A production calendar based on water temperature, spat size and husbandry practices reduces herpesvirus impact on cultured Pacific oyster *Crassostrea gigas* in the Ebro Delta

Carrasco, N*., Alcaraz, C., Gairín, I., Fernández, M., Vezzuli, L., Bertomeu, E., Carella, F., Roque, A., Andree, K., Gras, N., Bellot, O., Furones, D.

IRTA
RECERCA | TECNOLOGIA AGROALIMENTÀRIES

VIVALDI
Preventing and mitigating farmed bivalve diseases

Background

Ebro Delta geographical location and production

OsHv-1 problematics and previous studies

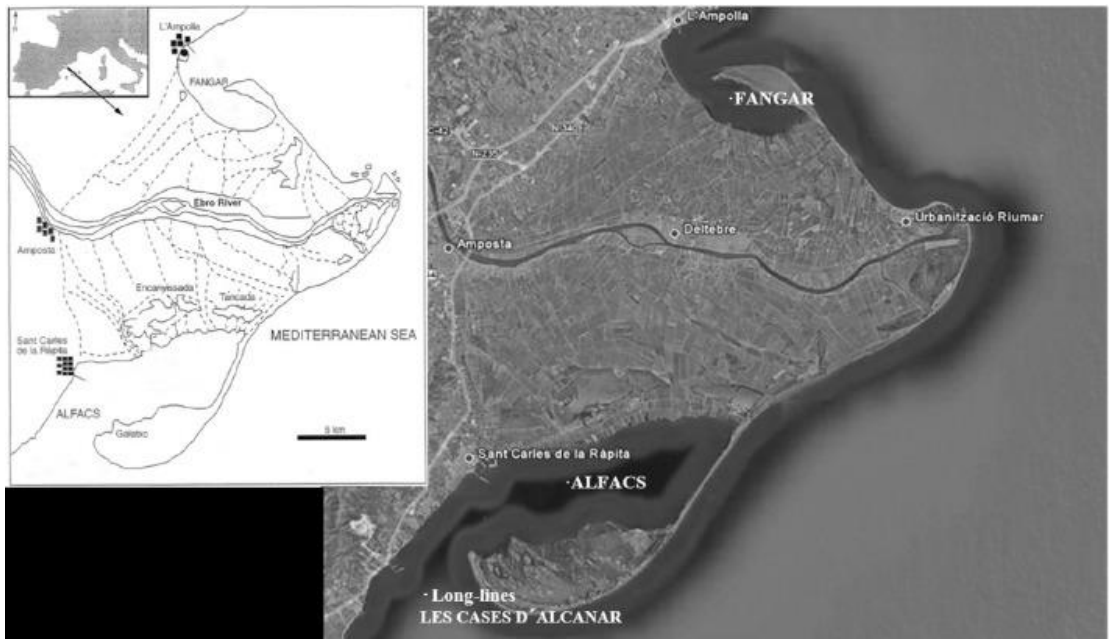
Study design and Results

Study design

Data collected

Analyzed results

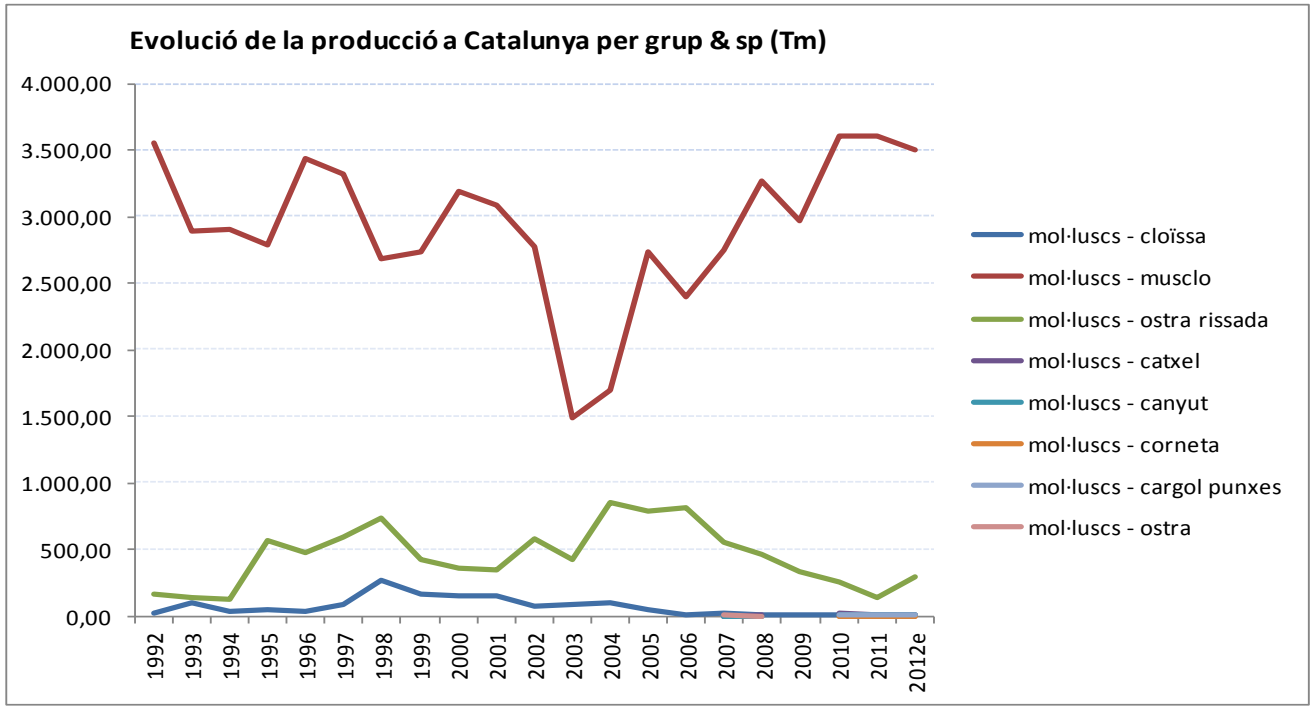
