

## A review of mortality outbreaks in the Pacific oyster, *Crassostrea gigas*, reported since 2008 in various European Union Member States and the related implementation of Council Directive 2006/88/EC

Since 2008, widespread mortality outbreaks, killing billions of young Pacific oysters (*Crassostrea gigas*) have been reported in different Member States of the European Union. The Pacific oyster appears to be the only shellfish species affected by these mortalities.

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In the summer of 2008, abnormally high mortalities were reported from most of the Pacific oyster production areas in France and from three bays in the Republic of Ireland. Similar mortality outbreaks were again observed in 2009 in France, Ireland and Jersey. During 2010, mortality events occurred again in France, Ireland and at one location in the United Kingdom (Whitstable, Kent, UK). These increased mortality events were seasonal (April to August) and affected mainly young oysters. Reported mortality rates varied from 40% to 95%.

Most of the reported cases of increased mortality were investigated, with the main objective of checking for compulsory notifiable diseases, endemic pathogens or emerging ones. The laboratory tests performed usually included histology, isolation and identification of the predominant bacterial strains, and *Ostreid herpesvirus 1* (OsHV-1) detection by polymerase chain reaction (PCR).

### The results of these diagnostic tests indicated that:

- no compulsory notifiable pathogen was involved
- OsHV-1 was detected in most of the samples, especially in moribund oysters
- *Vibrio splendidus* was also detected in the affected oysters (Table I).

Increased mortality outbreaks in Pacific oysters were attributed to a combination of adverse environmental factors together with the presence of OsHV-1 and *Vibrio* spp. (1). Although climatic factors alone are not likely to be sufficient to cause increased mortalities, a rapid increase in water temperature has been shown to be an important risk factor. The available evidence also suggests that OsHV-1 infection is a necessary cause, and a particular genotype named OsHV-1  $\mu$ var (4) appeared to be the dominant viral genotype in the increased mortality events between 2008 and 2010. The genotype OsHV-1  $\mu$ var has been detected in France, Ireland, Jersey and the UK (Kent) in cases of Pacific oyster mortality (1). However, it is not clear if this is a result of

increased virulence or other epidemiological factors. The role of other pathogenic agents, such as *Vibrio* spp., needs further investigation.

Similar mortalities have been reproduced through experimental assays on French oysters (2, 3). The selected experimental approach was based on the use of infectious tissue homogenates prepared from naturally infected Pacific oysters, collected in the field during mortality outbreaks. Intra-muscular injection of tissue homogenates in oyster spat of healthy appearance led to the induction of high mortalities and detection, by real-time PCR, of large amounts of OsHV-1 DNA in moribund animals.

According to EU regulations, OsHV-1 and *Vibrio* spp. are not agents that cause compulsory notification diseases; neither are they listed by the OIE in the OIE *Aquatic Animal Health Code*. French, Irish and British competent authorities have attempted to control the spread of abnormal mortality events to other farming areas by instituting restrictions on Pacific oyster movements. In 2010, Commission Regulation (EU) No. 175/2010 was



implemented to further control increased mortality in Pacific oysters in connection with the detection of OsHV-1  $\mu$ var. In 2010, four Member States established programmes for the early detection of OsHV-1  $\mu$ var in accordance with Article 5 of this Regulation (Ireland, the Netherlands, Spain, UK; see Table II). OsHV-1  $\mu$ var has not been detected in Scotland (UK) or Spain. The virus was detected in Ireland, Italy, the Netherlands, and Northern Ireland (UK), but not associated with mortality.

In the context of information collected on OsHV-1  $\mu$ var in 2010, Commission Regulation (EU) No. 175/2010 was abrogated in 2011 and Commission Regulation (EU) No. 350/2011 was adopted instead, making it possible for Member States to implement national surveillance programmes and declare coastal areas free from OsHV-1  $\mu$ var.

**Table I**  
Results summary from analyses of increased Pacific oyster mortality cases in France from 2008 to 2010\*

Pathogen(s) isolated	2008		2009		2010	
	(51 cases of mortality investigated)		Frequency of positive batches (61 cases of mortality investigated)		(80 cases of mortality investigated)	
	Positive/analysed	%	Positive/analysed	%	Positive/analysed	%
OsHV1*	28/37	75.7	57/61	93.4	71/80	88.7
<i>Vibrio splendidus</i>	23/46	50	27/59	45.8	70/78	89.7
<i>V. aestuarianus</i>	15/46	32.6	5/59	8.5	11/78	14.1
<i>V. harveyi</i>	15/46	32.6	2/59	3.4	0/78	0
<i>V. tapetis</i>	0/51	0	5/59	8.5	0/78	0

\*Source : Ifremer Repamo (Pathology molluscs network); [www.ifremer.fr/repamo/](http://www.ifremer.fr/repamo/)

**Table II**  
Results summary from programmes for the early detection of *Ostreid herpesvirus 1*  $\mu$ var (OsHV-1  $\mu$ var), established in accordance with Article 5 of EU Regulation No. 175/2010 (1)

	No. of compartments	Sampling points	Positive detection of OsHV-1 $\mu$ var	Mortalities	Comments
Republic of Ireland	8	22	3/22	Observed at only one of the three sites	All farming areas that were not affected by increased mortalities in 2008 and 2009 were included in the programme
United Kingdom:					
Northern Ireland	4	4	1/4	None	Four oysters from the 150 sampled tested positive. Water temperature at the positive sampling point was 14.5°C
Scotland	4	13	None	None	
The Netherlands	2	6	2/6	None	86 oysters from the 450 sampled tested positive. Water temperature at the positive sampling point was 21°C
Spain	1	3	None	None	Water temperature at the sampling point was 17.5°C

## References

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