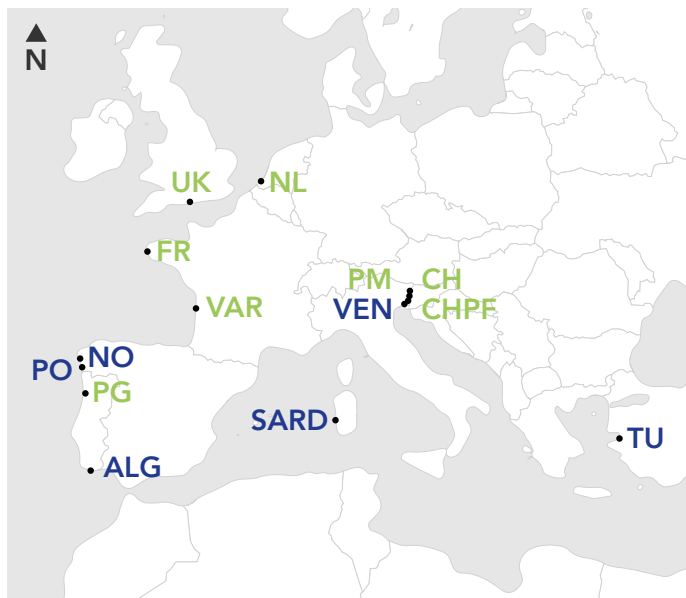


# Improving Manila Clam Resilience to Heatwaves and Disease

Bivalve aquaculture provides a valuable source of animal protein with a low environmental footprint, but climate change-related extreme events such as **marine heatwaves (MHWs)** have rapidly emerged as a **major risk causing mass mortalities**. In addition, climate change can enhance the **spread and virulence of pathogens**, also **weakening clam immune defences**. Under these changing environmental conditions, traditional management strategies are no longer sufficient to ensure production stability.

Selective breeding offers an effective long-term solution to improve resilience in **farmed bivalves**, enabling the development of stocks better adapted to heat stress and disease. To support this transition, **IGNITION project** has developed a **robust, large-scale genotyping tool for two farmed clam species – Manila clam and native grooved carpet shell**. This tool allows for an understanding of how traits are inherited as well as the implementation of modern, data-driven breeding programs.



● Manila clam

● Grooved carpet shell

~49,400 SNPs  
Manila clam

~14,200 SNPs  
Grooved carpet shell



This **dual-species single nucleotide polymorphism (SNP) array** is the **first developed for both species** and it is based on **multiple European populations of both species**. The platform comprises 63,585

markers: 49,392 designed for the Manila clam and 14,193 for the native grooved carpet shell. **The array maximises applicability across European farming systems and is now commercially available.**

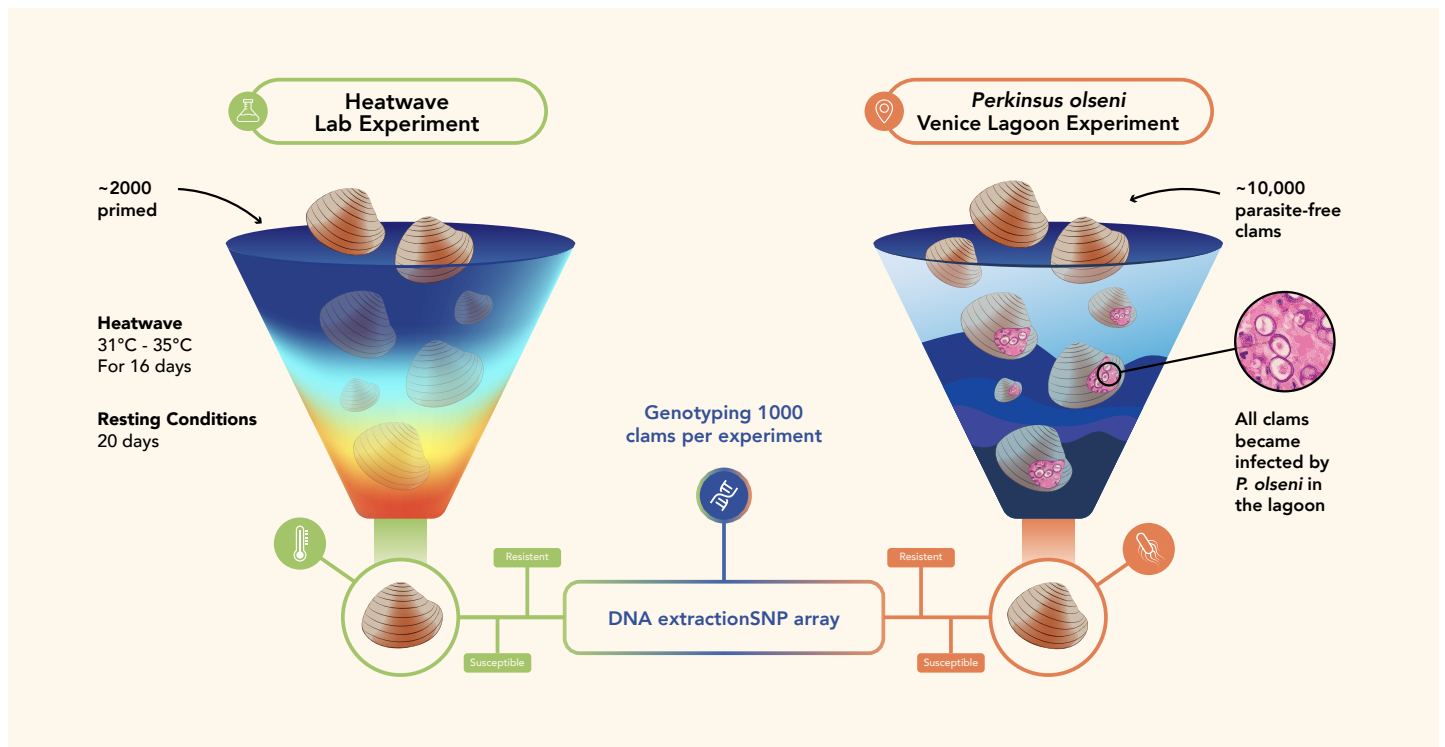
## Using the dual-species SNP array — from data to breeding opportunities

Two complementary experiments focused on the **key challenges affecting European Manila clam production**:

- (i) **MHWs** simulated under laboratory conditions, and
- (ii) **resistance to *Perkinsus olseni***, one of the most important pathogens for this species, assessed in an area naturally affected by the pathogen.

Clams were monitored for survival, infection status, and growth-related traits.

Subsequently, **more than 2000 clams were genotyped using the SNP array to estimate the heritability of resistance and commercially relevant traits to support informed selection decisions.**



Preliminary analyses indicate **moderate heritability for several traits of adaptive and commercial relevance, including growth performance and both disease and heat-stress resistance.** These results confirm the presence of exploitable genetic variation in European Manila clam populations and the **robust performance and practical utility of the SNP array as a genomic platform for clam aquaculture.**

Overall, the SNP platform enables the implementation of informed and structured selective breeding programs and long-term genetic improvement, providing the genomic foundation needed to move Manila clam farming towards more resilient, predictable, and sustainable production systems, fully aligned with the emerging hatchery-based supply chain in Europe.

### LEARN MORE

**Project website:** [www.ignition-project.eu](http://www.ignition-project.eu)  
**Zenodo community:** <https://zenodo.org/communities/ignition/>  
**LinkedIn:** <https://www.linkedin.com/in/ignition-eu/>

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