Conclusions



EBRO DELTA BAYS SHELLFISH PRODUCTION SITE

Shellfish Production in Catalonia in 2016

SPECIES	TONS
M. galloprovincialis	3.750 t
Crassostrea gigas	298 t
Ruditapes sp.*	26,5 t
Cerastoderma edule	6,8 t
Solen marginatus	5,2 t



854,50 Tm

138,20 Tm

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Short communication

First report of OsHV-1 microvar in Pacific oyster (*Crassostrea gigas*) cultured in Spain

A. Roque *, N. Carrasco, K.B. Andree, B. Lacuesta, L. Elandaloussi, I. Gairin, C.J. Rodgers, M.D. Furones

IRTA-Sant Carles de la Rápita, 43540, Spain

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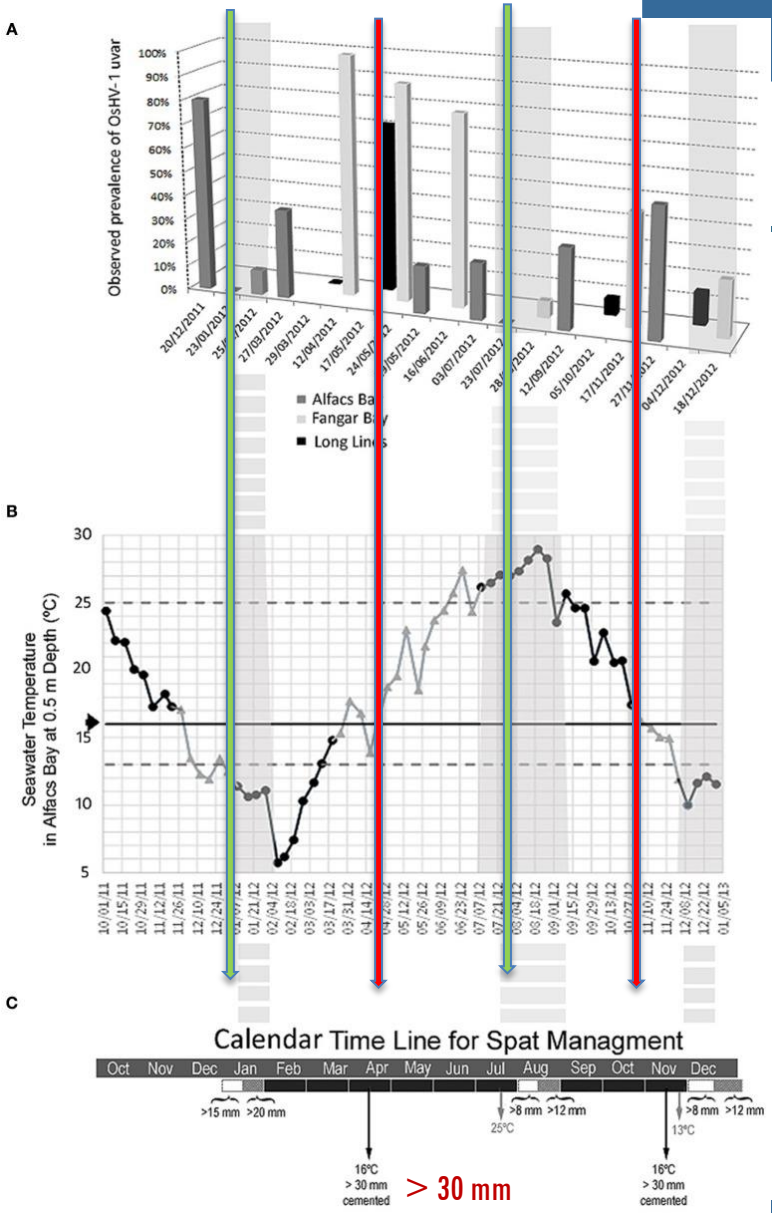
ABSTRACT

