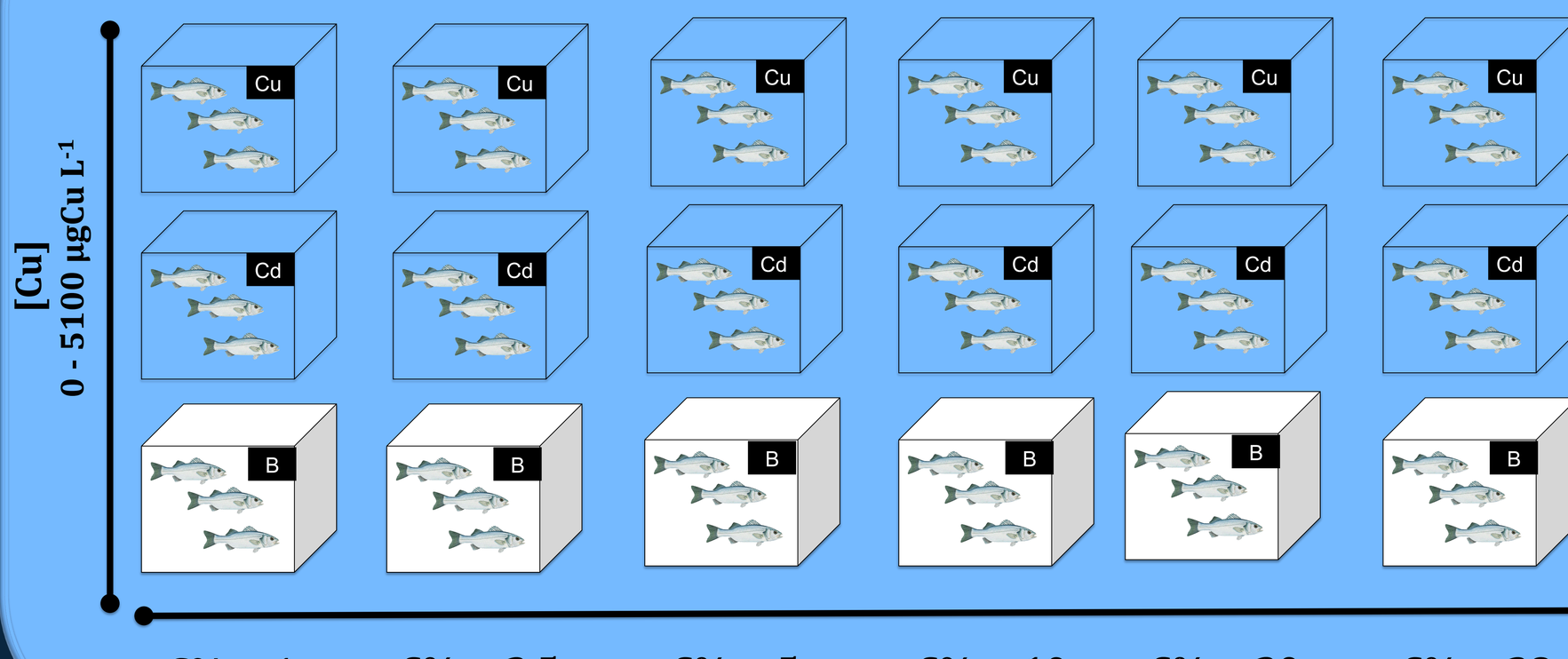
The 96h-LC50 test is used as an indicator of toxicity worldwide, and gives the lethal concentration where 50% of the population dies within 96 hours of exposure.

OBJECTIVES

Determine the 96h-LC50 values in acute exposure scenario's for Cu and Cd over a broad salinity range in juvenile (± 9cm) European sea bass *D. labrax l.*

MATERIALS AND METHODS

each 4 hrs. for 10 days



The 96h-LC50 values were calculated by the bioassay analysis of dose-response curve (drc) using R.

RESULTS AND DISCUSSION

- *D. labrax* showed to be the least sensitive to Cd, the 96h-LC50 ranged from 1 659 to 16 256 µg L^{-1} from 1 to 20 ppt and >20 000 µg L^{-1} at 28 and 35 ppt, while for Cu, it ranged from 1 163 to 6 835 µg L^{-1}.

- Importance of salinity in the toxicity of Cu and Cd during acute exposure.

  Cu ➔ mortality first decreased with increasing salinity but increased again at higher salinities (28 and 35ppt) (Fig 1).

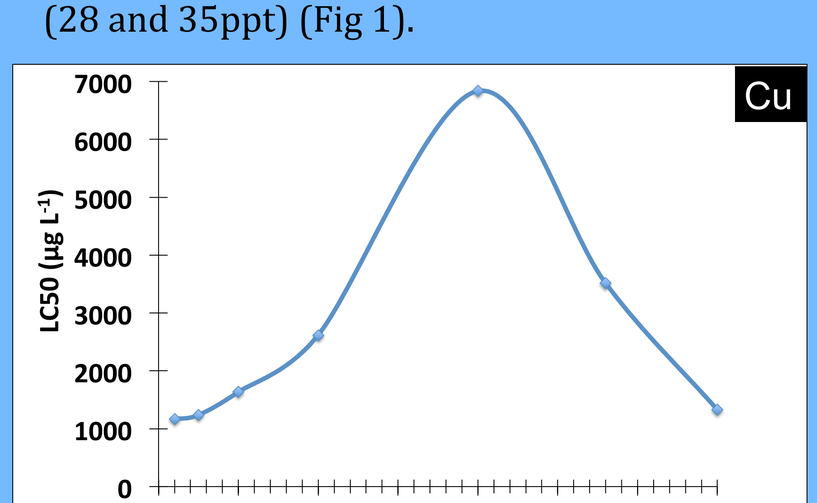


Fig 1. Acute Cu toxicity to european sea bass *D. labrax* as 96h-LC50 at different salinities

Cd ➔ mortality decreased continuously with increasing salinity, to a point where no reliable LC50 could be determined at the 2 highest salinities (28 and 35ppt) (Fig 2).

Fig 2. Acute Cd toxicity to european sea bass *D. labrax* as 96h-LC50 at different salinities

- Individuals were affected in different ways, for instance Cu exposed fish at low salinity showed open gills at die-off.

CONCLUSIONS

Juvenile euryhaline European sea bass *D. labrax* are less sensitive to Cd than Cu.

Salinity regulates toxicity differently for Cu and Cd, indicating that besides competition by cations and metal speciation, the changing physiology at different salinities plays an important role.

Future analysis of tissue samples will indicate whether differences in sensitivities can be explained by metal accumulation rates.

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