

# Summer mortality of the Pacific cupped oyster (*C. gigas*) in the Bay of Marennes - Oléron (France). Spatial variability of environmental parameters, growth and production rates using a Geographical Information System (GIS).

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## Introduction

The Marennes-Oléron Bay is the first rearing area in Europe for the cupped oyster, with 35,000 tons produced on a yearly basis. This species has suffered several chronic summer mortalities for the last 10 years.

## Materials and Methods

Oyster growth monitoring of a calibrated population equally deployed into 15 experimental sites (on bottom : 200 kg ; off bottom : 2 oyster bags with 200 oysters / bag) (figure 1). Sampling strategy based on longitude, latitude and depth.

Site descriptors (e.g. organic matter, salinity, ammonium, bacteria), survival rate, growth and sexual maturation were monitored every two weeks. Temperature was recorded on a continuous basis. Production models were geographically interpolated to the whole rearing oyster bank using a G.I.S (Geographic Information System).

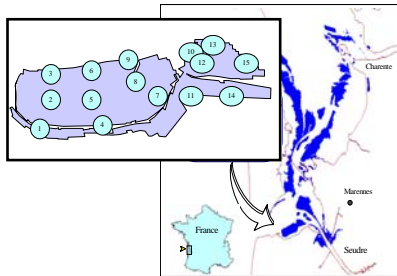


Figure 1 : Experimental sites on Ronce les Bains oyster-bank.

## Results

Sediment descriptors (e.g., carbone) (figure 2) and thermal shocks characterized the experimental sites and showed limited variability over time (figure 3).

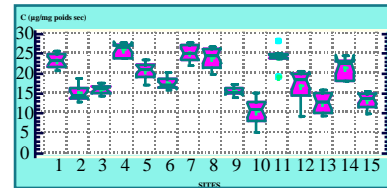


Figure 2 : Carbon organic content at the sediment level.

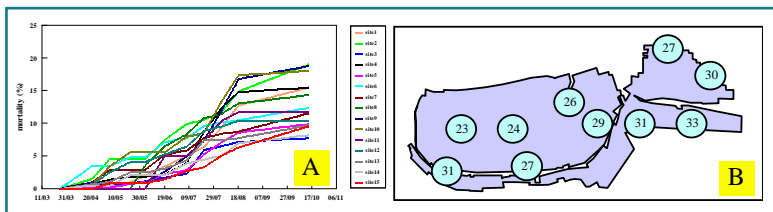


Figure 4 : Mortality rate (%) during 6 months rearing. A : off bottom ; B : on bottom.

Mortality rate varied from 8% to 20% and 23-33% for off and on bottom culture respectively (figure 4). No linear relationship has been established between mortality rate and environmental descriptors. Advanced sexual maturation and spawning were associated with higher mortality rates when concomitant glycogen concentration declined to near zero (figure 5).

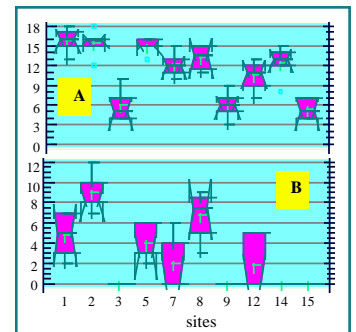


Figure 3 : Frequency of the diurnal thermal shocks >2°C (A) et >10 °C (B).

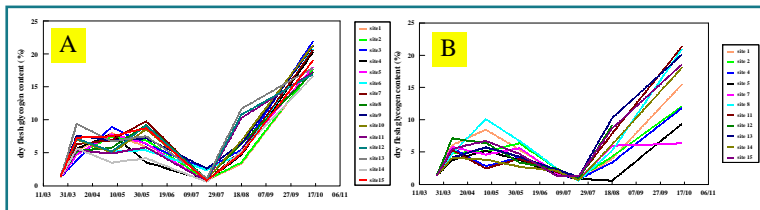


Figure 5 : Glycogen content (%) of the dry meat during 6 months rearing. A : off bottom ; B : on bottom.

A model was developed to relate somatic and gonadic (Psg) production to spatial coordinates (figure 6). A positive gradient was noted toward NNW of the bay.

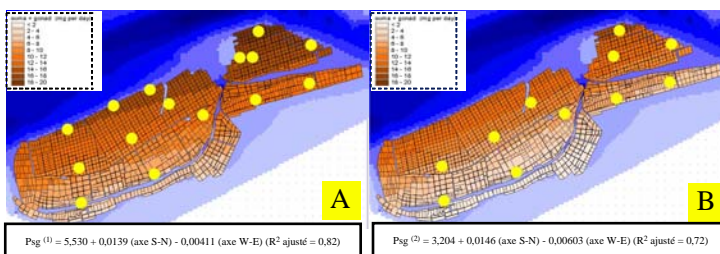


Figure 6 : Spatial modeling of the oyster meat production . A : off bottom ; B : on bottom.

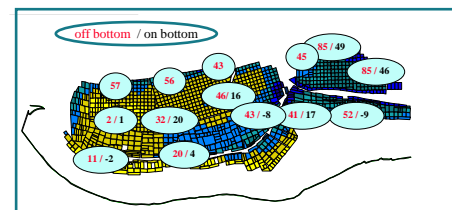


Figure 7 : Rearing biological yield.

- \* Higher mortality rate for on bottom culture.
- \* Sexual maturation induced oyster physiological distress.
- \* Thermal stress (shocks) monitored at the bottom level cannot alone explain the mortality rates.
- \* The lowest biological yields were observed in the S-S-W part of the bank, in areas characterized by high sediment organic load.
- \* A meat production model was based upon geographic coordinates independantly from oyster leases' bathymetric distribution