Increased mortality events in Pacific oysters (*Crassostrea gigas*) have been detected, since 2008, in their farming areas along the entire French coastline. With regard to the etiological agent of these events, there is a strong correlation with the presence of a variant of Ostreid herpesvirus-1 (OsHV-1), designated OsHV-1 microvar (µvar). During the last ten years, mortalities of Pacific oyster have also affected the shellfish culture regions in Catalonia, and its etiology has been studied in the region since 2000. This research lead to OSHV-1 being detected for the first time by nested PCR in samples collected in 2005 (Elandaloussi et al., 2009). Due to the suspicion of OsHV-1 µvar being responsible for very high mortalities in France since 2008, and since the oyster seed in Catalonia is almost 100% of French origin, different batches of samples from 2005, 2008, 2009 and 2010 were recently analyzed for the presence of OsHV-1 and OsHV-1 µvar.
The present study reports the findings from 2005, 2008, 2009 and 2010 for analyses of *C. gigas*, as they correspond to the first detection of OsHV-1 µvar in Spain.

PREVIOUS STUDY IN THE EBRO DELTA 2011-2015



frontiers in Physiology

ORIGINAL RESEARCH

A Production Calendar Based on Water Temperature, Spat Size, and Husbandry Practices Reduce OsHV-1 µvar Impact on Cultured Pacific Oyster *Crassostrea gigas* in the Ebro Delta (Catalonia), Mediterranean Coast of Spain

OPEN ACCESS

Investigate and define the optimal *C. gigas* husbandry practices to reduce oyster mortalities in the Ebro Delta production site

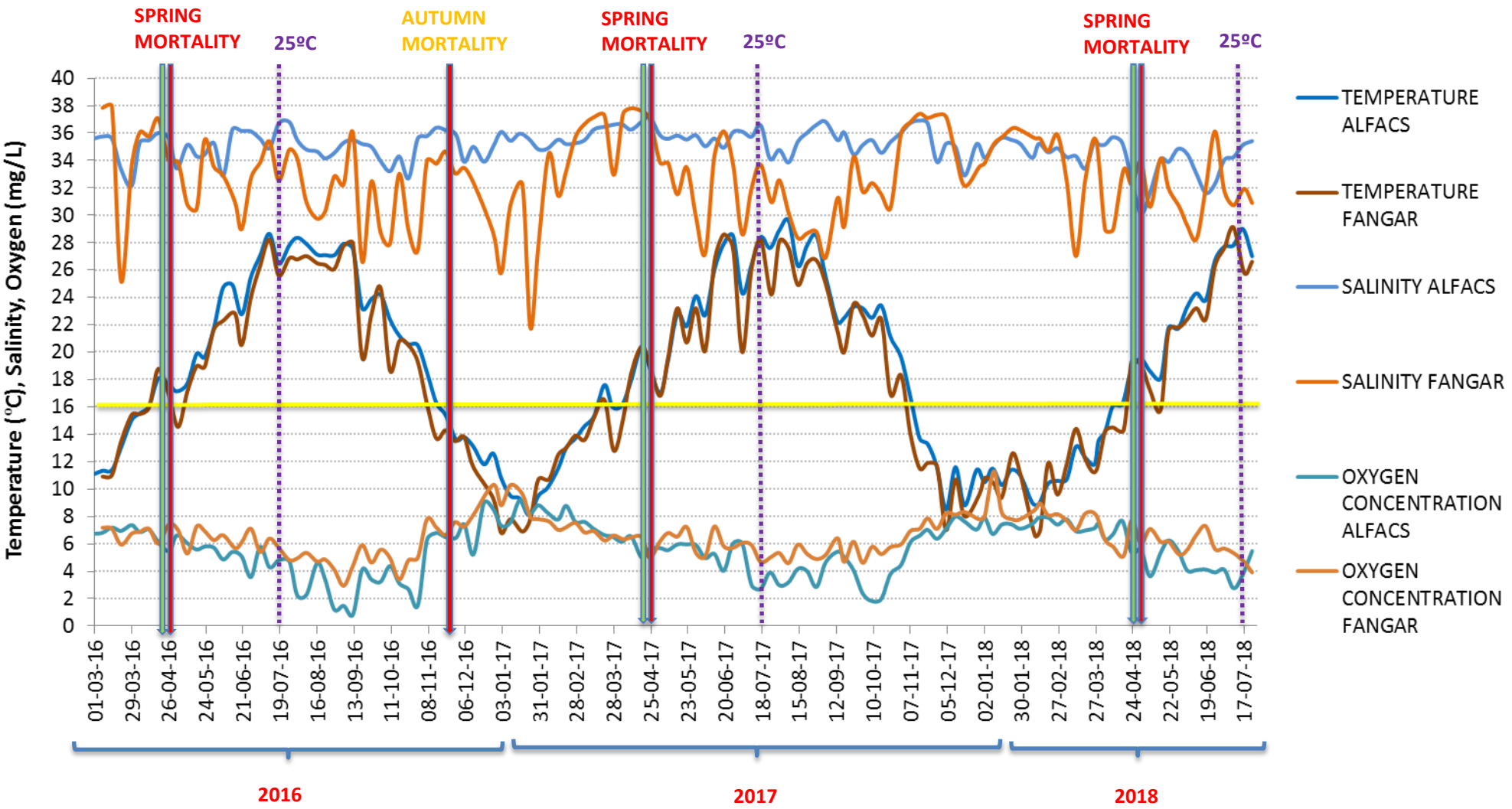
***Crassostrea gigas* spat produced at IRTA** during spring 2016 and 2017 and produced in **commercial French hatcheries** (reproducing producers outsourcing) were immersed in Fangar and Alfacs Bays in mid-December 2016 and January 2018 to study impact of OsHv-1 in different conditions, during 2017 and 2018.

Different spat size were immersed and they **were cultured with different methodologies (baskets, cemented, etc**.). Those oysters were farmed by collaborating producers that we have identified in each of the bays (Alfacs and Fangar). Oysters completed the usual commercial culture. Size and **mortality** were recorded depending on size and cultivation conditions during the study period.

Samples for **qPCR herpesvirus** (Webb *et al.*, 2007) detection were taken in April 2017 and April-May 2018 (mortality events) and results obtained in **IRTA hatchery oysters following recommendations** has been compared during the mortality episodes to cultured **French hatchery spat** and **French natural captured spat** (from producers).

Ebro Delta Bays (Alfacs and Fangar)

- IRTA Hatchery *(diploide)*
  - T10 — **Cemented* Basket**
  - T5-6 — **Cemented Basket***
- French Hatchery *(diploide and triploide)*
  - T8-10 — **Cemented Basket**
  - T5-6 — **Cemented Basket***
- French natural collection
  - <30 — **PVC Tubs* Fixation on shell**


SPRING MORTALITY
25ºC
AUTUMN MORTALITY
SPRING MORTALITY
25ºC
SPRING MORTALITY
25ºC
Temperature (ºC), Salinity, Oxygen (mg/L)
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
01-03-16
29-03-16
26-04-16
24-05-16
21-06-16
19-07-16
16-08-16
13-09-16
11-10-16
08-11-16
06-12-16
03-01-17
31-01-17
28-02-17
28-03-17
25-04-17
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20-06-17
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15-08-17
12-09-17
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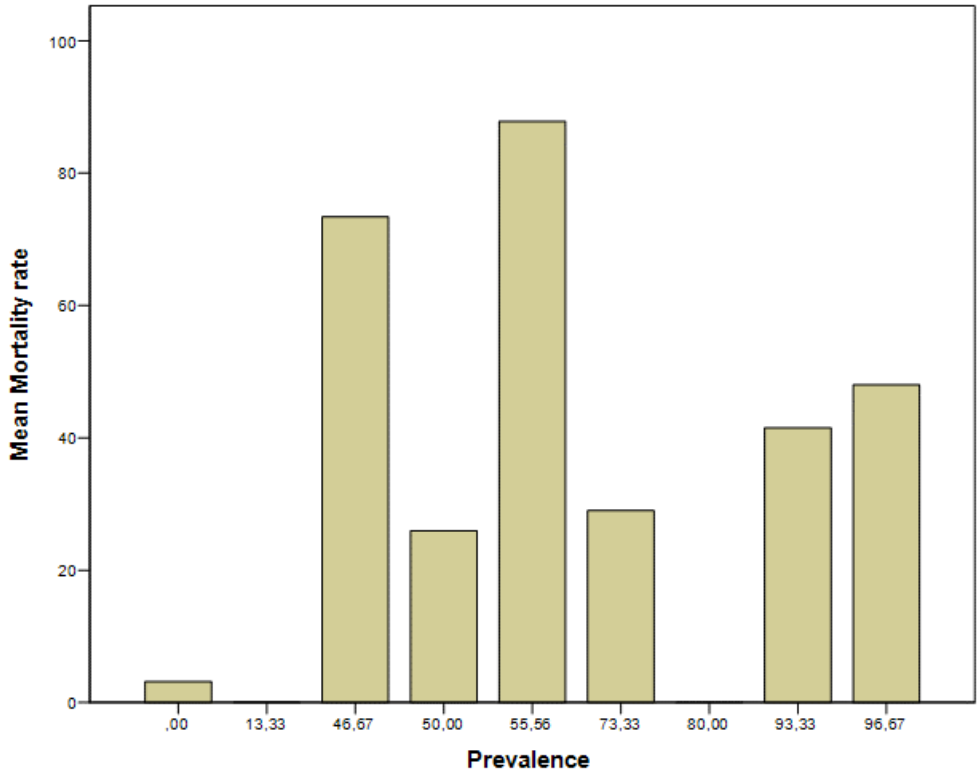
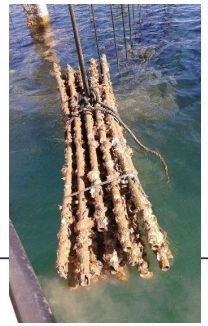
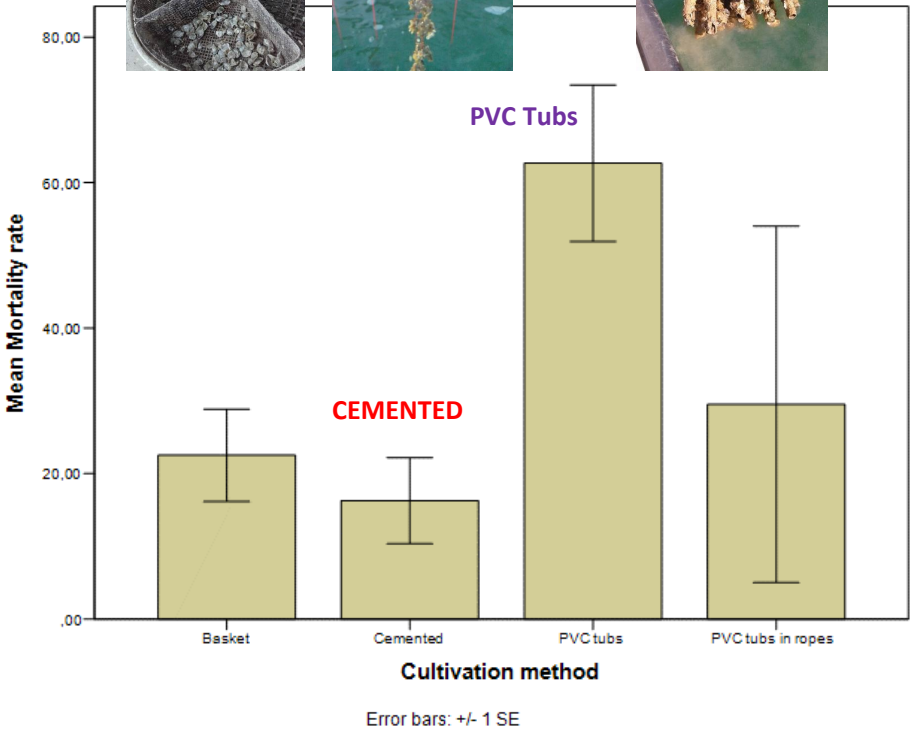
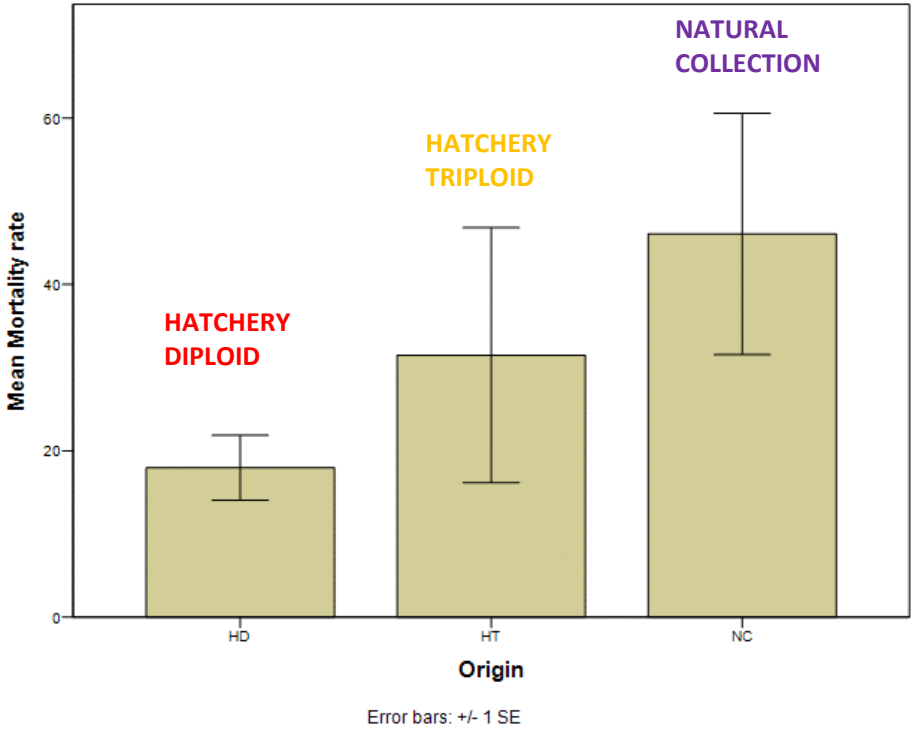
07-11-17
05-12-17
02-01-18
30-01-18
27-02-18
27-03-18
24-04-18
22-05-18
19-06-18
17-07-18
2016
2017
2018
TEMPERATURE ALFACS
TEMPERATURE FANGAR
SALINITY ALFACS
SALINITY FANGAR
OXYGEN CONCENTRATION ALFACS
OXYGEN CONCENTRATION FANGAR

SPRING MORTALITY EVENTS OF OYSTER SPAT AND JUVENILE OYSTER (25-45 mm) ASSOCIATED TO OSHV-1 PRESENCE









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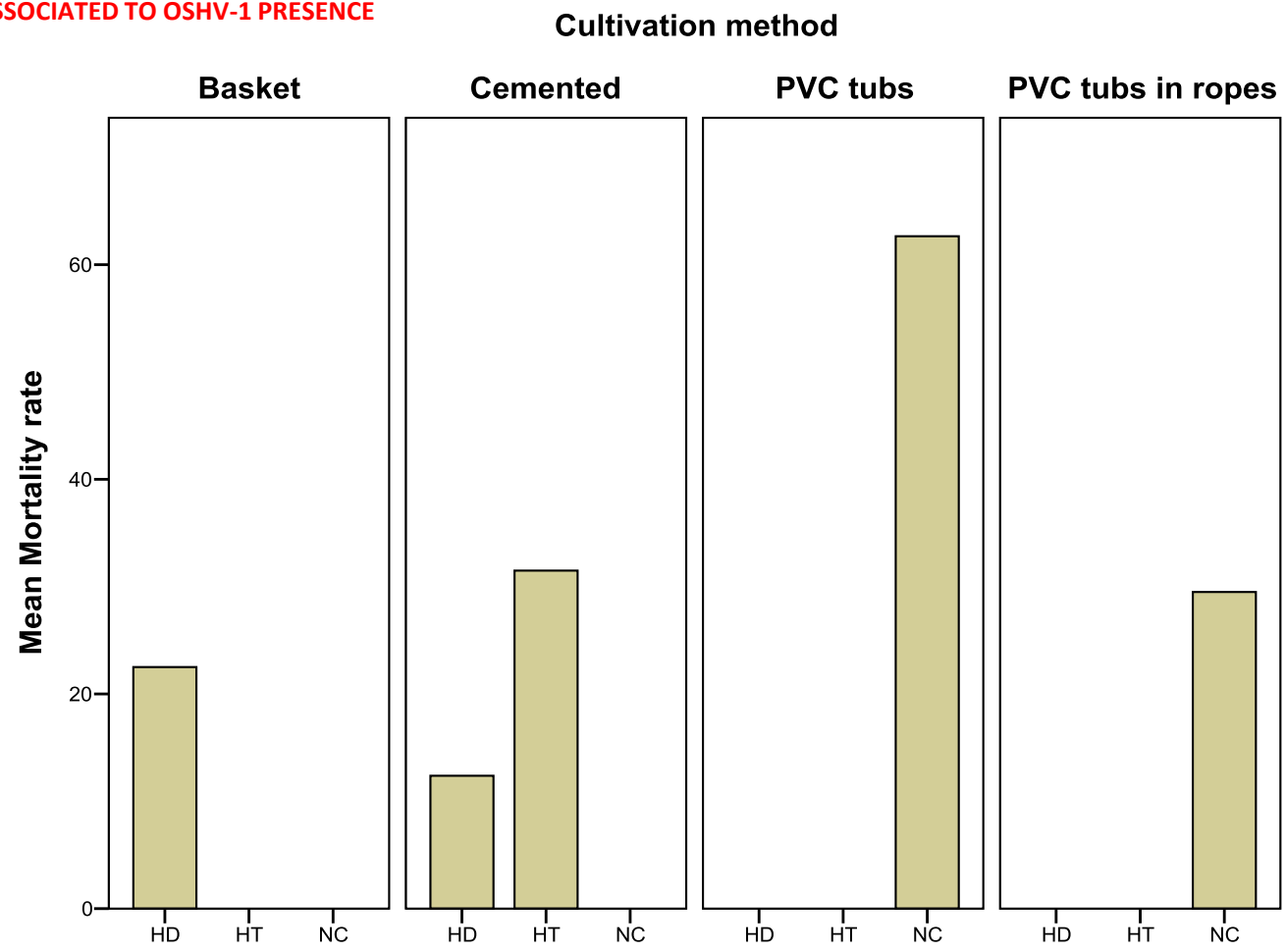

Main factors associated to OsHv-1 impact in *C. gigas* oysters in the Ebro Delta

- Production calendar (based in water Tª: optimal periods for spat of immersion)
- Spat size in the moment of immersion and the moment of virus episode (>45)
- Spat origin (natural recollection or hatchery) (hatchery diploid less mortality)
- Characteristics of spat (ploidy) (triploid seems to register more mortality)
- Cultivation methodology (based on spat density) (cemented less mortality)
- Bays hydrodynamics (*to be corroborated*)

THANKS

- Ebro Delta producers collaborating in the study, specially to Sra. Lorena Casanova and Sr. Antonio Vergés, as well as Sr. Francisco Curto and Sr. Carlos Boris
- FEPROMODEL, specially to Sr. Miguel Carles
- Jose Luis Costa, captain of IRTA sampling boat, as well as other board personal as Vanessa Castan
- DARP (Generalitat de Catalunya) and AMIC IRTA Program for collaboration in the study
- France Naissance hatchery for providing spat for IRTA studies in 2017 study

Preventing and mitigating farmed bivalve diseases

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CONTACT

Isabelle ARZUL
Isabelle.Arzul@ifremer.fr

IFREMER - Station de La Tremblade
17390 La Tremblade / FRANCE

Direct line: +33 (0)5 46 76 26 47
Switchboard:+33 (0)5 46 76 26 10

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